

SATCOM For Net-Centric Warfare — September 2017

MilsatMagazine



*Hosted Payloads
For Emergency Responders
Warfighting Domain
Switching Between Satellites
GDMSS*

*Fighting Organized Crime on the High Seas
An Army Warfighting Experiment
Supporting NGOs*

Cover image is courtesy of Space Systems Loral (SSL).

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DISPATCHES

SPACEX LAUNCHES U.S.A.F.'S X-37B AS IRMA BEARS DOWN



ORBITAL TEST VEHICLE 5 (OTV-5) MISSION

In spite of the Category 5 Hurricane Irma raging in the Atlantic Ocean at the time of this writing, SpaceX successfully launched the U.S. Air Force's X-37B, the Orbital Test Vehicle 5 (OTV-5) payload from Launch Complex 39A (LC-39A) at NASA's Kennedy Space Center in Florida on Thursday, September 7 at 10:00 a.m. EDT.

Following stage separation, Falcon 9's first stage successfully landed at SpaceX's Landing Zone 1 (LZ-1) at Cape Canaveral Air Force Station, Florida.

This Air Force mission is the fifth Boeing X-37B Orbital Test Vehicle launch. The X-37B is the Air Forces' unmanned and reusable space plane that resembles a small space shuttle, which will conduct orbital experiments.

Currently the only rocket fully designed and developed in the 21st century, Falcon 9 delivers payloads to space aboard the Dragon spacecraft or inside a composite fairing.

Safety and mission success were critical in the design of the Falcon 9 rocket. With a minimal number of separation events and nine first-stage Merlin engines, the SpaceX Falcon 9 rocket is designed so that even if two of the engines shut down, the rocket can still operate.

In 2012, SpaceX became the first commercial company to rendezvous with the International Space Station. Although these flights have not transported crew, SpaceX continues to work toward their goal of one day carrying astronauts to space in Crew Dragon's pressurized capsule using the Falcon 9.



Two vantage points, one up close and the other of Falcon 9 coming down through the clouds to successfully return to SpaceX's landing zone.

DISPATCHES

LOCKHEED MARTIN'S GPS III SV02 ACCOMPLISHES ACOUSTIC ASSAY

The launch is the most strenuous part of a satellite's life — to survive the extreme sound wave pressure and pounding vibrations generated by more than 700,000 lbs. of thundering rocket thrust, spacecraft need a solid, reliable design if they hope to arrive operational on orbit.

On July 13, Lockheed Martin's (NYSE: LMT) second, fully-assembled GPS III space vehicle (SV) completed a realistic simulation of its future launch experience and passed this critical acoustic environmental test with flying colors.

During acoustic testing, the GPS III SV02 satellite was continuously blasted with deafening sound reaching 140 decibels in a specialized test chamber equipped with high-powered horns. For comparison, that is about as loud as an aircraft carrier deck and human hearing starts to be damaged back at about 85 decibels. The test uses sound loud enough to literally shake loose anything not properly attached.

The GPS III SV02 satellite is part of the U.S. Air Force's next-generation of GPS satellites that will bring critical new capabilities to the warfighter.

GPS III will have three times better accuracy and up to eight times improved anti-jamming capabilities. Spacecraft life will extend to 15 years, 25 percent longer than the newest GPS satellites on-orbit today.

GPS III's new L1C civil signal also will make it the first GPS satellite to be interoperable with other international global navigation satellite systems.

GPS III SV02 is Lockheed Martin's second GPS III satellite to successfully complete acoustic testing.



GPS III satellite in production. Photo courtesy of Lockheed Martin.

The company's first satellite, GPS III SV01 — which is in storage awaiting its expected 2018 launch — completed acoustic testing in 2015.

The GPS III SV02 satellite is now being prepared for Thermal Vacuum (TVAC) testing this fall, where it will be subjected to extreme cold and heat in zero atmosphere, simulating its on-orbit life.

The satellite is expected to be delivered complete to the Air Force in early 2018. GPS III SV02 is the second of 10 GPS III satellites Lockheed Martin is contracted for and is assembling in full production at the company's GPS III Processing Facility near Denver. The \$128 million, state-of-the-art manufacturing factory includes a specialized cleanroom and testing chambers designed to streamline satellite production.

Lockheed Martin's unique GPS III satellite design includes a flexible, modular architecture that allows for the insertion of new technology as it becomes available in the future or if the Air Force's mission needs change. Satellites based on this design are

already proven compatible with both the Air Force's next generation Operational Control System (OCX) and the existing GPS constellation.

The GPS III team is led by the Global Positioning Systems Directorate at the U.S. Air Force Space and Missile Systems Center. 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.

Mark Stewart, Lockheed Martin's VP for Navigation Systems, commented that with this launch-simulation test, sophisticated, advanced satellite technology and electronics endured tremendous forces and then worked flawlessly afterward. Passing this test with GPS III SV02 further validates the robustness of the Lockheed Martin GPS III design.

www.lockheedmartin.com

THE HPA CORNER

SOON ALL PAYLOADS IN GEO COULD BE HOSTED PAYLOADS

by John Lymer, Chief Architect, Robots and Automation, Space Systems Loral (SSL)



In the near future, payloads will be hosted on self-assembling, modular platforms that provide plug-and-play interfaces and enable highly flexible repair and upgrade for both commercial and government missions.

Similar to the International Space Station in LEO, persistent platforms in GEO are expected to provide systems for power, navigation, telemetry, tracking, and control for a variety of payloads. Client payloads become temporary residents sustained by the platform, and are replaced or reconfigured to satisfy market or mission needs.

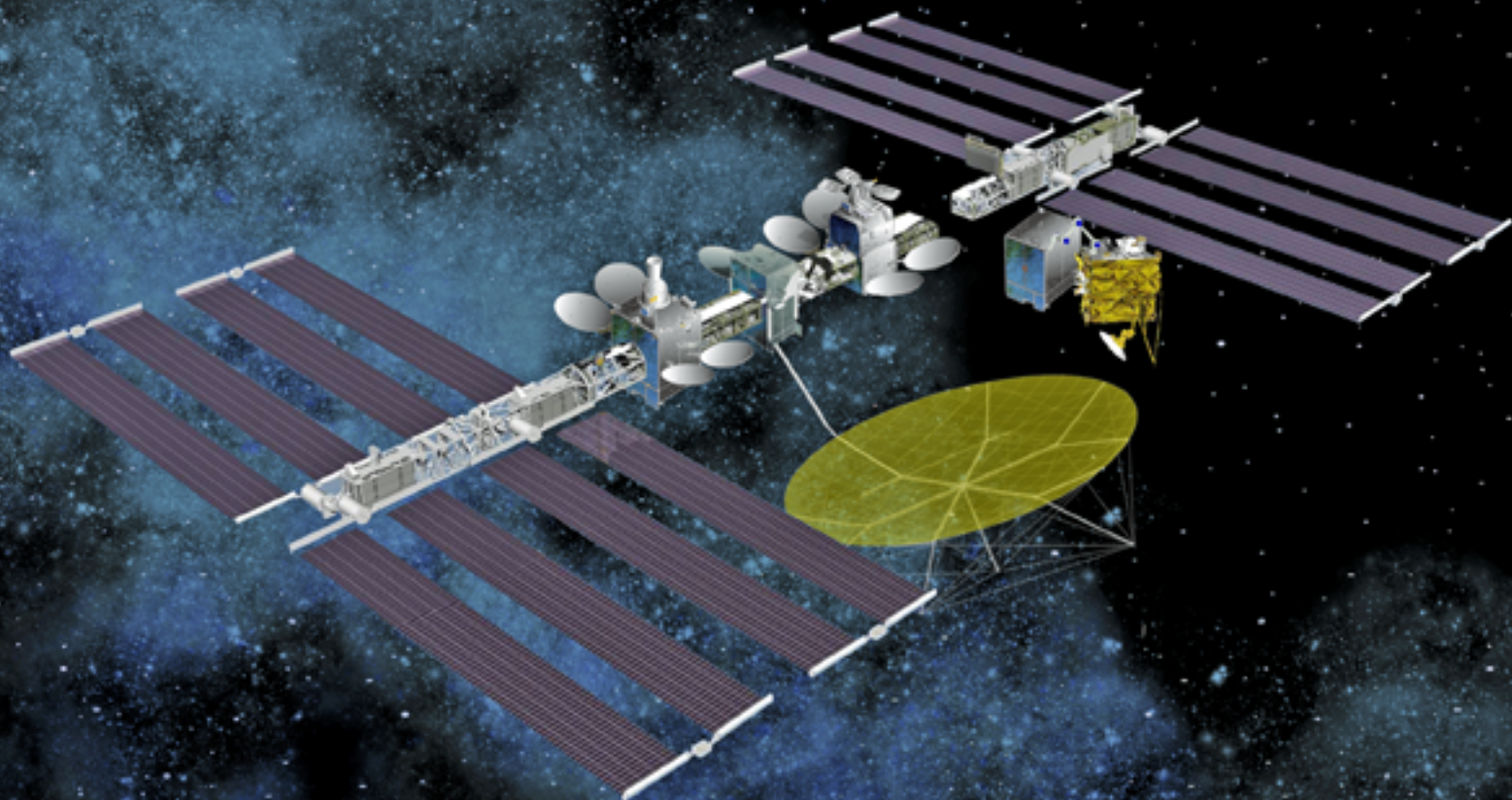
Hosted payloads need not be static items but rather dynamic elements that take advantage of the automated systems on the persistent platform to facilitate independent missions.

Free-flying spacecraft could return to the persistent host for stowage between missions, data download, periodic replenishment, or even conversion to support on-demand missions.

These free flyers can be small and inexpensive, and could be deployed in large, resilient numbers when required, returning to the host to replenish their consumables.

With this advanced and responsive architecture, the mass required to support space infrastructure doesn't need to be launched into space for every mission.

Instead, small payloads can be cost-effectively launched taking advantage of the high tempo launch cadence of



commercial satellites. When they reach GEO, robotic on orbit servicers — such as the one being developed by SSL in conjunction with DARPA's RSGS program — could collect and distribute them to their persistent hosts around the GEO arc.

This column's question for HPA members is...

If you had a cost-effective ride to GEO, shared with a dozen other hosted payloads, and an in-orbit, persistent platform to replenish, sustain or stow your small satellite in GEO, what missions and capabilities become possible?

"In the modern age of global conflicts, DoD users need immediate access to resilient, robust and secure SATCOM worldwide, across the full spectrum of engagement. To ensure this, it is critical that the government evaluates SATCOM for its effects rather than to perpetuate status quo. A cultural overhaul must take hold—one that thinks 'commercial first' in establishing and investing in a future SATCOM architecture.



"While this is a significant cultural shift, the analogy would look like this: In order to fill a bucket optimally, one first places the big rocks, then adds smaller pebbles and follows with sand.

"Commercial SATCOM, with its rapid innovation and flexibility, provides the big rocks, or the foundation of the SATCOM; then, it allows for purpose-built, commercially hosted as well as government-owned or operated SATCOM capability to meet specific needs. All of this provides a diverse, technologically advanced, affordable and resilient mix of capabilities."—Rebecca M. Cowen-Hirsch, Senior Vice President, Government Strategy & Policy, U.S. Government Business Unit, Inmarsat, Inc.

"In the future, we should see cost-effective, frequent access to GEO for hosted payloads/smallsats when combined with persistent platform hosts that could usher in a whole host of benefits for space missions. Economies of scale achieved with rideshare coupled with the ability to swap out smaller modules would make tech refresh at GEO affordable and achievable on a much more rapid scale than typical refreshing of GEO programs, many of which have a design life in excess of 15 years, thus enabling GEO systems to stay abreast of advancing technology.



"This type of capability also enables adaptable missions, swapping out one capability for another as missions change, threats emerge, or the business enabled by the payload has a new set of requirements. The capability could also enable more frequent, higher risk missions such as technology development, experimentation, and testing, all the while creating more room for innovation and development of new capabilities.

"The capability could also play a key role in disaggregated, resilient space architectures for military applications. Modular payloads could be spread over several platforms and replaced, moved, updated, as required to meet needs of a particular military CONOPS. Finally, there are likely applications that haven't yet been thought of that will be developed once this capability is on orbit." —Todd Gossett, Senior Director of Hosted Payloads, SES Government Solutions

www.hostedpayloadalliance.org/

Established in 2011, The Hosted Payload Alliance (HPA) is a satellite industry alliance whose purpose is to increase awareness of the benefits of hosted government payloads on commercial satellites. The HPA seeks to bring together government and industry in an open dialogue to identify and promote the benefits of hosted payloads.

DISPATCHES

BAE SYSTEMS DEBUTS A NEW SPACE COMPUTER



BAE Systems has revealed their new generation flagship space computer that combines fast performance and extreme resiliency to enable previously impossible missions in the harsh environment of space.

The new RAD5545™ single-board computer (SBC) provides next-generation spacecraft with the high-performance onboard processing capacity needed to

support future space missions—from weather and planetary exploration to communications, surveillance, tracking, and national security missions.

The RAD5545 SBC delivers exponential improvements in size, speed, and power-efficiency over its proven predecessor, the RAD750® SBC.

A single RAD5545 SBC replaces multiple cards on previous

generations of spacecraft and combines high performance, large amounts of memory, and fast throughput to improve spacecraft capability, efficiency, and mission performance. With its improved computational throughput, storage, and bandwidth, it will provide spacecraft with the ability to conduct new missions, including those requiring encryption processing, multiple operating systems, ultra high-resolution image processing, autonomous operation, and simultaneous support for multiple payloads—missions that were impossible with previous single-board computers.

The RAD5545 SBC is produced at the company's facility in Manassas, Virginia. The facility is a U.S. Department of Defense Category 1A Microelectronics Trusted Source.

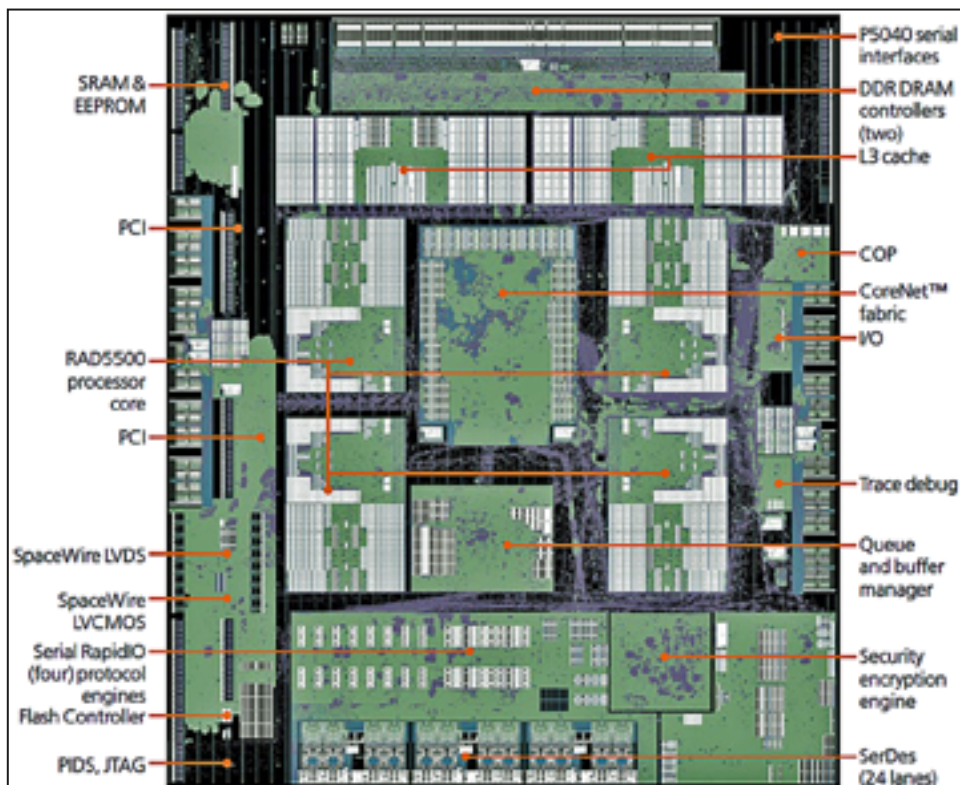
BAE Systems' radiation-hardened electronics have been onboard satellites and spacecraft for almost 30 years, delivering long-lasting computing power in extreme environmental conditions.

The company has provided more than 900 computers on over 300 satellites, and has provided the computers that power key national space assets, including some that are hundreds of millions of miles away from Earth.

According to Dave Rea, Director of On-board Processing and Advanced Technology at BAE Systems, the company has been delivering radiation-hardened components for almost three decades and customers have come to trust the performance, reliability, and longevity of BAE technology.

Rea added that the RAD5545 SBC is the next step in the evolution of space computers and is the most technologically advanced radiation-hardened, general-purpose processor for space applications.

www.baesystems.com/



DISPATCHES

EM SOLUTIONS AND RAYTHEON DELIVER COBRAS



EM Solutions has recently been contracted by Raytheon Australia to supply their Cobra X-/Ka- tri-band Maritime Terminals and associated network infrastructure to the Royal Australian Navy as part of the SEA1654 program that will deliver two new supply vessels.

Australian SME delivering leading edge capability to the Australian Defence Force. The project is being fulfilled from the EM Solutions facility in Brisbane.

EM Solutions CEO, Dr. Rowan Gilmore, commented that demand for the firm's Cobra and other on-the-move

This order follows the successful deployment of the same Cobra platform on both Navy and Border Force Cape Class Vessels, and further enhances EM Solutions as an

solutions has been very high in recent times; however, this is the first project for these products the company is managing under full ASDEFCON supply conditions.

He added, that this is a significant step forward for EM Solutions business, given the complexity and value of the solution being supplied and the need to ensure there is full support for the firm's Prime Contractor in delivering an exceptional outcome for the end user. A program of this nature enables the company to enhance systems and processes for project delivery and future support and sustainment.

www.emsolutions.com.au/

DISPATCHES

ADVANTECH WIRELESS ENGAGES WITH NATO CLIENT AND BRINGS SEVIS OPTIMIZATION TO TERMINALS

Advantech Wireless has announced that their 2.4 meter Engage™ Class High Performance VSAT Flyaway Terminal has been certified by a NATO customer and has also received XTAR Certification.

The New Engage™ Class 2.4 meter Flyaway VSAT Terminal Solution includes the most advanced SATCOM technology available today.

This flexible and transportable VSAT solution from Advantech Wireless is a fully integrated tri-band system designed for easy deployment and use.

The terminal is based on a high efficiency, ruggedized tri-band ready 2.4 Meter Flyaway Antenna, which can cover X-, Ku- or Ka-band by replacing the feed only.

The antenna is optionally fully motorized with an integrated satellite finding controller.

The terminal has built-in two independent unique triple access mode satellite modems based on the new ASAT II™ system or SCPC mode modems AMT-83L, Mil 165A Grade and DSSS Spread Spectrum Technology.

The ASAT II™ system technology allows the same modem to operate three different access wave forms, and achieve the most efficient bandwidth utilization possible.

The RF section includes the award winning Second Generation GaN based technology SSPA/SSPBs: X-Band from 20W to 100W, Ku-Band from 16W to 125W and Ka-Band from 10W to 40W. The terminals are fully compliant with MIL-STD-188-164a, MIL-STD- 810F, NATO STANAG 4484, IP65, and XTAR.

Cristi Damian, VP Business Development at Advantech Wireless said that these advanced VSAT terminals include state-of-the-art satellite technology. The system can

uplink two separate carriers and hence establish a solid connection backbone between a field command center and distributed resources.

He continued by stating that through selection of the best Advantech knowhow and technology, the company has managed to offer almost 10 times the data rate originally planned by the customer.

Additionally, Advantech Wireless has integrated the Sevis' 2G/3G/4G/LTE Intelligent Backhaul Optimization (IBO) into the firm's new Ultimate U7400-C2 and U7400-C4 Satellite Terminals.

Sevis IBO integration within Advantech Wireless' ASAT II™ Hubs and U7400-C2 / C4 terminals aim to make the most efficient use of satellite bandwidth to deliver savings up to 50 percent on 2G/3G and up to 30x throughput increase with Sevis LTE acceleration.

Sevis IBO Backhaul optimization and acceleration integration within Advantech Wireless ASAT II™ Hubs and high-throughput U7400-C2 and C4 terminals feature the company's unique WaveSwitch™ technology, supporting seamless switching between ASCPC™, MF-TDMA, and SCPC (DVB-S2X) waveforms, allocating bandwidth dynamically from a common space segment pool.

WaveSwitch™ delivers full bandwidth optimization at physical and protocol layers simultaneously. This integration boosts mobile throughput, reduces satellite backhaul bandwidth costs and increases service revenue, while at the same time establishing a software-defined platform for high-throughput satellite (HTS) cellular backhaul.

The Advantech Wireless-Sevis integration uses Sevis' 7000 and 6000 series, allowing satellite service providers and mobile carriers to conduct high-ROI optimization not just on IP-based 2G/3G/4G-LTE



Advantech Wireless Sevis 6000 Series.

links but also on legacy E1-based 2G/3G backhaul networks, over either traditional and high-throughput satellites (HTS).

Oscar Glottmann, CMO Satellite Networks Business Unit at Advantech Wireless, noted that Sevis' top-notch 2G, 3G and 4G / LTE optimization logic is at the heart of Advantech Wireless ASAT II™ cellular backhaul solution, and combined with the company's unique WaveSwitch™ and 3D-BoD™ technologies, enable satellite backhaul with the highest level of bandwidth efficiency, scalability and flexibility, allowing satellite service providers and mobile carriers to substantially reduce backhaul OPEX.

Tim Peyla, VP of Business Development, Sevis Systems, noted that as mobile operators around the globe expand their network coverage into areas such as rural or remote locations, unserved, or underserved, by terrestrial technologies, they rely on Sevis to help deliver such services in the most affordable and efficient manner. By integrating the company's 2G/3G/4G/LTE Intelligent Backhaul Optimization and Acceleration solutions within Advantech Wireless ASAT II™ Hubs and U7400-C2 and C4 terminals, users can benefit from a synergetic end-to-end solution that reduces both the cost of deployment and operation.

www.advantechwireless.com

DISPATCHES

SES GS ADDS BEAM FOR U.S. GOVERNMENT END-USERS

SES Government Solutions (SES GS), a wholly owned subsidiary of SES, has signed a five-year task order with the U.S. Department of Defense (DoD).

Under this agreement, an additional satellite beam will enable access to real-time information for better-informed, life-saving decisions in the field for key U.S. Government end-users.

The additional connectivity will be provided via SES's Medium Earth Orbit (MEO) O3b fleet as part of a high throughput, low latency satellite communications solution SES GS is providing to the U.S. DoD.

Operational benefits of the solution include the capability to transfer large files from remote locations in just minutes instead of hours.

Cloud-based applications and information can be used anywhere in the service area. End-users will be able to view simultaneous High Definition (HD) videos providing situational awareness to commanders.

The solution includes an additional 432 MHz satellite beam operating at less than 200 milliseconds round trip, a full duplex link, gateway access, transportable 2.4m AvL terminals, terrestrial backhaul, installation services and 24/7/365 operations and maintenance activities.

Pete Hoene, the President and CEO at SES Government Solutions, noted that last year SES GS won the first MEO-enabled satellite connectivity contract for the DoD and the company has been supporting the U.S. Government mission partner every step of the way since. The customer has been very pleased with the service the extended

SES Networks team has provided, hence the desire to proceed with an additional beam.

ses-gs.com/

FOR EMERGENCY RESPONDERS...

NETWORK RESILIENCY SHOULD BE SKY-HIGH

By Tony Bardo, Assistant Vice President — Government Solutions at Hughes Network Systems and Senior Contributor

With hurricane season once again underway, as has just been aptly demonstrated by Hurricane Harvey, emergency preparedness has never been more vital.

When disaster strikes, a timely and effective response is critical for mitigating damage done to citizens and infrastructure. However, disasters also have a knack for knocking out terrestrial communications networks when citizens and first responders need them the most.

Ensuring continuity of communications and operations, even in the most problematic conditions, requires implementation of resilient networks with built-in redundancy, avoiding single points of failure. And for the highest availability and most cost-effective solutions, that in turn calls for utilizing true alternate path technology to backup primary terrestrial landline or wireless facilities, namely satellite broadband.

THE CHALLENGES

When hurricanes hit, gale winds and flash flooding have the potential to severely disrupt, or even completely knock out, terrestrial networks, whether cable, fiber, microwave or wireless. Additionally, during emergencies the need for communicating real-time situations often necessitates data-intensive information sharing methods, such as video communications or geographic location tagging.

In these scenarios, even emergency communications lines can fall victim to bandwidth congestion, meaning mission critical information is either slow to reach its destination, or cannot be passed along at all. While these problems are a universal concern, they are exacerbated even further in rural and remote areas which lack the broadband terrestrial infrastructure available in most of urban and suburban America.



*Photo of Hurricane Harvey aftermath in Rockport, Texas.
Photo is courtesy of the Dallas Morning News Interactive.*

Although cellular networks do provide first responders with much needed mobility in the field, for first responders to rely solely on cellular networks is not a satisfactory option when disaster strikes, and cell towers or terrestrial backhaul are most vulnerable to outages. Cellular networks become quickly congested, as hundreds of thousands of users try to reach out to call their loved ones or local emergency services.

Unfortunately, many still do not understand that today's new world of high-speed satellite service is affordable and readily available across the country—a service that is rated by FCC as the only nationwide service with broadband download speeds of 25 Mbps. Only by including it with terrestrial as an integrated network architecture can public safety organizations achieve the highest level of communications reliability and availability when their services are needed the most.

CELLULAR BACKHAUL

When someone connects with a wireless device, the nearest cellular radio tower manages the traffic over a backhaul link to the core network.

Backhaul using terrestrial-only technology that occupies the same spectrum as user devices opens risk to jamming the network with congestion. This happened in 2011, when a 5.8 magnitude earthquake hit the Virginia and Washington, DC, area. Even though this was a relatively minor earthquake, cellular networks became so congested that service was either unreliable or unavailable.

By implementing satellite broadband to support cellular backhaul, responders can interconnect cellular base stations, even in rural and remote areas, or backup urban terrestrial links. Such a combined terrestrial and satellite backhaul architecture delivers the highest possible network availability by virtue of two alternate transport path technologies.

SYSTEM ON WHEELS (SOWS)

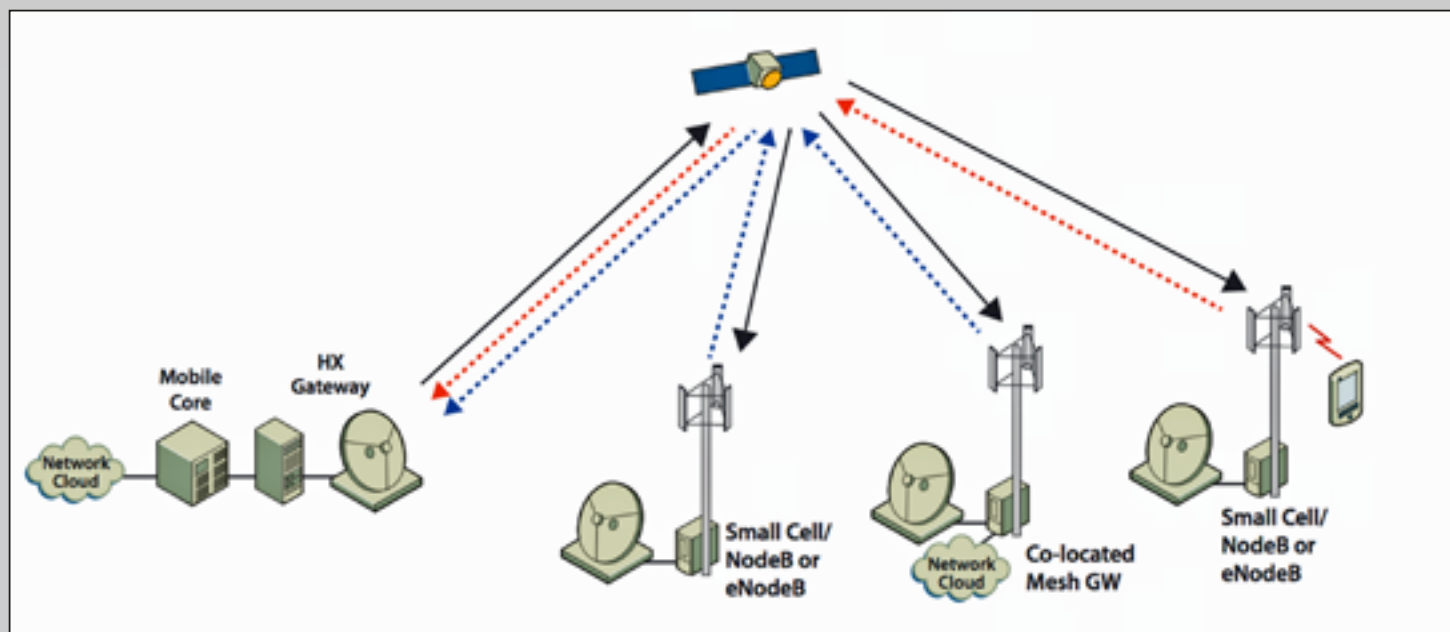
Systems on Wheels provide local cellular or direct satellite connectivity without relying on terrestrial connectivity to the network.

The deployable systems can deliver data either to improve existing emergency communications or provide primary communications where existing infrastructure has been compromised. This ensures first responders can communicate with each other and Emergency Operations Centers (EOC) to share the information required to coordinate an efficient response—no matter where it may be.

With lessons learned from Superstorm Sandy still forefront in thought, the New Jersey plan for implementing the FirstNet Public Safety Broadband Network (known as JerseyNet) has already incorporated satellite into their mix of available technology, thanks to its mobility and easy deployment in a path-diverse network architecture. As other states look to bolster their first responder capabilities, they would do well to look at the New Jersey model for ensuring resilient communications.

As emergency communications continue to rely on more data intensive communications, maintaining terrestrial-only connectivity in a disaster will remain a risky proposition. However, by implementing satellite broadband at key points in the network architecture—in the form of SOWs, terrestrial backup and satellite for cellular backhaul—first responders can ensure that they will have ample capabilities when responding to the next disaster, whenever and wherever such occurs.

Anthony "Tony" Bardo has more than 30 years experience with strategic communication technologies that serve the complex needs of government. Since joining Hughes Network Systems in January 2006 as assistant vice president, government solutions, Bardo has been responsible for providing Hughes managed network broadband solutions and applications to federal, state and local governments.



DISPATCHES

45TH SPACE WING SUPPORTS SUCCESSFUL MINOTAUR IV ORS-5 LAUNCH

ORS-5 is a single satellite constellation with a primary mission to provide space situational awareness of the geosynchronous orbit belt for Combatant Commanders' urgent needs. ORS-5 is not only a significant milestone for the ORS program office, but for the 45th Space Wing.

According to Brigadier General Wayne Monteith, 45th Space Wing commander and mission Launch Decision Authority, this successful launch shows the Wing is on track to complete 30 launches.

The launch also signifies the barriers the 45th Space Wing is breaking to guarantee assured access to space.



ORS-5 marks the first Minotaur IV launch from Cape Canaveral Air Force Station and the first-time launching from SLC-46 since 1999 and demonstrates the

Range's ability to support every vertical launch system in the U.S. inventory.

The Minotaur IV includes three solid rocket motors from decommissioned peacekeeper intercontinental ballistic missiles (ICBM).

"The ORS-5 Minotaur IV launch was the true epitome of partnership," Monteith said. "A collaborative effort between multiple mission partners, each group came together flawlessly to revolutionize how we work together on the Eastern Range. Teamwork is pivotal to making us the 'World's Premier Gateway to Space' and I couldn't be prouder to lead a Wing that not only has launched over a quarter of the world's launches this year, but also three successful, launches from three different providers, in less than two weeks."



The 45th Space Wing supported Orbital ATK's successful Minotaur IV rocket launch carrying the United States Air Force's Operationally Responsive Space 5 satellite August 26, 2017, at 2:04 a.m. from Space Launch Complex 46 at Cape Canaveral Air Force Station, Florida.

Courtesy Photo/Orbital ATK)

DISPATCHES

A SPAWAR WIN FOR ENGILITY HOLDINGS

Engility Holdings, Inc. has won a \$39 million contract award with the Space and Naval Warfare Systems Command (SPAWAR) Program Executive Office of Command, Control, Communications, Computers and Intelligence (PEO C4I).

As part of the contract, Engility will help the PEO C4I Ship Integration Program Office (known as PMW 760)



integrate network and communications systems and develop a single, consolidated and secure technology platform baseline for U.S. Navy and Coast Guard fleets.

PMW 760 is responsible for designing, integrating, testing and delivering interoperable, cyber-secure capabilities to the Navy and Coast Guard during new construction and modernization.

Engility will support PMW 760 as it begins integrating technologies toward a common C4I capability baseline for Navy and Coast Guard ships.

This second quarter 2017 win is a cost-plus-fixed-fee contract, with a base year and four one-year extension options and represents new work for Engility.

Lynn Dugle, CEO of Engility, stated that PMW 760 enhances the U.S. Navy's flexibility and efficiency while increasing warfighter capability, establishing a technology platform capable of meeting the diverse and evolving threats facing our armed services.

Lynn added that Engility will deploy domain expertise in cyber security and enterprise modernization to assist the Navy in IT service delivery, cyber technical leadership, fleet operations and C4I systems.

www.engilitycorp.com/

www.public.navy.mil/spawar/

DISPATCHES

CPI'S EMPOWERED TWTAS

The Satcom & Medical Products (SMP) Division of Communications & Power Industries LLC (CPI) has been awarded an exclusive contract that totals more than \$5 million to provide high power X-, Ku- and Ka-band traveling wave tube amplifiers (TWTAs).

The amplifiers will be part of an upgrade to existing mobile satellite uplink terminals operated by the U.S. military.

CPI is one of the largest global manufacturers of high-power communications amplifiers for satellite uplink applications, whose broad product line includes GaN-based SSPAs and Gallium Arsenide-based SSPAs, as well as TWTAs and klystron power amplifiers.

These products are used in fixed and mobile gateways in support of commercial and military communications around the world.



CPI's Model TL05XO 500W
SuperLinear offering.

Gerard Charpentier, VP of Business Development for the SMP Satcom Products Group, explained that CPI has supported this program for the U.S. military for more than 15 years — the company was selected for this contract because of the firm's quality and continued technical support of this program and ongoing support of the U.S. military.

www.cpii.com/

25 LAUNCHES FOR RUSSIA

Yuri Smityuk of the Russian news service, TASS, reports that the country's Roscosmos State Space Corporation plans as many as 25 carrier rocket launches this year, and about the same number of launches next year

This was information passed to the news agency by Igor Komarov, the head of Roscosmos.

"This year we have already carried out 11 launches not including launches from Kourou spaceport (in French Guiana). We will have up to 25 launches by the end of the year," the Roscosmos chief said.

"Benchmark figures for next year are the same," he said at the Army-2017 forum that opened outside Moscow.

According to the chief of the Space Corporation, this figure is expected to surge in 2019.

In 2016, Roscosmos conducted only 17 space launches, which put Russia in third place behind the U.S. and China for the first time in the past few years.



Photo of a Russian launch is
courtesy of the author.

GILAT SUPPORT ORDERS

Gilat Satellite Networks Ltd. (NASDAQ, TASE: GILT) has received orders of \$11.4 million, net of local taxes, to provide state-of-the-art communication solutions and technologies for a satellite-based broadband network to serve the Brazilian Geostationary Satellite of Defense and Strategic Communications — SGDC.

The SGDC will cover all of Brazil's territory and will enable Telebras to fulfill the Brazilian Governmental National Broadband Plan public policy.

The Brazilian satellite — SGDC — is planned to provide fast and affordable broadband communication to commercial and government entities.

Russell Ribeiro, Gilat LATAM's Regional VP, noted that Gilat is the satellite communication pioneer in Brazil and this turnkey project with Telebras is testament to the firm's commitment to this market and to Gilat's strategic direction in support of broadband satellite communication delivery to all.

Additionally, the company has reported that NTV-Plus has selected the broadband service developed by Eutelsat Networks and powered by Gilat's high-performance VSATs to offer high-speed internet to DTH subscribers across the European part of the Russian Federation.

Gilat's satellite solution provides affordable high-quality broadband, leveraging multi-beam high throughput capacity on the Express AMU1/EUTELSAT 36C satellite, whose wide-beam capacity is already used by NTV-Plus for TV broadcasting.

The service is based on Gilat's Gemini (for enterprise) and Scorpio (for consumers), VSAT-in-a-Box outdoor terminal, both supporting self-install and automatic service activation.

www.gilat.com

DISPATCHES

U.S.A.F. ENLISTS BLACKSKY FOR GEOSPATIAL INTELLIGENCE

Spaceflight Industries has announced that BlackSky has been awarded a two-year \$16.4 million cost-plus-prime contract with the Air Force Research Lab (AFRL) to develop and deliver a cloud-based geospatial intelligence broker platform — the brokering platform will provide on-demand analytics, collection, and information services from global data sources.

The BlackSky Geospatial Solutions team brings extensive expertise in geospatial intelligence, commercial remote sensing, cloud-based architectures, geospatial analysis, and machine learning to help customers harness the power of global data sources to gain improved situational awareness and actionable intelligence.

BlackSky is a division of Seattle, Washington-based, Spaceflight Industries and serves government and private sector organizations with solutions enabled by the BlackSky platform.

Within the platform, users can access BlackSky Spectra's on-demand imagery service to search, purchase, task, and download visual imagery and multi-spectral data from a global collection network.

They can also subscribe to BlackSky Events, the platform's global event monitoring service that fuses news, social media, industry data services and physical sensor networks to provide early warning and insights on risks, threats, and opportunities that can impact their business.

Brian O'Toole, executive vice president and chief technology officer of BlackSky, commented that this partnership with the U.S. Air Force and U.S. Government stakeholders on the development of leading-edge anticipatory analytics and commercial GEOINT brokering capabilities offers easy access and streamlined delivery

of timely and relevant insights about this changing world, essential to faster and more informed decision making. The BlackSky platform combined with the company's world-class solutions team is proving to be a key enabler for accelerating customers' success.

www.blacksky.com/

Over the past few weeks, Intelsat has reached some significant milestones that have moved the company ever closer to providing a much wider range of services to the firm's commercial and government customers who operate almost anywhere in the world.

The most recent development was the launch of the newest Intelsat Epic^{NG} satellite, Intelsat 35e. The satellite's Ku-band services include customized high-power wide beams for mobility and government applications in the Caribbean, trans-Europe to Africa, and on the African continent.

Government customers operating on Intelsat's first two Epic^{NG} satellites, Intelsat 29e and Intelsat 33e, have reported considerable gains in throughput with the powerful Epic^{NG} spot beams when compared to using wide-beam satellites.

One customer testing on Intelsat 29e determined that throughput on this terrestrial platform was three to five times higher than on traditional widebeam satellites and exceeded the performance of comparable antennas using the U.S. government's WGS satellites.

The higher throughput allows for more applications to be run simultaneously, including secure and non-secure email, chat services, secure voice over IP, and secure video teleconferencing. In addition, customers tell the company that the greater throughput will allow for a critical common operational picture to be seamlessly shared across units that are geographically dispersed across the battlefield.

Earlier in June, Intelsat partner OneWeb passed two major milestones that moved the company's ability to offer a new broadband capability to government customers a step closer.

The first was approval from the Federal Communications Commission of OneWeb's application to operate in the United States. The second was the start of OneWeb satellite production at an Airbus factory in Toulouse, France.

Even though Intelsat and OneWeb have terminated their proposed merger, the company remains a key OneWeb partner. In fact, the company is currently building out OneWeb's satellite control center in space subleased from Intelsat at the company's McLean, Virginia, headquarters.

In the company's collaboration with OneWeb, integrated GEO/LEO services are being developed that will enable customers to have critical fixed and mobile communications anywhere on the globe, from the polar regions to the most remote, isolated terrain.

Production of OneWeb's 700+ satellites started in late June in France and should eventually reach a pace of three satellites per day, according to Airbus.

OneWeb and Airbus broke ground in March for a second satellite production factory near the Kennedy Space Center in Florida, where the majority of the satellites will be built. OneWeb expects to launch their first satellites in April of 2018, with 300 satellites projected to be in orbit by the end of 2020 and more than 600 a year later.

The addition of OneWeb's low-latency LEO broadband capacity to Intelsat's global fleet of GEO satellites will offer government customers a level of coverage never before available.

The U.S. Department of Defense has submitted a budget request for FY 2018 that includes significant investments in space capabilities. While investments into commercial satellite capacity represent only a small fraction of the DoD's overall space investment, the Pentagon's continued efforts to evaluate how services like Intelsat and OneWeb can play future roles in the government's communications systems architecture is encouraging. These efforts are critical to informing the ongoing Wideband Communications Services Analysis of Alternatives and the DoD's future wideband architecture.

In addition, Intelsat partner Kymeta shipped their first flat-panel antennas in June. The Kymeta design uses electronic beam steering instead of mechanical parts to follow a satellite across the sky.



Such a design is critical for connecting to OneWeb's constellation of LEO satellites that require connections to pass from satellite to satellite as they orbit the Earth every 100 minutes. The Kymeta flat panel antenna design is also a game changer for a broad range of airborne, maritime, and ground-mobile applications.

Intelsat is also partnering with other electronically-steerable antenna developers to bring a product to market that is ideally suited for in-flight communications from aircraft carrying top government officials. These flat, light-weight antennas are also suitable for use on the smaller class unmanned aircraft systems that government agencies could use more widely for non-military operations in the United States and elsewhere around the world.

Combining the power of the Intelsat's Epic^{NG} constellation with the Low Earth Orbit (LEO) OneWeb satellites and the flat-panel antenna technology promises to provide customers with a wider range of choices and applications in the coming years.

PENTAGON MOVE TO REORGANIZE ACQUISITION IS THE CORRECT STEP

In a plan recently sent to Congress, the Pentagon calls for eliminating one leadership position and creating three others as part of its effort to reorganize the bureaucracy that oversees the acquisition of military technologies, reports National Defense Magazine.



The acquisition process as it currently exists is a pain point for the U.S. military and the commercial entities with whom it does business. Air Force General John E. Hyten, Commander, U.S. Strategic Command, recently pointed to the broken acquisition process as the reason for the military's struggle to keep up with U.S. adversaries. He argues that slow and onerous procurement processes stunt innovation and put the U.S. military at a disadvantage.

As part of the 2017 National Defense Authorization Act, lawmakers mandated a reorganization of the bureaucracy in the hopes of speeding up the acquisition process and reducing the risk of cost overruns. The Pentagon delivered its document, *"Restructuring the Department of Defense Acquisition, Technology and Logistics Organization and Chief Management Officer Organization,"* to Congress on August 1.

Under the Pentagon's plan, the position of undersecretary of defense for acquisition, technology and logistics will be eliminated, and three new positions will be added. The responsibilities previously held by the undersecretary of defense for acquisition, technology and logistics will be divided between two new positions: an undersecretary of defense for research and engineering, and an undersecretary of defense for acquisition and sustainment.

According to the report, the undersecretary for research and engineering will focus on "closing the gap on current and emerging threats, and on driving the disruptive innovation that provides the measure of technical dominance in specific warfare areas and on the scale and timeline called for [by the national defense strategy.]"

Meanwhile, the undersecretary for acquisition and sustainment will focus on "improving major defense program performance and reducing lifecycle costs to free up resources for further investment," reports Jon Harper for National Defense Magazine.

The third position created by the Pentagon's plan is a chief management officer, who will be responsible for improving the department's business operations and reducing its costs.

While the Pentagon's plan has the potential to add bureaucracy, we hope the reorganization will lead to further reform. Not only would the U.S. military benefit from technological advances made by the commercial sector, but it could see additional cost savings beyond the acquisition process itself.

Case in point: An Air Force and Defense Information Systems Agency Pathfinder program to test acquisition models yielded data showing long-term leasing of commercial SATCOM "saved (DoD) approximately 40 percent vs. annual spot leasing," according to Gen. Hyten.

The reorganization of the Department of Defense Acquisition, Technology and Logistics Organization is a step in the right direction, but it's only a small step. The people filling the Pentagon's new positions have a big challenge before them. Fortunately, commercial entities stand ready to support them.

www.intelsatgeneral.com/

The preceding articles are courtesy of Intelsat General's SatCom Frontier infosite and editorial team.

DISPATCHES

KRATOS COMBATS VSAT INTERFERENCE

According to Kratos Defense & Security Solutions, Inc. (NASDAQ:KTOS) their satID® satellite interference geolocation product offers the industry's only TDMA network geolocation capability to combat VSAT interference.

The satID®'s geolocation capabilities can routinely locate satellite interference well within 5 km of the source and the TDMA geolocation module enables satID to classify the signals from a TDMA network and provide geolocation results per terminal using advanced classification, filtering and processing.

Additionally, the TDMA's SatGuard technology identifies VSAT terminals by their ID to generate significantly more geolocation results.

David Wilkinson, Kratos' satID Product Manager, said that the TDMA network geolocation module dramatically improves the geolocation process for their customers, and the advanced capability transforms the way TDMA geolocation is performed.

Operators are able to identify the specific terminals causing interference and pinpoint their exact location to rapidly address quality of service issues.

Beyond interference mitigation the TDMA network geolocation module can help organizations in the satellite industry gain much better visibility into VSAT networks.

By geolocating VSAT networks, it becomes possible to profile and understand TDMA network usage enabling improved operations.

As an example, with an understanding of where VSAT terminals are located, satellite operators are able to improve capacity planning efforts to optimize beam coverage and bandwidth allocation.

The TDMA network geolocation capability adds to the existing modules available for satID. These modules include a signal cancellation capability that leverages the technology from Kratos' SigX product to enable customers to perform geolocation scenarios much more efficiently and effectively.



The module helps mitigate the effects of blocking carriers with a real-time signal removal capability.

In addition, an advanced spectrum analysis option employs features from Kratos' Monics® carrier monitoring product to provide carrier-under-carrier, modulation analysis and a new threshold triggering capability within satID.

Kratos' satID is part of the Monics family of advanced carrier monitoring and interference mitigation suite of products.

The RFI mitigation suite includes carrier monitoring capabilities from Monics, VSAT interference management from SatGuard and signal cancellation from SigX.

www.kratoscomms.com/products/rf-management/signal-geolocation



DISPATCHES

TEXAS FIRST RESPONDERS REINFORCED BY KANSAS AIR NATIONAL GUARD

Airmen assigned to the 184th Intelligence Wing reported to McConnell Air Force Base, Kansas, August 31, to assist in the ongoing relief efforts following Hurricane Harvey in southeast Texas.

The Category 4 hurricane reached its full intensity directly as the storm made landfall August 25 near Rockport, Texas.

Four days of concentrated rainfall caused catastrophic flooding in the region, engulfing thousands of homes and causing massive evacuations.

As a result, Texas Governor Greg Abbott activated the Texas National Guard for search and rescue, as well as recovery and clean-up operations. At the request of Texas, other states, including Kansas, have joined those efforts.

"In response to their request, the Air National Guard stood up the 10 different unclassified Processing Analysis and Dissemination sites around the country to provide support

here," said Major Dave Olds, officer in charge of the Processing Analysis and Dissemination cell.

The PAD sites receive video footage and imagery of the area and make products that are used by civilian and military personnel making decisions on the ground. Products include maps and images, aerial video clips, lists of blocked roadways, and more.

While other Air National Guard units were locating people, these Airmen were playing a different role.

"The search and rescue phase of the operation is going to last probably another 24 to 72 hours," said Olds. *"There are units much like ours here that are out doing that right now; looking for people that are stranded on rooftops or whatever the case might be. We are more focused on getting the regional assets to those people."* Airports were the main priority of the day.

"We're doing some flood analysis products for some of the regional airports in and around the Houston area," said Olds.

As the National Guard and other agencies bring personnel, supplies and vehicles, finding a runway that isn't flooded becomes significant.

Regional airports were also being used as evacuation hubs.

"That's important because right now they're taking a lot of evacuees to these airports and then taking them via [medical evacuation] or ground transport to hospitals if they need help," said Olds. *"They're kind of a consolidation point for those people that have been rescued."*

The PAD is a program that was developed over that last few years. Kansas is no stranger to devastating storms, and supporting emergency management agencies is one of the key focuses of the 184th Intelligence Wing.

"We've built this capability up over the past several years as an enterprise," said Olds. *"However, this is really the first massive-scale event that they've used incident awareness and assessment."*

The hard work seemed to pay off, though the real reward was the opportunity to serve.

"It's an amazing opportunity for our analysts here to get this experience," said Olds. *"It's really humbling to be part of this, but this is what we do as Guardsmen."*

"I don't personally know anybody on the ground that's been affected by this but, they might as well be my neighbors," said Olds. *"It means a lot to us to be able to provide good support to them."*



Staff Sgt. Luke Vanderpool, 161st Intelligence Squadron, Kansas Air National Guard, uses commercial satellite imagery to find routes that are clear for first responders to travel through. Vanderpool was activated in response to Hurricane Harvey, a Category 4 storm that flooded Houston and the surrounding area in late August.

Photo by Command Sgt. Maj. Matthew McCoy, 184th Intelligence Wing.

Story by MSgt Matthew McCoy,
184th Intelligence Wing, U.S.A.F.

PRESENTING MILITARY COMMS EXPERTISE

INNOVATION IS THE KEY TO SUCCESS IN THE WARFIGHTING DOMAIN

by Maryann Lawlor, Director of Communications, AFCEA International

Threats in the cyber domain are only one of the challenges military communicators face today.

Tight budgets, slow acquisition processes and reduced readiness are all factors the services must contend with from the tip-of-the-spear tactical warfighter to the satellites in outer space. Tackling these issues is a complex balancing act that requires experts in many fields to join forces.

During the 1990s, technology transfer was the buzz phrase. Having enjoyed years of innovation investments, the government sector sought opportunities for the products to move into commercial venues, possibly reducing prices. But by 2000, and especially after 9/11, the demand for readily available solutions skyrocketed. Commercial off-the-shelf, or COTS, solutions that could solve fast-evolving military requirements were in high demand.

Over the past nearly two decades, the lightning speed of advances in technology — and particularly in the cyber space — has pushed the need for a hybrid of tech transfer and COTS. As a result, the need for collaborative environments has grown exponentially, and conferences that bring the military, industry and academia together have seen a steady growth in leadership participation and attendance.

Nowhere is this more evident than in the area of military communications, and MILCOM 2017 has been designed to meet this need. With a theme of **"Military Communications and Innovation: Priorities for the Modern Warfighter,"** this international conference will address competing speed, security and cost. AFCEA International, IEEE and IEEE

ComSoc sponsor the event, which takes place October 23-25 at the Baltimore Convention Center in Maryland.

A number of speakers at MILCOM 2016 emphasized this necessity for military, industry and academia cooperation to address the substantial requirements in today's battlespace and especially in cyberspace.

Maj. Gen. John Morrison Jr., USA, commanding general of the U.S. Army Cyber Center of Excellence and Fort Gordon, stated that the days of separate strategic networks and tactical networks are long gone.

From a business standpoint, conference participants who attend events like MILCOM seek information about military requirements and guidance for investing their research and development dollars.

Last year, Maj. Gen. Bruce Crawford, USA, former commanding general, U.S. Army Communications-Electronics Command, gave them this advice, *"If you're looking for predictability, think about tomorrow's environment and the changing character of warfare and let that be your guide."*



Left: Maj. Gen. John Morrison Jr., U.S. Army.
Right: Maj. Gen. Bruce Crawford, U.S. Army.

Lt. Gen. Alan Lynn, USA, director of the Defense Information Systems Agency, and commander, Joint Force Headquarters-Department of Defense Information Network, agreed. Speaking at MILCOM 2016, he predicted that, in the future, technology will enable troops to conduct battles from a smartphone or tablet and emphasized the resultant need to build cybersecurity into every network.



"When you build the network, if you build it right, then the other side of the hat I wear, the cyber side, is a lot better," General Lynn said.



Lt. Gen. Alan Lynn, U.S. Army, during a MILCOM presentation.

Cybersecurity will also be a focus at MILCOM 2017. Command, control, communications, computers and intelligence experts will discuss cyber issues as well as science and technology developments during more than 200 unclassified and restricted sessions.

Among the invited speakers are Heather Wilson, secretary of the U.S. Air Force; Terry Halvorsen, former chief information officer, U.S. Department of Defense, and current executive vice president, IT and mobile communications B2B business, Samsung Electronics; and Vice Adm. Marshall B. Lytle III, USCG, director, command, control, communications and computers/cyber and chief information officer, the Joint Staff (J-6).

Panel discussions will include a look at the challenges and priorities for command, control, communications and computers (C4) in joint, hybrid and multi-domain warfighting.



Lt. Gen. Lynn visiting an exhibitor's booth at MILCOM.

Dr. John A. Zangardi, acting chief information officer, U.S. Defense Department, will lead the panel titled **"Accelerating the Speed to Solutions in Federal IT."** Invited panelists include representatives from the Office of Management and Budget, Department of the Navy and Defense Information Systems Agency.

MILCOM's tutorials will feature experts from organizations such as Johns Hopkins University Applied Physics Laboratory; the University of Southern California, Los Angeles; Virginia Tech; and The MITRE Corporation. Restricted tutorial topics will incorporate exploration of resistance and resilience in cyber and physical systems as well as the importance of reliable wires and cables.

As in the majority of AFCEA conferences, MILCOM 2017 will feature continuing education sessions. Prior to the opening of the event, a list of the panels, theater sessions, technical panels and tutorials that qualify as continuing education for maintaining cybersecurity certifications will be posted on the website. MILCOM 2016 included more than two dozen sessions that qualified.

Conference participants also will have the opportunity to view the latest technologies offered by the industry. Dozens of companies will be demonstrating the innovations they have been developing and representatives will be on hand to talk about the problems these technologies address.

Satellite communications companies participating in MILCOM include Anatech Eletronics, dBmCorp, EchoStar Satellite Services and Raytheon.

Registration for MILCOM 2017 is now open. For additional information and to sign up, visit the website: **events.afcea.org/milcom17/public/enter.aspx**



MILCOM 2016 editorial coverage, photos, recordings, slides and presentations are available on AFCEA's Past Events site: **afcea.org/site/?q=events/past-events**.

Maryann Lawlor is the Director of Communications at AFCEA International. In her more than two decades working for the association, she has written hundreds of military communications feature articles.

TECHNICALLY SPEAKING: SWITCHING BETWEEN SATELLITES WITH DIFFERENT POLARIZATION TYPES

by Dr. John Ness, Founder and Chief Technical Officer, and Marshall Lewis, RF Engineer, EM Solutions

Militaries around the world are seeking “assured communications.” Assuredness comes from multiple factors, including redundancy in components and systems that are resilient to weather, attack, or congestion — the ability to automatically switch frequency bands and satellites can help increase assuredness.

So, too, does interoperability between satellite systems.

High throughput satellites in both Ku- and Ka-band frequencies are being launched with increasing regularity. To the ground terminal manufacturer, building a terminal at one frequency rather than the other involves more than a change in receiver (LNB) and transmitter (BUC) hardware and settings: a build frequently involves accommodating a change in signal polarization as well.

The polarization of an electromagnetic wave is defined by the orientation of its electric field vector. For satellite systems, the signal polarization can be either linear or circular. Typically, satellite signals at Ku-band are linearly polarized (LP); that is, their electric fields, which are perpendicular to the direction of signal propagation, are aligned in a single direction (for

instance, north-south or east-west for a signal approaching the equator from space). This means the receiving ground antenna feed must also be appropriately rotated to ensure the electric field is captured at the correct angle for maximum signal. This makes implementing mobility solutions difficult in Ku-band.

Most satellite signals at Ka-band are circularly polarized (CP), which means the electric field rotates clockwise or anti-clockwise looking along the direction of propagation, called right hand circularly polarized (RHCP) or left hand (LHCP) respectively. Once the receiving antenna is aligned for maximum signal by pointing along boresight to the transmitting satellite, CP avoids the need for rotation of the feed to any particular transverse angle.

This simplifies the task of signal capture for a Satellite-On-The-Move (SOTM) SATCOM terminal, as the antenna need ‘only’ be steered toward boresight, while further adjustment of the transverse feed angle (around boresight) is unnecessary. That is not the case with linearly polarized Ku-band signals. A CP signal also rejects the first reflection, which will be polarized in the opposite direction, offering some protection from a strong reflection.



An EM Solutions X-/Ka- multi-band maritime terminal undergoing sea trials off the Barrier Reef in Australia. Photo is courtesy of EM Solutions.



The X-/Ka-multi-band Cobra terminal houses its electronics and polarization system in an RF "can" mounted directly behind the antenna. Photo is courtesy of EM Solutions.

For a wave that is close to ideal circular polarization, but not perfect, its trajectory will appear slightly elliptical. The axial ratio (AR) is given by $20\log(V_{\max}/V_{\min})$ where V_{\max} and V_{\min} are the amplitudes of the total signal on the major and minor axes respectively.

In the case of pure LHCP or RHCP, V_{\max} and V_{\min} are equal and, in this case, the AR = 0dB. An AR up to 1dB is considered to give a very good CP wave and is generally a difficult specification to meet.

AR values of ~2dB are more realistic. When $V_{\max} \gg V_{\min}$ but V_{\min} is not exactly zero, the wave can now be considered (almost) linearly polarized. The cross polar ratio (XPD) is given by $20\log(V_{\max}/V_{\min})$.

XPD values of 30 dB are considered very good for nominally linearly polarized signals, while 25 dB is a more realistic

value. Note that the propagation path through the atmosphere can affect the polarization, particularly if there are water droplets or rain along the path.

Because vertical and horizontal LP, or right and left CP signals, are orthogonal to each other, satellite systems will use alternating polarizations for separating adjacent transponders, or to separate the up and down links to reuse the same frequency.

Detection of circularly polarized signals requires careful design to ensure that only the right-hand mode (say) is extracted from any residual left-hand mode that could be a component of the overall received signal (in a similar way to the horizontal and vertical modes with LP). Any additive component from an imperfect cross mode will cause deterioration in the axial ratio or cross polar rejection, and the interference will lower the signal to noise ratio.

Various systems may also use different types of polarization, even if they operate in the same band. For instance, some Ka-band satellites are linearly polarized, rather than circular. Therefore, it is often required for a terminal to be able to switch between polarizations, which is typically done by using waveguide switches or manually changing ports.

For LP systems, the feed network or even the complete antenna may be made so it can be mechanically rotated. All of these methods complicate the mechanical layout of the feed network and usually increase its size and mechanical complexity. These are major considerations for small mobile terminals. A more simple and robust conversion mechanism to switch between LP and CP and their two orientations is required.

Switching Between Satellites with Different Polarization Types

A rotating circular vector can be created by summing two equal amplitude sinusoidal x- and y-vectors phased 90 degrees apart (in time). Circular polarization can be achieved the same way in terminals, using a device such as a quadrature hybrid coupler that splits an incoming electrical input into two equal signals 90-degrees apart in phase, and then recombining those two signals geometrically along perpendicular x- and y-axes. A receiver circuit works the same way, in reverse.

Using a combiner in this way, a CP receive antenna feed can be used to detect an LP signal; however, one of the two paths in the circuit above will be null and the incoming signal-to-noise ratio will be 3-dB lower than if the proper detection circuit were used. Similarly, an LP feed (say, vertical) can detect the CP signal component along this axis, but be

unable to detect the second component perpendicular to it (which would be horizontal). Such a halving in sensitivity can be fatal in satellite terminals.

To overcome this situation, EM Solutions terminals are designed with a novel electronic polarizer in the receiver that automatically adjusts for the polarization of any received signal — RHCP, LHCP and LP of any angle without any significant degradation in S/N in the receiver. The same polarizer in the transmitter can also be set up to work with either RHCP or LHCP without any drop in EIRP, or set up for LP of any angle.

Previously, to receive a linearly polarized signal on the move, the entire dish and feed network had to be rotated in order to align with the vertical or horizontal polarization of the satellite. Now, this rotation can be eliminated using EM Solutions new polarization module that also avoids rotation of any of the interconnecting cables.

In the new system, the receive path is corrected electronically using an Rx Polarization Module that automatically adjusts for the correct signal phasing using electronic phase shifters. As noted above, if a single linearly polarized path were used to extract the carrier or beacon signal, then this would be typically 3 dB below the maximum signal obtainable.

Additionally, with the new system, orthogonal linearly polarized paths created in the antenna feed referred to as H and V are first combined in a 3dB quadrature coupler and then phase adjusted to realize the receive path. This ensures both components of a signal of any polarization are captured and maximizes the signal to noise ratio of the signal.

For the transmit path, the high power levels create an additional level of difficulty. Electronic phase shifters need to be operated at relatively low power levels to avoid non linear effects. The relatively high insertion loss of such devices also means that they should be located where gain is low power and low cost. This requires that the relative phase shift along the two paths of the polarizer eventually includes both high gain and high power stages, and it is difficult to calibrate these to maintain an accurate phase relationship over frequency, power and temperature.

However, the distributed nature of high power solid state amplifiers is well suited to incorporating electronic polarization in the transmit path provided the phase stability issue can be resolved. Even so, a system set up to transmit LP at an arbitrary angle cannot be used to generate CP without a 3 dB drop in power, unless a complex array of switches is used which is not an elegant solution.

Benefits to the User

The polarizer above was developed to satisfy a requirement for EM Solutions terminals to provide assured communications, by tracking and communicating using satellites in both X- and Ka-band, military and commercial and with beacons of different polarizations.



An EM Solutions X-band Taipan terminal for land-based satellite communications on the move. Photo is courtesy of EM Solutions.

Switching between LHCP, RHCP, and LP needs to be automatic to provide the versatility and flexibility expected by today's military forces.

EM Solutions latest Cobra tri-band terminal makes the best use of military and commercial satellites, offering simultaneous communications in X- and Ka-band on the WGS satellite system and providing fallback to the Inmarsat GX system for assuredness. Such global interoperability, flexibility, and assuredness of satellite communications requires innovations like the electronic polarizer module that EM Solutions is renowned for.

www.emsolutions.com.au/

Dr. John Ness is the founder and Chief Technical Officer of EM Solutions. John is a veteran of the microwave industry and continues to be active in the design and measurement of complex RF circuits, antennas and waveguide structures. His contributions include multi-band antennas, waveguide power combiners, and established two companies.

Marshall Lewis is an RF engineer at EM Solutions. A winner of the University of Queensland medal for academic excellence, Marshall is rapidly becoming one of the company's experts in the design of circuits and systems used in satellite communications.



In April of 2015, NASA announced the selection of SES to host the agency's Global-scale Observations of the Limb and Disk (GOLD) payload aboard the SES-14 spacecraft — the GOLD payload is an ultraviolet (UV) imaging spectrograph designed to measure densities and temperatures in Earth's thermosphere and ionosphere.

GOLD is noteworthy for many reasons in addition to the spacecraft's mission to measure densities and temperatures in the thermosphere and ionosphere. GOLD is notable for how it's going to get there — as a hosted payload aboard a commercial geostationary (GEO) satellite — a method for getting payloads into orbit that is not widely adopted and used across the federal government.

Also notable is who is helping to make the entire program a success. GOLD is being developed and operated by an interesting mix of organizations that include NASA, the University of Colorado's Laboratory for Atmospheric and Space Physics (LASP), the University of Central Florida, Airbus Defence and Space, and SES. In fact, GOLD represents the first

time universities and a commercial spacecraft operator will team up to enable a NASA science mission.

GOLD will assist NASA and the scientific community in research and observations — this program is both historic and a learning experience for government and the space industry.

In regard to GOLD and the hosted payload program, GovSatReport convened a panel of subject-matter experts to discuss the GOLD program, what the program will accomplish for NASA, why this partnership is so exciting for the space industry and what other government agencies can learn from GOLD. The resulting podcast, moderated by Ryan Schradin, conducted interviews with...

- *Todd Gossett: the Senior Director of Hosted Payloads at SES Government Solutions*
- *Dr. Richard Eastes: the GOLD principal investigator at the University of Central Florida*
- *William McClintock: the GOLD deputy principal investigator at LASP*

The build of NASA's GOLD satellite. Photo is courtesy of AIRBUS.



- *Rory Barrett: the GOLD Project Manager at LASP*

This informative podcast may be accessed at ...

www.blogtalkradio.com/govsat/2017/05/31/nasa-sees-gold-in-upcoming-hosted-payload-program

Following up on the Government Satellite Report that examined NASA's GOLD program, note that GOLD is a particularly notable endeavor because the mission is being conducted as a hosted payload and has garnered involvement from the University of Central Florida and the University of Colorado's Laboratory for Atmospheric and Space Physics (LASP).

THE BENEFITS OF ACADEMIC INSTITUTIONS PURSUING HOSTED PAYLOADS

The involvement of academic institutions in a hosted payload program may be unique, but it shouldn't be particularly surprising. That's because hosted payloads can deliver multiple significant benefits to any academic institution looking to gather satellite data for use in research and scientific pursuits — especially in such hot research areas as climate science.

Hosted payloads present many of the same advantages for academic institutions that other government agencies using hosted payloads, like the FAA, already experience. The most important of these being the conservation of time, resources and funds. The cost of building a spacecraft and launching it is extremely high. Which is what makes the concept of hosted payloads so appealing for government agencies and academic institutions alike.

As Todd Gossett, Senior Director of Hosted Payloads at SES Government Solutions explained, *"It's a cheaper way to get into space. And that's because they [universities] don't have to procure an entire spacecraft [and] the entire support infrastructure that comes with that, such as the ground commanding infrastructure, antennas, operations center, etc. And they don't have to procure a launch...really it's because the unique attributes of a hosted payload program really match up with the funding and the infrastructure of the hosted payload customer."*

UNDERSTAND THE CHALLENGES

That's not to say there wouldn't be some sizable challenges to overcome in order to put a hosted payload program in place at an academic institution. Even with the massive cost savings that hosted payloads offer, these projects can still cost millions.

This is the main deterrent that is pushing most academic satellite programs to focus on much smaller satellites, such as nanosats or cubesats. However, although these satellites offer a valuable learning experience, they simply can't stay in orbit as long as a hosted payload on a GEO satellite, and as of this writing, they seem to be limited to LEO.

FIND A GOVERNMENT PARTNER WITH SIMILAR GOALS

Of course, government budgets for scientific exploration are far larger than that of an academic institution. In order to put a hosted payload program into action, the university will likely need to seek out a government sponsor with similar scientific goals.

"Seek out a government sponsor who is interested in the science that they could produce as a result of putting a mission into space," Gossett explained. "That's going to make it much easier for [universities] to obtain the requisite funding to put a science mission on board a spacecraft."

BUILD HARDWARE THAT IS SPACE CERTIFIED

Beyond funding, there is also the challenge of building payload hardware that is space certified. This is where partnerships with third-party vendors like Boeing, Lockheed Martin, Leidos, Ball Aerospace and some universities like University of Colorado, University of Massachusetts Lowell and University of California Berkeley come into play; they're capable of building space-qualified hardware that both meet mission requirements and can withstand the harsh environment of space. Satellite vendors such as Boeing, Airbus Defense and Space, and Orbital ATK also provide experienced teams to integrate hosted payloads with the host satellite.

Finally, owner-operators such as SES GS can operate the host satellite, facilitate operations of the hosted payload, and downlink and disseminate mission data using the company's existing satellite command and control and ground infrastructures, all invaluable resources to a typically lean academic team.

For universities and other academic institutions to successfully take part in a hosted payloads program, they likely will need to find a government partner with similar scientific goals in mind to sponsor the project, and a third-party vendor to support the hardware and infrastructure needs of that project.

Like most academic pursuits, a hosted payload program is a collaborative effort. However, should an academic institution put in the work and build a team — similar to the one behind the NASA GOLD program — the benefits could be well worth their effort.

This article is republished, courtesy of The Government Satellite Report (GSR) and Executive Editor Ryan Schradin. He is a communications expert and journalist with more than a decade of experience and has edited and contributed to multiple, popular, online trade publications that are focused on government technology, satellite, unified communications and network infrastructure. His work includes editing and writing for the GovSat Report, The Modern Network, Public Sector View, and Cloud Sprawl.

His work for the Government Satellite Report includes editing content, establishing editorial direction, contributing articles about satellite news and trends, and conducting written and podcast interviews. Ryan also contributes to the publication's industry events and conference coverage, providing in-depth reporting from leading satellite shows.

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THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GDMSS)

THE GMDSS TASK FORCE

The following article was prepared by the *Radio Technical Commission for Maritime Services (RTCM—www.rtcn.org/)* for publication at the *National Marine Electronics Association (NMEA—www.nmea.org/)* infosite.

Captain John Fuechsel, USCG, retired, has made significant contributions toward maritime safety throughout his long and distinguished career. He leads the GMDSS Task Force, which has thousands of members seeking to improve safety via more effective use of communications/electronic systems.

ORIGINS OF THE TASK FORCE

In 1993, the Coast Guard organized the Global Maritime Distress and Safety System (GMDSS) Task Force to help prepare the private sector for the new GMDSS recently adopted by the International Maritime Organization (IMO).

Initially, the main thrust was to prepare commercial vessels for their part in outfitting for the new system. Commercial vessels over 300 tons were subject to the new carriage and training Rules under an amendment to the Safety Of Life At Sea (SOLAS) Treaty which came into force in 1999.

The Task Force makes recommendations to government regulatory authorities to improve safety and minimize false alerts. Task Force members serve as advisors to government delegations to the IMO and the international telecommunications Union (ITU). U.S. Coast Guard funding supports efforts by the task force and travel expenses for leadership of the IMO's correspondence group on modernization of the GMDSS.

THE GMDSS CONCEPT

The IMO wanted to modernize the Distress and Safety systems to take advantage of the emerging maritime satellite systems and the ITU was ready to cooperate with the necessary changes to the Radio Regulations and supporting spectrum allocations.

The basic system of manual Morse telegraphy on 500 kHz was little changed since the days of the TITANIC, and ships were agitating for higher throughput. New Emergency Position Indicating Radio Beacons (EPIRBs) had revolutionized distress alerting, and the time was ripe for a complete overhaul of the system.

The result was creation of sea areas based on distance from the coast, A1 for VHF coverage, A2 for MF coverage, A3 for Inmarsat coverage and A4 for the polar regions. Ships in A3 could elect either HF or Inmarsat, but HF was the only choice for A4.



All ships would be required to watch distress channels in A1, A2 and A3 and receive NAVTEX and SafetyNET Marine Safety Information (MSI) broadcasts. Carriage of automatic, float free, self-activating EPIRBs was required.

English was selected as the common language for all safety communications. Finally, after much controversy, it was decided that Deck Watch officers would maintain the watches on voice 24x7 and that carrying Radio Officers would be optional.

TASK FORCE MEMBERSHIP AND MEETINGS

Membership is open to any interested party with an email address. There is no charge for participation.

Present membership includes manufacturers, service agents, government agencies, commercial vessel operators, training institutions, recreational boat operators and interested

private citizens. Many interested foreign representatives have joined and there is a total membership of about 4,500, including a large number of LinkedIn network members.

Meetings are held twice a year at the RTCM headquarters in Arlington, Virginia and once a year during each of the NMEA and RTCM annual meetings. Members unable to attend may participate by conference call and email. Summary records of the meetings are distributed to all members by email as Newsletters.

TASK FORCE TAKES ON EXPANDED TERMS OF REFERENCE

Gradually, the Task Force broadened its attention to include small commercial vessels, some of which were regulated, and recreational vessels that were virtually unregulated, as least as far as radio systems are concerned. Both groups use some of the new GMDSS radio systems.

By 2005, the U.S. Coast Guard passed sponsorship of the Task Force to the Radio Technical Commission for Radio Services (RTCM), a non-profit Standards writing group for maritime telecommunications.

The Task Force monitors non-GMDSS systems, such as the Automatic Identification System (AIS), the Long Range Identification and Tracking system (LRIT), Voyage Data Recorders (VDR), the Ship Security Alerting System (SSAS), the Vessel Monitoring Systems (VMS) used to monitor fishing vessels and issues relating to electronic navigation. Subordinate Task Groups have been established focusing their interest as follow...

Service Agents and Manufacturers Group

Issues dealing with GMDSS equipment and interfaces to navigation receivers. Servicing Agents have assisted the Task Force efforts to enable navigation receivers to be connected to DSC radios. In general this group deals with most issues of interest to NMEA members.

Commercial Vessels Group

Issues dealing with commercial vessels, including especially those below SOLAS tonnage for which regulations are a national issue. This group develops check lists for various periodic inspections and recently formulated regulatory proposals to the U.S. Coast Guard and FCC regarding Fishing Vessels and small Passenger Vessels.

Recreational Vessels Group

Issues dealing with radio safety for these unregulated private craft. This group works with the U.S. Coast Guard's Office of Boating Safety to develop check lists for voluntary inspections and encourages voluntary fitting of safety radio equipment. IT maintains liaison with the Coast

Guard Auxiliary, the U.S. Power Squadrons and the Association of State Boating Law Administrators (NASBLA).

Training Group

Issues dealing with training of Deck Officers, Radio Operators and equipment maintainers. This Group wrote the Exam Questions for the qualifying exams and has upgraded the questions as necessary. The Training Group is trying to improve the qualifications for GMDSS Maintainers beyond just passing the required multiple-choice exam. Another issue this Group advocates is requiring periodic recertification of GMDSS Operator Licenses that are currently issued for life of the holder.

GMDSS Modernization Group

This is a temporary group established to aid in the IMO's effort to modernize the GMDSS. Even though the changes seem minor at this point, the cumbersome IMO procedures will ensure several more years of activity and review. One major new initiative is the expected acceptance of the Iridium Satellite System as an official GMDSS system.

Notable Current Issues Being Pursued

The Task Force has made numerous recommendations to the FCC and the U.S. Coast Guard, many of which have been accepted. The most significant issue still pending is a recommendation to the U.S. Coast Guard that they use their authority to require emergency beacons on recreational vessels that go more than three miles offshore.

Other ongoing management issues include efforts to better manage the MMSI numbers used for identification in Digital Selective Calling (DSC) radios and Automatic Identification System (AIS) units and how to deal with the fact that a sizeable percentage of recreational vessels use DSC radios but don't bother to register for an MMSI number or connect a GPS receiver.

Use of smart cell phones in lieu of VHF has progressed to the point that the coast guard receives most of their short-range alerts by cell phone but at least the smart phones provide a position. A new initiative is how best to recommend proper Cybersecurity fundamentals for various sectors of the maritime community.

For more information, please contact the Task Force Director, Captain John (Jack) Fuechsel, USCG (Ret.), gmdss@comcast.net, 703-963-3747 (m).

FIGHTING ORGANIZED CRIME ON THE HIGH SEAS

AN IMAGE SAT INTERNATIONAL INNOVATION FOCUS

by Ori Zeisel, Business Development and Product Manager, Image Sat International

Coastal countries face a group of wily opponents: illegal and unregulated fishing vessels, their owners and the black market.

In 2009, experts measured the volume and extent of illegal, unreported and unregulated fishing (IUU) and noted that global economic losses from these activities equaled as much as US\$23 billion annually. This \$23 billion represents lost tax revenues, lost economic opportunities, lost jobs and above all, an expanding and dangerous black market that exploits human and natural resource.

To fight these organized crime efforts, Image Sat International (ISI) developed Kingfisher, a multi-sensor, multi-layer maritime intelligence system that combines and analyzes a variety of information sources to expose the deceptions of IUU criminals.

Using space based data sources, such as Satellite Automatic Identification System (S-AIS), Synthetic Aperture Radar (SAR) satellite imagery, Electro-Optics satellite (EO) imagery that are combined with other sources, such as Vessel Monitoring Systems (VMS), Coastal Radar and Open Source Intelligence

(OSINT) — even weather patterns — the system detects abnormal vessel behavior — the tell-tale patterns of criminals.

One of the Kingfisher's major advantages is the systems unparalleled capability to capture satellite images of suspect activities and then perform high end analysis of that imagery.

Kingfisher brings together this vast assemblage of knowledge with an added AI (Artificial Intelligence) twist — a behavior pattern recognition and prediction, multi-agent-based simulation that's integrated with deep learning techniques.

Kingfisher's AI enables users to improve satellite usage for rapid tasking, leading to a lower cost of operation with greater effectiveness in the detection and tracking of non-cooperative vessels.

The system's deep learning algorithms automatically identify vessels captured in satellite imagery and, through correlation with other sensors, detects vessels whose Automatic Identification System (AIS) has been turned off. The Kingfisher



Image of the predictive analysis of the Kingfisher system. Image is courtesy of ISI.

system is ready to identify maritime vessels that are using fake identification or operating without AIS, both of which are indicative of abnormal, maritime behavior.

CASE STUDY

ISI worked with the Coast Guard of one South American country and proved the worth—technological, economical and enforcement-wise—of the Kingfisher System. Translating oceans of data into highly detailed information, Kingfisher's advanced algorithms fused numerous sensory signals from satellite based sensors to other maritime monitoring sensors to deliver vessel-specific insights and alerts.

Together, the teams used diversified data sources and advanced computing technology, including citing abnormal activities, to outsmart evasive AIS techniques (including fake AIS updates).

One case monitored a fishing vessel that approached the country's Exclusive Economic Zones (EEZ) and turned off the vessel's AIS system. The vessel then sailed on the outside edge of the EEZ for period a time, turned into the EEZ for a few hours, and then sailed out of the country's national waters. Continuing to travel with the AIS system off, the ship sailed away from the EEZ, fully believing their unlawful action had not been discovered.

Kingfisher's operators, however, had other plans...

With the system's predictive behavior AI algorithm based on multi-agent based simulation and through study of the vessel's behavior pattern, Kingfisher forecast the vessel's next moves that were quite different from those of the country's Coast Guard enforcement team's existing system.

Based on Kingfisher's separate recommendation, the Coast Guard alerted their units following the recommendations from Kingfisher and pursued the ship that was sailing away from that nation's territorial waters.

Within a short period of time, the Coast Guard units reported engagement with the unlawful fishing vessel at the precise point that had been calculated by the Kingfisher's AI algorithm.

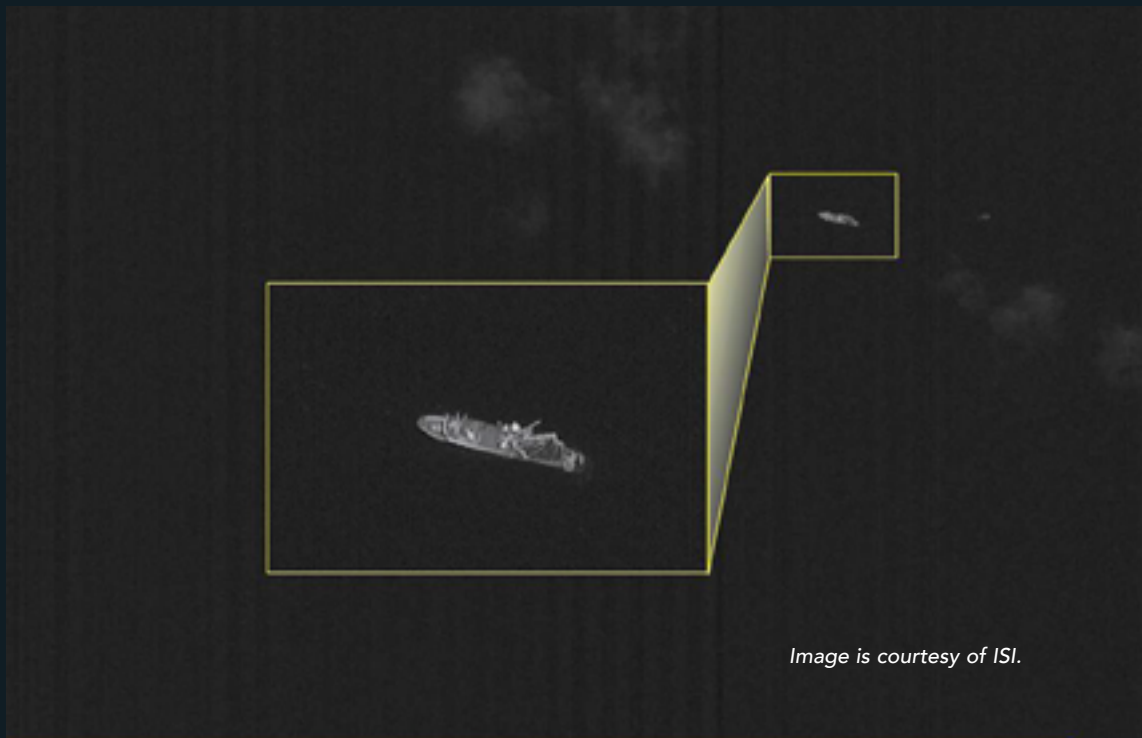


Image is courtesy of ISI.

As a result, the vessel, captain and crew were apprehended and returned to shore for legal and financial adjudication and the entire fish haul was confiscated.

Satellite detection of moving objects in marine environments has often been considered as similar to 'finding a needle in a haystack.' Kingfisher changes this perception—maritime enforcement authorities now have the upper hand. Kingfisher delivers reliable analysis compiled from the initial stages of strategic surveillance up to the profiling of individual vessels. This leads to a far more effective use of satellite resources and provides a more economically-viable solution.

AI algorithms, behavioral pattern recognition and dynamic deep learning skills all contribute to make Kingfisher an emerging and important platform that is able to...

- *Counter IUU fishing*
- *Protect EEZ and borders from unauthorized movements of maritime vessels*
- *Fight terrorism and piracy*
- *Counter human trafficking and illegal immigration*
- *Counteract drug smuggling*
- *Reduce enforcement reaction times*

www.imagesatintl.com/

Ori Zeisel is the business development and product manager at ISI (Image Sat International). He joined ISI in 2015 and possesses more than seven years of corporate leadership and UAV operation experience within the defense sphere. Zeisel holds a BA from the Open University in Israel.

AN ARMY WARFIGHTING EXPERIMENT WITH SLINGSHOT

A SPECTRA GROUP FOCUS

by Simon Davies, Chief Executive Officer, Spectra Group (UK) Ltd., and Senior Contributor

Earlier this year, Spectra Group (UK) Ltd. successfully participated in the 2017 Army Warfighting Experiment (AWE17).

AWE17 was a non-secret experiment run jointly by UK MOD departments, DE&S (Defence Equipment & Support) and DSTL (Defence Science & Technology) and this concluded with a VIP presentation at Copehill Down Village near Warminster, Wiltshire, in the UK at the end of March of this year.

AWE17 was established as a forum to examine ways in which mature technologies available from industry could solve specific problems for the military. The process first identified potential solutions and then, after a progressive series of demonstrations, tests and trials, Spectra's SlingShot® system emerged as one of those presented successful technologies following three rounds of selection.

With the ability to extend the secure net over thousands of miles using Inmarsat's L-TAC™ satellite service, SlingShot can connect dismounted, mounted as well as air and seaborne personnel to one another and to operational and national headquarters. The flexible system was trialed in the Warfighting Experiment to demonstrate a solution that enables further communication capabilities with existing equipment.

A GAME CHANGER

Recently referred to by a specialist user as "a game-changer," SlingShot enables in-service VHF and UHF tactical radios to operate over commercial satellite communications (COMSATCOM) networks for robust, reliable and cost-effective Beyond Line of Sight (BLOS) Communications on the Move (COTM).



The aim of the final stage of the trials was to place the product into the hands of the user. British Infantry, Royal Marines and a squad from the U.S. Army participated in level C trials, which were comprised of training and section exercises on the Salisbury Plain and platoon exercises prior to the final company battle exercise. This entailed a company grouping being deployed for 72 hours in a tactical scenario against a peer enemy force.

SlingShot is already deployed worldwide and has a proven track record for making a real difference as far as communications are concerned. As operations change and high-tempo, short duration, deployments become the norm, there is a real need to extend tactical communication distances, as the AWE17 requirements identified. SlingShot reached the final selection and will find increased use by British Forces.



Approximately 2,000 SlingShot units have been operationally deployed since the product's launch in 2013 to key users, and more than 15 armies ranging from North America to Europe and Africa, the Middle East, to the Far East and Australia are SlingShot users. The maturity and efficacy of SlingShot have been recognized by the product's selection in experiments such as AWE17 and the American Army Expeditionary Warrior Experiment (AEWE) as national defence organizations look to roll it out on a wider basis.

SWAP CRUCIAL

When discussing communications — especially tactical communications — the compatibility of products with existing systems' size, weight and power (SWaP) and, of course, security, have to be the overriding objectives.

When Spectra mapped out a development path for SlingShot, the company knew from the outset that success would be attained if the needs of the user community were kept in mind. The highest priority was to develop a system — in this case, available in manpack, vehicle, maritime and aviation versions — that was complementary and transparent to in-service equipment.

Real estate on mounted platforms is limited and dismounted troops face a real challenge if technology reduces the amount of ammunition, food and water that can be carried into force situations. For that reason, work on keeping the footprint to a minimum was challenging. The manpack system, which weighs under 2 kg, was eventually developed and is able to acquire power from in-service radio batteries, which frees the operator from carrying various battery types — other charging systems are also supported. Also introduced was a battery cassette as a further lightweight power option, making use of the ubiquitous AA battery.

The antennas that form the final part of the SlingShot system are all omni-directional, with robust BLOS and COTM capabilities. This gives the system several advantages over traditional UHF TacSat. On foot, there is no need to stop and orientate toward the satellite. The system can be used in prone or kneeling positions as well as when walking, jogging or running. As long as there is sight of the satellite, there will be service.

The vehicle antenna can be mounted with a magnetic plate or a pole and is small and unobtrusive at 146 x 72 mm. The antenna has been tested at speeds of more than 80 mph (130 kph) without loss of voice or data communications. Similarly, the maritime antenna has been tested up to 40 knots with high-speed turns on fast military RHIBs.

Another unique aspect of SlingShot is that the appliqué unit — which weighs close to 500 grams — is only a conduit for the radio signal, which can be encrypted or unencrypted as required by the user. This allows full security to be maintained as messages are conveyed between users or bases in locations around the globe.



Spectra's expertise is in providing voice and data services in areas where either none exist, or where high-intensity conflicts, natural disasters, terrorist attacks or pandemics have destroyed existing networks. As the company is mainly staffed by ex-serving members of the Armed Forces, first-hand experience of the damaging effects when communication services fail brings real-life knowledge to product design and development. All know only too well the crucial importance of having viable communications services available at any time and in any location to the Armed Forces.

The requirements of the modern war fighter are catered to with care. The nature of conflict has changed and so have the information needs of all involved, from the commander directly through to the frontline soldier. With this in mind, Spectra has invested in providing the communications capability at the tactical level in order that critical data can be sent and received in a timely and appropriate manner to save lives and shorten missions.

spectra-group.co.uk/

Simon Davies is the CEO of Spectra Group (UK) Ltd. Spectra is a leading provider of Voice and Data services into remote and hostile areas world-wide for defence, governmental and non-governmental sectors.

Upon leaving the Military in 2004, Simon established Spectra, which has achieved steady growth over the past 13 years through these difficult security and economic times and is fast becoming a leading service provider of reliable, robust, deployable communications. Spectra's services are deployed worldwide in some of the harshest environments supporting the UK Military and European Union, Stabilization Unit to name but a few.

SUPPORTING NGOS: A CONVERSATION WITH...

MS. VÉRONIQUE MORTIER, KEY ACCOUNT MANAGER, SPEEDCAST



Ms. Véronique Mortier is a key account manager at Speedcast where she leads non-government organizations (NGO) and UN accounts, as well as enterprise and emerging markets.

Mortier joined Speedcast in 2015 following the company's acquisition of Geolink Satellite Services, where she was the key account manager since 2004. Prior to Geolink Satellite Services, Mortier was an export sales director at Transtherm Technologies and founded a virtual art gallery, Best of Art. com. Mortier has a Business Administration Degree, and graduated from ESG Business School (Bac + 5).

Good day, Ms. Mortier. As an important player within your company's operations for NGOs and First Responders, would you please offer our readers information regarding your background and training for this important and crucial position with Speedcast? What drew you into communications in general and SATCOM specifically?

Véronique Mortier

I graduated from a business school in Paris. After college, I traveled throughout Europe and the U.S. in order to discover other cultures, traditions and share experiences. In my first position, I worked as an export sales manager. Coincidentally, I stepped into the satellite communication industry. I immediately liked the environment, as I met passionate people who were dedicated to their work and handled customer-focused challenges every day. No day is like the previous day. The telecommunication industry is stimulating and always on the move. There have been noticeable changes in the recent years and the need to adapt to meet customers' requirements is constant.

How did you decide to further your career by joining Speedcast, and what drew you into the NGO/First Responder divisions of your firm?

Véronique Mortier

Speedcast is a leader in this industry and provides innovative and cutting-edge solutions to a wide array of customers. This is rewarding, to work for a highly trusted provider of reliable, fully managed, end-to-end remote communication and IT solutions. Speedcast has a strong business identity, with solid foundations and values to which I adhere: customer focused, agile and responsive, success through people and safety, and team spirit.

I ended up moving to the non-governmental organization (NGO) sector, which is a demanding sector as lives are at stake. Working with stakeholders in this domain, I was feeling I was contributing in a highly positive manner to improve lives.

Given your daily work in composing solutions for these emergency situations that occur within Speedcast's zones of control, what do you believe are the most challenging of situations for those involved out in the field?

Véronique Mortier

The humanitarian community is operating in the harshest regions of the planet, accommodating requirements of the most vulnerable people suffering from conflicts, epidemics, natural disasters, and so on. In overall response plans of emergency or rescue missions, the ability to provide resilient telecommunications is essential.

Humanitarian aid must have the assurance of autonomous communications as they need to be in contact at anytime with their stakeholders, their headquarters, the local authorities or governments and recipients of the aid in order to coordinate their actions in the field.

As humanitarian workers are on the frontline in extreme conditions, they must be able to access agile technical support whether it's locally or remotely, at all times.

Another strong constraint is mobility, as workers need to quickly respond and travel to their site of operation. These workers require light and compact communication hardware that's easy to deploy. In their daily work in



the field, they need resilient and scalable communications wherever the location and in any weather condition.

What technologies, products and expertise can Speedcast bring to solve many of these demanding environments? Can you offer any examples of Speedcast successes in this area?

Véronique Mortier

Improving lives through remote communications technology is at the core of everything Speedcast does. The company is available where humanitarian organizations operate, providing resilient communications in the most remote parts of the world where conventional communications are unavailable or unreliable.

The company provides the robust global satellite connectivity, state-of-the-art infrastructure and unparalleled service and engineering support that NGOs and intergovernmental organizations (IGO) customers require to successfully operate. Speedcast offers a comprehensive suite of flexible, mobile, easy-to-deploy communications solutions necessary to facilitate quick emergency response and provide vital public services — anytime, anywhere in the world.

During the Ebola crisis in Western Africa, for example, Speedcast supplied VSAT links to connect hospital facilities which allowed emergency teams of NGOs specialized in medical assistance to communicate with their headquarters in Europe and the U.S. This was vital for the doctors, nurses and medical staff to be able to communicate with other parts of the world to transfer data, collect information, or simply reassure families they were safe.

In the Central African Republic (CAR), there have been armed conflicts between different factions in recent years and Speedcast has provided satellite phones to enable NGOs to communicate with their base while traveling in the war affected areas.

In your opinion, how can the industry as a whole, and Speedcast in particular, better serve NGOs and First Responders?

Véronique Mortier

Speedcast has gained broad experience in the operation of satellite services to NGOs and United Nations agencies and has a good understanding of the communication requirements of globally acting NGOs.

This experience makes the company especially aware of all the specific constraints that impact the NGO sector when acting in emergency situations and harsh environments. More than 90 satellite beams in the company's VSAT network provide C-, L-, and Ku-band coverage from more than 70 satellites that are strategically orbiting around the world.

The network is managed through a global infrastructure of state-of-the-art teleports, hubs and IP-connectivity links to ensure exceptional service and support. Speedcast takes an operator-agnostic approach to VSAT networks, enabling the flexibility to provide the best coverage, service quality, redundancy and cost efficiency for global humanitarian customers.

Fully managed communication solutions enabling humanitarian workers to perform their critical missions are managed by the company. Local experts that are located in 16 sales and support centers are fully dedicated to satellite communications to assist even the most remote sites and 24/7/365 Network Operation Centers (NOC) provide constant network monitoring via a state-of-art customer care system to ensure a robust and reliable network.

Speedcast specializes in developing connectivity solutions that feature flexible service options and can be activated anytime, anywhere in the world. A wide suite of communications solutions meet emergency response and humanitarian missions.

With "emergencies" occurring across the world on a daily, if not on an hourly, basis, could many of your firm's provisions for NGOs and First Responders also be applied to militaries and agencies in need of solutions for exigent circumstances? Has such been offered by Speedcast to such entities?

Véronique Mortier

Yes — Speedcast has worked with the Spanish Navy to provide connectivity to their headquarters in Madrid in order for normal operations to not be impacted.

Generally speaking about SATCOM, whether for commercial or for the military/government environs, what do you believe are the most pressing concerns that need to be addressed by the industry?

Véronique Mortier

Security, quick deployment, quality infrastructure, strong technical support and universal coverage.

As you look back upon your career, what project or projects truly bring a sense of personal satisfaction to you?

Véronique Mortier

Selecting one specific project is difficult. Over the past years, there have been several major projects that have required a full commitment of time and product. Among many of the humanitarian projects I have handled, the Ebola crisis was one of the most rewarding. Enabling resilient communications to humanitarian stakeholders that I personally knew at the climax of the Ebola crisis was extremely moving.

