SATCOM for Net-Centric Warfare

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5G
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FEATURES

ADVERTISER INDEX

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DISPATCHES

DISA steps toward faster technology implementation

The warfighter's needs change at the speed of sound. Unfortunately for those on the front line, the Department of Defense's (DoD) acquisition process tends to move at the speed of a biplane.

The Defense Information Systems Agency (DISA) hopes to counter the bureaucratic paralysis and continue driving innovation and offering solutions for the warfighter by using the **Other Transaction Authority** (OTA) contracting methodology.

The OTA methodology offers acquisition flexibility because it isn't bogged down by the same rules and regulations as the Federal Acquisition Regulation (FAR) process and, unlike a procurement contract covered by the FAR, Government Accountability Office (GAO) review of OTA actions are rare.

Because innovation moves at such a rapid pace, and threats to domestic security are real and evolving, DISA sees value in spurring innovation and attracting state-of-the-art companies to the conversation.

These visionaries, many of whom hail from Silicon Valley; the Austin and Boston "tech corridors;" and other centers of excellence, such as universities and civilian research labs, offer leading-edge expertise to enhance defense missions.

"*Many of the companies we're dealing with are small start-ups*," said Scott Stewart, technical director in DISA's Procurement Services Directorate. "*They're innovators, but can't endure the traditional years-long procurement processes. They also don't have the working capital to wait out the traditional FAR route. OTAs give the government flexibility to work outside the traditional process while allowing small businesses to get into the game*."

OTAs also give smaller businesses a level of comfort.

"*Navigating the FAR system can become very confusing for small business*," Stewart, who also serves at the agency's agreements officer, said. "*They usually don't have administrative staffs versed on all the paperwork, and can sometimes be somewhat intimidated by 'big government.' Under FAR, small businesses can also end up losing proprietary property because it ends up being a deliverable to the government. The way OTAs are structured, that doesn't happen, and there's just an added level of comfort*."

OTAs incorporate the flexibility needed for the government to approach acquisitions in a commercial-like manner with some restrictions.

Prototype projects under OTAs must be directly relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by DoD, or to improve platforms, systems, components, or materials in use by the armed forces.

Implemented by Congress in 1994, authorization to use OTAs reflects authorities NASA first used in 1958. The OTA methodology was made permanent in the National Defense Authorization Act for Fiscal Year 2016.

Congress sparked enthusiasm for the methodology by doubling the dollar thresholds for required approvals of OTA in the National Defense Authorization Act for Fiscal Year 2018.

Based on the OTA Process Guide, approval authority for OTAs at DISA up to $10 million require approval of the head of the contracting authority, more than $10 million and up to $50 million requires approval of a senior procurement executive, and OTAs greater than $50 million require approval of the Under Secretary of Defense Acquisition, Technology, and Logistics with notice to Congress.

Recent changes to OTA methodology

One of several changes Congress made to the statute was to widen the narrative regarding what constitutes a prototype.

In the past, when teams talked prototypes, it would evoke visions of a tangible piece of hardware. Now, a prototype can be an analysis, a process improvement, and even hardware and software solutions.

The second change Congress enacted to spur OTA use was to expand the definition of who may qualify for an OTA award.

Small businesses may receive an OTA award, and large businesses can also participate in this arena if they partner with a non-traditional defense contractor who participates to a "significant extent."

A significant extent is not defined as a percentage of work completed; rather, the non-traditional defense contractor may supply a key technology, facility, or unique capability.

The requirements of the OTA say if the prototype is successful, and the prototype phase was completed, OTA users can transition into the production phase without further competition.

To the maximum extent practicable, DISA will use a process where vendors may still have to compete for initial and follow on awards. In certain cases, leadership may determine a FAR-based contract is more appropriate for a particular project.

DISA's approach

The agency is currently using OTA methodology for several projects, and DISA service development executive Terry Carpenter recently told FCW OTAs allow defense agencies to work prototype projects that improve mission effectiveness.

"*OTA is a mechanism that forces us, and allows us, to have that conversation differently, with traditional DoD industry partners and up-and-coming companies at the table,"* the program executive officer said in an interview during a FedScoop event. *"It helps us to train our people that it's okay to have these kinds of conversations under this construct of the OTA*." DISA acknowledged it's preparing to use OTA methodology to set the framework for next generation applications in today's command and control battlespace.

Although the agency's OTA projects are currently under the authority of external agencies, this method is not necessary nor divergent from the agency's OTA policies and procedures.

DISA was granted OTA by the Defense Procurement and Acquisition Policy nearly one year ago. Since that time, a well-defined process for executing the methodology has been established.

This process was developed using the Commercial Solutions Offering process pioneered by the Defense Innovation Unit — Experimental, the DOD organization founded to help the military make faster use of emerging commercial technologies.

This process, along with templates, can be found on the DITCO website.

"*It's an interesting time*," Carpenter told FCW. "*I think there's convergence of technology where now application developers have to understand better what's going on with virtualization, with software defined networking, with security. There's more dialogue that's going to occur across the different specialties of IT. And I think OTA is just a way to help change the dialogue both internally and externally as we sit down together*."

www.disa.mil/

DISPATCHES

Soldiers training to detect and defend against EW

Knowing your location and the location of the enemy is paramount on the battlefield, and with the advent of satellites and GPS, U.S. Soldiers can pinpoint their exact position down to the meter. What happens when that signal is jammed?

Ohio National Guard Soldiers are training with a team from the U.S. Army Space and Missile Defense Command, Army Strategic Command (USASMDC/ARSTRAT) on how to identify and mitigate electronic warfare that targets GPS systems.

"*There are adversaries out there with the capability to deny, degrade and disrupt our capabilities*," said Capt. Kyle Terza, chief of home station training for USASMDC. "*The threat is out there and, while we may not be facing it right now, if we are looking towards the future, we have to be trained and ready to operate without it*."

Terza's team provides training and resources to both Soldiers maintaining communication and data networks and Soldiers out in the field who are most likely to encounter electronic warfare.

Most Soldiers are familiar with the Defense Advanced GPS Receiver (DAGR), commonly referred to as a '"dagger." It's a hand-held GPS receiver that is used in conjunction with many Army systems such as satellite receivers and battlefield command systems, but how they work is a mystery to many.

Soldiers were able to get hands-on with their DAGRs, learning how to recognize when they were being jammed and how to mitigate the electromagnetic interference (EMI). With the team from USASMDC offering guidance, Soldiers were able to triangulate and find the device that was blocking their signals.

By the end of the training, Soldiers had laid the groundwork to take the instruction back to their units to help other understand the challenges and how to adapt.

"*They understand how to recognize it, how to report it and who to report it to*." Terza said. "*If they do enter a contested environment, they are prepared for it*."

Story by Staff Sgt. Michael Carden, Ohio National Guard Public Affairs.

MALE across the pond success for Inmarsat and General Atomics

Success is the result of the test of the first-ever transatlantic flight of a Medium Altitude, Long Endurance (MALE) Remotely Piloted Aircraft (RPA). Inmarsat Government and General Atomics Aeronautical Systems' trans-Atlantic flight test of Inmarsat's L-band service.

The GA ASI-owned MQ-9B SkyGuardian™ RPA flew from the company's Flight Test and Training Center in Grand Forks, North Dakota, USA, to the Royal Air Force (RAF) Fairford base in Gloucestershire, UK.

SwiftBroadband operates over the Inmarsat-4 (I-4) satellite constellation, covering all major aviation routes, and every hidden island getaway therein, worldwide. With always available global coverage, the need for forward deployed ground infrastructure for command and control as well as take-off and landing operations is eliminated, an option that is not commonly available for traditional RPA ops.

During the remotely piloted flight, SwiftBroadband delivered seamless, worldwide coverage across multiple spot beams and satellites, ensuring no gaps in coverage and performance.

The service also provided full flexibility in route selection for the long endurance flight, while supporting mission-critical and time-sensitive data applications to include imagery and video.

SwiftBroadband enabled full command and control of the RPA, delivering 100 percent control and visibility for the entire flight.
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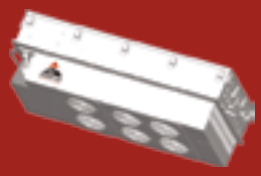

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DISPATCHES

Hughes brings managed network services to Malaysia

Hughes Network Systems, LLC (Hughes) has been selected by Mutiara Smart Sdn Bhd, a provider of network telecommunication and IT services in Malaysia, to deploy the JUPITER™ System and bring enterprise-grade, managed network services to Malaysian government and defense agencies.

The Hughes solution selected by Mutiara Smart includes the HG220 JUPITER Gateway, remote terminals, and a network management system to cost-effectively deliver both C- and Ku-band capacity from two satellites across all of Malaysia.

The system features enhanced networking technology for increased efficiencies as well as a 5IF interface capable of supporting multiple bands and transponders across up to five satellites, ensuring future scalability.

The initial order includes a hub and 200 remote terminals, expected to expand significantly over two years.

Richard Alwani, Chief Business Officer, Mutiara Smart, said the company was impressed by the ability of the Hughes JUPITER System to provide the high quality of service that the firm's customers demand.

He added that the company selected Hughes due to their advanced satellite technology, which has proven to be reliable and will serve the needs of the company's government customers.

www.hughes.com

www.smart.com.my/

Harris to enhance NGA's geospatial services

Harris Corporation (NYSE: HRS) has been awarded three multi-award IDIQ contracts with ceilings totaling $1.5 billion to provide the National Geospatial-Intelligence Agency (NGA) with geospatial data services for up to 10 years.

Harris will create, manage and disseminate high-quality geospatial-intelligence (GEOINT) information for use by the U.S. intelligence community and military worldwide under contracts that cover all three areas of NGA's JANUS program — geography, imagery and elevation. The JANUS program will contribute to and maintain comprehensive, geospatially accurate databases of the world that can be accessed quickly as intelligence, operational and crisis needs arise.

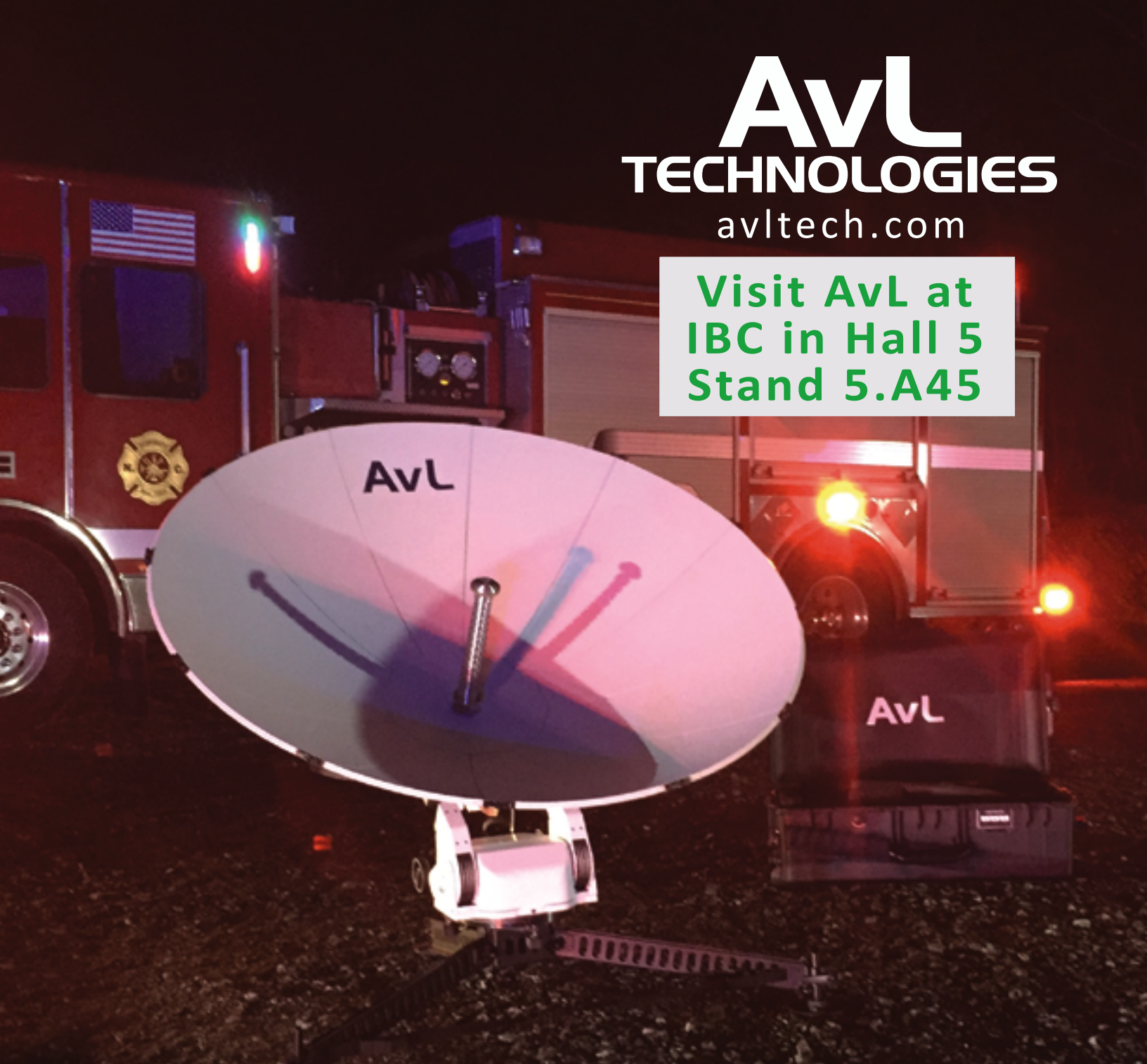
Harris will use its predictive analytics technology to continuously evaluate the health of NGA databases and to guide the acquisition, creation and integration of all forms of geospatial data. Harris' cloud-based tools will validate and correct the data — pinpointing locations that require updates.

Harris is investing in new technologies that improve the speed and accuracy of providing GEOINT products. The company has partnered with the NGA for almost 20 years to provide automated geospatial data processing, data management, and geospatial systems design and development. Harris provides high resolution geospatial data content and products under NGA's Foundation GEOINT Content Management program, and previously supported the Global Geospatial-Intelligence program.

Bill Gattle, President, Harris Space and Intelligence Systems, noted that winning JANUS continues the company's long-standing legacy of providing high-quality, responsive GEOINT and analytics to the intelligence and military communities. The company's analytics technology provides NGA with fit-for-purpose data, reduced production costs and cloud-based access to geospatial products and content.

www.harris.com

www.nga.mil/



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DISPATCHES

mu Space assists with the Wild Boars football team rescue in Thailand

"Wild Boars is finally going home!" — that was mu Space Corp CEO and founder James Yenbamroong's reaction as he witnessed the final mission to rescue the remaining four teenage players of the football team Wild Boars and their coach who were trapped in Tham Luang cave in Chiang Rai, a province in the northern part of Thailand.

The last person was rescued at 7:00 p.m., local time Tuesday. "*Many people have been waiting for this day for a long time*," James said. "*We're glad to see them out safe and thrilled that they're finally going home*."

Photo of the Thai SEALs in action during the dangerous cave rescues of the Wild Boars football team and their coach.

Thailand-based satellite and space company mu Space had sent five of the firm's staff engineers to assist in the rescue mission of 12 football players, ages 11 to 16, and their 25-year-old coach who were stranded inside the Tham Luang cave. On June 23, the football team had gone exploring in the cave after a practice game and were reported missing following a heavy downpour. They were found alive by search teams only after over a week of being stranded without food and clean water.

News of the discovery sparked jubilation across Thailand, but that news was cut short by news that the football team couldn't exit that location due to the cave being flooded.

"*When we heard the news that they were still trapped after two weeks, we quickly assembled a team of engineers to arrive in the area to give support to the rescuers*," said James. "*We collaborated with several private companies and universities who wanted to help in the rescue. Google provided useful data and Weather Decision Technologies aided the rescuers with weather forecast models. U.S.-based aerospace manufacturer SpaceX, who also offered support, contacted us to help them connect to the Thai government.*"

The final rescue mission on Tuesday brought an end to an 18-day long ordeal.

"*The Thai Navy SEALs, divers, water pumping and drilling teams, professional climbers, and K9 units played a big role in the search and rescue of the 12 boys and their football coach*," said James, adding that "*foreign individuals and teams from Australia, Belgium, China, Japan, Laos, Myanmar, Sweden, UK and USA also extended support to operations*."

Thai SEALs engaged in the cave rescue of the Wild Boars football team in Thailand.

Confirming the completion of the rescue operation, the Thai Navy SEALs on their Facebook page posted: "*We are not sure if this is a miracle, a science, or what. All the 13 Wild Boars are now out of the cave*."

Meanwhile, the eight boys rescued earlier on Sunday and Monday are being treated in a hospital in Chiang Rai.

"*Finally, they're out of the cave and going home. We wish the 12 brave boys and their coach a speedy recovery,*" concluded James.

www.muspacecorp.com/

DISPATCHES

Comtech Xicom achieves TWTA contract with U.S. Military integrator

Comtech Telecommunications Corp. (NASDAQ:CMTL) announced that, during the company's fourth quarter of fiscal 2018, its Santa Clara, California-based subsidiary, Comtech Xicom Technology, Inc.

The company, whic is part of Comtech's Commercial Solutions segment, has received a contract for more than $4.8 million from a U.S. military integrator for high-power satellite communication (SATCOM) traveling wave tube amplifiers (TWTAs).

Comtech Xicom Technology, Inc. manufactures a wide variety of tube-based and solid-state power amplifiers for military and commercial satellite uplink applications.

The product range encompasses power levels from 8 W to 3 kW, with frequency coverage in sub-bands within the 2 to 51 GHz spectrum.

Amplifiers are available for fixed and ground-based, ship-board, and airborne mobile applications.

Fred Kornberg, President and CEO of Comtech Telecommunications Corp., noted that the U.S. Military counts on Comtech Xicom Technology to deliver sophisticated, high-power amplifiers.

He added that over the past 5 years, Comtech Xicom has manufactured hundreds of amplifiers for this application and the firm's customers can count on Comtech Xicom to deliver high-power SATCOM products on time and with high quality.

www.xicomtech.com

DISPATCHES

MEOSAR-compatible beacons equal enhanced life-saving capabilities

ACR Electronics, Inc. and Ocean Signal are highlighting to commercial owners and operators how the life-saving capabilities of the company's distress beacons, including their Category 1 automatically-deployed, float-free EPIRBs, are significantly enhanced due to Cospas-Sarsat's next-generation, MEO Search and Rescue (MEOSAR) system.

The update in technology means that the importance of including an EPIRB for the vessel and PLBs for crew within the on-board safety equipment will increase as the new Cospas-Sarsat system reaches full operational capacity in the next few years.

Revolutionizing the search and rescue process, 24 EU-launched

Galileo navigation satellites will carry second generation SAR transponders for the Cospas-Sarsat system at MEO altitude to supplement the existing LEOSAR (Low Earth Orbit) and GEOSAR (Geostationary Orbit) systems. The increased number of satellites offers much faster signal detection, greater location accuracy, strengthened coverage and greater reliability to improve alerting times for distress beacon owners in emergency situations.

All ACR Electronics and Ocean Signal beacons, including the ACR Globalize V4 and GlobalFIX Pro and iPro EPIRBs, the ACR ResQLink PLBs, plus the Ocean Signal SafeSea E100 and E100G EPIRBs, rescueME EPIRB1 and rescueME PLB1, are compatible with the next-gen satellites, ensuring they will offer the near instantaneous signal detection and transmission enabled by the global MEOSAR satellite transponders and upgraded ground-station components.

For commercial vessels that require a float-free EPIRB that automatically deploys and activates when submerged in water, the ACR Electronics GlobalFIX V4 and GlobalFIX Pro, and Ocean Signal SafeSea 100G float-free EPIRBs feature Category 1 hydrostatic release brackets, or housing options.

ACR and Ocean Signal EPIRBs are reliable, innovative, compact and user-friendly with exceptional battery lives, and feature robust internal GPS to fix the exact location of the vessel in distress within 110 to 120 meters accuracy. The coordinates are then transmitted via a 406MHz distress signal to search and rescue authorities, with a 121.5MHz homing signal further guiding searchers to the position.

Estimates indicate that when using the next-gen network, anyone activating a GPS-enabled ACR or Ocean Signal EPIRB or PLB can expect their beacon to be located within 100 meters (328 feet), 95 percent of the time, within five minutes of the distress signal, instead of requiring as much as the one to two hours that is typical with the current LEOSAR and GEOSAR system.

When complete, there will be 72 MEOSAR satellites positioned at MEO altitude, more than six times the number of existing satellites in orbit. MEOSAR relays more beacon signals to ground stations using a technique known as 'bent pipe', which is an average of 46 minutes faster than LEOSAR. The network of ground stations, called MEOLUTs (Local User Terminals), along with multiple antenna systems, results in close to 100 percent reliability and near instantaneous global coverage.

The first rescues demonstrating near real-time signal detection using a MEOSAR satellite have already been documented, with the new Cospas-Sarsat system expected to reach full operational capability in 2020-21.

Chris Hoffman, Chairman of the RTCM (Radio Technical Commission for Maritime Services) Board of Directors and Chair of the RTCM Special Committee SC110 on Emergency Beacons, said that as the representative of beacon manufacturers within the Cospas-Sarsat community, the company works closely with companies such as ACR and Ocean Signal to ensure that the needs of end-users are taken into account when developing these new systems and enhancements.

www.acrartex.com/

oceansignal.com/

www.rtcm.org/

DISPATCHES

U.S.A.F. Combined Space Ops to Vandenberg AFB

The Joint Space Operations Center will transition to a Combined Space Operations Center (CSpOC) during a ceremony at Vandenberg AFB, on July 18,2018, at 10:00 a.m. PST.

In 2017, Air Force Gen. John E. Hyten, Commander, U.S. Strategic Command (USSTRATCOM), directed the Joint Force Space Component Command to transition the Joint Space Operations Center to a CSpOC. The transition to a CSpOC is designed to improve coordination between the U.S., allies, commercial and civil partners for defensive space efforts, and to enhance individual and collective space capabilities, thereby expanding overall multi-domain military effectiveness.

Air Force Gen. John W. Raymond, Commander of JFSC and Air Force Space Command, will preside over the ceremony, and validate the CSpOC has met USSTRATCOM's Initial Operations Capability requirements.

Conducting operations with allies and partners will improve space mission assurance, resilience and mutual security, broaden military relationships by leveraging capabilities, maximize effectiveness across all mission areas, and expand international partnerships in support of combined objectives.

The CSpOC will direct, but is not limited to, the following operations: Missile Warning; Positioning, Navigation and Timing; Navigation Warfare; Optimization/Restoration of Military Satellite Communications; Electro-Magnetic Spectrum Awareness and Resolution; Theater Battlespace Awareness using Overhead Persistent Infrared; Environmental Monitoring; Theater Support Fires; Space Intelligence; Defensive Space Situational Awareness; and Space Defense.

General Raymond said that space is a warfighting domain, just like air, land and sea. Strong alliances are vital, and the U.S. National Space Policy is clear on the importance of partnering with nations that share U.S. objectives to promote the preservation and long-term sustainability of the space environment. The CSpOC positions the U.S. and allied space forces to deter a conflict from extending into space, and should deterrence fail, to fight and win. The CSpOC will be essential to protecting, advancing and elevating our combined space capabilities, which fuel our country's way of life, our economy and our nation's security.

DISPATCHES

West Point promotes STEM learing in South Africa

Representatives of the U.S. Military Academy promoted science, technology, engineering and mathematics learning to 70 gifted students on June 25 in partnership with the African Institute for Mathematical Sciences.

The contingent, including Samuel Ivy, a mathematics professor, and two West Point cadets, Patrick Cowan and Matthew Rivera, spent three days partnering with faculty at AIMS to promote STEM education, facilitating practical modules and fostering further confidence in learning for the African students.

The outreach event was made possible through efforts between the U.S. Embassy in Pretoria, U.S. Africa Command, West Point and the researchers, staff, and graduate students at AIMS South Africa.

Students were selected from Luhlaza High School and Joe Slovo Engineering High School in the Khayelitsha Township, and from the Thope Foundation and the Molomhlaba Organization — two non-government organizations (NGO) focused on transforming the lives of young girls through education.

"*We are very honored to be a part of something special*," Rivera said. "*Being a cadet at West Point is an opportunity unimaginable and is something learners such as these, chosen to be here, should also be afforded*."

"Exposure and awareness of the opportunities within STEM and exposure to universities like West Point will establish future dividends for all stakeholders," Ivy said.

The U.S. Military Academy usually runs the education workshop for underserved communities in the United States, with varying modules on STEM topics depending on the

local interests. The AIMS program was the first such workshop held overseas.

"*This is a pilot program for an enduring partnership between U.S. academies and the AIMS network both here in South Africa and across the continent*," said Navy Lt. Cmdr. Carl Pearson, the Africom research, development, testing and evaluation liaison. "*We're looking forward to working together on future events that expand the horizons of Africa's youth*," he said.

Ivy and his cadets brought a "programmable circuit" lab to the training. The lab highlights the Arduino platform, an open-source miniature programmable computer with uses including education, home automation and rapid prototyping in research labs. Using this platform, the workshop introduced the South African students to technological discovery through several exploratory exercises.

The event was a smashing success, with pairs of students building and programming several different device configurations, said Thomas Pritton, a senior at Cape Town's Heathfield High School.

"*This workshop is very interesting and rewarding because a learner can design and build their own device for computer everyday use*," he said.

AIMS advocates empowering Africa's youth to shape its future, solve global challenges and drive economic self-sufficiency since its founding in 2003. The program encourages growth and learning in partnership with six universities: Cambridge and Oxford in England, Cape Town, Stellenbosch and Western Cape in South Africa, and Paris Sud XI in France.

"*We love math and we love what math is about but we must continue to discover*," said Barry Green, AIMS South Africa director. *"We want to build a stronger South Africa and continent from a medical perspective to a banking environment and mathematics is the gateway*."

The STEM learning program with West Point could not have occurred at a more symbolic time, Pearson said. The workshop coincides with South Africa's National Youth Month, with activities to inspire the next generation of scientists, technologists, innovators and leaders in the nation.

These academic engagements in South Africa and elsewhere on the continent are part of larger, long term collaboration between the broad U.S. research enterprise and African partners.

"*We are in this for the long haul, and STEM outreach activities like these today are introducing us to the people we will be working with 10 to 20 years from now*," Pearson said.

Agreements at higher government and academic levels, such as the research, development, testing and evaluation framework and the New York National Guard State Partnership Program with the South African Defense Force, highlight the value that both countries place on such collaborations.

Story by Army Maj. Al Phillips, New York National Guard

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FEATURED SPEAKERS:

Kevin M. Mulvihill, SES
Director C4, Information Infrastructure
DoD CIO Office

Thomas F. Greenfield, SES
Dep. Director Communication & Networks Directorate
DASD C3CB, OSD (AT&L)

MG (Ret.) N. Lee S. Price, USA (Panel Moderator)
Price Solutions, LLC (SDVOSB)
Former Program Executive Officer, PEO C3T

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FREE FOR ACTIVE MILITARY AND GOVERNMENT

BEFORE DISASTER STRIKES!

Make satellite part of the response plan...

By Karl Fuchs, Vice President of Technology, iDirect Government, and MilsatMagazine Senior Contributor

Disaster spares no one. It strikes when least expected... and often when we aren't prepared.

Since 2007, the Federal Emergency Management Agency (FEMA) has declared more than 1,000 disasters in the United States alone. Whether they are natural or man-made occurrences, community leaders, first responders and military organizations should be adequately prepared to respond.

Continuity of Operations (**COOP**) plans effectively keep government agencies performing essential functions during a wide range of situations, from a simple failure of an IT email server to something catastrophic, including wildfires, hurricanes and earthquakes.

Without a backup communications plan in place, it's difficult — and sometimes impossible — to make certain these governmentagenciesareabletotakecareof their communities.

As such, developing a solid communications COOP plan is critical to protecting these infrastructures.

One common mistake found in communications plans is a reliance on perceived system redundancy or invulnerability where none exists. Systems failures often include extended power outages.

Even if local power can be restored to central offices by backup generators and batteries, extended power outages can cause telephone and internet networks to fail. Although network planners take great pains in building and designing diverse path routing of terrestrial links, several examples have proven route diversity isn't fool-proof.

COOP Air Force Emergency Operations.

However, military and emergency response organizations rely heavily on terrestrial networks to safeguard critical information. When these networks experience outages for any reason — poor weather conditions, human error and even malicious intent — irreparable damage can occur.

Baltimore, Maryland found this out the hard way when a derailed train caused fire to erupt in the Howard Street Tunnel. In addition to rail traffic, the Howard Street Tunnel is a major conduit of fiber optic cables servicing Baltimore's Northeast Corridor for internet and telephone service.

When the CSX train derailed, a chemical fire ensued and blazed through multiple bundles of fiber optic cable on both sides of the tunnel. Unfortunately, fiber bundles on one side of the track were part of the redundant path for fiber bundles on the other side. In this case, the path diversity was not as robust as was needed.

A better solution for COOP plans is to provide redundancy over satellite.

Satellite communications (SATCOM) provides true diversity for terrestrial links and is much more than just a redundant path. Using SATCOM in a COOP plan gives disaster recovery personnel a great deal of flexibility.

Because satellite communication systems don't rely solely on local terrestrial grids, towers or fiber optics to send signals, they are the perfect communications solution to add to any COOP plan.

Satellite networks offer fast, non-stop connectivity to support all modes of communications that government agencies, emergency response and military organizations require during and after an event.

Not only can SATCOM be used for critical voice and data connectivity, it can also be used for monitoring and reporting data.

During the Gulf Oil spill crisis, SATCOM was used for atmospheric monitoring and exfiltrating aerial data.

MODIS satellite image of the Deepwater Horizon oil spill that started on April 20, 2010 in the northern Gulf of Mexico.

High-tech planes equipped with auto-tracking antennas and state-of-the-art infrared cameras shot high-definition video images of the 3,300-square-mile Deepwater Horizon oil spill and tracked where the oil was spreading in the Gulf of Mexico. Over a secure satellite backbone, the images were transmitted to the U.S. Coast Guard and cleanup workers, giving them a view they could not have had any other way.

Similarly, such airborne satellite communications are enabling first responders and the military to have a bird's eye view of an emergency or situation at hand to help with intelligence, surveillance and reconnaissance (ISR) for military and emergency disaster response missions.

By taking flight, airborne SATCOM systems are giving warfighters, first responders, HAZMAT crews and others a panoramic view of their surroundings. They are also getting a steady stream of updated and accurate information, making them more able to react to the situation at hand than ever before.

Another example of SATCOM's powerful **Beyond Line of Site** (BLOS) application is during large-scale floods. Aerial communications can aid people on the ground with safe evacuation routes based on the sky-down observation of impassible roads. Such information can be invaluable to emergency managers and public safety officials as they decide how to best apply their assets to respond to the flooding as part of their emergency management strategies and COOP plans.

Satellite networks can operate independently of a terrestrial infrastructure and integrate seamlessly into any terrestrial network. This capability is available anytime, anywhere and under any condition. Satellite equipment can be stationed literally anywhere — land, sea and air.

If military or emergency responders are on the move in a remote location, there is satellite equipment specifically designed for ideal size, weight and power (SWaP) that easily fits in a soldier's rucksack or responder's pack.

This sophisticated satellite equipment has the power to deliver high throughput data communications but is efficient enough to run for extended periods on a single battery. Satellites have the ability to provide true diversity for terrestrial links and assurance for emergency teams and military personnel that their messages will get through to the correct people.

While SATCOM can be more expensive than its terrestrial counterpart, satellite costs can be reduced by using a shared satellite network. During a disaster when operational continuity matters most organizations can prioritize first responder satellite traffic in a shared network environment.

An additional feature of a strong COOP plan is to implement geographic hub redundancy for SATCOM services. In a redundant satellite network, a satellite remote will automatically switch over to a secondary teleport in the event of an outage to the primary Earth station.

For example, if the primary hub infrastructure on the East Coast is unavailable due to a hurricane or other disaster, the remotes in the network will turn over to a redundant hub located on the West Coast.

This technology proves particularly advantageous for the military and emergency responders who need to quickly communicate on the move and set up networks on the fly, even when there is no existing communications infrastructure.

Having backup satellite communications will help the military and emergency responders to prepare for, and respond to, critical incidents with emergency assessment, medical assistance, relief, monitoring, evaluation and more.

Effective SATCOM networks operate from a flexible platform that supports multiple satellites and bands, including C-, X-, Ku- and Ka-band over commercial or WGS satellite frequency.

In the chaotic operational atmosphere of a military mission or emergency, obtaining and communicating clear and accurate information is vital. SATCOM by land, air and sea can provide a reliable picture of the extent of the disaster or mission at hand.

As an integral part of a COOP plan, SATCOM helps military, first responders, government and all of those charged with protecting people, property and infrastructure to respond properly to any event, and executing their missions with a heightened degree of safety and success.

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Threats

While many realize the threats from fires, storms, biological events, pandemic outbreak and weather, there are many types of threats that can cause disruptions in operations and require critical communications.

- *Active shooter*
- *Avalanches*
- *Aviation/maritime/land/vehicle accidents*
- *Chemical*
- *Civil unrest*
- *Cyber attacks*
- *Droughts*
- *Explosions*
- *Extreme cold/heat*
- *Fires*
- *Floods*
- *Gas leaks*
- *Groundwater contamination*
- *Hazmat events*
- *Landslides*
- *Pest invasion*
- *Power outages*
- *Radiological/Nuclear events*
- *Sinkholes*
- *Structural collapses*
- *Terrorism*
- *Thunderstorms/lightning strikes*
- *Tsunamis*
- *Volcanoes*

VIRTUALIZED SMALLSAT GROUND SYSTEMS...

New alternatives for government and intel community programs

By Jordan Klepper, Kratos Defense

For a number of years, small satellites (smallsats) have been seen as a way to provide low cost solutions for technical demonstrations.

Only recently, have smallsats been viewed as mission-ready for government and Intelligence Community (IC) programs. While the commercial world has been quicker to adopt these new platforms, the advent of virtualized ground system environments that feature plug-and-play design for simplified setup, automation tools for lights-out operation and complete situational awareness have opened new alternatives for government and IC programs.

While virtualized environments allow IC programs to stand up new ground stations quickly and efficiently there is still some resistance to migrating legacy systems for a number of reasons, time and effort to prepare and complete a successful migration being chief among them. New programs, with no legacy systems to migrate, have been quicker to embrace virtualized environments.

What Does it Mean to be Virtual?

For the purposes of this article, virtual is defined as a system or piece of equipment requiring only Commercial-Off-The-Shelf (COTS) hardware in standard configurations to run. Applying this definition to ground equipment, a virtual ground system or piece of ground equipment can run on a standard server or in a cloud instance with no special or system specific configuration of the underlying hardware.

A Virtual Architecture

Before discussing virtual architectures, a quick synopsis of existing ground architectures should be helpful. A traditional satellite control ground system requires basic elements to perform three general functions: Command and Control (C2), Baseband, and Radio Frequency (RF).

Legacy Architectures

The architecture shown in *Figure 1* is generally common and known to be reliable amongst many satellite programs that are operational today.

In a traditional architecture, antenna systems tend to be more expensive and inflexible than the other pieces of ground equipment. In order to mitigate the need for every satellite program to build its own antenna farm, shared antenna systems such as the Air Force Satellite Control Network (AFSCN) were created to provide a common, distributed antenna system through which multiple Department of Defense (DoD) programs could interface for antenna uplink and downlink services. Shared antenna systems also exist in the commercial market as well with companies such as Kongsberg Satellite Services AS (KSAT), Swedish Space Corporation (SSC) and Atlas providing services to both commercial entities as well as some national programs.

While shared antenna systems reduce the antenna expense, mission specific hardware or systems may still be required to be co-located at the antenna site. Such co-location increases hardware investments and expands datacenter floor space. Using edge devices, virtual architectures, and even

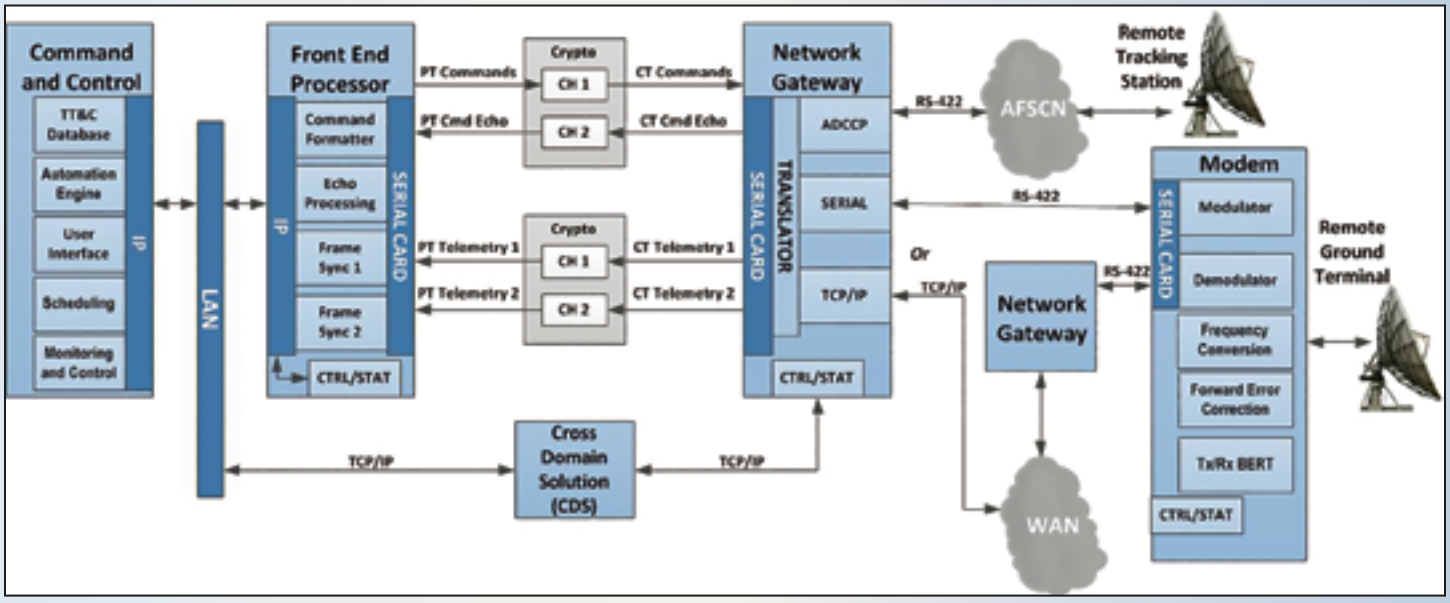

Figure 1: Typical Traditional Ground System Architecture

architectures augmented with virtual solutions can result in a reduction in overall operating costs.

Virtual Architectures

Virtual architectures look very similar to the "traditional ground system architecture", yet there are some major differences:

- *Hardware platforms*
- *Data interfaces between components*
- *Configuration flexibility*
- *Cyber security considerations*
- *Reduction in integration labor*

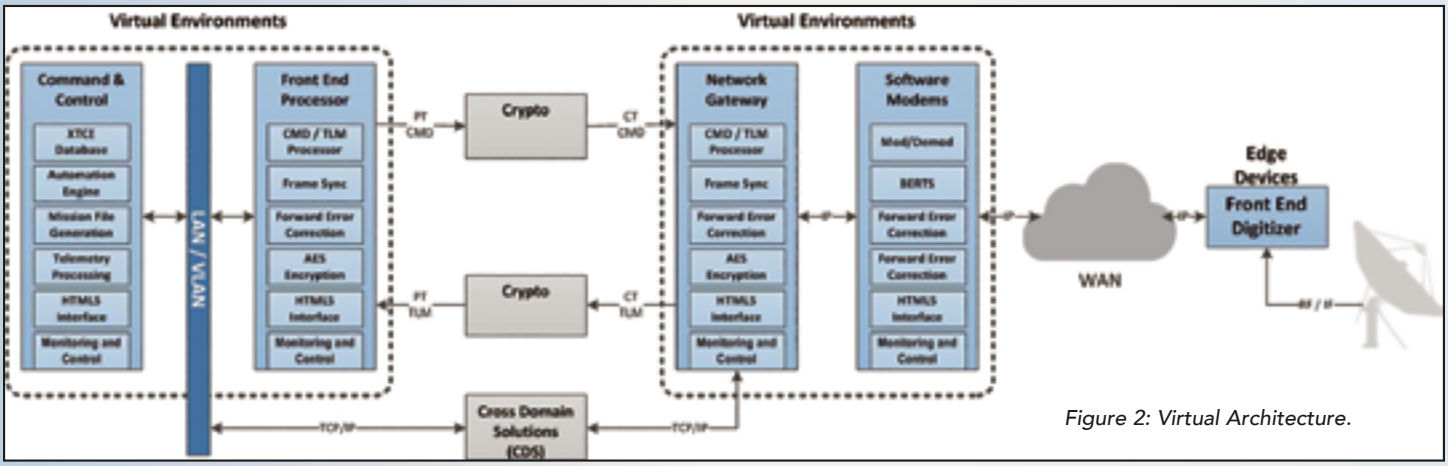

Figure 2: Virtual Architecture.

In a traditional architecture, the edge device or digitizing front end and modem are in the same hardware package. In a virtual architecture, the edge device is a hardware piece that could be co-located at the antenna site. Now separated from the digitizing front end, the virtual environment could host the modem (software). This lends itself to unique architectures such as distributed ground sites with consolidated processing through RF transport.

Serial communications, as shown in Exhibit 1, are common in traditional ground systems. Virtual environments by their nature do not support serial interfaces. However, by using serial-to-IP converters, items such as legacy serial cryptographic devices can be used in a virtual environment. This is one example of how a current architecture can be augmented with virtual solutions.

A Virtual Ground System: quantum®

For this article, smallsats are being defined as being nominally 500 kilograms.

They require ground systems that match the rapid rate of innovation and reduction in cost that COTS products give them on the spacecraft side. As traditional architectures are unable to rapidly meet the ever-changing needs of small satellites, a virtual ground system environment is an ideal solution.

quantum is the Kratos small satellite virtualized product family designed to solve small satellite ground system requirements. The quantum system consists of both narrowband and wideband offerings and has been developed to support missions through various stages; *i.e.*, development, integration, launch and operations.

Multi-mission and re-use were major development requirements for the quantum system. By ensuring the developed ground system could be used for the current missions but also for the next several missions, the quantum system is a virtualized solution meeting the majority of user needs. While many users can use a COTS ground system out of the box, provided the system has enough configurability, there will always be those users who need something special. A virtual environment provides the flexibility for ground system developers to create custom patches to standard baselines allowing them to adapt quickly and efficiently to special customer requests.

While the majority of the quantum ground system is virtualized, there are pieces, which for different reasons, consist of hardware units.

Narrowband Systems

The quantum narrowband system, in its typical configuration, consists of a digitizing front end or edge device (SpectralNet®Lite), a quantumRadio, quantumFEP (Front-End Processor), and quantumCMD (Command). The quantum system is fundamentally designed to support virtual environments. (Please see ***Figure 3*** on the next page.)

The edge device brings a tunable range of RF frequencies, from IF up to S-band, into the digital domain. For small satellites, this is significant as they only need a single device located at the antenna and can potentially remove block converters from their budget. SpectralNet Lite supports the Vita-49 interface to transfer the digitized data into the digital domain, *i.e.*, to a software modem.

By embracing open standards, it could theoretically interface with any software modem

(supporting the open standard) and, as such, is a modem agnostic edge device.

The software modem or quantumRadio provides a wide range of modulation and forward error correction schemes. Currently, supporting up to 10 MHz of bandwidth, it is designed to handle narrowband commanding and telemetry links but can also be used for narrowband payload links. This flexibility makes it ideal for supporting a small satellite program.

The front-end processor (quantumFEP) handles all of the baseband processing. Supporting a range of data protocols, it also provides encryption services at many different levels. Management of AES keys, their storage, and over the air rekeying (OTAR) are functional capabilities baselined into the device.

quantumCMD provides central data management of all core command, telemetry and ground Monitor and Control (M&C) needs common to smallsat missions.

The quantumDRA is a virtual recording application that also provides some high level processing.

Edge Devices

Edge devices will continue to play an important role in virtual architectures. Somewhere in the system, the RF signals have to get into the digital domain. Edge devices perform the function of analog to digital (A/D) and digital to analog (D/A) conversion. The quantum edge device (SpectralNet Lite) supports an open standard on its data interfaces. This is a key feature that must be supported by edge devices wishing to exist in a virtual environment. By open supporting standards, these devices (along with the antenna system) begin to look like nodes on a network and can be used by just about any software modem anywhere to take a pass.

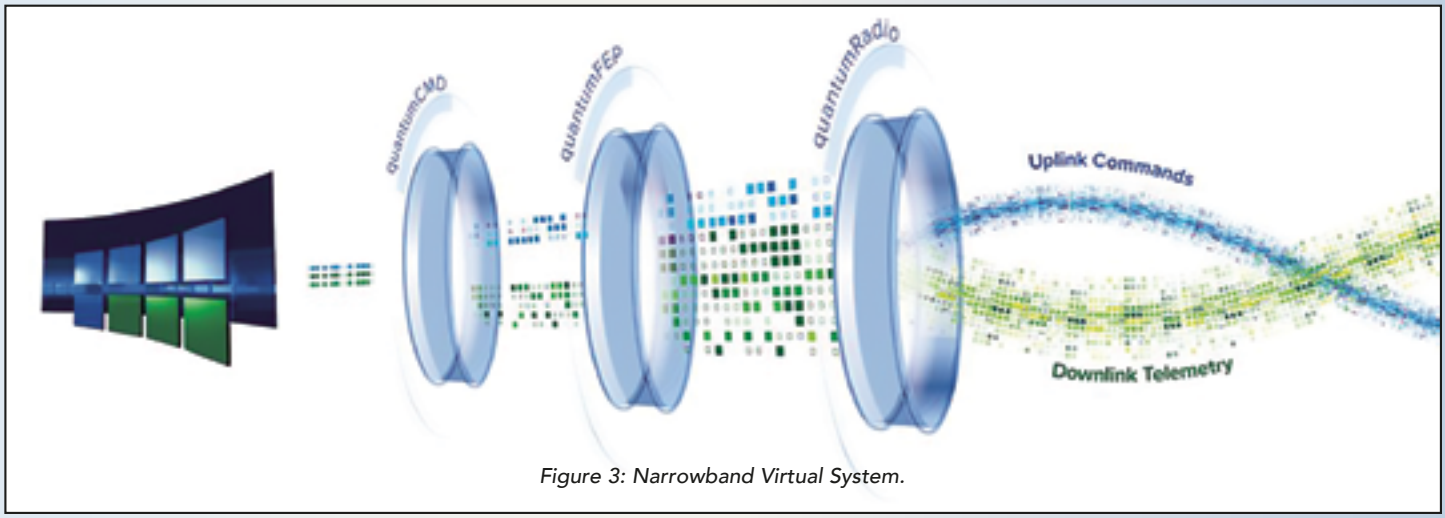

Figure 3: Narrowband Virtual System.

Wideband System

The quantum wideband system, in its typical configuration, consists of quantumMR (Mission Receiver) and quantumDRA (Digital Recording Application).

quantumMR is a COTS hardware solution tailored specifically to meet data rates of small satellite payload downlinks. It can support two independent receive channels, each capable of processing up to 600 Msps, making it a power house in the small satellite receiver market.

While the quantumMR is a hardware solution, it was developed with a virtual architecture in mind. By embracing standards such as Vita-49 and CCSDS, it is highly compatible with a virtual environment.

Benefits of Virtual Ground Systems

While there are the obvious benefits to virtual ground systems, such as reduced total cost of ownership, others, like configuration management in a multi-mission environment, may not be as obvious.

Multi-Mission

A virtual architecture lends itself well to a multi-mission environment where multiple assets are trying to use the same ground system. Configuration management of ground systems for the multi-missions becomes very important. The quantum applications allow for application level configuration management. Additionally, Virtual Machines (VMs) have tools (i.e. snapshot and templates) that provide the ability to control configurations at the system level.

Virtual environments allow ground network service providers to onboard customers quickly and cost effectively. End customers can develop

against an instance of the virtual solution and then pass along system configuration files to the network provider. Issues such as different hardware configurations and incompatible pin outs on serial lines that plague hardware solutions do not have any impact on virtual solutions. Additionally, multiple network providers or ground networks can all share the same configuration or even the same instance of the solution (contained in either a VM or container).

Several quantum users today have end customers who use their own instances of quantum that deliver configurations of quantum they have tested. These end customers are able to refine their configurations through various stages of the program, including development, integration and test, through launch and on-orbit testing.

Cost

Virtual solutions allow ground systems to scale exponentially with minimal hardware investments compared to hardware solutions. Additionally, cloud computing introduces architectures that reduce the initial capital costs of ground equipment to near zero and missions or programs run entirely on operating budgets.

With all that being said, software solutions are not free. Lots of time and effort goes into ensure that virtual products work consistently and that they perform to the same level as the hardware solutions before them.

Delivery

System delivery tends to be the next major pain point. With many hardware based ground systems, typical delivery time frames of three to six months (sometime longer) are not uncommon, whereas quantumRadio has an advertised lead time of less than 30 days.

The ability to deliver virtual ground solutions enables rapid deployment of ground sites. Programs that would have taken several years can be deployed in several months. Additionally, new capabilities can be delivered either as updates or as patches to existing systems.

Redundancy and Resiliency

Virtual systems are able to leverage the work going on in other software based environments, one of which is redundancy. With VMs, whole systems can have fail-over capabilities with systems monitoring each other and even fail-over between COTS servers. Kratos has government users who have deployed these architectures to increase the resiliency of their systems today.

Virtual Considerations

Crypto

While many aspects of the small satellite ground architecture have been virtualized, there are a number of things that are much more difficult to virtualize (i.e. serial interfaces). Cryptographic devices used to encrypt commanding data and decrypt telemetry data, especially in the government and IC programs, are hardware systems that are tightly controlled. Virtual systems have the ability to interface with these devices and programs requiring their use.

Many commercial customers today use commercially available AES encryption and decryption to secure their links. quantum supports commercial AES and can support secure links in cloud-based architectures. Small satellites, especially in government programs, have been seen as a way to demonstrate technology. These "tech demos" often have little to no security on the link. quantum offers a way to provide an additional layer of security to these demonstrations.

Virtual environments are increasingly enabling commercial, government and national programs to support small satellite missions. Virtual environments allow for the deployment of new ground stations quickly and efficiently and can augment existing traditional systems as well.

The quantum product line is an example of how virtual environments are not only ready for missions today but also an example of how programs are actively deploying virtual ground systems.

www.kratostts.com/~/media/ktts/datasheets/satellite%20and%20space/quantumgnd.pdf?la=en

THE KEY TO MORE EFFECTIVE COMMS IS...

5G technology

By Sagi Subocki, Vice President of Products and Marketing, Softil

The ultimate promise of 5G technologies lies in its ability to deliver new, essential services that will go well beyond "instant gratification" for the Netflix and Hulu aficionados, according to *Sagi Subocki*, the Vice-President of Products and Marketing at Softil.

5G networks will see rates of as much as 10 times faster than current 4G networks, while having the capacity to connect trillions of objects. This degree of connectivity will prove to be economic game changers for every nation, supporting widespread adoption of emerging applications such as autonomous vehicles, augmented reality, smart cities, and the Internet of Things (IoT).

Connecting economies to 5G-enabled, high-speed networks will have deep impacts in terms of innovation, productivity and efficiency gains beyond those of current mobile broadband.

5G Networks, currently actively developed in 3GPP, IEEE, ITU-T and other standards organizations, hold the promise of going well beyond increased network bandwidth.

Consumers have an insatiable appetite for "more data now," so wider pipe might seem to be a key strategic agenda item, warranting the development of a new class of faster, more efficient and reliable communication technologies and infrastructure. However, in reality, "bigger pipe" might be the last priority item driving the need for the new 5G networks.

These new 5G services will help to dramatically improve the quality of life, and even beyond quality — they will help to save lives.

Mission Critical Communications (MCC) is one of the key elements of the new 5G buildout. Starting with 3GPP Release 13, Mission Critical Communications are delivered as the core network service allowing First Responders — police, firefighters and emergency medical personnel — to replace outdated radio with modern communication capabilities which are readily available to any smartphone user today.

In 5G Networks, First Responders will go far beyond basic Push-to-Talk to add Push-to-Video, video sharing, group chat, file sharing, location sharing and much more — all with the proper prioritization of mission critical traffic above anything else.

5G networks will also include cars and "things" into the communication flow from the start — services such as V2X (vehicle to anything) and MTC (Machine Type Communications) are natively supported, which allows users of 5G networks to take full advantage of all the advanced capabilities and create types of solutions not even thought of before as now possible.

Other technologies which will be enabled and facilitated by the 5G networks are the so called Augmented Reality (AR) and Virtual Reality (VR), both of which need full support of the faster and more capable network.

Think about dealing with a natural disaster, such as a wild fire. Armed with the traditional LMR (Land Mobile Radio), firefighters can talk to each other, but to be able to see the spread and intensity of the fire, they have to rely on external, unconnected tools. Their communications to the rest of the world might also be affected if a nearby cellular tower is jeopardized. Of course, firefighters can deploy planes or even drones for visual assessment of a fire, but all the data coming from those high-tech channels will not reach First Responder teams in real-time.

What is needed is to also include satellite communications into the mix. Satellite networks have been around for a long time, but more often than not, they have been used for either cellular traffic backhaul, or for point-to-point communications that was limited strictly to that satellite network.

With the advent of the 5G, there is an opportunity to organically design satellite networks to work seamlessly with the terrestrial networks, providing much needed extension of coverage that is so essential for Mission Critical operations, all via seamless design from the outset. This seamless design work is already planned to occur in the 3GPP Release 16, including specific study of items for the integration of satellite communications under the 5G umbrella.

What can happen once advanced networking capabilities are deployed — what's important to note is that, while 5G networks are still in the early design stages, many services, such as MCC, are already available in the LTE networks, as specified in the 3GPP Release 13 and above.

Using MCC over LTE, the communication capabilities of First Responders can already be greatly enhanced. Even if a tower becomes unavailable, a mobile network can be provided via the antenna on any truck, drone, emergency vehicle or even a backpack. Such private LTE networks will support all of the communication capabilities among all First Responders.

Firefighters will be able to share a live video of a disaster site among team members, as well as receive videos from drones, surveillance cameras, planes and satellites in real-time. They will also be able to share their location, greatly improving teamwork and team communication.

Adding AR into the mix will put yet another twist on the way First Responders communicate. For example, a first responder might wear special goggles or a helmet where all the visuals will be displayed directly on the goggle's screen, including video, object identification, any type of maps, location of the team members and more, coupled with ability to simply use your eyes as a control interface.

Going beyond traditional communication modalities, 5G networks will also facilitate the inclusion of "other participants" into a mission critical exchange. Think about all the sensors which are now becoming part of the communication network — temperature sensors, humidity sensors, wind speed and direction sensors, thermal sensors and many more. Each one of those "things" can become a "life-saving thing," greatly assisting in an important critical mission — an army of robots would be highly useful in the case of natural disasters or search and rescue operations.

5G networks will change all aspects of human life — from such simple qualities as unconstrained network bandwidth for everyone in this increasingly mobile world, but an even more connected society, to new and profound capabilities for First Responders, allowing them to use advanced tools, such as real-time video, location sharing, and connectivity to the internet in order to be a lot more efficient in their jobs. That will equate to saving more lives as well as connecting and optimizing things never connected before, such as smart cities, farmers' fields, wild animals or simply truck pelotons.

There will not be any area unaffected by the 5G change — and the world will eagerly embrace this new, ever more connected, planet Earth.

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With a strong technological background, Sagi is a proven leader in product management, marketing, and business development and specializes in product and marketing strategies that balance business, technology, market, and competitive landscape. He has a significant track record in the fields of telecommunications, video over IP, real-time mission critical communications, and Internet of Things (IoT).

COTM + SOTM

More mobility, more bandwidth — meeting government requirements

By Dwight Hunsicker, Executive Vice President and General Manager, Government Solutions, Globecomm

In the world today, there is a constant need for information, intelligence and awareness — this is particularly true for military forces who may be deployed anywhere, from large cities to the most remote locations — this is where Communications-On-The Move (COTM) and SATCOM-On-The-Move (SOTM) come into play.

Deployments may be sized from small teams to enterprise-level divisions numbering in the thousands. Satellite network technologies can provide the services, capabilities and infrastructures to furnish U.S. Government customers with connectivity services anywhere in the world in a highly secure and resilient manner.

The insatiable, global demand for broadband connectivity is increasing every day. Communication systems have taken the largest leaps in attempting to keep up with the demands new use cases are placing on the network at large.

Government regulatory commission's and standard's groups are working to provision communication spectrum that will support the traffic. The challenge is to support new connectivity requirements and uses of spectrum, while at the same time not diminishing the capacities or services that are currently in place (*e.g.*, video, voice, and Internet Protocol (IP) data.)

Background

A typical satellite network will consist of a hub or teleport with connection via satellite to Very Small Aperture Terminals (VSATs). The advantages of VSAT technology are clear:

- *VSAT services can be deployed anywhere*
- *VSAT provides a wireless link completely independent of the local terrestrial / wireline infrastructure - especially important for expediency, command & control, as well as backup or disaster ecovery services*
- *VSAT services can be deployed in hours or even minutes, especially true with auto-acquisition antennas*
- *VSAT enables networks to get the same speeds and SLAs at all locations across their entire network regardless of location*
- *VSAT systems use onboard acceleration of protocols such as TCP ("spoofing" of acknowledgement packets) and HTTP (pre-fetching of recognized HTTP objects); this delivers high-quality Internet performance and associated user experience regardless of path latency*
- *VSAT systems use a broadcast download scheme (such as DVB-S2) which enables them to deliver the same content to tens or thousands of locations simultaneously at no additional cost*

Satellite Orbit Types

OVERVIEW	DETAILS
LEO: Low Earth Orbit Satellites	In order for Low Earth Orbit satellites to remain only a few hundred miles above the surface of the earth, it is necessary for them to move much faster with reference to the earth. Lower orbits appear to move faster than the rotation of the earth, and higher orbits slower. Low Earth Orbit (LEO) satellites, like the Iridium fleet are only a few hundred miles above the surface of the earth, allowing small, handheld terminals (like overgrown cell phones) with omnidirectional antennas to be used. To maintain this low orbit, the satellites are constantly moving, rapidly around the earth. The disadvantage of LEO satellites is that they are not parked in one spot, relative to the earth, and are actually rotating rapidly around the earth. LEO satellites are rising and setting and zipping across the sky, so to provide uninterrupted service, you need to be able to see more than one satellite at any given time, with the capability to hand off the call from one setting satellite to a new one that might be rising. Iridium and Globalstar are two of the major vendors and soon to market OneWeb and LeoSat constellations have pursued this complex technology.
MEO: Medium Earth Orbit	Medium Earth Orbit satellites, like the O3B Network, have satellites in a circular orbit about 5000 miles above the equator. The O3B Network currently uses 12 satellites each with 10 steerable spot beams that light up certain areas on the surface of the earth as the satellite revolves around the earth
GEO - Geostationary Earth Orbit	In order to overcome Earth's gravity and remain stationary in the sky synchronized with the rotation of the earth, geostationary satellites must maintain an orbit of 22,300 miles (37,000Km) above the equator. These are the primary means of satellite communications and are spaced just 2 degrees apart, and often even less. This results in the satellite orbiting the earth at exactly the same rate that the earth revolves, thus appearing to the observer to be stationary in the sky.

Figure 1.

- *VSAT networks are private layer-2 networks over the air providing Corporate-grade security*

Looking Forward: Satellite Space Segment

The mature Fixed Satellite System (FSS) will play an important part as a gateway connecting back-haul data using the available C-, X-, Ku- and the emerging Ka- frequency bands to link data centers supporting network management.

The FSS marketplace is also moving into the implementation of High Throughput Satellites (HTS) to increase data delivery capacities — this will provide increased capacities and augment FSS gateways to support larger user communities.

Additional infrastructure provided are Mobile Satellite Systems (MSS) with the implementation of Medium Earth Orbit, and Low Earth Orbit (MEO, LEO) platforms using L-band frequencies and the promising newer HTS Ku and Ka-band LEO constellations coming to market in the coming years.

The MSS interface is the cross over point from the terrestrial cellular system. This interface provides the dual-mode connectivity that supports coverage gaps that are a part of the cellular infrastructure. The following table summarizes the satellite types that we estimate will be used in the future:

Satellite Orbit Types
With the diverse requirements of mobility, the solutions that are available to fit the needs of Rolling, Floating and Flying use cases do not currently have a single solution.

The solution options will require the integration of fixed radio networks (WiFi, low power/narrow band, etc...), cellular and satellite in multi-mode, hybrid connectivity scenarios, depending on the data throughputs required. (*See Figure 1 on the previous page.*)

Looking Forward: Implications of HTS
Also needed for consideration is the advent of high-throughput satellites (HTS) that enable network service providers to offer a new generation of communications solutions.

HTS systems combine the exceptional spectrum efficiency and performance of spot-beam antennas with ultra-wideband transponders to enable unprecedented levels of bandwidth and throughput. Each spot beam reuses frequencies in multiple carriers so that a single HTS spacecraft can provide five to ten times the capacity of traditional satellites. For the customer, this provides the potential to dramatically increase data rates, greater than 100 Mbps to a single site, and improve application performance compared to traditional satellite based communications.

The Government and its end users need to be advised of the limitations associated with HTS space segment.

- *The multiple spot beam approach could limit the opportunity to provide a one to many distribution covering a wide area like we have with traditional VSAT networks. Other requirements may involve a private TDMA-type network comprised of numerous remote terminals spread across an Area of Responsibility (AoR). In order to achieve this, End Users would have to use multiple uplinks from the various hub ground stations managing the specific geographic spot beams. They are typically charged by a consumption model rather than bandwidth which will typically increase costs.*

- *Along this same train of thought, the HTS satellites also require ground infrastructure to manage them removing the typical bent-pipe scenario of legacy satellites; i.e. your communication must land at the satellite operators' ground stations then be routed to you. The benefit of HTS comes in delivering a broadband signal to a geographic region within a single spot beam or delivery of broadband for mobile applications where the network will have switching capability from spot beam to spot beam. Good for communications-on-the-move, less so for other wide-area networking requirements.*

Despite this tremendous potential, there is a great deal of misperception and lack of understanding about these new technologies among both customers and the industry at large. This is compounded by marketing exuberance from some satellite fleet operators with their own specific and often proprietary flavors of these emerging technologies.

Figure 2.

BENEFIT	
Bandwidth/ Throughput	With HTS, higher throughputs can be achieved. Therefore, modem and VSAT management system manufacturers are developing and building systems that can deliver those high throughputs.
Flexibility	With the ever-changing market and customer demands it's important to live up to those expectations with modems and VSAT management systems which are easy and quickly adaptable to those demands. This means being able to quickly upgrade and/or downgrade in both hardware at the teleport as well as throughput on the user's end.
Network Management Systems	Looking at the VSAT management systems manufacturers it's clear that for complex networks out there today an easy and accessible tool is a must. Manufacturers have made great progress in developing Network Management systems which allow for easy configuration and monitoring of networks. Furthermore, there is continuous research and development in designing flexible and bandwidth management to improve satellite bandwidth efficiency.

Customers and satellite network service providers alike need an unbiased engineering perspective on the features, benefits and trade-offs of emerging HTS technologies.

Looking Forward: Modems and Antennas

For the modem and VSAT management systems, manufacturers are rapidly developing new modems equipped with the latest technologies to support technologies like HTS as well as creating greater bandwidth efficiencies.

These technologies will help in providing a stable and secure connection between hub and remote with high throughput availability. These benefits are further highlighted in *Figure 2* on the previous page.

For mobility use cases that require a dual-mode satellite connection to sustain their data connectivity, the emerging arena of malleable flat panel antennas offer promising benefits in terms of vehicle integration, installation flexibility, size, weight & power, and cover. These antennas offer sizing to achieve the desired signal quality for both transmit and receive of satellite signals, while at the same time allowing for conformal installation to the body of the vehicle, vessel or aircraft due to the malleable nature of the panel material.

Summary

For consumers and producers of broadband connectivity, these truly are exciting times — with the continual evolution of technology, providing more with less energizes the industry and the end user reaps the benefits.

As the evolution occurs from point-to-point voice to integrated data networks, to highly sophisticated command and control as well as surveillance networks, to the current state of the Internet of Things, the envelope must continually be pushed to expand throughput, increase connectivity and enhance the overall user experience.

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Dwight R. Hunsicker has more than 28 years of experience in sales, marketing and business development activities associated with communications networks, products, and services for Government. Since joining Globecomm in 2001, he has helped build the company's Government business base such that it represents more than 50% of the company's revenue. He is responsible for setting the overall go-to-market strategy in terms of positioning the company's products and services within the Government market space. He manages a team of business development and sales professionals that cover the DoD, Intel, Foreign Affairs, and Civilian sectors within the Government market.

Mr. Hunsicker came to Globecomm Systems from WorldLinks Incorporated which he co-founded to provide professional engineering / consulting services to domestic, international and US Government clients. At WorldLinks, Mr. Hunsicker and his organization were responsible for the development and implementation of numerous communications systems, focusing on terrestrial wireless and satellite communications technologies. Mr. Hunsicker personally focused on developing unique business strategies for companies and Governments advising them on how to apply information technology and communications technologies to optimize their needs.

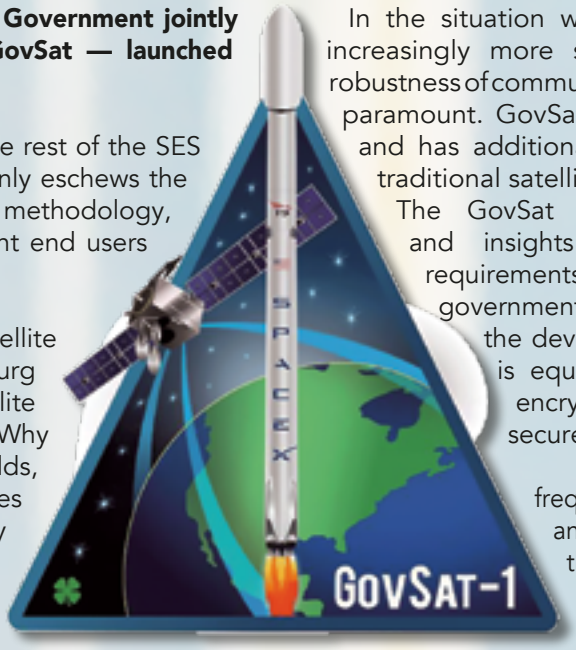
A GOVERNMENT-ONLY COMMERCIAL SATELLITE

Experts from SES weigh in...

By Ryan Schradin, Senior Contributor and Executive Editor of SES-GS' Government Satellite Report

Recently, SES and the Luxembourg Government jointly — through a separate entity LuxGovSat — launched their new satellite, GovSat-1.

This new satellite is different from the rest of the SES satellite constellation in that it not only eschews the company's traditional satellite naming methodology, but it's also intended for government end users exclusively.



Why would a commercial satellite company and the Luxembourg Government jointly launch a satellite specifically for government users? Why would an organization that builds, launches and operates its own satellites — such as the United States military — be interested in a government-only commercial satellite? Is there really market demand for such a thing in the commercial satellite market today?

To answer these questions, Government Satellite Report sat down with Chris Kinman, Vice President of Business Development at SES Government Solutions, and Paul Wells, the Vice President of Government Satellite Communications at GovSat, to discuss why GovSat-1 is important for today's federal government, how it's different from government satellites and constellations that are available today and why a government-only satellite was a smart investment for one of the world's largest satellite communications companies and the Luxembourg Government.

Government Satellite Report (GSR)
What exactly is GovSat-1 and how is it different from other commercial satellites?

Paul Wells (PW)

GovSat is a public-private joint venture between the Luxembourg Government and SES, the world leading satellite operator.

GovSat-1 was launched in January 2018 year and has been operational since March of 2018. It is not a commercial satellite but one designed for use only by Government and Institution users. The unique satellite features the latest technology advancements in communications security and is entirely dedicated to governments and institutions including defense and security applications.

In the situation when cyber threats are becoming increasingly more sophisticated, the resiliency and robustness of communications capabilities are absolutely paramount. GovSat-1 was devised with this in mind and has additional levels of security compared to traditional satellites.

The GovSat team has extensive experience and insights into the unique connectivity requirements necessary to support classified government missions that have factored into the development of the satellite. GovSat-1 is equipped with anti-jamming features, encrypted telemetry and control and uses secure frequencies.

Unlike traditional satellites, the frequencies GovSat-1 is using are in X-band and military Ka-band. GovSat-1 provides the most powerful and flexible X-band capacity available. This frequency is reserved for governments and institutions and is ideal to establish secure and robust satellite communication links, for example between theaters of tactical operations, maritime missions or over areas affected by humanitarian crises.

The secure communication links enabled by high-powered military Ka-band beams are for smaller, high-throughput VSAT terminals and are ideal for mobility applications, such as Intelligence Surveillance and Reconnaissance (ISR) missions and various border surveillance applications, including maritime.

It is also important to note that GovSat-1 is operated from its Secure Mission Operations Centre in Luxembourg. This is a dedicated facility that ensures 24/7 operations, with security-cleared personnel with government and military SATCOM experience that can handle classified information up to NATO/EU and LUX SECRET. GovSat-1, together with its Secure Mission Operations Centre, forms one of the most reliable and secure satellite communications capabilities for governments available on the market.

GSR
Why did SES and the Luxembourg Government jointly build and launch GovSat-1? What is the business case for building and launching this satellite?

PW
The business case is to provide secure, assured and resilient satellite communications Services for Governments and Institutions for NATO, EU and Allied partners to Luxembourg.

Accessibility and affordability are two very important characteristics when it comes to serving governmental and

institutional customers. With GovSat-1, the capabilities of the national programs are made accessible to a broader spectrum of governments. In other words, they can get secure and robust end-to-end communication services from GovSat, and protect their nations without launching their own, quite costly, satellite programs.

The connectivity established by GovSat-1 enables critical communications over such important geographical areas as Europe, the Middle East, Africa, and provide extensive maritime coverage over the Mediterranean and Baltic seas, and the Atlantic and Indian oceans.

GSR

The government operates its own purpose built satellite and that fleet handles most of its SATCOM requirements. How is GovSat-1 different from the purpose-built satellite that the military currently operates?

Chris Kinman (CK)

There's really not much of a difference. The big difference is the investment that we made on our own dime and with investment from the Luxembourg Government. We designed the satellite very close to government needs in meeting their demands for secured communications.

We built in NSA grade encryption of the telemetry and control and wrapped security around the service, as well as the facilities that serve the ground segment. We also built in military grade anti-jam capabilities — all of the resilient type of U.S. government requirements. They get the same thing with this satellite.

GSR

It sounds as though there are a lot of similarities between GovSat-1 and a satellite that the U.S. military currently operates and that raises a most interesting question — why use GovSat-1 instead of these purpose-built satellites that the military already has?

CK

Nothings free in life, including those government satellites that I talked about. Those constellations were expensive and, frankly, they're very expensive to operate. SES and Luxembourg Government saw the opportunity to economically fulfill critical mission needs.

The military needs satellite bandwidth at certain times and that bandwidth has to work. With a government scenario, trying to get priority bandwidth, a lot of our users have come to us and said they have to wait in line, participate in a scheduling process and hope that they get the bandwidth when needed. They have to contend with others in the mission area and oftentimes may not be able to get that bandwidth because some higher priority command came along and took it away.

These customers have identified the need and requirement to us saying, "*…if you build something like this we would actually pay for it because the bandwidth set aside in reserve we're actually going to get it when we need it.*"

GSR

Earlier this year, GSR heard about issues with ground stations and ground technology at a trade show. Would the use of GovSat-1 require the U.S. government or a U.S. military user to have different ground infrastructure or new technologies and terminals on the ground?

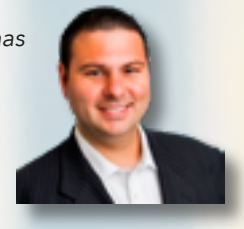
CK

The great answer is "no" because our end users don't have to modify anything about their WGS capable terminals. They don't have to go out and do a refresh of any of these terminals that are out in the field — all they need to do is tune to the military Ka- or X-band frequencies that we provide.

The capacity is unbelievable — we're talking about 10 transponders alone in global beam for X-band, up to 40 transponders for narrow beam of high powered beams for X-band, and 36 transponder equivalents within the Military Ka-band. These beams are steerable and military grade and the satellite is so flexible that users can cross strap both between beams and also across X- and mil Ka-band. This is the inflection point where commercial satellites meet government satellites. We're at a point where the technology is blending and they can pay for service and get outstanding results.

To learn more about GovSat-1 and how it can benefit government users and the military, please visit ***ses-gs.com/govsat/resources/govsat-1-brochure/.***

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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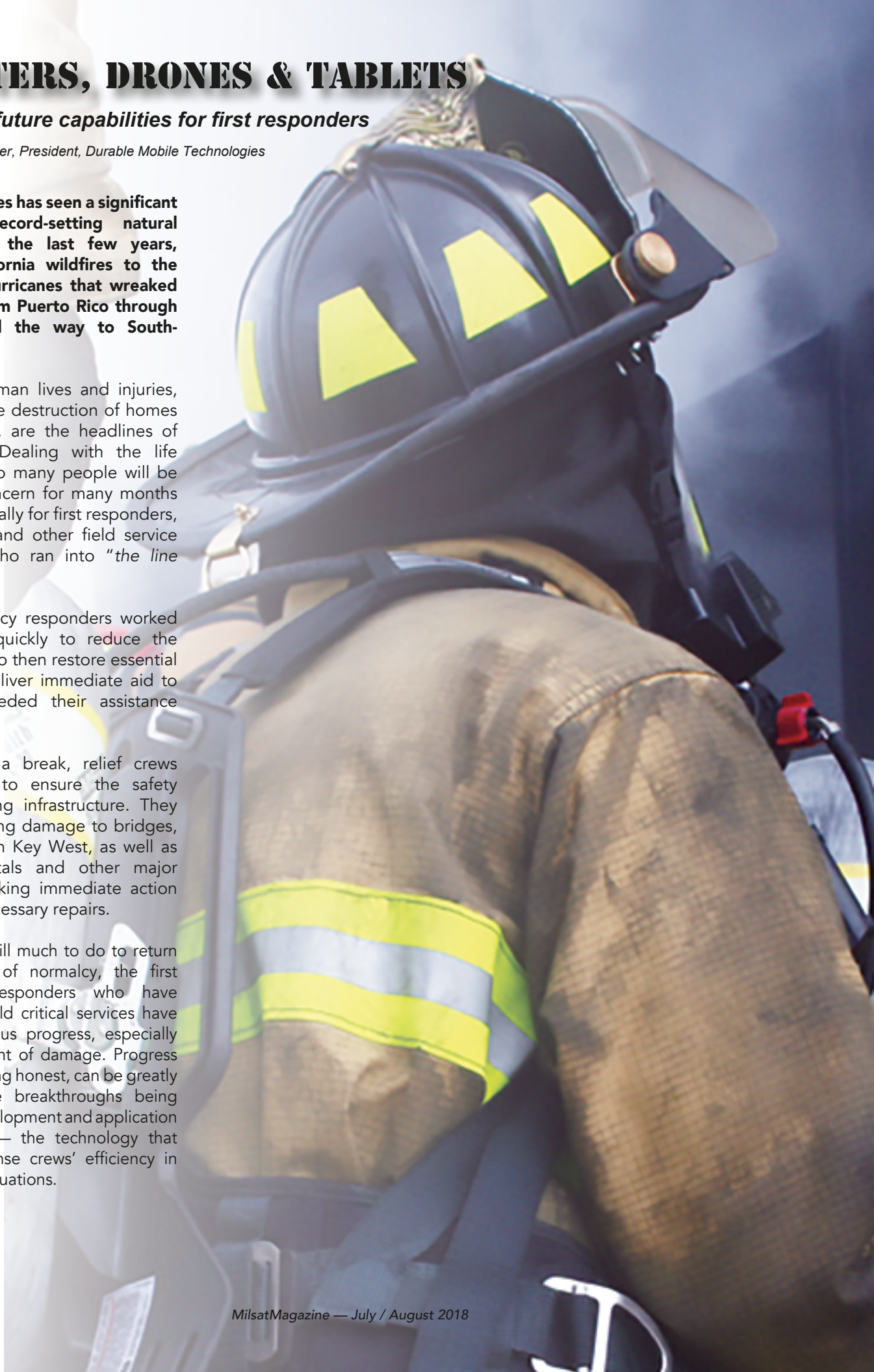
DISASTERS, DRONES & TABLETS

Developing future capabilities for first responders

By Bob Ashenbrenner, President, Durable Mobile Technologies



The United States has seen a significant number of record-setting natural disasters over the last few years, from the California wildfires to the back-to-back hurricanes that wreaked devastation from Puerto Rico through Florida and all the way to South-Central Texas.

The cost in human lives and injuries, plus the massive destruction of homes and businesses, are the headlines of these events. Dealing with the life challenges of so many people will be an ongoing concern for many months to come, especially for first responders, utility workers and other field service professionals who ran into "*the line of fire.*"

These emergency responders worked tirelessly and quickly to reduce the loss of life and to then restore essential services and deliver immediate aid to those who needed their assistance the most.

Then, without a break, relief crews shifted efforts to ensure the safety of the remaining infrastructure. They started inspecting damage to bridges, such as those in Key West, as well as shelters, hospitals and other major sites, before taking immediate action to make the necessary repairs.

While there is still much to do to return to some level of normalcy, the first and second responders who have worked to rebuild critical services have made tremendous progress, especially given the amount of damage. Progress that, if we're being honest, can be greatly credited to the breakthroughs being made in the development and application of technology — the technology that increases response crews' efficiency in time-sensitive situations.

Disaster response is a crucible test of the tools, techniques and tactics that these agencies have at their disposal. Mobile technologies usually deployed for everyday work have truly been put to the test during these recent disasters.

Though these technologies are generally successful for situations that they were originally designed for — such as dealing with the aftermath of a thunderstorm that knocks down a powerline or two or routine fire and rescue calls — these huge disasters expose important new applications for everything from rugged tablets to the drones and hybrid underwater ROVs they control.

Building a New Foundation — From the Top, Down
With technological capabilities far beyond toy drones, there are real systems that provide cost effective ways to solve real field problems.

For example, there are drones that can examine structures after a major earthquake, especially places too dangerous for people to quickly inspect. Long-duration flights of drones over affected areas can not only assess damage, but deliver essential cellular voice and data services to public safety personnel via remote-controlled cellular "towers", this communication capability can then direct them to people in need.

Flying cell towers, with visual and thermal sensors over wildfire areas, all overlaid with GIS data of cellular towers and power lines, provide critical real-time data that is essential for command and control leaders.

These are just a few examples of how responders can access real-time information in order to coordinate efforts, maintain crew accountability and manage rehab in real-time via rugged tablets and other mobile technologies.

It is also possible to use drones equipped with infrared sensors to overfly areas affected by natural disasters before and after an event to provide an actionable census. For example, after Hurricane Irma left Key West, Coast Guard personnel drove into the town on bulldozers — the only kind of vehicle that could travel through the debris.

They found many homeowners in a mobile home park who had no transportation to access for evacuation and were forced to remain sheltered in place. That was a surprise to authorities who had thought everyone had left the area. Had drones been available to provide additional eyes overhead, this highly dangerous situation could have been averted.

Simultaneously, drones could have also helped the doctors and other out-of-towners who descended on Houston in an unofficial capacity after Hurricane Harvey. Many volunteers were in personal boats when they realized that they didn't know what hazards were in the water, such as power lines and homeowner propane tanks to name a few.

In future responses, expect more use of waterproof tablets with GIS overlays to show the electrical grid lines, and drones that scout out areas ahead of relief efforts to look for items not on an GIS map, such as propane tanks. (*Also expect to see an increase in satellite-connected rugged tablet use for relief coordination in areas where drones have not yet been deployed and WiFi and cellular signals are limited, such as the case in Houston after Harvey.*)

However, these certainly aren't the only life-saving applications that we can and should foresee for drones. Unmanned Aircraft Systems (UAS) technologies have been used to deliver medicines, food and water.

There are many routine public safety applications that are gaining traction, as well. Just as important to note, though: Drones also have great potential to avert crises beyond major emergency response events.

One tech company is perfecting the ability to inspect aircraft for wear or damage, whether that aircraft is on the tarmac or in a hanger where GPS isn't a viable navigation aid. Others are developing drones that can inspect rail lines or pipelines in remote areas, autonomously.

Using GPS and GIS overlays of power lines and other hazards, drones will fly along these paths and use sensors and cameras to inspect these lines, while workers will only be dispatched to areas that need follow up. In other words, disaster response is a growing business and governmental opportunity for the UAS industry.

What It Will Take to Drive Drones into the Mainstream

While drones alone can add significant value to many industrial and field service applications, their capabilities are often amplified when they can directly interface with mobile devices on the ground in a more collaborative way.

Having a drone see a stranded victim is useless if there is no way to communicate the findings to first responders. Coupling a drone's unique situational awareness with resilient communications — such as mobile devices that can put overlays of hazards and support personnel in the hands of on-the-ground personnel — will ensure help reaches those in need quicker. It also reduces risk for both professional and volunteer rescuers.

As core mobile computing technologies, such as rugged tablets, are put in the hands of these emergency personnel as part of standard operating procedures, they become the platform upon which additional drone capabilities can most effectively be applied in a "*layers of support*" concept.

Just as security is best delivered using layers of protection, the tools to protect and support mobile workers start with rugged tablets, radios and GIS tools, and then expand to specialized peripherals and, soon, drones.

Xplore's F5M field-ready rugged tablet PC.

There is also a rising demand for rugged tablets that can serve a dual purpose, as both the info-capturing mobile computer and drone control panel ***(www.xploretech.com/us/news/post/xplore-rugged-android-tablet-exclusively-chosen-to-serve-as-human-machine/)***.

This hand-in-hand coordination between mobile workers and remote technology assets make workers safer and more productive, especially as they become more common and more sophisticated. At a fundamental level, rugged tablets reduce "paperwork" time — non-productive hours spent in the office or generating reports, etc. That translates to more time in the field performing the mission.

However, the real benefit, as seen after recent natural disasters, is having better-informed first responders in action to minimize the literal life-or-death consequences by minimizing haphazard estimates. The coordinated mobile device-drone interactions improve real-time situational knowledge — and therefore safety — amplifies the ROI for both technologies far beyond basic expectations.

Just knowing how close support resources are located is a valuable benefit of mobile technology, such as this Battalion 3 command and control solution. However, the access gained to dangerous and otherwise inaccessible areas via robots and drones — and the information subsequently gathered — is invaluable whether fighting fires or simply trying to prevent a conflagration during remote oil or gas pipeline inspections.

In the moments following a disaster event, that is not the time to wonder if the tools are up to the task of emergency response. Rugged tablets that will survive the often-harsh environment immediately during and after a crisis, and running operational software, can be immediately deployed — and they'll work.

The software is proven every day and the survivability in extreme conditions is designed into the code. The tool that provides daily operational efficiency is also the tool that will make all the difference when reliability really matters.

From this consistent base, new capabilities of drones and other technologies can be layered. As they prove their worth and are deployed, the effectiveness and safety of wide-scale emergency response will also improve.

www.xploretech.com

For additional information, please read the author's earlier article in SatMagazine at: ***www.satmagazine.com/story.php?number=1226887873***

Bob Ashenbrenner has more than 25 years of computer engineering and engineering management experience, with 18 of those specific to mobility and the field requirements that enable real work to happen. He was previously a Solutions Architect with Xplore Technologies (and Motion Computing) for 13 years. In that role, Ashenbrenner led the development of a suite of rugged mobile tablet PCs, services and software, with an emphasis on supporting the whole mobile work environment.

UP IN THE SKY...

This is no bird, this is no jetliner... this will be DARPA's Spaceplane

Recently, Aerojet Rocketdyne completed assembly of their first AR-22 rocket engine being built for Boeing (NYSE:BA) as part of the U.S. Defense Advanced Research Projects Agency (DARPA) Experimental Spaceplane program.

This new Boeing spaceplane, called Phantom Express, is intended to demonstrate a new paradigm for more routine, responsive and affordable space access.

Aerojet Rocketdyne's AR-22 engine, derived from the Space Shuttle Main Engine that was designed from the outset for reusability, is the main propulsion for Phantom Express. The AR-22 engine is capable of generating about 375,000 pounds (170,097 kg) of thrust and was designed to fly 55 missions with service every 10 missions. This reusability feature makes the AR-22 ideally suited for Phantom Express.

The reusable Phantom Express spaceplane will take off vertically and land horizontally. The vehicle will be equipped with an expendable second stage capable of placing up to 3,000 pounds (1,361 kg) of payload into LEO. Aerojet Rocketdyne assembled the AR-22 at the company's facility at NASA's Stennis Space Center in Mississippi.

The engine will undergo a series of daily hot-fire tests at Stennis this summer to demonstrate its ability to support the high flight rates envisioned for Phantom Express. These tests will also provide valuable insight that will be used to refine Phantom Express flight and turnaround procedures, while also informing the design requirements for the new ground infrastructure that Boeing is developing for the flight program.

Eileen Drake, Aerojet Rocketdyne CEO and President, said that Phantom Express builds on the company's legacy of reusable space flight experience to provide the ability to quickly augment and replace on orbit capabilities, which face an increasing array of threats from potential adversaries. The company's immediate task is to demonstrate this rapid turnaround capability for this engine on the ground, paving the way for a demonstration program.

Eileen Drake, President and CEO of Aerojet Rocketdybne

AR-22 Program Manager Jeff Haynes added that the aircraft-like operations of Phantom Express are an important factor in the rapid redeployment of this spaceplane. Additionally, the engine has a hinged nacelle that makes it easier to access and inspect the engines for rapid turnaround.

Artistic rendition of DARPA's Experimental Spaceplane program (formerly known as XS-1) which aims to build and fly the first of an entirely new class of hypersonic aircraft that would bolster national security by providing short-notice, low-cost access to space. Image is courtesy of Boeing.

A Closer Look

DARPA's Experimental Spaceplane program, through the agency's Tactical Technology Office (TTO: ***www.darpa.mil/about-us/offices/tto/more***) aims to build and fly the first of an entirely new class of hypersonic aircraft that would bolster national security by providing short-notice, low-cost access to space.

The program's goal is to achieve a capability well out of reach as of this writing — launches to LEO in days, as compared to the months or years of preparation currently needed to get a single satellite on orbit. Success will depend upon significant advances in both technical capabilities and ground operations, but would revolutionize the Nation's ability to recover from a catastrophic loss of military or commercial satellites, upon which the United States today is critically dependent.

DARPA envisions a fully reusable unmanned vehicle, roughly the size of a business jet, which would take off vertically like a rocket and fly to hypersonic speeds. The vehicle would take flight, potentially within hours. As the next step toward a future of routine, responsive, and low-cost space access, DARPA has awarded Phases 2 and 3 of the program to The Boeing Company, which led one of three teams in the program's initial design phase. Phases 2 and 3 are focused on fabrication and flight.

In its pursuit of aircraft-like operability, reliability, and cost-efficiency, DARPA and Boeing are planning to conduct a flight test demonstration of Experimental Spaceplane technology, flying 10 times in 10 days, with an additional final flight carrying the upper-stage payload delivery system.

The test firing of an Aerojet Rocketdyne AR22 rocket engine at NASA's Stennis Space Center in Stennis, Mississippi. Image is courtesy of AP - Gerald Herbert.

If successful, the program would enable a commercial service that could operate at an achievable flight rate and with recurring costs of as little as $5 million or less per launch, including the cost of an expendable upper stage — a small fraction of the cost of launch systems the U.S. military currently uses for similarly sized payloads. (Beyond actual cost, commercial price would be determined in part by market forces.)

To achieve these goals, the Experimental Spaceplane's designers plan to take advantage of technologies and support systems that have enhanced the reliability and fast turnaround of military aircraft.

For example, easily accessible subsystem components configured as line replaceable units would be used wherever practical to enable quick maintenance and repairs.

The Experimental Spaceplane Phase 2/3 design also intends to increase efficiencies by integrating numerous state-of-the-art technologies, including some previously developed by DARPA, NASA, and the U.S. Air Force.

Other technologies in the Phase 2/3 design include:

- *Advanced, lightweight composite cryogenic propellant tanks to hold liquid oxygen and liquid hydrogen propellants*
- *Hybrid composite-metallic wings and control surfaces able to withstand the physical stresses of suborbital hypersonic flight and temperatures of more than 2,000 degrees F*
- *Automated flight-termination and other technologies for autonomous flight and operations, including some developed by DARPA's Airborne Launch Assist Space Access (ALASA) program*

Phase 2 of the Experimental Spaceplane program includes design, construction, and testing of the technology demonstration vehicle through 2019. It calls for initially firing the vehicle's engine on the ground 10 times in 10 days to demonstrate propulsion readiness for flight tests.

Phase 3 objectives include 12 to 15 flight tests, currently scheduled for 2020. After multiple shakedown flights to reduce risk, the technology demonstration vehicle would aim to fly 10 times over 10 consecutive days, at first without payloads and at speeds as fast as Mach 5.

Subsequent flights are planned to fly as fast as Mach 10, and deliver a demonstration payload between 900 pounds and 3,000 pounds into low Earth orbit.

Another goal of the program is to encourage the broader commercial launch sector to adopt useful Experimental Spaceplane approaches, processes, and technologies that facilitate launch on demand and rapid turnaround — important military and commercial needs for the 21st century.

Toward that goal, DARPA intends to release selected data from its Phase 2/3 tests and will provide to all interested commercial entities the relevant specs for potential payloads.

www.darpa.mil/program/experimental-space-plane

www.rocket.com
or
www.aerojetrocketdyne.com

CYBER COMMAND AND CONTROL (C2)

Tech solutions... AFCEA's Defensive Cyberspace Operations Symposium

Artificial intelligence (AI), automation and the cloud have the potential to support Command and Control (C2) in the cyberspace domain government and industry leaders said during a panel discussion at the annual Armed Forces Communications and Electronics Association's Defensive Cyberspace Operations Symposium in Baltimore.

"*Our cyber environment is contested*," said panel moderator, Greg Duchak, Deputy Assistant Secretary of Defense for Command and Control, Communications, Cyber, and Business Systems. "*Our ability to command and control our forces and work with others in this contested cyber environment will make the difference between mission success and failure.*"

Greg Duchak, Deputy Assistant Secretary of Defense

Top to bottom:

Misty Blowers

Terry Carpenter

Colonel Paul Craft

Dan Prieto

Rounding out the panel were Misty Blowers, cyber research leader at Air Force Research Laboratory (AFRL), Rome Labs; Terry Carpenter, services development executive at the Defense Information Systems Agency (DIA); Army Colonel Paul Craft, Director of Operations for the Joint Force Headquarters — DoD Information Network; and Dan Prieto, strategic executive at Google Cloud.

Duchak said there are no one-size-fits-all solutions to approaching C2 in defensive cyber operations (DCO), but there are critical, interrelated challenges that must be addressed.

"*We need to design approaches to C2 that work well for DCO*," he said. "*We need to know ourselves and to know our adversary. This means we need solid situational awareness (SA). We (also) need to focus on making mission C2 more agile so it can adapt to circumstances even in a cyber degraded environment, and we need to understand the link between DCO and our ability to exercise mission C2 in all domains.*"

Speed is Essential

Craft and Prieto described the similarities and differences between the cyber domain and the other warfighting domains.

"*The major difference between cyber and land, air, sea, and space is that the cyber domain is a man-made domain and it can be changed*," said Craft.

Because the cyber domain can be changed, maintaining SA and C2 of the terrain and what an adversary might be doing is exceptionally challenging, he said.

The speed at which adversaries are able to adapt is much greater in the cyber domain than in physical domains, Prieto said.

"*Adversaries can easily modify malware in under 24 to 36 hours*," Prieto said.

Craft agreed: Speed is key to C2 in DCO.

Events occur in cyberspace in seconds, he said. The amount of data that can be taken is dependent on how fast data can be removed, moved, or modified within the network before cyber defenders can react.

"*The speed at which we can operate the network, the speed at which we can change or maintain the network, the speed at which we can secure and actively defend the network — and therefore make decisions at speed — will require some sort of artificial intelligence so that the computer provides options for when we have to have a DoD level, or even commercial, decision made*," Craft said.

Carpenter, who is responsible for delivering integrated enterprise services and data systems to the warfighter, said a large amount of data is constantly being acquired, and DOD requires different and novel ways to make the data consumable and usable by the warfighters.

"*When you talk about petabytes of data and the analysis that has to go on, we have to provide tools that are just as responsive," he said. "But there is a lot of challenge and risk in the way we build those applications for the C2 functions. We have to think about how to provide better tools to the user community.*"

Prieto reflected on the paradox of maintaining C2 with the exceptionally large volume of data that saturates DOD's systems. "*On the one hand, you are flooded with data, you are slow to knowledge — because of the overwhelming amount of data*," he said. "*You are looking for needles in haystacks.*"

Technology to Support Cyber C2

Carpenter said he wants to help the operator gain situational awareness (SA) faster, and automation, AI, and cloud are important elements to get to the desired end state.

"*How can I help the operator to discover faster? We want to improve the speed with which the operators can discover things. So they don't have this huge lag time in trying to sort through the big data*," Carpenter said.

Carpenter also emphasized the need to look for ways to streamline the development and adoption process for C2 tools. "*There is an appetite I have never seen before, for trying new things, to automate, to make it more predictable and to leverage things like artificial intelligence and machine learning*," he said.

Blowers agreed AI will be an essential weapon in the cyber fight. "*Because of the advancements are adversaries are making in this (AI) arena, it is imperative we also develop cyber autonomous capabilities so that we can be sure to be competitive in a future conflict*," she said.

The panel explored how cloud adoption might help with the path to improve C2 in DCO.

"*When you think about cloud, the opportunity is to move to a more modern, secure, consistent, scalable environment, without having to make all the upfront investments yourself*," Prieto said. "*That is what is on offer from cloud service providers.*"

"*Cloud needs to be an agnostic underpinning on everything we do," Carpenter said. "More importantly, though, I listen to the warfighter, I listen to the folks trying to deal with this new domain.*"

Duchak agreed that the goal of moving to the cloud must be connected to the warfighting functions. "*Cloud is more than just efficiencies; it's about improving operations*," he said.

A Joint Effort

Craft said the solution to the C2 for DCO question will only come through teamwork. "Teamwork includes working with our industry partners, working with academia, working with other agencies and combat commands and services," he said.

Although the path forward still has many unknowns, Craft said the desired goal for C2 in DCO is a secure network.

"In the end we will have a secure network, we will know where all the data is, and we will know that it is secure and actively defended," he said.

www.afcea.org/

RELIABLE CONNECTIVITY IS A MUST...

For humanitarian aid and disaster relief efforts

By Yagnesh Rajendran, Vice President, Global Enterprise, ITC Global

Last year, natural disasters caused more than $330 billion in damages from 710 catastrophic events.

Regardless of what these types of events were — wildfires, earthquakes, floods, typhoons or hurricanes — emergency aid and relief was, and still is, vital to the health and well-being of those affected by these tragedies.

This is where humanitarian aid and relief organizations come in to assist. However, in order to call for help, and for these organizations to be able to do what they need to do to serve affected communities in emergency situations, connectivity is vital.

Whether it is getting telecommunications back up and running, providing patients in remote regions with access to specialists through video calls, or simply setting up a network for families to reach their relatives to let them know they are safe, connectivity not only helps communities sort through the mess following a disaster, but it also helps them get back to normal life.

Establishing or re-establishing connectivity in some of these locations can be difficult due to the remote areas that are often in need of humanitarian aid and disaster relief after a catastrophe. This makes it even more important for organizations to work with a well-established service provider with experience delivering connectivity to remote locations.

To provide this type of mission-critical connectivity, ITC Global, a remote communications provider, supports organizations at the forefront of humanitarian aid, including NetHope, a consortium of the world's leading humanitarian organizations, the Red Cross and that organization's globally deployed Emergency Response Units (ERUs), Plan International and more. Partners and vendors of the disaster relief and humanitarian aid community must have a keen ability to create flexible solutions, help customers manage logistical and budgetary constraints, and deliver top-tier global support and training to empower aid organizations' deployed staff.

ITC Global doesn't simply provide communications in response to disaster recovery missions following natural disasters — it provides ongoing support to these aid organizations that do life-saving work every day, and is regularly recognized by these organizations for efforts and continued commitment to improving the human condition across the world.

Ongoing Support Vs. Reacting to Disasters

Catastrophes can happen in seconds or minutes and often leave devastating chaos and destruction in their wake.

Red Cross disaster relief mission in Haiti.

A deployed Red Cross VSAT.

The time following these events is critical, and the time it can take for a communications provider to react and reorganize if a system of solutions isn't already in place can mean life or death.

Non-governmental organizations (NGOs) and humanitarian aid organizations are best positioned to respond quickly if they partner with organizations that can supplement needs and work out connectivity issues regardless of where the aid is deployed. ITC Global's ongoing partnership with organizations such as NetHope and the Red Cross enable the company to engage with disaster relief and humanitarian aid organizations 24 hours a day, seven days a week — making an immediate and lasting impact rather than reactively working to organize a response following a disaster or crisis.

NetHope

Many of the NGO and charity organizations for which ITC Global delivers services are supported through NetHope.

For instance, these services included free and discounted equipment and network solutions for extended use to multiple NetHope organizations throughout the recent African Ebola epidemic.

At the peak of the crisis, ITC Global responded to requests for help by providing multiple NGO customers with much-needed technology in support of the first responders who were on the ground. ITC Global's offerings included a VSAT trailer system and bandwidth throughout the epidemic. This helped make deployments possible, facilitated an expedited response and increased connectivity for those struggling to support the extreme nature of the situation. The free equipment and service was supported by ITC Global's Network Operations Center (NOC) on an ongoing basis throughout the crisis.

Red Cross

In addition to NetHope, ITC Global has provided critical communications to the Red Cross for more than seven years in support of their disaster relief efforts during responses to crises in numerous regions, including the Philippines, Sierra Leone, Nepal and Puerto Rico.

Due to the critical needs of many of the regions in which the Red Cross provides support, the organization needed a provider with the capability to supply always-on VSAT services to enable the disaster relief organization to quickly respond to emergencies and natural disasters around the world.

ITC Global's solutions and services provided the perfect match for the disaster relief organization with reliable internet, WiFi and voice capabilities. The company also provided the Red Cross with additional NOC support for critical VSAT setup outside the scope of typical disaster recovery communications support. When ITC Global heard that the organization was in need of communications equipment for their ERU training in New Zealand, the team jumped into action.

ITC Global's Perth office and NOC team worked to coordinate the delivery of multiple satellite modems for the training, as well as test option files that were loaned to the New Zealand ERU. The added units, in addition to the Red Cross team's VSAT modem, allowed the group to train with only three people per modem, greatly increasing the value of the training and providing extra hands-on experience that the group will need when deployed to a crisis.

The ITC Global team provided extra support and worked with the ERU for several days, helping to create an ideal training environment for the Red Cross team and enabling them to troubleshoot and work through real-world field examples. ITC Global continues to maintain a long-standing partnership with the Red Cross and its ERU teams around the world.

When it comes to providing services to NGOs and disaster relief organizations, providers should treat them the same way they treat their highest-priority customers. Emergency connectivity can make the difference in life or death situations, and companies such as ITC Global take pride in providing communications solutions that matter for people in need all over the world.

www.itcglobal.com/

As head of enterprise, Yagnesh Rajendran drives growth strategies across the global enterprise business and advances ITC Global's delivery of complete connectivity solutions for mining, remote hospitality and NGO clients. Yagnesh leads all aspects of sales, account management and new business development for the company's global enterprise business.

MILSATCOM TECHNOLOGY…

Looking skyward

By Stav Gizunterman, Vice President, R&D, Orbit Communications Systems

In *Military Embedded Systems'* June 2017 article, "*Secure satellite communications for warfighters on the move*", Technology Editor, *Mariana Iriarte*, cites that today's military satellite communications development is being driven by mobility, Beyond-Line-of-Sight (BLOS) capabilities and security.

Mobility

The article quotes Rebecca Cowen-Hirsch, Senior Vice President of Government Strategy and Policy for Inmarsat's US Government Business Unit in Washington, DC, as saying, "*Military users have to access the same degree of capability on the move as they would if they were stationary, for all operational stages.*"

They can no longer count on predetermined areas or fixed locations, given the current demands of manned and unmanned airborne intelligence, surveillance, and reconnaissance missions, for example. Knowing that they can be deployed anytime, anywhere, "*mobility is a capability that is very important in the design of satellite communications*," said Cowen-Hirsch

Helicopter image from Wikimedia — 12" airborne SATCOM antenna photo by Orbit Communications Systems.

Whether on the move, in aircraft or ships, or on the ground, at military bases, the same access to high-speed data communications is needed because military operations can be highly unpredictable. The readiness of today's armed forces requires a truly global connection, because from a training base at home, troops might be sent out on a search and rescue mission in the middle of the ocean at a moment's notice.

BLOS Capabilities

BLOS operations demand always-on, consistent coverage.

Pilots, for example, should be able to take off from one location and fly across multiple spot beams without ever losing connectivity — and without having to manually repoint their antennas. At the same time, airborne SATCOM systems must transfer between satellite signals automatically and seamlessly. For example, aboard Air Force One, BLOS connectivity enables the U.S. President to communicate with anyone, anywhere.

BLOS is an ideal SATCOM solution because today's satellite architectures are capable of supporting consistent, uninterrupted connectivity everywhere in the world. Due to the military's need for on-demand access and high reliability, one solution is to leverage commercial satellites to boost the effectiveness, flexibility and redundancy of military satellites for global unmanned missions.

This initiative is in contrast to broadcast-centric fixed transponder leases which require pre-commitments for large tracts of bandwidth in a best-guess, piecemeal approach as to where, when and how much bandwidth will be needed.

Security

For armed forces, having a secure, on-the-move connection does not only ensure their safety, but also enables high throughput without interference or loss of service wherever they may be.

Thus, the objective to secure satellite communications continues to evolve. Because many of today's military challenges are geographically-based, users are seeking broader protection and anti-jamming (A/J) resistance to enhance resilience.

Technology Looks Skyward

The increase in the demand for communications at any point on Earth, at any time of day or night, is leading technology companies to look skywards and to develop airborne beyond-line-of-sight (BLOS) SATCOM and 3D audio systems, as well as earthbound line-of-sight (LOS) tracking and control systems used by ground forces to communicate with airborne targets, like UAVs.

The challenges facing such systems include the ability to withstand extreme environmental conditions and maintain the highest quality standards — while keeping costs competitive.

Airborne BLOS SATCOM

The challenge for solution providers is to develop a single airborne stabilized VSAT system capable of delivering high-quality broadband communications to many different types aircraft via satellite.

The terminal must be small enough to fit into the tight spaces usually allocated for communications equipment within the aircraft — with antenna sizes as small as 12 inches (30 centimeters) — but deliver high-speed Internet-based data communications to fixed- and rotary-wing aircraft as well as UAVs.

The systems must be built to military standard (MIL-STD), with minimal Size, Weight and Power consumption (SWaP) properties, and must also be ruggedized to overcome the many environmental challenges posed by mission-critical platforms.

Airborne BLOS SATCOM terminals should include:

- *Multiband support via RF front ends*
- *Optimized SWaP*
- *Tracking/stabilization via feedback from both INS and RF tracking*
- *RTCA DO160 and Mil-STD certification*

Airborne 3D Audio

Today's forward-thinking airborne audio management systems are based on a Dual IP Ring topology for inherent system redundancy, reduced aircraft weight, incremental scalability and the flexibility to suit any size platform.

Features such as 3D Audio, Adaptive Noise Reduction and Voice-Activated Detection should be standard, to deliver a 360-degree clear audio experience with outstanding benefits for pilots, like increased situational awareness and flight safety, and reduced workload and fatigue.

With 3D Audio, pilots can pinpoint the direction of the source of the sound, whether it be the voice of a crew person or air traffic controller, a system alert or a threat warning.

Airborne 3D Audio management systems should include:

- *Dual IP Ring topology*
- *3D Audio*
- *Adaptive Noise Reduction*
- *Voice-Activated Detection*
- *Incremental scalability and flexibility*
- *Inherent redundancy*
- *Low-weight components*

LOS Tracking andControl of Airborne Targets

Although the Military Embedded Systems' article stressed the importance of airborne BLOS systems, there is an equally compelling need for Earthbound LOS tracking and control systems used by ground forces to communicate with airborne targets, like UAVs.

Such systems should be portable (with the ability to be carried, assembled and disassembled by two people) and fully self-contained. They should also come equipped with an elevation-over-azimuth positioner unit with a built-in tracking controller, as well as a mounted directional antenna and data-link unit.

3D Audio representation, courtesy of Orbit Communications Systems

LOS terminals for the tracking and control of airborne targets should include:

- *Controller inside the positioning unit, connected by a single LAN cable*
- *28V DC, instead of AC, current, to eliminate safety issues*
- *Slip ring topology, for up to 70 simultaneous circuits*
- *Full duplex operation, for complete tracking and control capabilities*
- *Advanced tracking algorithms*
- *Compliance with MIL-standard 810 (mechanical/ environmental) and 461 (electro-magnetic interference)*
- *Whole system — including C-band directional antenna — mountable on base riser, or a tripod in emergency situations*

LOS terminal for the tracking and control of airborne targets, by Orbit Communications Systems

In Conclusion

In the dynamic world of military communications, with its ever-present demand for mobility, BLOS and LOS capabilities and security, there is a continuous need for innovative technology and systems.

This article presented three airborne-related solutions — two, aboard aircraft (BLOS SATCOM and 3D Audio systems) and one, on the ground (LOS terminal for the tracking and control of airborne targets)

www.orbit-cs.com

Stav Gizunterman is the Vice President of R&D at Orbit Communications Systems Ltd. He was appointed VP R&D in 2017, after holding senior management positions in R&D and Product Marketing at the company since 2012. Prior to joining Orbit, he served in a variety of engineering roles at Elbit Systems, a global solution provider focused on the defense, homeland security and commercial aviation markets. Stav holds a BSc in Communication Systems Engineering from Ben-Gurion University of the Negev, in Israel, and an MBA from Heriot-Watt University. He can be reached at ***stav.gizunterman@orbit-cs.com***

ENSURING UNIFIED EMERGENCY COMMS

...for first responders and NGOs

By Simon Davies, Chief Executive Officer, Spectra Group, and Senior Contributor, MilsatMagazine

National disasters can have a devastating effect on conventional communications. Hurricanes, Tsunamis and earthquakes can render land based systems useless.

Terror attacks can have similar devastating effects on traditional methods of communicating. Command and control, situation awareness and humanitarian assistance and disaster relief can be seriously impaired if reliable communications are not available.

With traditional systems that are normally relied upon by first responders down, a reliable and easily implemented, satellite communications (SATCOM) network comes in to its own. In many cases, SATCOM has been the only source of reliable communication for the hours, days, weeks and months after a disaster.

For any First Responder, information is critical. The necessity of having the correct information at the correct time saves lives. There are a number of key areas to assist the transfer of information, these are;

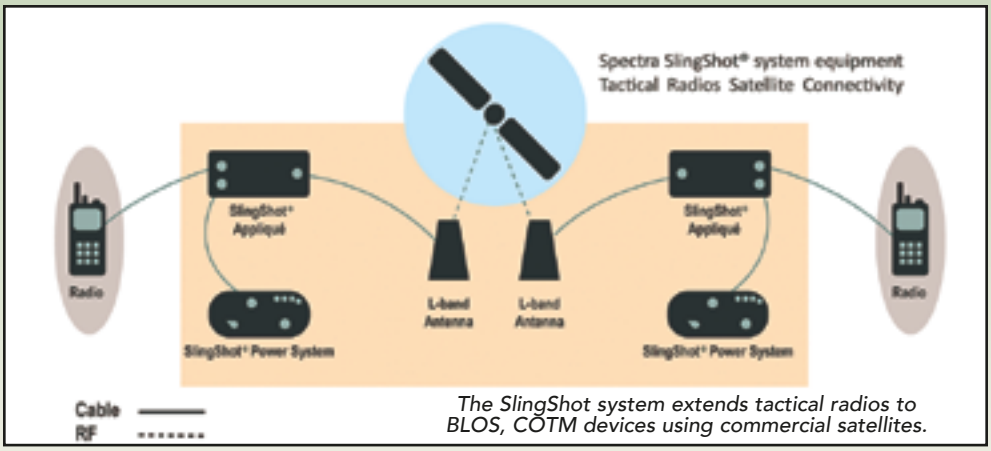
- *The communications systems*
- *Communications within responder agencies (Emergency services and aid agencies)*
- *Communications between responder agencies (between Fire & Rescue with Police, for example*

All First Responders have their own communications systems that are designed to be robust in times of crisis; however, these systems are typically based upon terrestrial infrastructure. If the infrastructure is not available due to the crisis being in a remote area, or because the infrastructure has deteriorated because of severe weather, terrorist attack or network congestion,) then the ability to communicate is severely restricted or non-existant.

To ensure the necessary information is received by the correct personnel is much harder to accomplish when circumstances have interfered with communications — responders must have in their possession the correct equipment that would allow them to communicate effectively, no matter the situation surrounding them.

There is proof that quicker response through increased collaboration saves lives. The ability to share the same information between a First Response Organization and multiple agencies results in greater awareness and increased effectiveness.

An omnidirectional antenna, the size of a soda can, connects the SlingShot equipped radio to the satellite. Image is courtesy of Spectra Group



The SlingShot system extends tactical radios to BLOS, COTM devices using commercial satellites.

SlingShot offers a natural enhancement to any First Response communications capability. The product provides range extension from normal terrestrial based systems via connection to the Inmarsat Satellite I4 constellation (called L-TAC). SlingShot is low SWaP (size, weight and power), that is able to provision the personnel, vehicles, boats or aircraft (fixed and rotary). The system connects directly to the current radio used by the First Responder — that results in minimal training time or any cognitive burden to the user. SlingShot can be used from any 12 – 230v power source, using the Responders own power system or any number of secondary power sources.

SlingShot provides critical voice and data services — this means that when the Responder presses the pressel on the radio, a channel is provided instantly and all communications is transmitted to all on the network. This is different to many range extension systems which provide either an on demand channel, (*i.e.*, one is provided if a channel is available and not guaranteed), or Voice over IP (VoIP)/Radio Over IP (RoIP) where there is no guarantee of the IP network providing the circuit when needed and, therefore, no guarantee of the delivery of the actual message. Where the Responders radio system is able to transmit data, SlingShot will support this, meaning that the First Responder remains able to share critical data.

SlingShot provides a collaborative network for interoperability. Where First Response Agencies may have differing radio network systems which normally do not communicate directly together, SlingShot enables differing types of radio systems to work together on the same net.

The SlingShot system does not have to be provided to each and every First Responder, only key elements would require the capability, therefore, there is not a massive hardware cost. The L-TAC network can be leased daily, weekly, monthly or yearly, as the situation requires, allowing budgets to be managed effectively. When compared to the cost of keeping key infrastructure in remote locations or other range extension capabilities such as air platforms, L-TAC is less expensive.

What does this mean for the First Response community?

The ability to respond to any crisis, anywhere, and not having to rely on the normal communications network that is working in the crisis location, means being able to share information using voice and data with their main HQ, interoperability with other Response Agencies, resulting in true collaboration. Being able to use the radio system already in service means no additional training burden.

The AA Battery Cassette offers a straightforward and lightweight back-up power supply for SlingShot.

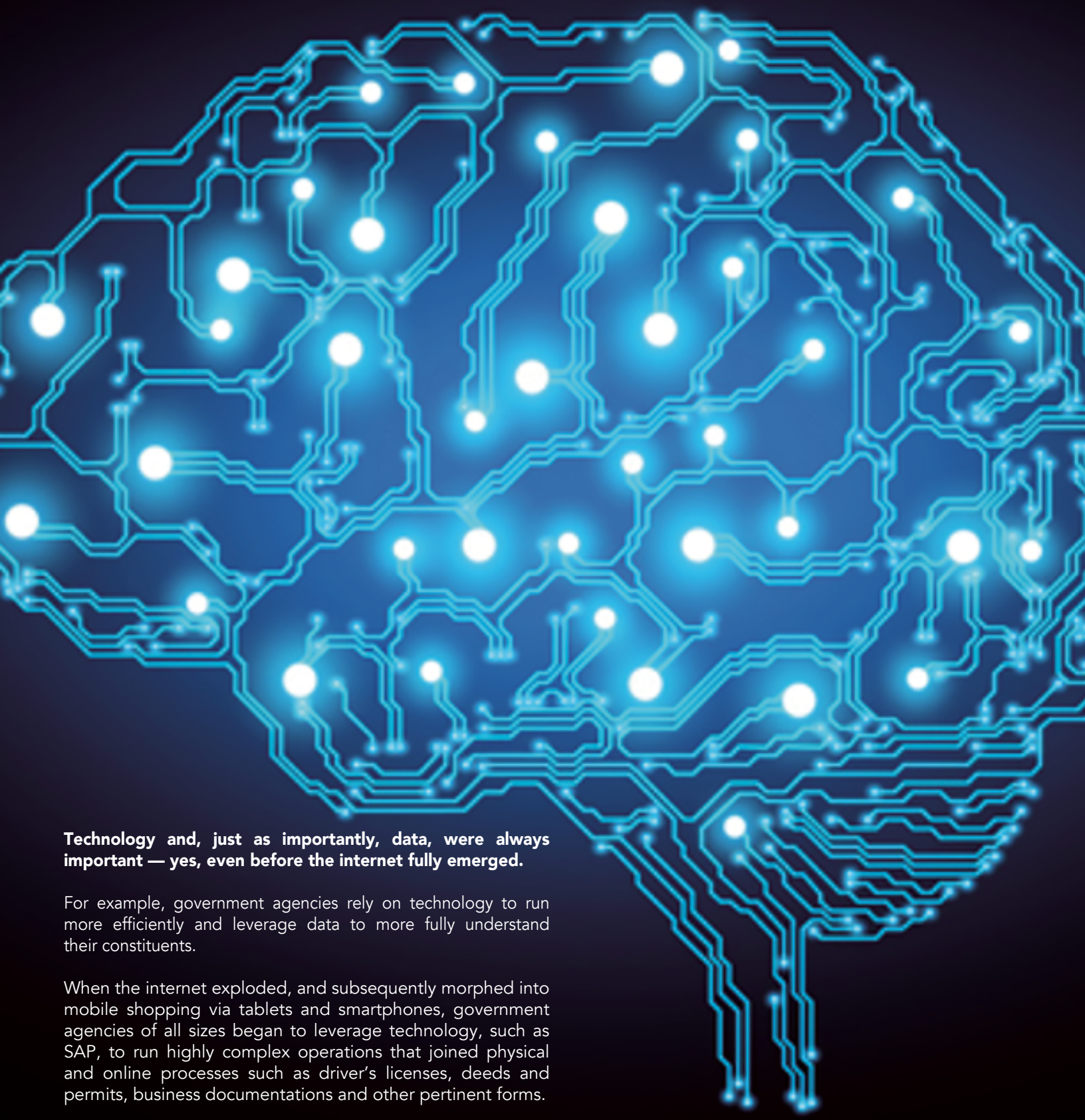
Author Simon Davies is the Chief Executive Officer of Spectra Group and a Senior Contributor for MilsatMagazine.

Spectra Group (UK) Ltd is a world leading solutions provider of high grade information security and communication capabilities with a proven record of accomplishment. The company has more than 15 years of experience in delivering solutions for governments around the globe to elite militaries and private enterprises of all sizes. As a dynamic, agile, security accredited organisation, Spectra can leverage this experience to deliver Cyber Advisory and secure Hosted and Managed Solutions on time, to spec and on budget, ensuring compliance with industry standards and best practices.

PROTECTING SAP SYSTEMS FOR CYBERSECURITY

Three key areas for governments and municipalites

By Thomas Kastner, Managing Director and Chief Technology Officer, Virtual Forge GmbH



Technology and, just as importantly, data, were always important — yes, even before the internet fully emerged.

For example, government agencies rely on technology to run more efficiently and leverage data to more fully understand their constituents.

When the internet exploded, and subsequently morphed into mobile shopping via tablets and smartphones, government agencies of all sizes began to leverage technology, such as SAP, to run highly complex operations that joined physical and online processes such as driver's licenses, deeds and permits, business documentations and other pertinent forms.

Because of SAP's vast amount of code and data, this also means agencies have had to be constantly wary of cybersecurity threats — from internal and external audiences. In fact, there are roughly 320 million lines of code in SAP's Business Suite alone. What's more, the company has also struggled to remain in compliance with changing regulatory expectations.

The challenging part governments and municipalities face is that, even if they're large enough to have a dedicated internal IT department, their focus remains on tying operations to the IT function. The notion that most IT staff are cybersecurity experts is a widespread misconception, leaving thousands of agencies and their millions of constituents exposed to everyday cybersecurity threats. This vulnerability can be costly, as the CISO of a Fortune-500 company once said, "*If our company's SAP system is breached, it will cost us $22 million per minute.*"

There are three key areas government agencies and their IT staff must be aware of to help ensure their SAP data is secure: **SAP Systems**, **Custom Code** and **Transports**.

SAP Systems

A large proportion of all SAP security vulnerabilities are a result of improper configurations to the broader SAP System. This area is difficult for IT staff to comprehend simply because there are so many settings in a typical SAP landscape. Interfaces are difficult to identify and manage, and patch management is not as easy as you might find, in example, as with Windows applications.

IT personnel frequently consult with reliable SAP security experts that provide a comprehensive overview of all SAP interfaces; complete transparency of data streams; continuous protection of interfaces; and a proactive approach to ongoing and automated monitoring of the entire system landscape.

Custom Code

One of the great benefits of SAP for agencies is the ability to customize the system for the benefit of a specific organization's unique mission.

As an example, a local Government entity will have slightly different IT needs compared to a Federal bureau. As such, the SAP system running both organizations and their functions will each be customized for their specific needs. In this case, custom code must be developed and implemented for the agency to realize the benefits of SAP.

The challenge here is that there are millions of lines of custom code developed for SAP and it is virtually impossible to manually scan this code for security vulnerabilities. What's worse, developers typically do not have the proper knowledge needed to fully vet code for cybersecurity vulnerabilities.

To combat this, developers and organizations are now using cutting edge technologies that automate the scanning process of custom code implementations. These solutions are similar to a spell-checker system, and can quickly scan lines of custom code with the click of a button to help protect against any vulnerabilities.

Transports

As mentioned earlier, organizations that use SAP software add in their own customizations and developments. This means that functions and settings are often modified and enhanced, which can lead to changes made to hundreds of objects every day, along with manipulation of data.

These changes are reviewed and adjusted in development and test environments before getting deployed to the live production system. Unfortunately, these transport files can't be checked before the import takes place to production, leaving systems vulnerable to stability issues when the data is transported.

Any slight modification during development and test environments can change critical settings of the data, leaving important applications unable to operate or even result in a complete system failure. What's worse, there can be possible intrusion situations that involve transporting a user and password or other critical data without drawing attention.

In response, advanced SAP system solutions today leverage technologies designed to ensure the integrity of transports, as well as configuration and application data that are critical for running error-free operations.

Organization Defense

Today's government landscape is beyond complex and the global economy has digitally connected businesses, vendors, governments and constituents in a way that helps move information, services and goods at lightning speed.

This velocity of commerce and information, and vast network of interconnectivity also means organizations are vulnerable to malicious entrants they may not be aware of for weeks or even months. On average, an organization requires about 80 days to realize their SAP system has been penetrated; and another 50 days until that vulnerability is fixed.

By leveraging new SAP security solutions and technologies, agencies of all sizes realize they will be defended in a more efficient way, keeping them in compliance with the latest regulations and ensuring their data and that of their constituents remain safe.

www.virtualforge.com

Thomas Kastner is the Managing Director and Chief Technology Officer at Virtual Forge GmbH, the leading provider of Cyber Security solutions for SAP® systems and applications. He is responsible for the product management and development, consulting services and IT Infrastructure.

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