

SATCOM For Net-Centric Warfare – June 2016

MilsatMagazine



NOAA's Operation DeepFreeze... Inmarsat + AeroVironment

A Helping Hand For First Responders—Globalstar

HALE + Hearty

The HPA Corner: Helping The DoD...

Networking The Battlespace

The NexGen Of Firefighting

SIGINT Trends For UAVs + Small Aircraft

Enhanced SATCOM Connectivity

Dispatches



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June 2016

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DISPATCHES

NRO-37 Sent Off To Secret Work By ULA + Aerojet Rocketdyne.....	4	DARPA Plans On More Sophisticated, Resilient + Collaborative UAS.....	12
Glonass-M Satellite Acquires Designed Orbit After Soyuz-2.1b Launch.....	7	Successful Flights Tests Of Predator C Avenger Successful	13
SpaceX's Perfect Launch + Landing... A THIACO-8 Send Off.....	8	US Air Force Approves New RPA Initiatives.....	14
New Drone Detection System.....	10	SMC's CAMMO Contract To L-3.....	15
Satellite AIS For French Navy.....	10	"Mini" Space Fence Prepares Engineers + Airmen For Debris Monitoring ...	16
New Falcon III® Family Member	11	US Air Force SSA Contract Awarded To Orbit Logic.....	17

FEATURES

A Case In Point: NOAA's Operation Deep Freeze... ..	18	A Honeywell Aerospace Focus: Networking The Battlespace.....	28
The Roles Of Inmarsat + AeroVironment By Todd Jacobs, Project Scientist, NOAA		By Tom Hart, Honeywell Aerospace	
A Helping Hand From Space For... First Responders.....	22	GovSat Insights: UAVs Should Enable The NexGen Of Firefighting	30
By Gavan Murphy, Globalstar		By Ryan Schradin, GovSat Report	
HALE + Hearty... The Correct Application Of	24	SIGINT Trends For UAVs + Small Aircraft.....	32
Ground Infrastructure Technology By Rajanik Mark Jayasuriya, ST Electronics		By John Beckner, Horizon Technologies	
The HPA CORNER: DIUx To Help DoD Reap The Benefits Of.....	26	A Cobham Focus: Enhanced SATCOM Connectivity.....	34
Hosted Payloads By Al Tadros, Vice President, SSL		By Andrew Legg, Cobham SATCOM	

ADVERTISER INDEX

Advantech Wireless.....	9	Hosted Payload Association (HPA)	17
Airbus Defence and Space CIS.....	5	SatFinder	21
AvL Technologies	3	Satnews Digital Editions.....	15
Comtech Xicom Technology, Inc.	13	Teddyne Paradise Datacom	11
CPI Satcom Products	7		

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DISPATCHES

NRO-37 Sent Off To Secret Work By United Launch Alliance + Aerojet Rocketdyne



The launch of NROL-37 aboard a Delta IV Heavy. Photo courtesy of ULA.

A United Launch Alliance (ULA) Delta IV Heavy rocket carrying a payload for the National Reconnaissance Office (NRO) lifted off from Space Launch Complex-37 on June 11 at 1:51 p.m. EDT. The NROL-37 mission is in support of national defense.

Laura Maginnis, ULA vice president of Custom Services, said, "This was the ninth time ULA launched the Delta IV Heavy, the most powerful launch vehicle in existence today."

This mission was launched aboard a Delta IV Heavy configuration Evolved Expendable Launch Vehicle (EELV), which featured a center common booster core along with two strap-on common booster cores. The ULA Delta IV Heavy is currently the world's largest rocket, providing the nation with reliable and proven heavy lift capability.

Each common booster core was powered by an RS-68A Liquid Hydrogen/Liquid Oxygen engine producing 702,000 pounds of thrust. A single RL10 Liquid Hydrogen/Liquid Oxygen engine powered the second stage.

The booster and upper stage engines were both built by Aerojet Rocketdyne. ULA constructed the Delta IV Heavy launch vehicle in Decatur, Alabama.

"The team worked together through many challenges this flow including overcoming the after effects of Tropical Storm Colin," said Maginnis. "We are proud of the outstanding teamwork between the ULA, NRO and Air Force partners to ensure mission success for this critical national security asset."

ULA's next launch is the Atlas V MUOS-5 mission for the US Navy and the US Air Force, which is scheduled for June 24 from Space Launch Complex-41 at Cape Canaveral Air Force Station, Florida.

The EELV program was established by the US Air Force to provide assured access to space for Department of Defense and other government payloads.

The commercially developed EELV program supports the full range of government mission requirements, while delivering on schedule and providing significant cost savings over the heritage launch systems.

ULA has successfully delivered more than 100 satellites to orbit that provide critical capabilities for troops in the field, aid meteorologists in tracking severe weather, enable personal device-based GPS navigation and unlock the mysteries of our solar system.

Few satellites are large enough that a Delta IV Heavy launch vehicle is required to reach geosynchronous transfer orbit. Past NRO launches to use this vehicle from the Cape have all traveled directly to geosynchronous orbit, which suggests that the payload will be an Orion electronic signals intelligence (ELINT) satellite.

NROL-37 is the ninth launch of an Orion satellite, part of a series of spacecraft introduced in the mid-1980s to replace the earlier Aquacade satellites.

The flight, designated NRO Launch 37 (NROL-37), is the second of the year for the National Reconnaissance Office (NRO), following February's NROL-45 mission which flew from Vandenberg Air Force Base, also atop a Delta IV and was also the second Delta launch of the year.

Aerojet Rocketdyne, Inc., a subsidiary of Aerojet Rocketdyne Holdings, Inc., successfully supported the launch this national security payload into orbit for the US government.



NROL-37 launch photo courtesy of ULA.



During launch, three RS-68A engines ignited to boost the Delta IV Heavy off the pad, each providing 702,000 pounds of lift-off thrust.

The RS-68A is the world's most powerful liquid-hydrogen/liquid-oxygen engine, and has now flown 32 commercial and government missions with 100 percent mission success. After the upper stage separated from the launch vehicle, a single RL10B-2 ignited to provide 24,750 pounds of thrust to power the upper stage, using cryogenic liquid hydrogen and liquid oxygen propellants during its operation.

RL10B-2 is a liquid-fuel cryogenic rocket engine designed and developed from the RL10 family of upper-stage engines, which have accumulated one of the most impressive lists of accomplishments in the history of space propulsion.

The RL10 has helped place numerous military, government and commercial satellites into orbit over the last 50 years, and has powered scientific space-probe missions to every planet in our solar system.

ARDÉ, a subsidiary of Aerojet Rocketdyne based in New Jersey, provided the pressure vessels on the first and second stages of the launch vehicle.

Three of the world's most powerful hydrogen-fueled booster engines were used. Aerojet Rocketdyne propulsion included three RS-68A booster engines, an RL10B-2 upper-stage engine, multiple attitude control thrusters and 26 helium pressurization tanks.

"As a military veteran, I can personally attest to the importance of national security satellites for our nation's troops deployed at home and overseas," said Aerojet Rocketdyne CEO and President Eileen Drake. *"Congratulations to everyone for another successful launch."*



ulalaunch.com

nro.gov/index.html

aerjetrocketdyne.com

DISPATCHES

Glonass-M Satellite Acquires Designated Orbit

A Russian Fregat booster has successfully delivered a Glonass-M satellite into the designated orbit, the Defense Ministry press office told TASS on May 29th.



"A Soyuz-2.1b medium-class heavy carrier rocket has successfully delivered the Glonass-M Russian navigation spacecraft into the designated orbit. The carrier rocket's launch and the injection of the spacecraft into orbit were carried out in a normal mode," the Defense Ministry said.

The carrier rocket was launched at 11:45 a.m. Moscow time (08:45 GMT) from site No. 43 of the Plesetsk cosmodrome in the Arkhangelsk Region in north Russia by an operational crew of the Russian Aerospace Force's space troops, the press office said.

"The launch was supervised by Commander of Aerospace Force Space Troops Lieutenant-General Alexander Golovko who had arrived at the cosmodrome to control the preparation and the launch of the satellite for the Glonass orbital navigation system," the Defense Ministry's press office reported.

All the pre-launch operations and the launch were carried out in a normal mode. Ground-based automated systems exercised control of the carrier rocket's launch and flight, the Defense Ministry said. Ten minutes after the launch, the carrier rocket's upper stage comprising the Fregat booster and the Glonass-M navigation satellite separated from the rocket in a normal mode. The satellite's further injection into orbit was carried out by the Fregat acceleration unit.

This is the second launch of a Glonass-M satellite and the third launch of a Soyuz-2 medium-class carrier rocket from the Plesetsk cosmodrome this year. The flight tests of the Soyuz-2 spacecraft began at the spaceport on November 8, 2004. Over the last 12 years, 27 launches of Soyuz-2 carrier rockets in their upgraded 1a, 1b and 1v modifications have been carried out at the Plesetsk spaceport.

Glonass is Russia's satellite navigation system designed to provide Russia with its own navigation data for military and civilian use, as well as to compete with the US Global Positioning System (GPS) in the commercial market for navigation data.

DISPATCHES

SpaceX's Perfect Launch + Landing... A THAICOM-8 Send Off



"All looks good," reported SpaceX CEO Elon Musk.

SpaceX landed its third consecutive rocket on May 27th, concluding a mission that successfully launched a commercial communications satellite to orbit—THAICOM 8.

"Falcon 9 has landed," a member of SpaceX's launch team confirmed about 10 minutes after a 230-foot Falcon 9 rocket's 5:39 p.m. blastoff from Cape Canaveral Air Force Station.

About 20 minutes later, the rocket's upper stage deployed the Thaicom 8 satellite into orbit, as planned.

Later, Musk said the rocket's first stage had landed at close to the top speed it was designed to handle, possibly undermining its stability on the ship floating more than 400 miles offshore.

"Prob OK, but some risk of tipping," he said on Twitter.

If the first stage remained upright, crews planned to board the unpiloted "drone ship" to weld shoes over the rocket's four landing legs and then sail it back to Port Canaveral within a few days.

Musk's comment was a reminder that despite a remarkable run of three straight booster landings and four in the company's last six missions, the landings remain experimental.

SpaceX's goal is to cut launch costs by reusing rockets. Musk eventually wants to achieve aircraft-like operations, with teams needing only to hose down and refuel rockets between flights.

However, the rockets that landed on the 27th as well as the previous landing three weeks ago have sustained more damage that may make them impossible to fly again.

That's not surprising, as their landings were considered the most difficult yet to complete. Both missions launched communications satellites on their way to orbits more than 22,000 miles over the equator, requiring more speed.

After completing their engine burns and separating, the roughly 14-story boosters dropped more than 70 miles, entering the atmosphere at about 4,000 mph.

Descending at that high a velocity, the rockets were seared with heating five times more intense than on missions to lower orbits, such as SpaceX's launches of cargo to the International Space Station.

Plus, the rockets had less fuel to spare for engine firings to slow their fall.

Despite those challenges, the Falcon 9 booster again deployed its legs and touched down on the football field-sized deck of the ship named "Of Course I Still Love You," prompting another celebration from the jubilant employees gathered at the SpaceX headquarters in Hawthorne, California.

When returned to shore, the Falcon 9 booster will join three other boosters stored in a hangar at Kennedy Space Center, starting to strain the hangar's capacity: the hangar can only hold five boosters.

spacex.com

thaicom.com

Some of the information contained in this story is by James Dean of Floridatoday.com.



DISPATCHES

New Drone Detection System



DSM Dyneema has announced that ROBIN Radar Systems has selected industry-leading Dyneema® Crystal Technology for the radome of its new Elvira® drone detection system.

With near-zero signal loss, Dyneema® Crystal Technology helps Elvira® detect drones and classify them, distinguishing them from birds or other flying objects, at longer distances than traditional radar systems. In fact, this breakthrough radar technology can detect larger fixed-wing drones at a range of nine kilometers and smaller multi-rotor drones at up to three kilometers.

In addition to the material's electromagnetic transparency, ROBIN Radar chose Dyneema® Crystal Technology for its superior protection of sensitive equipment in harsh outdoor environments and its extreme light weight for easy transport.

The Elvira® radomes are produced by Airborne, a partner of DSM Dyneema. The two companies collaborate to deliver next-generation radomes made with Dyneema® Crystal Technology to customers worldwide.

"Because Elvira® is looking for very small targets and must distinguish fine details to prevent false positives, we needed a radome material that could provide high transparency to minimize signal loss," said Gerben Pakkert, head of R&D at ROBIN Radar Systems. "These rigorous requirements quickly ruled out existing alternatives. Dyneema® Crystal Technology delivers lower signal loss than any other radome material available today, allowing us to realize the full potential of our advanced radar system."

Elvira® was specifically designed for drone detection. After winning a tender from the Dutch Ministry of Justice, ROBIN Radar applied its expertise in tracking small targets to design the new system, which launched in April 2016. Elvira® provides military-grade radar capabilities, including advanced Doppler processing that enables it to track even the most agile drones. The system is offered at a competitive price that supports broad usage in professional security scenarios, such as protecting high-profile events, airports, harbors, prisons and other critical infrastructures against drones. By combining detection and classification in just one sensor, the technology saves precious time in the decision process.

"With nearly 200,000 new drones taking to the air each month, as reported by CNBC, accurately detecting and classifying them is becoming extremely critical," said Danielle Petra, new business development manager at DSM Dyneema. *"Elvira® is an excellent example of how Dyneema® Crystal Technology is helping customers create radically new detection technologies and underscores DSM Dyneema's commitment to supporting our customers with the most advanced security materials on the market today."*

Dyneema® Crystal Technology provides an extremely low loss tangent and approximately half the dielectric constant compared to aramid, e-glass and quartz. The electrical properties of the material maintain superior performance - even at higher frequencies from X band to millimeter band - allowing military, civil and telecommunications organizations to realize the full potential of their advanced antenna, radar, radio astronomy or communications systems.

Further, because Dyneema® Crystal Technology offers an exceptional strength-to-weight ratio and high impact resistance, it can be used in thinner gauges that enhance transmission quality even more. Its light weight also makes radomes more energy-efficient to ship and easier to maneuver and install.

Dyneema® Crystal Technology is inherently hydrophobic without the need for time-consuming and demanding secondary resin application, a property that virtually eliminates

Satellite AIS For French Navy

exactEarth Ltd. has been selected by Telespazio France to supply Satellite AIS services to the French Navy as part of the recently announced four-year Trimaran 2 project won by a consortium of Airbus Defense and Space and Telespazio France.

Under terms of the contract, exactEarth will provide a Satellite AIS data feed of the French economic exclusion zone, which encompasses 11 million square kilometers, to Telespazio France who will provide a viewing capability to several users in the French Navy.

"This is an important strategic win which will allow us to develop business with new long-term customers," said Peter Mabson exactEarth CEO.



"Telespazio is a key name in European satellite services and the French Navy has significant global maritime surveillance and security interests. Given exactEarth's industry leading satellite AIS capabilities, our ability to now offer advanced analytics and with our real-time second generation satellite system coming on line next year, we see the opportunity to substantially grow the value of this business over the next four years starting from this beachhead contract."

exactearth.com

telespazio.fr

DISPATCHES

New Falcon III® Family Member

Harris Corporation has introduced their Falcon III® RF-7850S advanced wideband Secure Personal Radio (SPR™).

This unit will provide modern-day warfighters with secure networked voice, data and situational awareness in a single, lightweight, easy-to-use platform.

The RF-7850S is the successor to the globally fielded RF-7800S SPR Team Radio and provides increased power as well as greater waveform and spectrum flexibility.

The new radio expands Harris' next-generation Falcon III® radio family, which now covers every tier of the battlefield, from handhelds at the tactical edge to vehicular and airborne communications.

According to Matt Nearpass, director, product management, Global Networking Products, Harris Communication Systems, Harris will now be able to offer their customers a common user experience across each tactical tier of the battlefield with a single platform and seven products.

harris.com//solution/harris-falcon-iii-rf-7850s-spr-advanced-wideband-secure-personal-radio



DARPA Plans On More Sophisticated, Resilient + Collaborative Unmanned Air Systems

DARPA's Collaborative Operations in Denied Environment (CODE) program seeks to help the US military's unmanned aircraft systems (UASs) conduct dynamic, long-distance engagements of highly mobile ground and maritime targets in denied or contested electromagnetic airspace, all while reducing required communication bandwidth and cognitive burden on human supervisors.

In an important step toward that goal, DARPA recently awarded Phase 2 system integration contracts for CODE to Lockheed Martin Corporation (Orlando, Florida.) and the Raytheon Company (Tucson, Arizona). Further, the following six companies—all of which had Phase 1 contracts with DARPA to develop supporting technologies for CODE—will collaborate in various ways with the two prime contractors:

- » Daniel H. Wagner Associates (Hampton, Virginia)
- » Scientific Systems Company, Inc. (Woburn, Massachusetts)
- » Smart Information Flow Technologies, LLC (Minneapolis, Minnesota)
- » Soar Technology, Inc. (Ann Arbor, Michigan)
- » SRI International (Menlo Park, California)
- » Vencore Labs dba Applied Communication Sciences (Basking Ridge, New Jersey)

CODE's main objective is to develop and demonstrate the value of collaborative autonomy, in which UASs could perform sophisticated tasks both individually and in teams under the supervision of a single human mission commander.

CODE-equipped UASs would perform their mission by sharing data, negotiating assignments, and synchronizing actions and communications among team members and with the commander.

CODE's modular open software architecture on board the UASs would enable multiple CODE-equipped unmanned aircraft to navigate to their destinations and find, track, identify, and engage targets under established rules of engagement.

The UASs could also recruit other CODE-equipped UASs from nearby friendly forces to augment their own capabilities and adapt to dynamic situations such as attrition of friendly forces or the emergence of unanticipated threats.

"During Phase 1, we successfully demonstrated, in simulation, the potential value of collaborative autonomy among UASs at the tactical edge, and worked with our performers to draft transition plans for possible future operational systems," said Jean-Charles Ledé, DARPA program manager. *"Between the two teams, we have selected about 20 autonomous behaviors that would greatly increase the mission capabilities of our legacy UASs and enable them to perform complex missions in denied or contested environments in which communications, navigation, and other critical elements of the targeting chain are compromised. We have also made excellent progress in the human-system interface and open-architecture framework."*

CODE's prototype human-system interface (HSI) is designed to allow a single person to visualize, supervise, and command a team of unmanned systems in an intuitive manner. Mission commanders can know their team's status and tactical situation, see pre-planned and alternative courses of action, and alter the UASs' activities in real time.

For example, the mission commander could pick certain individual UASs from a team, circle them on the command station display, say "This is Group 1," circle another part of the map, and say "Group 1 search this area." The software then creates a sub-team with the circled UASs, divides up the search task among those assets, and redistributes the original tasks assigned to Group 1 assets to the remaining UASs.

This capability significantly simplifies the command and control of large groups of UASs. Other parts of the HSI research focused on how to display the new plan, including potential impact on other mission objectives, and—depending on pre-set mission rules—either directly executes the plan or waits for the commander's approval to act.

The HSI and autonomy algorithms are being developed in open architectures based on emerging standards: the Future Airborne Capability Environment (FACE) and Unmanned Control Segment (UCS) standards used by the US Army and US Navy, and the Open Mission Systems (OMS) and Common Mission Command and Control (CMCC) standards that the US Air Force uses.

During Phase 2, DARPA plans to implement an initial subset of the behaviors within each of the two open architectures and use those architectures to conduct live flight tests with one or two live UASs augmented with several virtual aircraft.

If those tests are successful, DARPA could move to Phase 3, in which one team would test the capabilities using up to six live vehicles cooperating among themselves and with additional simulated vehicles. A single person would command the UAS team to perform a complex mission involving target search, identification, and engagement against an active, unpredictable adversary.

CODE seeks to deliver a software system that would be resilient to bandwidth limitations and communications disruptions, yet compatible with existing standards and capable of affordable retrofit into existing platforms

If successfully demonstrated, these scalable, cost-effective capabilities would greatly enhance the survivability, flexibility, and effectiveness of existing air platforms, as well as reduce the development times and costs of future systems.

darpa.mil/

darpa.mil/program/collaborative-operations-in-denied-environment

DISPATCHES

Successful Flight Tests Of Predator C Avenger

General Atomics Aeronautical Systems, Inc. (GA-ASI), has completed successful flight tests of their Predator® C Avenger®, which is equipped with a MS-177 Electro-optical/Infrared (EO/IR) sensor manufactured by UTC Aerospace Systems.



MS-177, an advanced sensor in UTC's SYERS family of sensors, is a key component that supports GA-ASI's effort to equip Avenger with a long-range imaging capability. MS-177 is more technically advanced than the SYERS 2 flying on U-2 aircraft and also is significantly more affordable to manufacture. The sensor is a 7-band multi-spectral system that can be upgraded to a 10-band system to enhance target detection for maritime applications.

Linden Blue, CEO, GA-ASI, said "A MS-177-equipped Avenger provides a strategic ISR capability at a fraction of the cost of other ISR collecting platforms, offering high-resolution imagery from significant standoff ranges, thereby expanding the situational awareness of the warfighter greatly."

During government-funded testing, Avenger demonstrated its ability to collect high-resolution imagery of land-based and littoral objects with the MS-177 sensor at altitudes above 37,000 feet Mean Sea Level (MSL). A total of seven test flights occurred between January and February 2016 at Naval Air Weapons Station, China Lake, California.

GA-ASI plans to begin flight testing of an Improved Avenger in October 2016, which will further enhance the operational capabilities of the MS-177. With an increased wingspan of 76 feet, Improved Avenger will extend the aircraft's already impressive endurance from 15 hours to 20 hours, thus increasing the utility of MS-177 over a longer period of time.

The Improved Avenger will provide an optimal balance of long loiter ISR and precision-strike capability, supporting a wide array of sensors and weapons payloads to perform high-speed, long-endurance, multi-mission ISR and ground support missions.

ga-asi.com/predator-c-avenger

DISPATCHES

US Air Force Approves Of New RPA Initiatives



The Air Force recently approved two initiatives for the remotely piloted aircraft career field. Eight RPA reconnaissance squadrons will be redesignated as attack squadrons, and the Air Force has also authorized RPA aircrews to log combat time when flying an aircraft within designated hostile airspace, regardless of the aircrew's physical location. Photo is courtesy of US Air Force photo/Tech. Sgt. Nadine Barclay)

The US Air Force recently approved two initiatives for the remotely piloted aircraft career field.

First, eight RPA reconnaissance squadrons will be redesignated as attack squadrons. Second, Air Force Chief of Staff Gen. Mark A. Welsh III authorized RPA aircrews to log combat time when flying an aircraft within designated hostile airspace, regardless of the aircrew's physical location.

The changes were two of many recommendations that emerged as part of Air Combat Command's Culture and Process Improvement Program, which seeks to address a number of issues affecting operations and the morale and welfare of Airmen across the RPA enterprise.

"The Airmen who perform this essential mission do a phenomenal job, but we learned from the RPA pilots, sensor operators and their leaders that these Airmen are under significant stress from an unrelenting pace of operations," said Air Force Secretary Deborah Lee James. "CPIP was established to help stabilize the RPA enterprise. These policy changes are steps toward addressing issues highlighted by RPA operators in the field."

The redesignation will affect the names, but not the core missions of RPA squadrons at Holloman Air Force Base, New Mexico; Whiteman AFB, Missouri; and Creech AFB, Nevada.

These units, consisting of approximately 600 officers and 700 enlisted Airmen, will continue to provide real-time intelligence, surveillance and reconnaissance to commanders, close air support to ground troops, and post-operation battle damage assessment to senior leaders.

Previously, squadrons consisting of MQ-9 Reaper aircraft were designated attack squadrons, while squadrons of MQ-1 Predator aircraft were designated reconnaissance squadrons.

The redesignation anticipates the Air Force's ongoing transition to an all MQ-9 fleet and acknowledges the capability of these units to support military operations that can include strikes against targets.

The cost of the redesignation is minimal, mostly affecting signs, stationary and other local items that display the unit's name or emblem.

"Aerial warfare continues to evolve. Our great RPA Airmen are leading that change. They are in the fight every day," Welsh said.

"These policy changes recognize the burdens they bear in providing combat effects for joint warfighters around the world."

Since their first employment over the Balkans, Air Force RPAs have been in high demand, according to Air Force senior leaders. This has led to rapid expansion of both the number of squadrons and the number of operators.

Unique organizational structures and names evolved during this time, and the Air Force is now taking steps to standardize operations and improve conditions for operators.

The RPA mission "...is instrumental to achieving decision advantage against our enemies, is an indispensable asset to our national security, and is the backbone to the success of our fights in Iraq, Syria, Afghanistan, and other areas combating extremism and terrorism," Gen. Hawk Carlisle, commander of ACC, said March 16 in his testimony to the US Senate Committee on Armed Services. "The Air Force is fully invested in continuing to achieve sustainability of this enterprise."

The Air Force reduced the number of combat lines to 60, from 65 in 2015. They also increased incentive retention pay for pilots to \$25,000, matching incentive pay for rated pilots in other airframes.

ACC is expanding the training pipeline for operators, creating a more robust force and decreasing the current operational tempo.

A combat operations-to-dwell ratio of 2:1 will provide Airmen predictable schedules, improve work-life balance, enable further professional development, offer increased training opportunities, and ultimately improve readiness, according to Col. Jeffry Long, ACC's director of CPIP.

Story by Secretary of the Air Force Public Affairs

DISPATCHES

SMC's CAMMO Contract To L-3

The Air Force has awarded a \$43,874,673, fixed-price incentive contract to L-3 National Security Solutions for the operations, maintenance, and sustainment of the Air Force Satellite Control Network.

The Consolidated Air Force Satellite Control Network (AFSCN) Modifications, Maintenance, and Operations (CAMMO) contract is a seven-year, Fixed-Price Incentive (Firm Target) (FPIF) contract which has been awarded through a competitive, best-value source selection process. The CAMMO contract will be for a maximum period of seven years with a six-month extension of services option (one 1-year base + six 1-year options + 6-month extension of services option).

The CAMMO contract is a services acquisition effort integrating and consolidating AFSCN weapon system and operating location requirements from two existing contracts into a single operations, maintenance, and sustainment (OM&S) contract. The two existing contracts are: the Satellite Control Network Contract (SCNC) and the Network and Space Operations and Maintenance (NSOM) contract. Current operations, operations support, remote site support, and Level 1 (organizational) maintenance is provided under the NSOM contract with Harris Information Technology Services (HITS) Corporation. Sustainment, Level 2 (depot) maintenance, sustainment modifications, and factory compatibility testing are provided under the SCNC with Honeywell Technology Solutions Incorporated (HTSI).

This approach will require the CAMMO contractor to provide a defined level of service across the network based on system performance measures. This will incentivize the contractor to implement efficient processes across OM&S and have the opportunity to optimize their workforce, subject to mandatory requirements of the Performance Work Statement and compliance documents. The objective of CAMMO is to maintain performance and reduce OM&S cost for the AFSCN without adding additional risk. This acquisition strategy enables AF Space Command to streamline critical space operations, save scarce funding, and usher in a new era of vertically integrated service-based contracting for the AFSCN.

The AFSCN is a global network of communications and computer systems that support a growing inventory of increasingly complex space vehicles which support operational forces in peace and wartime. It is designed to have the flexibility to support a wide spectrum of orbiting satellites. A large number of satellites with various altitudes and orbit inclinations are supported on a 24-hour per day, 7-day a week schedule. In addition to the primary support provided to DoD, the AFSCN also provides services for non-DoD organizations, National Oceanic and Atmospheric Administration (NOAA), and US—sponsored programs of foreign governments.

The Space and Missile Systems Center is the US Air Force's center of acquisition excellence for acquiring and developing military space systems including Global Positioning System, military satellite communications, defense meteorological satellites, space launch and range systems, satellite control networks, space-based infrared systems, and space situational awareness capabilities.

DISPATCHES

"Mini" Space Fence Prepares Engineers + Airmen for Orbital Debris Monitoring



The Space Fence testing facility is representative of the larger Gallium Nitride (GaN)-based digital array radar system under construction on the Marshall Islands. This innovative system will transform the way the United States Air Force monitors thousands of orbital space objects. The photo is courtesy of Lockheed Martin.

Off a busy suburban street near Philadelphia, Pennsylvania—and within sight of a popular shopping center—testing is underway for a system that will monitor hundreds of thousands of pieces of junk orbiting the Earth and threatening active satellites and the International Space Station (ISS).

The US Air Force's Space Fence marked a major accomplishment earlier this year, after a scaled-down version of the end-item system recorded its first track of a satellite.

"First track is major milestone for us and represents that we have a functioning radar," said Bruce Schafhauser, Space Fence Program Director for Lockheed Martin. *"It's the first time the end-to-end radar loop is closed and we track real objects in space. The first track and the new test facility means we are one step closer to delivering a dramatic tenfold improvement in space situational awareness and orbital monitoring capability."*

It's a critical mission. The space station crew has conducted at least 25 avoidance maneuvers to avoid space junk. Space junk traveling at speeds of nearly eight miles per second passed the station four times in 2015.

Long before Space Fence begins S-band radar tracking of objects from its site on a narrow island in the middle of the Pacific Ocean, Lockheed Martin engineers and US Air Force personnel are testing and training on a scaled-down version of the system from the comfort of New Jersey.

The test facility is used for early validation of hardware, firmware and software that will enable the Space Fence system to detect, track, and catalog orbital objects that facilitates the prediction and prevention of collisions in space. The test site will also provide early lessons learned on installation of the S-band ground-based radar, support maintenance training and allow engineers to test verification procedures.

"The main objective is to reduce risk of discovering something unexpected in the Marshall Islands—especially because we will be integrating a new radar system on a massive scale," said Schafhauser. *"Some things as simple as mechanical fit or installation sequence will be much better understood before we arrive on island."*

Air Force personnel are at the test facility running procedures as well, to prepare for formal acceptance testing the new system.

"Our strong partnership with the Air Force leads to learning and discovery on both sides," Schafhauser added. *"The collaboration in the Moorestown facility drives great efficiencies before the installation and test commences on Kwajalein."*

Space Fence will replace the existing Air Force Space Surveillance System, or VHF Fence, which has been in service since the early 1960s. Space Fence is a scalable solid-state S-band radar capable of detecting much smaller objects than the current system.

Space Fence system's accuracy and its persistent surveillance decreases orbital uncertainty to maintain custody of space objects and to alert operators of changes in the space environment.

By using an open-architecture system, Space Fence can adapt to future missions requiring various tracking and coverage approaches. The inherent flexibility of the digital array radar allows for tasking in deep space simultaneous with un-cued surveillance mission.

Construction continues at the six-acre Space Fence site 2,100 miles southwest of Honolulu. Forty-five hundred cubic yards of concrete now form the foundation of the sensor site and the start of vertical ring walls that will support the air inflated Kevlar roof that provides transparency to radio frequency (RF) transmissions.

The test facility will remain in place so that teams can provide long-term support after the system is operational on Kwajalein in 2018.

lockheedmartin.com/

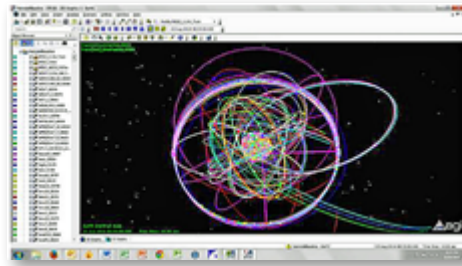
DISPATCHES

US Air Force SSA Contract Awarded To Orbit Logic

Orbit Logic has signed a Phase II SBIR contract sponsored by the Air Force Research Laboratory (AFRL) to research and implement software to optimize the scheduling of observations of known space objects and the search for unknown space objects from ground observation sites for improved Space Situational Awareness (SSA).

Orbit Logic is teamed with the Colorado Center for Astrodynamics Research at the University of Colorado at Boulder and the University of Texas at Austin for this effort and the firm will be working closely with the AFRL team at the Maui Space Surveillance Site in the execution of this contract.

The work will leverage Orbit Logic's existing scheduling software framework to rapidly prototype and compare new algorithms, refine figures-of-merit (FOM), and simulate and compare resulting observation schedules.



Sample Orbit Logic Prototype SSA Sensor Tasking Schedule Displayed in Systems Tool Kit (STK).

The University of Colorado and University of Texas will develop and refine Finite Set Statistics (FISST) methods to prioritize known-object observation opportunities and search areas for unknown space objects that are then scheduled within the Orbit Logic scheduling software.

This contract is a continuation of a successful Phase I contract in which Orbit Logic and its subcontractor team developed and

demonstrated prototype software including an SSA-specific FOM, FISST prioritization and target density prediction methods, and methods for optimized tasking of ground sensors for SSA observations.

The proposed software solution will provide a configurable, automated system to improve sensor tasking efficiency and responsiveness for SSA applications. The FISST algorithms for task prioritization, specialized scheduling algorithms for sensor tasking, and configurable SSA-specific figure-of-merit will together provide optimized and tunable scheduling for the Maui Space Surveillance Site and other sites and organizations across the US military and for allies around the world.

**orbitlogic.com
wpafb.af.mil/AFRL/
ccar.colorado.edu/
utexas.edu/**

A CASE IN POINT: NOAA'S OPERATION DEEP FREEZE... THE ROLES OF INMARSAT + AEROVIRONMENT

By Todd Jacobs, Project Scientist, NOAA Unmanned Aircraft Systems Program, + Deputy Superintendent, Channel Islands National Marine Sanctuary

For more than a month, a National Oceanic and Atmospheric Administration (NOAA) team endured brutal environmental conditions aboard the iconic US Coast Guard Heavy Icebreaker Polar Star.

Surrounded by icebergs as deep as 1,000 feet, the US Coast Guard Cutter (USCGC) Polar Star went to work. The mission: to chop up enough ice to create a watery "superhighway" through the middle of Antarctica's frozen Ross Sea.

At least that's how Todd Jacobs, a project scientist at the NOAA Unmanned Aircraft Systems Program and deputy superintendent for operations and administration of the Channel Islands National Marine Sanctuary, describes the mission called Operation Deep Freeze 2016.

Once a year, crews haul critical deliveries of fuel, food and other supplies to the National Science Foundation's McMurdo Station in Antarctica (located at 77 degrees 51 minutes South, 166 degrees 40 minutes East). Jacobs and seven other team members joined Operation Deep Freeze by assisting

on the Polar Star, a 399-foot Heavy Icebreaker ship manned by 140 Coast Guard crew members. The Polar Star cleared ice obstructions up to 15 feet thick to open up the "superhighway" (or ice-free channel) for an oil tanker and a supply ship, so the ships could get to and from McMurdo Station readily and safely.

On board, NOAA's primary role involved the transmission of data, images and video from an unmanned AeroVironment Puma AE (All Environment) aircraft. The team used Inmarsat satellite communications (SATCOM) for constant connectivity.

In the weeks leading up to the trip, nothing could have prepared Jacobs and his colleagues for what they'd ultimately face: wind chills plunging into negative double-digits as well as howling storms that were measured at up to 200 mph (320 kph).

"We would be up on the deck for hours," said Jacobs in describing his first-ever participation in Deep Freeze. "We'd have on multiple layers of





BGAN in the Antarctic.

insulation under a heavy parka, along with face masks and goggles. As the air was so extremely dry, we had to repeatedly coat our skin with lotion to prevent painful cracking.”

During the more than one-month long operation, Inmarsat’s reliable satellite communication services proved indispensable. The network included Broadband Global Area Network (BGAN) via a Hughes 9450-C10 BGAN Mobile Satellite Terminal and Global Satellite Phone Service (GSPS) through an Inmarsat IsatPhone 2 handset.

For Jacobs and his team, these services and equipment established their sole link to NOAA operations and their families. At first, BGAN was intended as a backup, in case the Coast Guard-provided email system broke down. As it turned out, the Coast Guard was never able to link the NOAA team to its email system—BGAN emerged as the only available option and the system remained reliable for the duration of the voyage.

“This was huge from a professional standpoint,” Jacobs said. “We counted on Inmarsat BGAN throughout the operation to communicate with our command centers. Then, we used BGAN to check in with our families and keep up with life events while we were at sea.”

The first stop for the NOAA team members was Tasmania, Australia, in late December, where they set up the BGAN antenna. Thanks to “plug and play”



Launching a PUMA UAS. Photo courtesy of AeroVironment.

ease-of-installation made possible by Inmarsat’s managed, on-demand capability, crew members spent minimal time installing, troubleshooting and configuring the antenna, which enabled them to focus on final preparations for Deep Freeze.

***“Inmarsat won over quite a few fans on the ship.”
—Todd Jacobs, NOAA project scientist.***

On December 30, the Polar Star got underway from Hobart, Tasmania, for Antarctica, reaching the edge of the frozen Ross Sea on January 7 and McMurdo Station by January 18. The mission ended for the NOAA team on February 24, when the ship arrived at Valparaiso, Chile. The Inmarsat satellite equipment was in constant use for the whole mission, which transited the rough Southern Ocean twice and spanned three different continents.

Commissioned in 1976, the Polar Star is considered the most powerful, non-nuclear icebreaker in the world. The ship is powered by six diesel-powered propulsion generators and three gas-fueled propulsion turbines that can produce 75,000 horsepower during the heaviest of ice-breaking modes. The ship’s curved bow was designed to allow the ship to “ride up” on ice, using its 13,000-ton weight to then fracture and break the ice. For all of the formidable power and structure, much of the Polar Star’s communication equipment is fairly antiquated.

The hand-launched, 13.5 pound Puma AE can fly for more than 210 minutes at a maximum range of about 12 miles in the UAS’ standard configuration. The advanced Puma equipment that AeroVironment provided for the operation was capable of flying more than 25 miles from the ship.

NOAA used the Puma AE to “scout” ahead of the Polar Star’s path, collecting data and images to deliver real-time information about the potential for treacherous conditions and to acquire high-resolution images that were used to validate the satellite images used by ice forecasters at the National Ice Center.

With Inmarsat's 99.9 percent network availability for the company's L-band constellation, team members were free to download and transmit data reports, images and video clips to command centers in Washington D.C. and Florida.

Without Inmarsat's communication services, the Puma crew's capability for operating would have been severely limited due to a lack of reliable communication with flight governing authorities—the dissemination of the data would have been limited to only the personal aboard the ship. Additionally, there would not have been a way for the ice and weather forecasters to send and receive the images captured from by the satellites.

"The unmanned aircraft observational images and data provided a real-time capability that was critical for tactical use," Jacobs said. "Having high-resolution imaging made the ice forecasting more accurate by providing 'ground truth' and validating the forecasts. The objective was to be able to tell the crew exactly where the ice was and how thick in order to help the Coast Guard navigate the ship safely and efficiently."

Rough seas caused major rolling on the Polar Star and wind levels grew severe. However, the ship maintained connectivity to the Inmarsat satellite system throughout the entire mission.

With this, NOAA operation participants stayed in touch with command centers and family through the Inmarsat BGAN and IsatPhone 2 communication services. "The phone worked pretty much the entire time," Jacobs said. "Thanks to the BGAN terminal, we were able to send and receive email the entire time. Both systems were so reliable that the captain of the ship asked us if he could use the service a couple of times, as he couldn't download certain files through his Coast Guard email service—Inmarsat won over quite a few fans on the ship."

On the water, the NOAA team supported the Coast Guard's mission to build its "superhighway" across a vast swath of stingingly frigid ocean. This was a once-in-a-lifetime experience, forged in ice. By supplying the satellite communication services required to build another "superhighway" along the way—this one reaching to space—Inmarsat positioned the Polar Star for a safe and successful journey.

inmarsat.com

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SOME SPECIFICS

Inmarsat BGAN

- » Provides simultaneous voice and broadband data communications globally – including regions as remote, cold and harsh as Antarctica – from small and lightweight satellite terminals
- » Allows for "plug and play," ease-of-use set-up and deployment
- » Connects to a portable PC or smart device using Standard IP to access the Internet for applications such as web browsing and email
- » Offers a range of guaranteed Streaming IP rates to meet all data, voice and video needs
- » Ensures 99.9 percent satellite and ground network availability via the Inmarsat-4 network
- » Meets military and government requirements for security and supports all major VPN products and encryption standards

IsatPhone 2

- » The latest addition to Inmarsat's handheld phone portfolio, IsatPhone 2 is designed to work with the most reliable satellite communication network in the world
- » Handsets operate over Inmarsat's global Inmarsat-4 satellite network, ensuring reliable call stability and seamless roaming worldwide
- » Robust handsets operate at -20°C to +55°C, with humidity tolerance up to 95 percent, ensuring you stay connected in even the most extreme and remote locations

AEROVIRONMENT'S PUMA AE UAS

The Puma AE (All Environment) is a fully waterproof, small, unmanned aircraft system (UAS) designed for land and maritime operations. Capable of landing in water or on land, the Puma AE empowers the operator with an operational flexibility never before available in the small UAS class.

The Puma AE delivers 3.5+ hours of flight endurance with versatile smart batteries options to support diverse mission requirements. The craft's powerful propulsion system and aerodynamic design make it efficient and easy to launch especially in high altitudes and hotter climates.

Puma AE carries a gimballed payload with an electro-optical (EO) and infrared (IR) cameras. For increased payload capacity, an optional under wing Transit Bay is available, plus a plug and play secondary power adapter is incorporated for increased mission flexibility.

The enhanced precision navigation system with secondary GPS provides greater positional accuracy and reliability of the Puma AE. AV's common ground control system allows the operator to control the aircraft manually or program it for GPS-based autonomous navigation.

A HELPING HAND FROM SPACE FOR... FIRST RESPONDERS

By Gavan Murphy, Director of Marketing EMEA, Globalstar

Emergency services, security personnel, NGOs, and other first responders who support civil emergency situations can benefit from improved communications through the integration of satellite connectivity with existing terrestrial infrastructure. This article explains why a hybrid technology approach can help improve operational efficiencies, while enhancing safety for both the public and emergency response personnel.

Currently, the topic of emergency communications is high on political agendas everywhere—with constantly increasing pressures being placed on emergency and security services including counter-terror activities, regulators are wisely exploring how new technologies can improve emergency services operations and enhance communications capabilities in areas with limited or unreliable alternative infrastructure.

The role of commercial mobile/cellular providers in the overall solution is a key aspect of this discussion, especially considering that such networks are already frequently used by police, fire and ambulance personnel to augment radio or land-based communications infrastructure. However, few nations anywhere can accurately claim to have ubiquitous cellular coverage.

For cellular network operators in almost any country, there are many areas within a nation's borders and coastal waters that are simply uneconomic to equip with terrestrial infrastructure that would guarantee total uninterrupted coverage.

Furthermore, disasters are not limited to areas with communications infrastructure. As all witnessed during the UK's flooding crisis during the

winter of 2015/16, heavy storms can rapidly disable land-based telecoms infrastructures. The US' own 'Snowmageddon' also underlined that terrestrial communications networks can be one of the first casualties of damage to power lines.



Currently, emergency services tend to rely on a mix of commercial mobile networks that include LTE (long-term evolution) / 4G, 3G and 2G based communications networks as well as bespoke network technologies such as TETRA in the UK. However, the simple technological fact is that none of these terrestrial-networks delivers 100 percent coverage. Even if you move beyond urban centers, cellular signals can drop or disappear—and rather suddenly.

Most have experienced the frustrating and sometimes terrible feeling of not being able to get through on our cell phones due to poor signal, especially during an emergency. "Network Unavailable" is the last message you want to see on your phone in a time of crisis. The same goes for first response professionals attempting to provide emergency support to the public.

During a major crisis, terrestrial communications networks can simply be overloaded with the sheer volume of call traffic generated by emergency responders, local organizations and agencies as well as the general public. But the additional threats to the integrity of terrestrial communications infrastructure resulting from natural as well as man-made disasters certainly can add an additional dangerous dimension to any emergency situation which can already be chaotic, frenzied and even explosive.



FRAN assists first responders to reliably communicate with one another as well as their emergency control centers, even when operating in remote areas.

When this happens, certain communications traffic management priorities automatically kick in to ensure that only the most essential communications are served. This may result in a significant number of calls failing to connect or being knocked off the network to give priority to pre-identified agencies. The risk is that those failed calls could be from individuals in danger.

Furthermore, after a disaster, if people are unable to reach out to family and friends, nor are capable of contacting key authorities to warn them of imminent local dangers, this can add significant anxiety to stressed, even panicked, members of the general public. The November 2015 terrorist attacks in Paris, and more recently those in Brussels, further highlighted the need for continued mobile network availability during major incidents.

Fortunately, there is a communications solution that does not rely exclusively on terrestrial radio or cellular/mobile networks, but one that can offer a highly valuable backup to infrastructure in situ. We believe the answer is to integrate Direct-to-User (DtU) satellite communications into existing terrestrial infrastructures, providing extended reach and reinforcing land-based networks.

By embracing this approach, governments and authorities can ensure that emergency services providers, as well as important local and national agencies, have the connectivity they require. Importantly, this multi-technology approach will also facilitate communications for the general public, providing citizens with support after a major incident.

THE ADVANTAGES OF HYBRID TECHNOLOGIES

Globalstar has teamed up with Manx Telecom, a pioneering communications provider and mobile operator based on the Isle of Man in the Irish Sea, to create EMN, Extended Mobile Network, the world's first integrated cellular and DtU satellite network.

EMN incorporates Smart SIM technology developed by Manx Telecom. With Smart SIM, if a caller—for example, a police officer—moves out of coverage of the network he or she is currently using, the call can be dynamically routed to another carrier without disrupting the call. If no other cellular network is available, then the transmission or call is automatically switched onto the Globalstar satellite system.

Globalstar's Low Earth Orbit (LEO) satellites fly at 1,400 km above the Earth and, therefore, experience less signal latency, or delay, than constellations resident in other orbits. Furthermore, with multiple satellites speeding across the skies in LEO at any given point, one, two or more satellites typically are visible. This results in high levels of reliability and minimizes the potential for calls and signals being dropped. The technical configuration of a LEO network also means lower service cost compared to other satellite solutions.

First responders, including police and other 'blue light' organizations, most urgently need networks that they can rely on, wherever they are, 24/7. This means that the first service to use EMN is in support of emergency services—this is called First Responder Auxiliary Network, or FRAN.

With FRAN, first responders and other emergency support organizations, can take advantage of this new, powerful, integrated network to communicate reliably, with their existing off-the-shelf devices, including smartphones—and using their same phone numbers. With this architecture, any emergency call can be delivered using reliable and ubiquitous satellite

coverage, directly to the user, wherever they are. At the heart of EMN is a customized version of Globalstar's Sat-Fi satellite hotspot product which can be installed in any emergency vehicle, or indeed in any remote location where people absolutely need to communicate without fail.

PILOT TRIALS OF FRAN THIS SUMMER

Manx Telecom and Globalstar are collaboratively kicking off pilot system trials of FRAN in the UK, supported by specialist wireless technology consultancy Intelcomm and complementary technology providers, as well as parties from the emergency services community. The aim is to demonstrate how FRAN can deliver never-before-seen levels of communications reliability and reach for these important professionals.

First responders, NGOs and other emergency support organizations of many kinds are already well aware of the benefits of reliable satellite communications from Globalstar. This group includes firefighters in Canada, the US, Chile, and Spain, military and civil support organizations based in the US and beyond, and also international relief agencies such as Disaster Tech Lab which is currently providing much-needed support to desperate and displaced people involved in the current European / Middle East refugee crisis.

By integrating legacy and future land-based infrastructure with satellites orbiting the Earth, emergency services have the chance to benefit from always-on, reliable and ubiquitous communications capability right across the UK—in fact, the same applies to almost any country's landmass. In addition to this, unlike conventional terrestrial alternatives, satellites can deliver reliable coverage offshore, enabling seamless communications for the coastguard, police and other rescuers across islands and coastal waters.

With every new emergency situation, first response teams need to quickly assess what is required and to deploy the crew and equipment to the right places at the right times. When multiple agencies are co-ordinating rescue and recovery operations, they need to be able to communicate reliably and speedily. Remotely working emergency support personnel, even in semi-suburban areas, require a better communications system, one they can completely trust, rain or shine, and that enables an always-on link with colleagues.

Globalstar believes that satellite-based solutions such as EMN can play a major role in helping these professionals carry out their important jobs more efficiently and safely.

With EMN, the aim is to help ensure that emergency services, NGOs and other first responders, can always count on being connected, wherever they are located.

eu.globalstar.com/en/

Gavan Murphy is the Director of Marketing, EMEA, at Globalstar. Based in Globalstar's European HQ in Dublin, Gavan is responsible for the development and implementation of Globalstar's marketing strategy across the European, Middle Eastern and African regions. He spearheads the marketing of Globalstar's consumer products, including the SPOT tracking solutions portfolio, as well as the B2B marketing of voice and data solutions for a range of vertical sectors including maritime, energy, safety and security, commercial fishing and shipping, construction and heavy industry and the burgeoning M2M sector. Prior to joining Globalstar in 2008, Gavan worked with leading global mobile provider Vodafone.

HALE + HEARTY... THE CORRECT APPLICATION OF GROUND INFRASTRUCTURE TECHNOLOGY

By Rajanik Mark Jayasuriya, Vice President/General Manager, Satellite Networks Business Group (SNG), ST Electronics

The number projected by for the global UAV (unmanned aerial vehicles) market by 2024 from analyst firm NSR is 4.1 million. While civil and commercial sectors are contributing to this accelerated growth, by far the largest stimulus is driven by the military and government sectors around the globe.

UAVs are synonymous with global defense. The nexgen vehicles play a primary role in facilitating information and reconnaissance missions, all without the need of placing soldiers in harm's way.

A growing segment of the UAV market consists of HALE (high-altitude, long endurance) vehicles. In fact, HALE will comprise just over 25 percent of the aforementioned NSR projection. These solar-powered, unmanned aircraft fly at altitudes higher than about 60,000 feet and are able to remain airborne for extremely lengthy periods of time, allowing them to view large areas of land.

Over the past year, this market segment has definitely "taken off." There are increased levels of interest from the primary aerospace manufacturing companies that are developing these nexgen vehicles as well as by major players from the technology realm. What's been particularly exciting to watch is how the technology giants from Silicon Valley—you know the names—have all been drawn toward the idea of enabling HALE vehicles.

You could say that these technology company interests in the space are primarily tied to the commercial connectivity aspects of HALE—to assist in the altruistic mission of providing Internet to the roughly three billion unconnected around the globe.

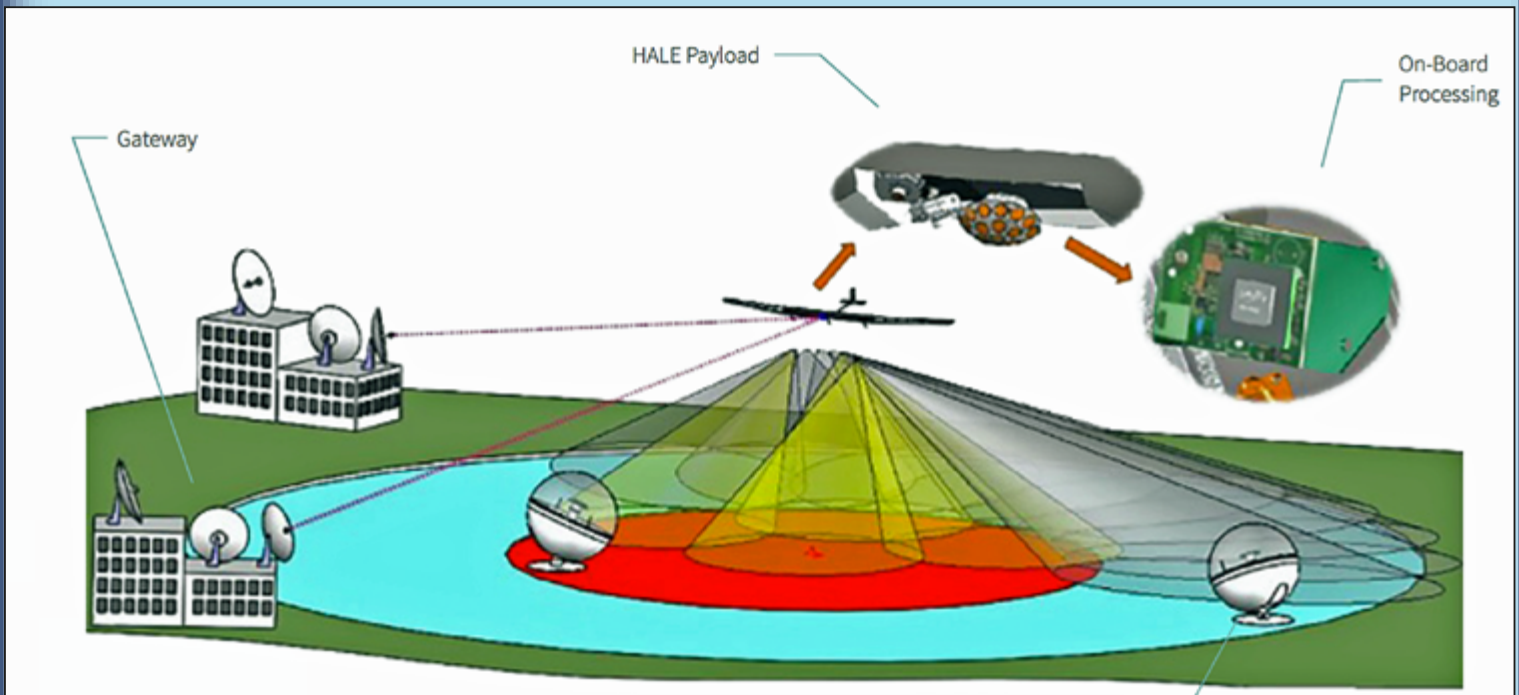
This motivation is to be applauded, as part of satellite's overall mission is to play a crucial role in seamlessly connecting more and more people and more and more devices to the Internet across more and more locations around the globe. This interest and investment by leading tech firms have elevated the stature of this segment of the market.

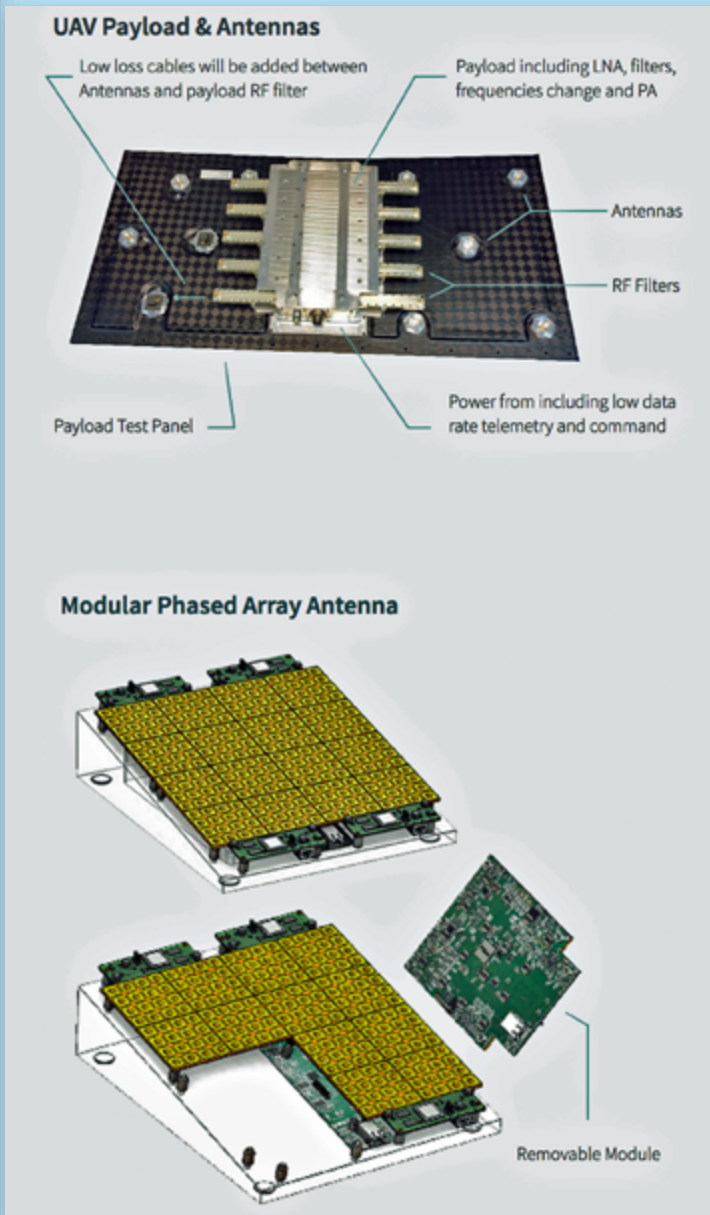
DOWN ON THE GROUND

While stature and headlines are great, the fact of the matter is that the true value of HALE vehicles will never get off the ground—so to speak—without ground infrastructure technology that can handle every demand that is required.

Technology must be able to significantly enhance ground equipment performance, reduce costs and increase satellite efficiency. Doing so will enable a broader audience to enjoy a larger variety of applications via satellite. However, that means some key technical challenges must first be addressed:

- *The UAV payload must be low in weight and power consumption and support high altitude environment conditions*
- *The handheld terminal must have a small form factor with low power consumption and weight*
- *The modular phased array must be designed for RF performance, multi-beam support, low power consumption, and also be cost effective*





Multiple chips are being developed, each of which have a software/hardware hybrid architecture that combines the benefit of a software defined radio (SDR) with custom hardware acceleration.

The technology also played a strong role in the development of the satellite modem, mechanical steering antenna, and the modular phased array antenna, along with parts of the UAV payload.

Together, what I like to call a 'pseudo-satellite' system, has been developed. This system can be rapidly deployed anywhere when needed. This is far different from conventional communications satellites, which are costly and time-consuming to launch into orbit. This is innovative and sustainable.

The latency issue has also been addressed. With typical satellites, with data transmission latencies of around 600 ms, the Agilis system performance has been taken to a level that is about 20 ms.

Another critical piece to this solution is the payload. The payload design can be custom built to fit a customer's HALE UAV platform and operational requirements. Certain engineering parameters will still be maintained, such as a weight and power requirement that does not exceed 10 kg and 100 W, respectively, as well as broadband capacity up to 6 gigabytes per second with zone coverage of up to 100 km around the UAV.

BUILT TO SOAR

A new era in satellite communications has arrived, where age-old challenges related to cost and performance of the technology are being challenged and overcome. This progression is not only about solutions for traditional satellite space, but also what new opportunities are being developed along the way, such as HALE.

When you have the correct technology in place, the reach of satellites is taken to levels never before experienced.

agilissatcom.com

Agilis has taken an integrated approach to help solve these issues. The company recently announced the release of the HALE UAV Communication solution, which can be applied to defence and commercial applications. In the case of defence, the solution is used to augment or enhance the three primary defence applications: communication, ISR (Intelligence, Surveillance and Reconnaissance) and navigation.

Leveraging the firm's guiding principle of a partnership with understanding, Agilis is aligning with the correct technology to build the most capable technology that can scale to meet future demands.

In particular, work has been continuing with a company that develops ASIC (Application Specific Integrated Circuit) chips—this level of intelligence at the chip level is necessary in order to provide the sophistication required of HALE vehicles.

THE HPA CORNER: DIUX TO HELP DOD REAP THE BENEFITS OF HOSTED PAYLOADS

By Al Tadros, Vice President, Business Development, SSL

While innovation in the private sector is rampant, the US government has struggled to benefit from emerging technologies and changing ways of doing business.

To ameliorate the situation, last August the Secretary of Defense Ash Carter established a new agency in Silicon Valley to act as a bridge between the Department of Defense (DoD) and the thriving commercial technology industry.

Called the Defense Innovation Unit Experimental (DIUx), the agency is tasked with scouting for breakthrough and emerging technologies and facilitating the use of novel technology, business practices, and ideas from those who don't usually work with the DoD.

"We want to partner with businesses on everything from autonomy to robotics to biomedical to engineering; from power, energy, and propulsion to distributed systems, data science, and the Internet of things... if we are going to leverage these technologies to defend our country and help make a better world, the DoD cannot do everything in all of these areas alone," said Carter.

As SSL is in Palo Alto, the heart of Silicon Valley, I've had the opportunity to talk to our colleagues at DIUx about our space infrastructure and the logic of using hosted payloads to reduce cost and increase resiliency for government missions.

DIUx is listening and knows that the Hosted Payloads Solutions (HoPS) Indefinite Delivery Indefinite Quantity (ID/IQ) contracting vehicle is ready and available for use.

Helping government agencies move forward with hosted payloads is an activity that would align well with the DIUx mission of bringing commercial innovation and efficiencies to the US government.



The Hosted Payload Alliance is a resource for DIUx to help it accomplish its goals. We are working together to develop a workshop or facilitate a discussion directly focused on opening the floodgates to using commercial satellites to host US government payloads.

The benefits to the DoD are overwhelming and include fast access to space, lower cost missions, increased resilience through disaggregation, operational flexibility, and existing and secure command and control and ground systems ready and available for use.

The creation of DIUx office is a clear reflection of the DoD's commitment to working with innovators and nontraditional DoD suppliers, and with the experienced and motivated staff in charge of the office, it is well situated to become a strong catalyst for DoD innovation.

This column's question for HPA Members is... **What should DIUx consider when it promotes DoD use of the HoPS ID/IQ contract?**

"As DIUx scouts innovative commercial technologies and business practices, such as DOD payloads hosted on commercial satellites, it must also consider how to convince DOD acquisition program offices to adapt their processes to integrate these commercial capabilities and practices.



"Traditional programs using traditional methods-onerous Statements of Work, large Contract Data Requirements Lists, long timelines, etc. may find it difficult to leverage the innovative technologies and practices of the commercial sector. This traditional approach to acquisition is often better suited toward the DOD prime contractor community.



"DIUx must consider creative and innovative DOD acquisition approaches to overcome traditional acquisition hurdles in order to fully leverage the innovation the commercial sector can bring to the fight. The Air Force's Big Safari Program Office and Rapid Capability Office are two examples that offer unique approaches to acquisition. Is the DOD ready to adopt approaches such as they offer outside of niche programs?"—**Todd Gossett**, Senior Director of Hosted Payloads, **SES Government Solutions**

"Hosted payloads present a great opportunity to increase the tempo of commercial innovation through lower cost access to space. Having the Hosted Payload Alliance working with DIUx to better leverage innovation in the private sector is a no brainer.



"A key DIUx challenge when bringing technology from sources without Government/DoD pedigree to the HoPS ID/IQ contract is the mechanism to access the contract.

"The DIUx itself may need to fund the hosted payload contract and provide a hosting service to the commercial technology provider. There is inherent risk with hosting new technology—schedules often slip, so off ramps and contingency plans become important.

"The government has a vehicle in place that allows it to take advantage of the commercial pace of innovation, letting DIUx offer a new way to access space while technology innovators focus on what they do best."—**Janet Nickloy**, Vice President of Responsive ISR Programs, Space & Intelligence Systems, **Harris Corporation**

hostedpayloadalliance.org

diux.mil/

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The DIUx team.

 OSD	 Army	 Navy	 Marine Corps	 Air Force	 National Guard	 SOCOM	 CYBERCOM	 Joint Chiefs
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A HONEYWELL FOCUS: NETWORKING THE BATTLESPACE

By Tom Hart, Vice President, Defence Aftermarket Americas, Defense & Space, Honeywell Aerospace



There is a growing desire to stay connected, no matter where you are. Whether you are an executive answering emails on a business trip, a student checking social media on a smartphone, or a soldier on the battlefield communicating across the theater, the expectation is that there will be a fast, high-bandwidth, and reliable connection available anywhere in the world.

However, creating and maintaining that high-speed, high-bandwidth environment anywhere in the world can be a challenge, particularly for the military. Military connectivity has vastly different needs and requirements for voice and data applications compared to civilian use.

The military's non-traditional flight paths, remote operations, trans-oceanic routes and need for security means it can't rely solely on land-based radio and cellular coverage. When looking at platforms, there's a unique challenge especially when looking at helicopters, which bring heavy vibrations and spinning rotor blades, which creates a difficult environment for consistent connectivity.

Most importantly, security and safety of data and communications transmissions are paramount. In the end, though, regardless of the mission or the location, whether in the air or on the ground, the system has to work.

Honeywell has responded to this demand and unique environment for the military by networking the skies with satellite connectivity to provide one of the most secure and reliable broadband airborne network for civilian and military operators worldwide.

From airborne equipment, to software packages; from the ground, to the aircraft in the air, to the satellites in space, Honeywell technology provides vital situational awareness, enhancing safety and ensuring mission success for warfighters, troops and more around the globe.

Honeywell

Networking the Battlespace

Possibilities of Connectivity. *Made Easy*

From tactical line-of-sight communications to beyond-line-of-sight satellite connectivity, Honeywell technology provides secure network links to armed forces around the globe.

- > Aspire 200 Satellite Communications System
- > High Data Rate (HDR) Software Package
- > Sky Connect Tracker Systems
- > Health Usage and Monitoring Systems (HUMS)
- > AC-27 Common Datalink Antenna



- > VIPER II Mobile (RO/RO) Satellite Communications System
- > Hatch-Mounted Inmarsat Antenna (HMIA)
- > JetWave Ka-band Satellite Communications System
- > Wi-Fi/Cabin Networking System
- > HSD-400 Voice and High-Speed Data Transceiver
- > HSD-440 Voice and High-Speed Data Transceiver (CNS/ATM)
- > High Data Rate (HDR) Software Package
- > AC-27 Common Datalink Antenna



- > COM DEV Satellite Processing Technology
- > RF Payload Products
- > AC-27 Common Datalink Antenna
- > Beyond Line of Sight High-Speed Data System



- > Multiband Datalink Systems



- > GC-27 Common Datalink Terminal
- > AC-27 Common Datalink Antenna



- > GC-27 Ground Common Datalink
- > Manpackable Satcom Receive Terminal



Honeywell's aerospace business unit develops innovative solutions for more direct and on-time flights, safer flying and runway traffic, along with aircraft engines, cockpit and cabin electronics, wireless connectivity services, satellite components, and more.

More specifically, Honeywell has a range of flexible and customizable airborne satellite communications for fixed- and rotary-wing aircraft. Regardless of mission, aircraft type or system requirements, Honeywell has a solution designed to meet the needs of the operator.

- **JetWave Ka-Band Satellite Communications System**

Powered by the Inmarsat Global Xpress satellite network, the JetWave family of products provides seamless global broadband service for military and commercial operators. This system is ideal for high-bandwidth, high-speed environments, including large military transport aircraft and others.



- **Aspire 200 Satellite Communications System and High-Data Rate (HDR) Software Package**

The Aspire 200 system creates an industry first—broadband speeds and data rates in a helicopter environment. The system's HDR software package cuts through the impacts of the rotorwash on the satellite communications signal, offering 50 percent higher data rates (up to 650 Kbps per channel) than other systems on the market.



- **VIPER Mobile Satellite Communications Terminal**

VIPER, a palletized high-speed data terminal, is a flexible, Roll-On/Roll-off system that is ideal for rapid deployment for missions that require a broadband communications pipe.

- **Hatch-Mounted Inmarsat Antenna (HMIA)**

This Inmarsat antenna can be used to instantly add voice and broadband data communications capabilities to C-130 type aircraft. Features include a non-permanent, no-scar installation that can be quickly performed by just one person.

Honeywell's presence in the military connectivity ecosystem is expanding. This year, Honeywell acquired COM DEV, making the company the leading producer of space-qualified passive microwave equipment and RF payloads for military and commercial communications satellites.

In addition, the COM DEV acquisition provides Honeywell with the capability to offer advanced space based optical and RF instruments for a range of remote sensing applications in fields such as science and astronomy, space situational awareness and environmental monitoring.

The demand for always-on and reliable connectivity—regardless of application or mission—is growing exponentially. Honeywell and its portfolio of innovative products and services across the connectivity ecosystem are ready to ensure our warfighters and troops data needs are always met.

aerospace.honeywell.com

Tom Hart is Vice President of the Defense Aftermarket Americas business for Honeywell Aerospace's Defense & Space business. In this role, he is responsible for providing strategic and tactical leadership to achieve the business objectives for Honeywell's Defense Aftermarket business, consisting of all US DoD, Canada, and commercial helicopter customers across the Americas.

Prior to this role, Hart was Vice President of Technical Sales and Operations for the Honeywell Defense & Space in June 2013. In this role, he was responsible for providing technical sales leadership for the global Defense and Space business, defining, deploying and continuously improving our sales operations processes, as well as driving sales pursuits for advanced technology funding that support Aerospace technologies.

Hart previously served as Vice President for Sales & Business Development for the Defense Aftermarket Americas Business Segment, Honeywell Defense & Space responsible for leading the business development and marketing effort to identify, capture, and retain new business opportunities for the America's Defense Aftermarket segment which has annual revenues of over \$1.3b.

Tom has been with Honeywell for more than 13 years and has worked in a variety of Leadership and Business Management roles. Tom has a broad base of experience in business leadership, Sales and Systems Implementation roles. Prior to his current position, Tom was the leader of Honeywell's Aerospace Trading business from December 2006 through August 2009.





GOVSAT INSIGHTS: UAVS SHOULD ENABLE THE NEXGEN OF FIREFIGHTING

By Ryan Schradin, Executive Editor, GovSat Report (Sponsor: SES Government Solutions)

In May of this year, approximately 80,000 residents of Fort McMurray in Alberta, Canada were forced to evacuate their homes due to the continued spread of a wildfire that is now burning an area estimated at approximately 1860 square miles—and then there was another announcement that the same fire had spread into the neighboring province of Saskatchewan.

This wildfire has been so sustained and has grown so large that the conflagration has made international headlines. The estimate is that the residents who have been displaced by the fire will be able to return to their homes in mid-June, and even that date is conditional and based on the situation vastly improving.

Wildfires such as this one in Canada are terrifying due to their unpredictability and their almost unlimited potential for damage. Unfortunately, they're more common than you might believe.

According to the EPA, the National Interagency Fire Center has documented an average of 72,000 wildfires per year since 1983—and that number could continue to rise. There are a variety of reasons for this increase, including:

- Longer fire seasons
- Drier conditions
- More fuel for forest fires
- Increased frequency of lightning

THE NEED FOR GEOINT IN COMMAND & CONTROL

One of the ways wherein organizations can better prepare is to explore innovative new uses of existing technologies to better respond and fight wild fires. In an article in the nationally-distributed Canadian newspaper, the *Globe and Mail*, reporter Affan Chowdhry interviewed Rick Swan. Rick is the director of wildland firefighting safety and response at the International Association of Fire Fighters in Washington, D.C., and previously spent 33 years fighting fires California.

What really stood out in Rick's interview was just how essential GEOINT and command and control are in the fighting of a wildfire—both for firefighter safety and for effectively battling a blaze.

When asked about how to keep firefighters safe in the face of a massive wildfire, Rick answered, "...as the person who is responsible for a number of resources on a section of the fire, your eyes are not focused down on the tactical level; your eyes are focused on what is around you, because you are the eyes and ears for those people that are performing that tactical duty. And you're looking out ahead of the fire, you're looking at what's behind it. You're looking out for the potential of other issues coming up as far as access and water supplies and safety areas and safe refugee areas that you can deploy into if you needed to."

The ability to view the entire scope of a fire and see the full, high-level picture, decision makers and senior leaders are then able to ensure that no firefighters get surrounded, that they're not cut off from necessary supplies and that the appropriate citizens are being evacuated at the correct time. This intelligence guides the movement of firefighters, which citizens are evacuated and dictates strategy.

THE EMERGING ROLE OF SATELLITE-CONNECTED UAVS IN FOREST FIRES

Traditionally, GEOINT (geographical intelligence) has been gathered by helicopters. Unfortunately, the average helicopter used in this capacity can only remain in the sky for an average of two hours at a time and an extended flight period could unnecessarily place pilots in danger. For this reason, a new weapon is being entered into service in the battle against wildfires—satellite-connected UAVs.

In 2013, a Predator UAV was able to assist California firefighters battle the Rim Fire burning at Yosemite National Park. The MQ-1 Predator drone was on loan from the California National Guard and was capable of delivering real time video intelligence of the fire for a total of 22 hours at a time.



Photo of the Fort McMurray wildfire in Canada.



MQ-1 Predator in flight.

This wasn't the first time a drone was used in response to a wildfire. Previous fires in 2008 and 2009 also used drones to determine hotspots and provide intelligence to decision makers.

The MQ-1 Predator is capable of delivering the real-time, HD video intelligence that firefighters and emergency response personnel need to battle fires effectively while protecting their firefighters. They also eliminate the need to put pilots at risk by forcing them to fly aircraft around raging wildfires.

There would be little in the way of surprise to ultimately see UAVs become a steadfast and integral part of fighting wildfires now and in the future.

Using SATCOM ensures that government organizations don't have to pay for the construction and launch of their own dedicated satellites for the operations of drones in firefighting efforts—a cost that would be almost impossible for them to accommodate, especially given today's restrictive budgets. SATCOM also ensures that the high-bandwidth, low-latency connections that these agencies need are available when and where they're required.

UAVs are an incredible new tool in the battle against wildfires. Their introduction to these emergency scenarios couldn't be timed any better, as reports indicate that the frequency and ferocity of wildfires is on the increase.

SATCOM will continue to deliver the connectivity necessary to make these tools available to firefighters and first responders.

This article is republished, courtesy of GovSat Report (ses-gs.com/govsat), 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 GovSat 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 event and conference coverage, providing in-depth reporting from leading satellite shows.



The GovSat Report is sponsored by SES Government Solutions (ses-gs.com/govsat).

SIGINT TRENDS FOR UAVS + SMALL AIRCRAFT

By John Beckner, Director, Horizon Technologies

When thinking of SIGINT, the USAF RC-135V/W Rivet Joint reconnaissance aircraft program, or its international cousins; primarily, the UK's Air Seeker program, and for smaller SIGINT aircraft, the USAF MC-12W Project Liberty program based on a KingAir 350ER, all come to mind.

These programs provide state-of-the-art SIGINT capabilities. Unfortunately, for many potential users, their export potential is limited.

Due to worldwide advances in technology, and the relaxation of US export restrictions for some allied countries, a number of countries are now fielding ISR aircraft and UAVs with a SIGINT component that provides robust ISR/SIGINT capabilities.

Every country has different ISR requirements, and in order to conduct such missions with maximum effectiveness, some signals/communications detection and interception (SIGINT) is crucial. Whether it be illegal fishing boats off the coast of Thailand, refugees (and human traffickers) in the Mediterranean Sea, children being kidnapped by Boko Haram in Nigeria, diamond hunters in Namibia, or lonely Russian soldiers calling home from the Eastern Ukraine, all of these target sets use some form of electronic communication.

Currently, the basic ISR aircraft flown by most countries (C-208s, King Airs, CASA 212s, and DA-42s, etc.) have a simple configuration: an EO/IR sensor, on-board processor with a basic tactical system, AIS for maritime operations, and a simple Line of Sight (LOS) data link. Regrettably, users of these basic ISR aircraft are discovering that without SIGINT, their threat detection capabilities are minimal.

Finding targets/threats with an EO/IR sensor alone is similar to "looking through a drinking straw." ISR aircraft in this configuration are being tasked more often than not into "Force Protection" missions where they are supporting ground forces whose locations are known as well as the threats. Sadly, these aircraft are being wasted in roles for which they were not designed. Despite all of their modern technology, they are providing no more support to ground troops than the Luftwaffe's Fieseler Storch aircraft of the early 1940s.

Clearly, the EO/IR sensors on board these aircraft need cueing to become more effective and actually go out and seek undetected targets/threats. Radar suppliers are more than happy to "solve" this problem by offering either search radars, or small SAR radars.

However, radars are an expensive "partial answer" to this problem. Large search radars generally don't fit onto small, light, ISR aircraft, and, when installed, they have a major problem: they emit. For maritime operation, radars provide a proven tool to correlate AIS with radar tracks. That's fine and good until pirates and smugglers, using commercially available radar detectors, turn off the AIS. Today, most flights in the Mediterranean and off the coast of East Africa are passive (with SIGINT) and their expensive, capable radars are turned off.

Today's target set is like today's youth; they love to communicate. No pirate ever attacks a ship without a phone call first to a number in London or Geneva asking for data on the vessel's cargo. When refugees reach a Greek island, the calls invariably go to either human smugglers discussing payment, or ISIS terrorists checking in on their way to Northern Europe. No EO/IR or radar will catch these targets; only SIGINT will.

Those countries who are upgrading their ISR aircraft with SIGINT focus on three target sets: Satellite (Sat) Phones, GSM (active and passive) and PTT radios (VHF/UHF). Combining low-cost, mostly European SIGINT systems with their current ISR fit gives these users highly capable aircraft (and UAVs) which can conduct "real ISR missions" rather than Force Protection.

Outside the US and its close allies, airborne GSM is a fairly new field. GSM has the major limitations that (1) most targets are well aware that GSM calls are monitored/stored in some fashion and "not secure," and (2) there is a large volume of traffic.

Due to the number of calls picked up, finding a threat/target with a passive system is often difficult. Active systems can be used when a specific target is known but are also emitters. Obviously, GSM is not used at sea. Despite



its drawbacks, GSM systems are proving tactically effective over land and are being installed on more and more ISR aircraft.

Direction Finding (DF) and potential interception of PTT radios is becoming more and more prevalent on ISR aircraft, especially for overland operations. There is a saying in the SIGINT business, "The boss has the Sat Phone, but his guards have PTT."

Several South and Central American countries have had great success using manned aircraft to track truck drivers traveling to drug pick up locations. The SIGINT pickups from covert bases need to be timed, and the only way they communicate is via PTT radios. Their use is ubiquitous and rapidly spreading. While quite effective, the downside of installing VHF/UHF systems on small manned aircraft is space on that aircraft. To increase the capability (detection), there needs to be wider spacing and more antennas. Unfortunately, this results in increased cost, weight, and complexity.

Airborne Sat Phone monitoring is now a must on all ISR aircraft. Due to the fact that this technology is passive, Sat Phone monitoring is perfect for long range AIS correlation. Also, these phones are the primary terrorist/target tool for long-range communication where there is no GSM infrastructure; for example at sea, or in the desert.

Just as terrorists use "burner" GSM phones, they now use Thuraya "sleeves" in the same manner. The other attraction of Sat Phone communication for terrorist/targets is that mobile satellite communication does not "touch" the local GSM infrastructure; it is completely independent, and unless monitored, completely secure.

At sea, these phones have turned out to be the primary and most useful method of pirate/smuggler communication. However, it's not only "bad guys" who use these phones. Many human traffickers hand over a Thuraya phone to a ship of refugees, tell them to sail on a bearing, and "to call this number when you see land."

There are more than a few instances of panicked refugees calling media outlets for help from sinking ships (see: <http://www.aljazeera.com/news/2015/05/150505152253352.html>). Due to the classification, not much more can be said about this topic, but it is credibly assumed that Sat Phone

use (mostly with AIS) has saved more Mediterranean refugees than any other technology. Conversely, it's a proven "pirate catcher" off of East and West Africa.

Basic ISR aircraft can be much more effective with one or more of the SIGINT systems described above. Visual systems such as EO/IR are simply not enough today. However, used for cueing and coupled together with SIGINT, these aircraft can accomplish the missions for which they were designed. Due to the large stand-off ranges of today's current EO/IR sensors, a SIGINT target can be located, and imaged 50+ km away from the aircraft with the target remaining completely unaware.

Looking ahead, there are three emerging trends in the "low-end" SIGINT field:

- *Data linking of the SIGINT data over long distance BLOS (Beyond Line of Sight) links to command centers for analysis*
- *Installing the same packages into UAVs with LOS and BLOS data links*
- *Installing extremely small lightweight SIGINT capability into small UAVs; even those launched by submarines, and ground forces.*

While current US systems do the "heavy lifting" in the Western SIGINT world, emerging technology is allowing many smaller countries the opportunity to field effective and sophisticated SIGINT systems to complement their current ISR platforms. In addition, they now have the option of customizing their baseline ISR packages to their own specific and unique requirements.

horizontechnologies.eu

Horizon Technologies is a UK startup, and within three short years, has become a world leader in Airborne Satellite Phone Monitoring. We have offices in the United Kingdom, USA and other parts of Europe, along with a worldwide network of sales representatives. FlyingFish™ has been in production since 2012, is manufactured in the UK, and is available worldwide for customers desiring an affordable, proven, ISR product.



*If it's Worth a Mission,
It's Worth a FlyingFish™*

A COBHAM FOCUS: ENHANCED SATCOM CONNECTIVITY

By Andrew Legg, Sales + Business Development, Cobham SATCOM

The launch of the new AVIATOR UAV 200 by Cobham SATCOM has redefined UAV SATCOM connectivity and has also created future possibilities for further improving and enhancing the capabilities of tactical UAVs.

As the world's smallest, lightest Inmarsat UAV SATCOM solution, the Cobham system offers Inmarsat SwiftBroadband SATCOM connectivity in a compact 1.45 kg one-box package that measures just 24 x 16 x 6 cm.

Providing a significant 75 percent mass reduction over comparable systems available on the market today, the system's size, weight and power savings have significant implications and benefits for tactical UAVs, including enhanced performance, range and payload capability, which enable operators to take full advantage of the capabilities of their airframes. The AVIATOR UAV 200 can deliver greater operational flexibility for TUAVs in a number of applications, including military, border security enforcement, public safety, commercial use and scientific research.

As SwiftBroadband is currently in use for safety-critical ATC communications, the AVIATOR UAV 200 system could pave the way for possible future integration into controlled airspace for beyond line-of-sight (BLOS) UAV operations. The system provides up to 200 kbps background data, or about 120 to 140 kbps streaming which, along with some innovative video processing solutions available, allows narrow bandwidth BLOS video greatly extending the useful range of these small UAVs.

Eye in the sky applications are about sending visual information, and while users may all default to HD video on their wish list, there's a solid argument to be made that live situational awareness achieved through low bandwidth video can have massive strategic value. The ability to react to situational data real time and retask an air vehicle instead of waiting eight to 12 hours to gain this awareness, can not only give the upper hand, but more importantly, save lives.

The AVIATOR UAV 200 features a phased array antenna that allows use within the full SwiftBroadband coverage footprint as the beam steers down to 5 degrees elevation, enabling high and low-latitude operations. Normally phased array antennas need contact with a substantial ground plane around the transmitting structure, to pull the beam down that far. However, Cobham's little phased array is completely independent of the ground plane. This means the phased array can fit in the confined spaces within the narrow fuselages of tactical UAVs of the size of Insitu's Integrator



The new Cobham SATCOM AVIATOR UAV 200.

or the smaller airframes from Textron or Elbit Systems, for example.

With improved SATCOM technology, UAV operators can benefit from improved aircraft control and situational awareness, with the ability to make real-time route adjustments while simultaneously tracking the airframe. Operators also have a constant overview of on-board systems and structural integrity with real-time health monitoring. Reliable connectivity reduces risk and is an asset in the flight planning process.

The Cobham system is also significant for safety and security as it enables tactical UAVs to play an even more pivotal role in enforcing border security and ensuring public safety in areas including search and rescue, real-time scene surveillance and disaster management. Cobham has just been awarded approval to go on air with Inmarsat and will offer the AVIATOR UAV 200 to the market in November or December of this year.

Kim Gram, Vice President of Cobham SATCOM's aeronautical business unit, said, "Until now, the size, weight and power requirements of Inmarsat SATCOM hardware were too restrictive for smaller UAVs, which depend upon lightweight components to maximize range, endurance and operational use. AVIATOR UAV 200 matches the connectivity and performance of larger, class-leading SATCOM systems, but in a far smaller, lighter and less power-demanding package."

Andy Start, President, Inmarsat Global Government, added, "This product allows beyond line of sight flight and payload control for a wide range of small UAV platforms where previously this has simply not been possible. Adding the ability to extend their operational range significantly and provide access to real time situational data and video, it is a truly compelling package."

www.cobham.com/SATCOM
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Cobham SATCOM AVIATOR UAV 200

The AVIATOR UAV 200 is a single box SWAP optimized Inmarsat SwiftBroadband solution with the following technical specifications:

- Mounted within the airframe
- Coverage within the full Inmarsat footprint
- Contended background data up to 200 kbps
- Streaming class data up to 120/140 kbps
- Multiple user-configurable data contexts
- Aircraft interfaces
 - DC power
 - 2 x Ethernet
 - 2 x RS-232
 - Navigation/attitude data in via Ethernet or serial ports
- Physical characteristics
 - Weight: 1.45 kg
 - Dimensions: 24 x 16 x 6 cm
 - Power: 28 Watts at 14/28 VDC nominal
 - Mid-flange for ground plane and heat management
 - Micro-D connector interface
 - No ground-plane requirement