SATCOM For Net-Centric Warfare February 2015

MilsatMagazine

MIGHTY MUOS-3 HEADS INTO ORBIT TO ENHANCE WARFIGHTER COMMS

The launch of MUOS-3 from Cape Canaveral AFS. Photo is courtesy of United Launch Alliance.

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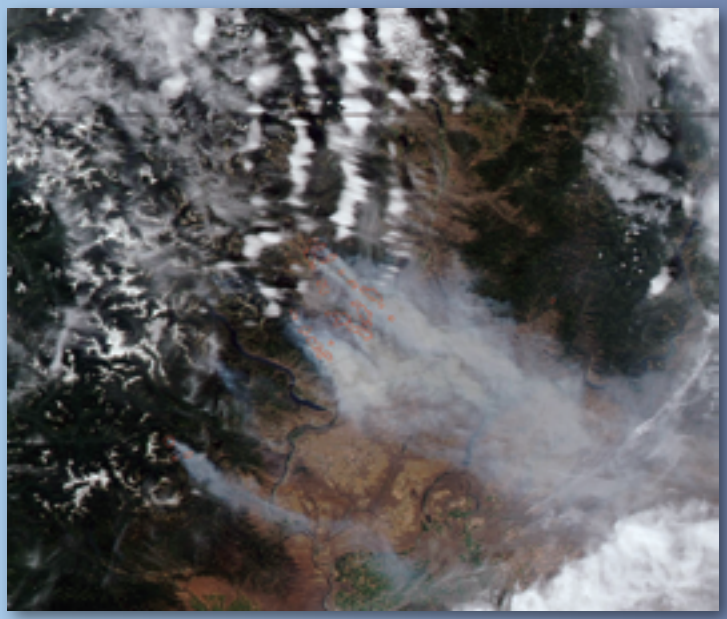
DISPATCHES



The Moderate Resolution Imaging Spectroradiometers (MODIS) on NASA's Aqua and Terra satellites captured these images of the Carlton Complex Fire in Washington State.
See page 30...

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FEATURES

Photo of the Atlas V with MUOS-3 payload being moved to the launch pad.
Photo is courtesy of United Launch Alliance.

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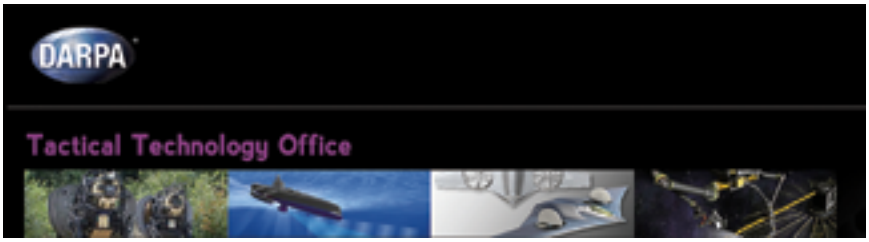
DISPATCHES

DARPA'S POTENTIALLY POWERFUL PLAN FOR JETTING SATELLITES INTO ORBIT



Through its Airborne Launch Assist Space Access (ALASA) program, DARPA has been developing new concepts and architectures to get small satellites into orbit more economically and on short notice.

Bradford Tousley, director of DARPA's Tactical Technology Office, provided an update on ALASA at the 18th Annual Federal Aviation Administration (FAA)'s Commercial Space Transportation Conference in Washington, D.C. Tousley discussed several key accomplishments of the program to date, including successful completion of Phase 1 design, selection of the Boeing Company as prime contractor for Phase 2 of the program, which includes conducting 12 orbital test launches of an integrated prototype system.

DARPA's Airborne Launch Assist Space Access program (ALASA) seeks to propel 100-pound satellites into low Earth orbit (LEO) within 24 hours of call-up, all for less than $1 million per launch.

The program is moving ahead with rigorous testing of new technologies that one day could enable revolutionary satellite launch systems that provide more affordable, routine and reliable access to space.

"We've made good progress so far toward ALASA's ambitious goal of propelling 100-pound satellites into low Earth orbit (LEO) within 24 hours of call-up, all for less than $1 million per launch," Tousley said. "We're moving ahead with rigorous testing of new technologies that we hope one day could enable revolutionary satellite launch systems that provide more affordable, routine and reliable access to space."

Launches of satellites for the Department of Defense (DoD) or other government agencies require scheduling years in advance for the few available slots at the nation's limited number of launch locations. This slow, expensive process is causing a bottleneck in placing essential space assets in orbit.

The current ALASA design envisions launching a low-cost, expendable launch vehicle from conventional aircraft. Serving as a reusable first stage, the plane would fly to high altitude and release the launch vehicle, which would carry the payload to the desired location.

"ALASA seeks to overcome the limitations of current launch systems by streamlining design and manufacturing and leveraging the flexibility and re-usability of an air-launched system," said Mitchell Burnside Clapp, DARPA program manager for ALASA. "We envision an alternative to ride-sharing for satellites that enables satellite owners to launch payloads from any location into orbits of their choosing, on schedules of their choosing, on a launch vehicle designed specifically for small payloads."

ALASA had a successful Phase 1, which resulted in three viable system designs. In March 2014, DARPA awarded Boeing the prime contract for Phase 2 of ALASA.

As reducing cost per flight to $1 million presents such a challenge, DARPA is attacking the cost equation on multiple fronts. The Phase 2 design incorporates commercial-grade avionics and advanced composite structures.

Perhaps the most daring technology ALASA seeks to implement is a new high-energy monopropellant, which aims to combine fuel and oxidizer into a single liquid. If successful, the monopropellant


Artist's Concept

would enable simpler designs and reduced manufacturing and operation costs compared to traditional designs that use two liquids, such as liquid hydrogen and liquid oxygen.

ALASA also aims to reduce infrastructure costs by using runways instead of fixed vertical launch sites, automating operations and avoiding unnecessary services. Phase 1 of the program advanced toward that goal by making progress on three breakthrough enabling technologies:

Mission-planning software could streamline current processes for satellite launches—space-based telemetry would use existing satellites instead of ground-based facilities to monitor the ALASA vehicle. Additionally, automatic flight-termination systems would assess real-time conditions during flight and end it, if necessary.

DARPA plans to continue developing these capabilities in Phase 2 and, once they're sufficiently mature, intends to eventually transition them to government and/or commercial partners for wider use in the space community.

Pending successful testing of the new monopropellant, the program plan includes 12 orbital launches to test the integrated ALASA prototype system.

Currently, DARPA plans to conduct the first ALASA flight demonstration test in late 2015 and the first orbital launch test in the first half of 2016. Depending on test results, the program would conduct up to 11 further demonstration launches through summer 2016.

If successful, ALASA would provide convenient, cost-effective launch capabilities for the growing government and commercial markets for small satellites.

"Small satellites in the ALASA payload class represent the fastest-growing segment of the space launch market, and DARPA expects this growth trend to continue as small satellites become increasingly more capable," Burnside Clapp said.

Additional information is available at DARPA's ALASA infosite: ***http://www.darpa.mil/Our_Work/TTO/Programs/Airborne_Launch_Assist_Space_Access_%28ALASA%29.aspx***

DISPATCHES

U.S. ARMY CHIEF OF STAFF IS UPDATED REGARDING SPACE + MISSILE DEFENSE

Army chief of staff Gen. Raymond Odierno visited leaders at the Space and Missile Defense Command/Army Forces Strategic Command where he was introduced to the command's mission as well as its technology capabilities to provide space and missile defense forces to the war fighter.

This was the first visit to SMDC/ARSTRAT headquarters by any Army chief of staff.

As the chief of staff, Odierno is the senior military leader in the Department of the Army. In a separate capacity, he is a member of the Joint Chiefs of Staff and, in this position, a military adviser to the chairman of the Joint Chiefs of Staff, secretary of defense and the president.

"This visit was something I have been wanting to do for some time," Odierno said. "Most people don't understand the important role the Army plays in space operations and so I wanted to make sure I experienced it firsthand."

Odierno, the 38th chief, previously commanded U.S. Joint Forces Command; served as commander U.S. Forces-Iraq and its predecessor, Multi-National Forces-Iraq, and also served as the III Corps commander. Odierno is the 12th American military officer to command at the division, corps and Army level during the same conflict. He assumed his current assignment September 7, 2011.

SMDC conducts space and missile defense operations and provides planning, integration, control and coordination of Army forces and capabilities in support of the war fighter and U.S. Strategic Command. The command serves as the Army force modernization proponent for space, high altitude and global missile defense; it serves as the Army operational integrator for global missile defense and conducts mission-related research and development in support of Army Title 10 responsibilities.

SMDC's Command Sgt. Maj. James Ross spoke about the visit and what it means to the command. "It was a great opportunity to present Gen. Odierno with a detailed overview of the operations, capability development and material development capabilities that the Soldiers and professional Army civilians of U.S. Army Space and Missile Defense Command provide to the war fighter," Ross said. "He was very interested in our emerging technologies in missile defense and was appreciative of the command's efforts in publishing and executing our Army space training strategy."

After his arrival, Odierno received a command overview where he was briefed on the overall importance of the command's missions and how the command's Technical Center and Future Warfare Center coordinate and develop current and future technologies.

He also received a briefing on the Reagan Operations Center-Huntsville that controls the Reagan Test Site located at Garrison-Kwajalein Atoll in the Republic of the Marshall Islands and learned about its mission of monitoring space and missile operations. The center also provides the command with the necessary tools to remain the Army's operational integrator and force modernization proponent for space, global missile defense, high altitude and related technologies.

"This communications piece is really important to us as we are looking to the future," Odierno said. "Because as we deploy to remote places, we want to have communications working quickly without having to bring a lot of additional equipment."

Odierno then visited the Concepts Analysis Laboratory (CAL), where he learned how the command trains college students pursuing degrees in science, technology, engineering and mathematics, or STEM, disciplines and newly hired engineers and scientists. While in the CAL, Odierno also received an Army astronaut presentation by Lt. Col. (Dr.) Drew Morgan, an Army astronaut candidate, and a Space Kit overview and demonstration by Col. Eric Handy, division chief, SMDC G-31 Training and Exercise Division.

Odierno was then escorted to the Future Warfare Center's Joint Air Defense Operations Center-Developmental to see what the command does to support and protect the National Capital Region.

"I wanted to be able to look at the great work that's being done on technology and engineering that can be used, not only for space application, but for some other applications that are important to the Army," Odierno said.

Odierno also got to witness the High Energy Laser Mobile Demonstrator and learned how in the future, it will use directed energy against rockets, artillery and mortars; unmanned aerial vehicles; and cruise missiles to protect Soldiers on the battlefield.

"USASMDC/ARSTRAT should be very proud of what they do and I am very proud of them in what they do to help the Army and contribute to its mission," he added. "I am very thankful for the service of all the civilians and military members who are here, and I appreciate the support they get from the local community."

Story by Jason Cutshaw, SMDC/ARSTRAT Public Affairs

DISPATCHES

BOEING'S B-52 CONNECTION FOR COMMS

The B-52 Stratofortress bomber was built during the Cold War, but its digital capabilities have entered the 21st century, thanks to Boeing's ongoing Combat Network Communications Technology (CONECT) upgrade.

On January 28, the U.S. Air Force awarded Boeing a full rate production contract to deliver 10 CONECT kits that modernize communication systems for the B-52 bombers today and into the future.

Those technology enhancements include full-color LCD displays with real-time intelligence feeds overlaid on moving maps, several communication data links that connect via satellite to platforms and troops in the field and an onboard, high speed network that enables aircrew to respond quickly to a mission change or identify and engage new targets with their weapons.

"CONECT gives the B-52 the agility and flexibility needed for the modern battlefield while also providing greater situational awareness for the aircrew," said Scot Oathout, Boeing's B-52 program director.

Under previous contracts, Boeing is currently supplying 20 CONECT kits to the Air Force. This new full rate production award will bring the total number of upgraded B-52s to 30.

DISPATCHES

U.S. SPACE DOMINANCE MUST BE MAINTAINED, SAYS STRATCOM CHIEF

The space domain is changing, and the U.S. military must remain ahead of these changes to maintain the nation's military dominance, the commander of U.S. Strategic Command said here today.

Navy Adm. Cecil D. Haney spoke at a Peter Huessy Breakfast Series seminar sponsored by the Air Force Association, the Reserve Officers Association and the National Defense Industrial Association.

The playing field in space is changing, and not always to the advantage of nations that are peaceful and have democratic governments, Haney said. "Today, our nation is dealing with a global security environment that is more complex, dynamic and volatile than at any time in our history," he added. The security environment features multiple actors operating across all domains. Many actors challenge U.S. democratic values in many ways, the admiral said.

"In addition to significant tensions involving nation states," Haney told the audience, "we are in an environment that is flanked with numerous ungoverned or ineffectively governed areas that are breeding grounds for bad actors and violent extremist organizations." These groups, he added, also use space and cyberspace to recruit and spread propaganda—including misinformation—in support of their causes.

"Perhaps of greater concern, however, is the proliferation of these emerging strategic capabilities attempting to limit our decision and maneuver space that ultimately impacts strategic stability," Haney said.

The admiral focused on the emerging capabilities and what it means for the United States. Space is getting cluttered, he said, noting that it is more "congested, contested and competitive." That alone makes U.S. capabilities increasingly vulnerable, he said.

Congestion is a huge problem for Strategic Command. More than 17,000 objects the size of a softball or larger are in orbit today, the admiral said, and hundreds of thousands of smaller, untracked objects are circling the Earth at orbital speeds. Roughly 1,200 of those objects are satellites, Haney said. The rest are debris, increasingly threatening operational satellites.

Complicating this already crowded environment is the increase of small satellites, which also pose a threat, the admiral said. "Consider for a moment the devastating effects just one collision could have on our financial and economic sectors and our ability to conduct military operations," he said.

As more countries develop space capabilities, the problem will grow, the admiral said. North Korea has been busy upgrading launch facilities, Haney noted. "Iran, just this past week, successfully launched a satellite into orbit after a string of failures," he said.

China has publicly stated that its goal for the next decade is to outperform all other nations in space, investing large amounts of money in increasing the number of platforms in every orbital regime, and increasing their influence, Haney added.

Countries also are working to take away America's strategic advantage in space, the Stratcom commander said. "U.S. national security space systems are facing a serious growing threat," he added. "For example, multiple countries have developed and are frequently using military jamming capabilities designed to interfere with satellite communications and global positioning systems."

China and Russia warrant the most attention, the admiral said. "Both countries have acknowledged they are developing—or have developed—counter-space capabilities," he said. "Both countries have advanced directed energy capabilities that could be used to track or blind satellites—disrupting key operations—and both have demonstrated the ability to perform complex maneuvers in space."

Space also plays a large role in 21st-century deterrence, Haney said. "To effectively deter adversaries—and potential adversaries—from threatening our space capabilities, we must also understand their capabilities and their intent and make it clear that no adversary will gain the advantage they seek by attacking us in space," the admiral said. "We must apply all instruments of power and elements of deterrence."

Strategic Command is working to ensure the United States maintains the strategic advantage in space today. Operationally, the admiral said, STRATCOM must protect and defend space capabilities using new tools and new tactics, techniques and procedures. The command, he said, also must use new partnerships and new command and control relationships. All this is happening at a time of constrained budgets, he noted.

"We are early in the process, but let me make clear: Any retrograde in the president's budget could jeopardize these investments and diminish our asymmetric advantage in space, exposing our nation to significant risk in this foundational area," he said.

Story by Jim Garamone,
DoD News, Defense Media Activity

DISPATCHES

INMARSAT'S ISATPHONE 2 FOR EMERGENCIES

Inmarsat is offering all post-pay IsatPhone 2 customers free-of-charge access to GEOS' Worldwide Emergency Response Coordination service.

The service takes advantage of the IsatPhone 2's one-press assistance button, located at the top of the handset. GEOS' service enables customers to contact the GEOS International Emergency Response Coordination Center (IERCC), simply by pressing the assistance button.

Pressing the button triggers a message containing the user's GPS co-ordinates, sent over Inmarsat's global satellite network.

Once the emergency notification request is received, the response center; staffed 24x7 and located in Houston, Texas, will contact the user directly and establish the nature of the emergency. GEOS staff will then notify the appropriate authorities based in the region to begin search and rescue procedures.

"Increasingly, safety and security are paramount concerns amongst purchasers of satellite phones who often work in isolated or volatile areas," said Greg Ewert, President, Inmarsat Enterprise. "The GEOS service is an excellent complement to the IsatPhone 2's tracking functionality, and coupled with the global reach of Inmarsat's reliable satellite network, will provide a welcome peace of mind for new and existing IsatPhone 2 customers."

"We are extremely pleased to welcome Inmarsat IsatPhone 2 users to the broad global family of members all over the world protected by the GEOS global umbrella" said David Ruby, CEO of GEOS Worldwide.

The service is available free-of-charge to all existing and new IsatPhone 2 post-pay customers. Pre-pay customers can also access the service; however GEOS will charge an annual fee. GEOS also offer Inmarsat customers additional membership benefits to defray search and rescue and medivac costs.

Inmarsat IsatPhone 2 info:
http://www.inmarsat.com/isatphone/

DISPATCHES

COMMANDER OF U.S. FLEET CYBER COMMAND ON THE FUTURE OF WORLDWIDE MILSATCOM

With the launch of the third Mobile User Objective System (MUOS) satellite January 20 from Cape Canaveral Air Force Station, Florida, the U.S. Navy is one step closer to vastly improving secure satellite communications for mobile U.S. forces.

MUOS is the next-generation narrowband tactical communications system that operates like a smartphone network from space.

As some of you may know, the Navy is responsible for providing narrowband satellite communications for the Department of Defense (DoD) and delivers this capability under the operational control of the U.S. Fleet Cyber Command/C10F.

Fleet Cyber Command is the Navy's central operational authority for the Navy portion of the space constellation and the Naval Satellite Operations Center (NAVSOC) team under Fleet Cyber Command "flies" the MUOS satellites as they become operational.

The MUOS operational capability will assure users, particularly those carrying radios in the field or while dismounted on patrol, secure on-demand voice and data communication services, both in point-to-point mode and through networked communications.

This 24-7 on-demand satellite communication is the lifeblood U.S. forces to conduct operations around the world. Our teammates across the DoD can rest assured that we are operating MUOS as a warfighting platform, delivering capability when and where it is needed. Indeed the first of our five strategic goals* at U.S. Fleet Cyber Command is to operate the Navy network—which includes Space assets—as a warfighting platform.

Ultimately, the MUOS satellite constellation will provide users with 10 times more communications capacity over the existing system by leveraging modern mobile communications technology and simultaneous voice and data capability.

In addition to providing continuous, beyond line-of-sight communication for all branches of the U.S. military, the Navy-delivered space-based narrowband capability also ensures reliable worldwide coverage for emergency assistance, disaster response, and humanitarian relief. CAPE CANAVERAL AIR FORCE STATION,

The MUOS program is managed by our teammates the Navy's Program Executive Office for Space Systems, Chantilly, Virginia, and its Communications Satellite Program Office in San Diego, California.

All MUOS satellites also have capability to provide legacy narrowband communications from geosynchronous orbit positions 22,000 miles above Earth.

The MUOS satellite constellation and associated network will extend narrowband communications availability well past 2025.

Fleet Cyber Command's vision is to conduct operations in and through cyberspace, the electromagnetic spectrum, and space to ensure Navy and Joint/Coalition freedom of action and decision superiority while denying the same to our adversaries.

We will win in these domains through our collective commitment to excellence and by strengthening our alliances with entities across the U.S. Government, Department of Defense, academia, industry, and our foreign partners.

* The value the U.S. Fleet Cyber Command team brings to Navy and Joint commanders moving forward will be measured based on our ability to:

- ***Operate the Navy network as a warfighting platform***
- ***Conduct tailored signals intelligence (SIGINT)***
- ***Deliver warfighting effects***
- ***Create shared cyber situational awareness***
- ***Establish and mature Navy's Cyber Mission Forces.***

Story by By Vice Adm. Jan E. Tighe
Commander,
U.S. Fleet Cyber Command/U.S. TENTH Fleet

DISPATCHES

NEW SOFTWARE FROM GENERAL DYNAMICS OFFERS 4X IMPROVEMENT TO U.S. NAVY COMMS

General Dynamics' four-channel Digital Modular Radios (DMR) are being upgraded with high-frequency dynamic routing (HFDR) software to turn the radio's four channels into eight virtual channels.

Also, the new high-frequency virtual channel exploitation software expands the DMR's communications capacity to 16 virtual channels when operating in the high frequency (HF) line-of-sight and ultra-high frequency (UHF) satellite communications frequencies.

With the two new software upgrades, the U.S. Navy has four-times more capacity for secure HF communications without adding additional hardware or changing the configuration in space-constrained shipboard radio rooms. The Navy began equipping surface and subsurface ships and a number of land-based locations with the DMR in 1998, and there are currently 500 secure, four-channel DMR radios supporting Navy operations worldwide.

General Dynamics engineers are also working to integrate the new Mobile User Objective Systems (MUOS) waveform into the DMR radios. The waveform is the digital dial tone needed to connect to the U.S. military's new narrowband MUOS satellite communications system. Once the MUOS network is operational, Navy personnel will experience the global reach, voice clarity and connection speeds similar to their cellphones they use at home.

Built using open architecture standards, the DMR radios will continue to provide improved functionality and interoperability while accommodating next-generation communications waveforms, like MUOS, the Integrated Waveform and future advanced network communications waveforms.

General Dynamics (NYSE: GD) combined the resources of Advanced Information Systems and C4 Systems into "General Dynamics Mission Systems" in September of 2014.

The General Dynamics Mission Systems infosite is located at:
http://gdmissionsystems.com/

DISPATCHES

FIRST DIBS ON COMMS UPGRADE FOR MARYLAND NATIONAL GUARD SIGNAL COMPANY

The Maryland Army National Guard's Company C (Signal) of the 29th Infantry Division was the first unit in the Army to field and train on the latest tactical network at the Military Reservation in Pikesville, Maryland.

The Maryland Army National Guard's Company C (Signal) of the 29th Infantry Division was the first unit in the Army to field and train on the latest tactical network at the Military Reservation in Pikesville Maryland, January 14, 2015.

Known as the Warfighter Information Network-Tactical Increment 1 (WIN-T Inc 1), Soldiers at the battalion level and above are provided with a high-capacity voice, data and video communications. This networking system has been a major support for more than 94 percent of the Army and National Guard's tactical network and a full range of military operations since 2004.

"It's about getting better communication to the Guard," said Maj. Gen. Daniel P. Hughes, program executive officer for command, control, communications—tactical. "This really will increase the ability of this unit to support the nation in the fight or even support the governor."

Hughes said the new upgrades on the WIN-T Inc 1 would allow faster responses when there are natural disasters and the Maryland National Guard is needed to support its citizens.

"Look what happened to Hurricane Sandy on the coast of New Jersey, there are places right now that don't have basic services. The Guard's critical mission in the state is now enhanced greatly. It's great to have the Guard getting [this] first," Hughes said.

The four modernizations to the WIN-T Inc 1 networks are: End Of Life Technical Refresh (EOL Tech Refresh), the WIN-T Inc 1b Upgrade, Network operations (NetOps) Convergence Upgrade, and the High Capacity Line Of Sight (HCLOS) Radio upgrade.

The EOL upgrades include new commercial hardware and software components such as routers, switches, servers and firewalls. The new products reduce size, weight and power (SWaP) by combining capabilities that once required their own hardware on virtualized servers.

The EOL also enables the Army to reduce the number of required Increment 1 transit cases by one third, shedding 1,000 cases over the next three years, and reduces the weight of the remaining cases.

The WIN-T Inc 1b upgrade adds the Network Centric Waveform (NCW) modem that takes advantage of NCW, a dynamic waveform that optimizes bandwidth and satellite utilization. Another key attribute of the NCW is that it enables Soldiers to send all information across the battlefield securely.

"The 1b allows us to do a number of different things," said Lt. Col Joel Babbitt, product manager for WIN-T Increment 1. "It makes the Increment 1 a Swiss Army knife of communications. We could put Top Secret traffic through it; we could commercial traffic through it like we're doing right now for Operations United Systems in West Africa for Ebola response.

The NetOps Convergence Upgrade simplifies and reduces the number of network management tools that communications officers use to manage the tactical communications network. The HCLOS radio upgrade provides more than a fourfold increase in throughput, enabling higher-data applications such as full-motion video, high definition video teleconferencing, and network convergence.

Twelve National Guardsmen within this Maryland-based signal company have the privilege to learn, use and to train their fellow Soldiers on the new the WIN-T upgrades.

"Some of the other Soldiers couldn't make the training today, so moving forward we're going to have to get them up to speed, just in case one of us is out," said Sgt. Dewayne Carruth, a nodal network systems operator-maintainer, with the 29th Inf. Div. An aggressive fielding schedule is planned to rapidly bring this new equipment capability to all Army WIN-T 1 units by the end of 2017.

Story and photo by
U.S. Army Staff Sgt. Michael Davis,
29th Mobile Public Affairs Detachment,
Maryland National Guard Public Affairs Office

DISPATCHES

NORTHROP GRUMMAN TO HELP KEEP THE U.K. SECURE

Northrop Grumman Corporation is among the companies that have been awarded a contract by the government of the United Kingdom to provide a range of cyber security solutions.

Outpacing the rapidly evolving cyber threat spectrum demands constant innovation. Northrop Grumman has been battling cyber threats for more than 30 years and, through aggressive technology investments in key research areas such as identity management, situational awareness, modeling and simulation, cloud security, and supply chain, has a deep understanding of the breadth and complexity of cyber. It is embedded in everything we do.

Under this competitively awarded, seven-year framework contract, Northrop Grumman will provide engineering and development services in support of data security and information assurance.

Northrop Grumman continues to invest in U.K.-based cyber security capabilities with new facilities in England, where the company has established an Advanced Cyber Technology Centre of Excellence, a global collaboration initiative to advance high-end solutions for the most challenging cyber problems.

DISPATCHES

SENSOR RESEARCH BY THE U.S. ARMY ENABLES FUTURE CAPABILITIES

Army scientists and engineers are advancing sensors research in hopes of giving future soldiers enhanced situational awareness.

Sensor technology has broad application across the Army. Medical researchers are investigating how physiological sensors may help soldiers achieve superior performance on battlefields of the future. Soldiers of 2025 and beyond may wear sensors to help detect and prevent threats such as dehydration, elevated blood pressure and cognitive delays from lack of sleep.

Army researchers are working on flexible plastic sensors that could be attached to individuals, gear or vehicles. With this technology, soldiers will gather information on the chemical-biological environment, troop movements and signal intelligence.

"I think that Army [Science & Technology] is looking at a broad number of approaches for what sensor capabilities we will need to meet future challenges," said Deputy Assistant Secretary of the Army for Research and Technology Mary J. Miller in an interview with *Army Technology Magazine*.

"We're looking to improve situational awareness, mobility, lethality and even improve the maintainability and effectiveness of our systems. Sensors and situational awareness are the keys to our soldiers being effective," Miller said. "I think we've all seen the reports that have come out of Afghanistan, where unfortunately a majority of the engagements our soldiers (at the squad and team level) had with the enemy is because they were surprised. That is a situation in which we do not want to put any of our soldiers. Holistically the work we have been doing in our sensor technology areas is to help ensure that never happens."

"Our real goal will be to build in multi-functionality," said Karen O'Connor, Command, Control, Communications, and Intelligence portfolio director for the Deputy Assistant Secretary of the Army for Research and Technology in the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology.

"There are sensors in imaging, motion detection, radar, chemical-biological detection and more. At the end of the day, sensors are all about collecting data."

One critical area of research is enhancing air operations in degraded visual environments, known as DVE. At the Aviation and Missile Research, Development and Engineering Center at Redstone Arsenal, Alabama, Army engineers are advancing and implementing new technologies. One research program fuses images of multiple sensor technologies such as radar, infrared, and laser detection and ranging, also known as ladar. Each of these sensor technologies provide unique advantages for operating in various types of DVE conditions.

"Successfully fusing the images of radar, IR, and ladar provides the pilot a more accurate, high-resolution picture of the operational environment in all DVE conditions by exploiting the advantages of each sensor technology and compensating for its weaknesses," said Maj. Joe Davis, an experimental test pilot at Aviation and Missile Research, Development and Engineering Center, or AMRDEC, Aviation Applied Technology Directorate.

"Army researchers are working on flexible plastic sensors that could be attached to individuals, gear or vehicles. With this technology, soldiers will gather information on the chemical-biological environment, troop movements and signal intelligence," said Jyuji Hewitt, executive deputy to the commanding general of the U.S. Army Research, Development and Engineering Command.

"The Army of 2025 and beyond calls for advanced sensors that can locate and identify threats, enable protection systems to counter those threats and make it less likely an enemy will detect our vehicles."

Sensors are redefining our world and how research and development community supports soldiers.

Dr. Donald A. Reago Jr., director of Communications-Electronics Research, Development and Engineering Center's Night Vision and Electronic Sensors Directorate, at Fort Belvoir, Virginia, said, "[Sensors] are becoming holistic cross-domain solutions unto themselves that provide capabilities greater than the sum of their parts."

As networking and communication technologies become decentralized and integrated into dynamically aware sensors, sensors have emerged as a focal point where soldiers are connected into the digital battle space at both the individual and global level, Reago said.

The Army is really relying on its scientists and engineers, Miller said.

"We are being asked to stand up and deliver, and I fully expect that we will," she said. "I have yet to see us fail at being able to solve a problem."

Story by David McNally, RDECOM Public Affairs

DISPATCHES

RAMPING UP GLOBAL HAWKS FOR REPUBLIC OF KOREA'S AIR FORCE

Northrop Grumman Corporation will begin production of four RQ-4 Global Hawk unmanned aircraft systems (UAS) for the Republic of Korea's Air Force.

The systems will provide valuable wide-area intelligence-gathering capabilities to military commanders to enable them to make more informed decisions. Under a contract awarded December 16, 2014, the company will work closely with the U.S. Air Force to deliver the systems starting in 2018.

"It's clear that U.S. allies have seen the critical role Global Hawk plays for the U.S. Air Force around the world," said Mary Petryszyn, vice president, International, Northrop Grumman Aerospace Systems.

The contract is for four aircraft, two ground stations and supporting equipment that allows Republic of Korea Air Force operators to control and maintain the system.

"This is a significant achievement for Northrop Grumman as it represents the first time a Global Hawk has been sold to an allied nation in the Asia-Pacific region under the Foreign Military Sales process," said Mary Petryszyn. The contract announcement follows significant procurement decisions made by the Japanese and Australian governments to purchase the Global Hawk and the MQ-4C Triton—comprising Northrop Grumman's family of high-altitude, long-endurance UAS.

The Air Force Global Hawk evolved from DARPA technology and was deployed overseas shortly after the September 11, 2001 terrorist attacks. Today, the active Global Hawk enterprise is made up of three complimentary systems—the Battlefield Airborne Communications Node (BACN), Global Hawk Multi-INT for situation awareness and intelligence and for situational awareness and targeting.

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DISPATCHES

SEQUESTRATION—NO FRIEND TO THE U.S. MILITARY

The severe, multiyear budget cuts of sequestration will have a negative impact on the Defense Department and U.S. military technological superiority, Under Secretary of Defense for Acquisition, Technology and Logistics Frank Kendall told a congressional panel.

Kendall testified before the House Armed Services Committee with Air Force Lt. Gen. Mark Ramsay, director of force structure, resources and assessment for the Joint Staff. The topic was the Department of Defense and technological change.

Kendall was asked to advise the Senate Homeland Security and Government Affairs Committee on areas in which Congress could help DoD improve acquisition outcomes, he said. Number one, by a wide margin, he said, was that Congress should end the threat of sequestration.

"This is a huge problem for the department," Kendall told the panel, "and not just because of the uncertainty associated with the department's ability to plan or the inadequate resources that sequestration levels will provide. I am very concerned about the increasing risk of loss of U.S. military technological superiority. We're at risk and the situation is getting worse.

"The intelligence estimates when I left in 1994 were that China was not much of a problem for us but they possibly could be in 10 or 15 years, based on their economic rate of growth at that time," he recalled. "I became, I think it's fair to say, alarmed as soon as I started seeing technical intelligence reports on China's modernization programs and I can say the same about Russia's modernization programs."

Kendall said that what he's seeing in foreign military modernization, particularly China's, is "a suite of capabilities that are intended—clearly, to me at least—to defeat the American way of doing power projection, the American way of warfare when we fight in an expeditionary manner far from the United States."

U.S. military systems depend on a few high-value assets, he added. "We start with space-based assets—satellites, which in relatively small numbers provide an important function for intelligence, targeting and communications." Other elements are aircraft carriers and airfields.

Kendall said China is making advances "beyond what we have done... and it's designed to threaten largely those high-value assets. The department is recognizing this [and] doing some things to try to address the problem." Russia is also advancing military capabilities, though to a lesser extent, he said. He added, "But we also have global commitments. We also have readiness concerns. We also have the threat of sequestration in front of us. So this is a serious problem for the country."

A small number of assets are carrying the bulk of U.S. military power projection capability forward, Kendall said. "They're either Air Force bases that are already in the region or they're carriers and carrier strike groups that are coming forward," he added. "If you can target those and attack them with precision missiles, then you have a significant advantage. That's the situation we're increasingly faced with."

Kendall also discussed a program called the Aerospace Innovation Initiative, part of the broader Defense Innovation Initiative that Defense Secretary Chuck Hagel announced last fall. The larger program seeks to streamline DoD business processes, operational concepts, training and other activities. The Defense Advanced Research Projects Agency (DARPA) initially will lead the program, which will involve the Navy and the Air Force and develop prototypes for next-generation air-dominance platforms or X-Plane experimental programs, Kendall said.

"To be competitive, the Navy and the Air Force each will have variants focused on their mission requirements. There will be a technology period leading up to development of the prototypes," he added, and a reduction of the lead time it takes to produce next-generation capability.

Kendall said one effort designed to address economic challenges is an acquisition tool called Better Buying Power 3.0, which continues core aspects of earlier versions, shifting the department's focus toward technical excellence and innovation.

Answering a question from the panel on the progress of acquisition reform, Kendall said improving the professionalism of the government workforce has the greatest potential over the long term of improving acquisition outcomes. "We need to give our people the tools and the training and the experience they need to do their jobs," he said, "and then we need to get out of their way [and not interfere with] a lot of the things that make it harder for them to do their jobs." Kendall added, "Leadership and professional skills honed over decades do matter, perhaps more than any other factor that we can influence."

Story by Cheryl Pellerin,
DoD News, Defense Media Activity

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Brigadier General Carlos de Salas Murillo, Head C4ISR & Space Programs, **Spanish Armed Forces**

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To counter such perils, today's warfighter must have the latest communication technologies at hand to know when, where and how to destroy threats and to counter terrorist and enemy state activities. This information has to be immediate, mobile, viable and interception adverse.

A step forward in this crucial direction for the United States is the recent launch of the U.S. Navy's MUOS-3 satellite, built by Lockheed Martin and launched by United Launch Alliance.

Operating within the Ultra High Frequency Band, the recently launched third MUOS (Mobile User Objective System) secure communications satellite traveling into geosynchronous orbit offers higher data rates, much improved operational capabilities as well as greater mobility to the MILSATCOM community.

With the ability to connect with legacy terminals and newer, smaller terminals, full operational capability will be attained in 2015 for members of the armed services. This is thanks to the satellite's vantage point in geostationary orbit, enabling the satellite to cover approximately a third of the Earth's surface and to use the 14-meter diameter reflecting mesh antenna to communicate with ground-based users.

MUOS-3 launch photo is courtesy of United Launch Alliance.

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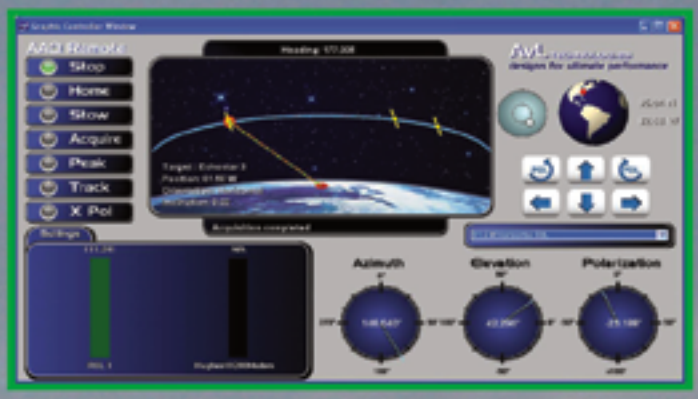

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As stated by Iris Bombelyn, V. P. of Narrowband Communications at Lockheed Martin, "The addition of this satellite will give the MUOS constellation coverage over more than three-quarters of the globe, further extending the reach of the advanced communications capabilities MUOS will provide our mobile warfighters."

MUOS-3 will eventually replace the legacy system already on orbit, with MUOS-1 and MUOS-2 having been in operation since February of 2012 and July of 2013, respectively.

Looking forward, MUOS-4, in December of last year, completed thermal vacuum testing at Lockheed Martin's Dual Entry Large Thermal Altitude chamber, directly following the shipment of MUOS-3 to the Cape Canaveral Air Force Station for launch. The next step for MUOS-4 is the final integrated system testing. Later this year, expect the launch of MUOS-4, with MUOS-5 scheduled for a 2016 launch. There are a total of five MUOS spacecraft contracts for the company.

A United Launch Alliance Atlas V Evolved Expendable Launch Vehicle (EELV) 551 configured rocket boosted the MUOS-3 into orbit on January 20, 2015 to an altitude of 22,000 miles above the Earth. The launch occurred from Space Complex 41.

The EELV program was established by the United States 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.

MUOS-3 during the satellite's build process. Photo is courtesy of Lockheed Martin.

The United Launch Alliance MUOS-3 Mission Booklet reveals that the satellite was encapsulated in a 5 meter (14-ft) diameter medium payload fairing (PLF), which is a sandwich composite structure made with a vented aluminum-honeycomb core and graphite-epoxy face sheets. The bisector (two-piece shell) PLF encapsulates the Centaur second stage and the satellite itself. The vehicle's height with the PLF is approximately 206 ft.

MUSO-3 encapsulation within the fairing. Photo is courtesy of Lockheed Martin.

The Centaur second stage is 10 ft in diameter and 41.5 ft in length with propellant tanks constructed of pressure-stabilized, corrosion resistant stainless steel. Centaur is a cryogenic vehicle, fueled with liquid hydrogen and liquid oxygen and uses a single RL10C-1 engine producing 22,900 lbs of thrust.

The cryogenic tanks are insulated with a combination of helium-purged insulation blankets, radiation shields, and spray-on foam insulation (SOFI). The Centaur forward adapter (CFA) provides the structural mountings for the fault-tolerant avionics system and the structural and electrical interfaces with the spacecraft.

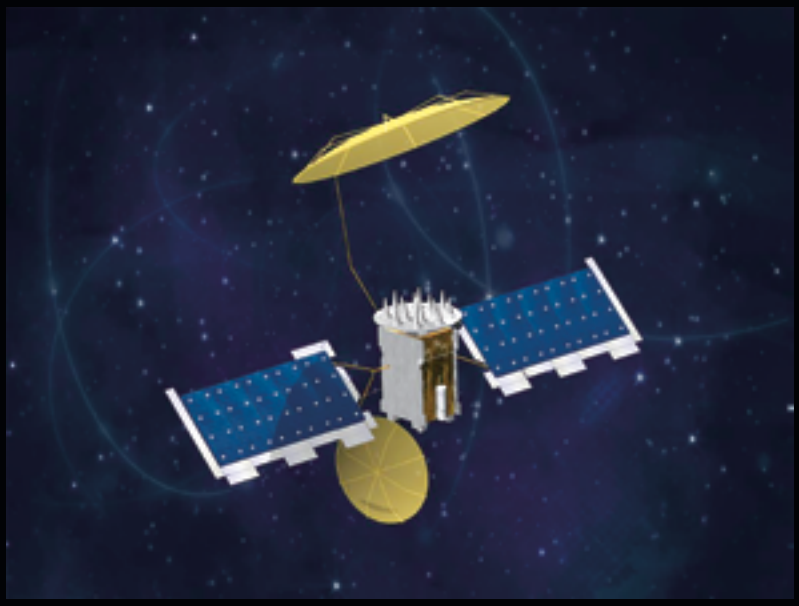
The Atlas V booster is 12.5 ft in diameter and 106.5 ft in length. The booster's tanks are structurally rigid and constructed of isogrid aluminum barrels, spun-formed aluminum domes, and intertank skirts. Atlas booster propulsion is provided by the RD-180 engine system (a single engine with two thrust chambers). The RD-180 burns RP-1 (Rocket Propellant-1 or highly purified kerosene) and liquid oxygen, and delivers 860,200 lbs. of thrust at sea level.

Five solid rocket boosters (SRB) generate the additional power required at liftoff, with each SRB providing 348,500 lbs. of thrust. The Atlas V booster is controlled by the Centaur avionics system, which provides guidance, flight control, and vehicle sequencing functions during the booster and Centaur phases of flight.

Jim Sponnick, United Launch Alliance Vice President of the Atlas and Delta Programs said, "The MUOS-3 satellite is the heaviest payload to ride into space atop any of ULA's Atlas V launch vehicles. The Atlas V will generate more than two and a half million pounds of thrust at liftoff in order to meet the demands of lifting the nearly 7.5-ton satellite. The ULA team is focused on attaining Perfect Product Delivery for the MUOS-3 mission, which includes a relentless focus on mission success (the perfect product) and also excellence and continuous improvement in meeting all of the needs of our customers (the perfect delivery)."

Participating in the launch with their crucial role was Aerojet-Rocketdyne, as ULA's Atlas V rocket used five AJ60 solid rocket boosters (SRB), an RL10C-1 upper-stage engine and several spacecraft attitude control thrusters. The AJ-60A was developed from 1999 to 2003 as a commercial low cost strap-on booster for the Atlas V launch vehicle.

The RL10-C Centaur upper-stage engine, couresty of Aerojet-Rocketdyne



Artistic rendition of the MUOS-3 satellite. Image courtesy of Lockheed Martin.

The motor is configured with a thrust profile that reduces aerodynamic loads during max-Q and thrust-differential during tail-off. It can be configured for other applications that require a different case length and/or attach interface requirement. It could also be used as an in-line stage for small launch vehicles or strategic missiles.

The composite graphite fiber and Aramid-filled EPDM insulation monolithic motor case has no segmented joints, thus eliminating historical failure modes and provides functional and operational simplicity. At 62-inches in diameter and 669-inches in length, this is the largest monolithic motor currently in production in the world.

The motor nozzle is fixed at a 3-degree cant; however, the nozzle can be upgraded with a flexseal TVC for steering. Both the throat and exit cone are fabricated with carbon-phenolic composite materials.

The five AJ60 SRBs were ignited at lift off, increasing the launch thrust of the Atlas V rocket by more than 1.9 million pounds. All Atlas V launches requiring extra boost performance have flown Aerojet Rocketdyne-produced SRBs. These motors have demonstrated a 100 percent success record in flight since the first Atlas V launch with SRBs on July 17, 2003.

A single RL10C-1 engine delivers 22,890 pounds of thrust to power the Atlas V upper-stage, burning cryogenic liquid hydrogen and liquid oxygen propellants. Created in 1959, after Aerojet-Rocketdyne engineers harnessed high-energy liquid hydrogen as fuel for aerospace propulsion, the RL10 has helped place numerous military, government, and commercial satellites into orbit, and has powered space-probe missions to nearly every planet in our solar system.

Some of the engine's notable interplanetary missions include the Surveyor Lunar Lander, Viking Mars Lander and the Voyager Outer Planets Fly-By; while its heritage includes supporting MILSTAR, EUTELSAT, TDRS ECHOSTAR, INTELSAT, GALAXY, DSCSIII, and JCSAT satellites.

The RL10 continues its legacy as the industry workhorse, with two separate models supporting the latest versions of United Launch Alliance's (ULA) launch vehicles. The RL10A-4-2 powers the upper stage of the Atlas V, and the RL10B-2 powers the upper stage of the Delta IV. The RL10B-2 also features the world's largest carbon-carbon extendable nozzle. This high-expansion ratio nozzle enables the RL10B-2 to achieve 465.5 seconds of specific impulse and lift payloads of up to 30,000 lbs.

In addition to the five SRBs and upper-stage engine, 12 Aerojet Rocketdyne monopropellant (hydrazine) thrusters in four modules on

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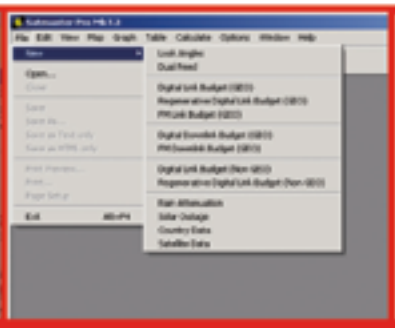

http://www.satnews.com/satfinder

Atlas V with MUOS-3 payload enroute to the launch pad. Photo is courtesy of United Launch Alliance.

the Atlas V Centaur upper stage provided roll, pitch and yaw control as well as settling burns for the upper stage main engine. ARDÉ, a subsidiary of Aerojet Rocketdyne based in New Jersey, provides the pressure vessels on the first and second stages on the launch vehicle.

Additional launch support was provided by ATK. The company delivered critical hardware for MUOS-3 and the United Launch Alliance (ULA) Atlas V launch vehicle. Using advanced fiber placement manufacturing and automated inspection techniques, ATK produced three components for the ULA Atlas V vehicle, including the 10-foot diameter composite heat shield that provides essential protection to the first stage engine, the Centaur Interstage Adapter (CISA) that houses the second stage engine, and the boattail that adapts from the core vehicle to the five-meter diameter fairing. The structures were fabricated by ATK at its Iuka, Mississippi, facility. This is the 52nd Atlas V launch using ATK-built composite structures.

The Atlas V rocket flew in the 551 vehicle configuration with a five-meter fairing, five solid rocket boosters and a single-engine Centaur upper stage. ATK manufactured the Reaction Control System propellant tank for the Atlas V at its Commerce, California facility.

This flight marked the 17th successful flight of the ATK retro motors. Eight of these solid motors supported separation of the spent first stage. The Atlas retrorocket is built at ATK's Elkton, Maryland, facility.

For the MUOS-3 satellite, ATK provided multiple components and structures from the following company locations: San Diego, Goleta, and Commerce, California; Magna, Utah; and Beltsville, Maryland.

Additionally involved with this launch of the Atlas V rocket, built by ULA, was engineering analysis and simulation software from Siemens' product lifecycle management (PLM) software business. Siemens PLM software is used throughout the global space industry to help increase efficiency, reduce costs and ensure mission success.

No less than 18 of the top 20 Original Equipment Manufacturers (OEMs) in the aerospace and defense sectors use Siemens PLM software solutions for constructing, designing and simulating rockets, satellites and space shuttles. NASA's Mars rover Curiosity, which was made for the 2012 mission to Mars, is the best example of this successful cooperation.

High Definition Product Lifecycle Management (HD-PLM) solutions are based on three core principles:

- Intelligently integrating information to extract value from large volumes of a wide variety of data, providing users meaningful assistance in decision-making
- Future-proofing the PLM architecture to preserve client investment in the solutions, minimize the total cost of ownership and enabling the ability to take advantage of change
- Providing a "high-definition" user experience so that everyone involved in making your products gets the information they need in a form that's best suited to their job, in the simplest and fastest way possible

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A Siemens HD-PLM Vision white paper PDF is downloadable at https://www.plm.automation.siemens.com/en_us/about_us/facts_philosophy/index.shtml#lightview%26uri=tcm:1023-155767%26title=HD-PLM%20Vision%20-%20Siemens%20White%20Paper%20-%2026286%26docType=.pdf.

The prime contractor and system integrator for MUSO-3 is Lockheed Martin. The MUOS program responsibility rests with the Navy's Program Executive Office for Space Systems and their division's Communications Satellite Program Office that's based in San Diego, California.

The Mobile User Objective System provides netcentric use of UHF SATCOM, as well as the following enabling capabilities:

- Beyond line-of-site communication for mobile warfighters with focus on usability
- Global communications to connect any set of users, regardless of location with the exception of polar regions
- Improved connectivity in stressed environments including urban canyons, mountains, jungle, weather and scintillation
- "Bandwidth on Demand" architecture that is future upgradeable with "smarts" on the ground and accessibility to Global Information Grid (GIG), Non-secure Internet Protocol Router Network (NIPRNet), Secure Internet Protocol Router Network (SIPRNet), and Defense Information Systems Network (DISN)

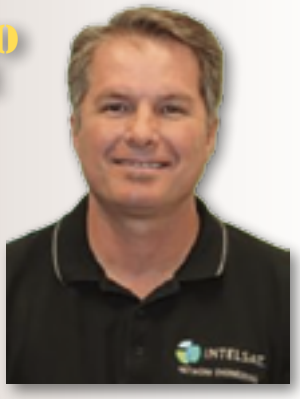
On-orbit testing was initiated directly after the satellite's solar arrays and antennas were deployed, with turn-over to the U.S. Navy for additional testing and service commissioning. Once such has occurred, the premium result will be 16x the capacity of the legacy systems, thanks to waveform that enables priority capacity assignments and Wideband Code Division Multiple Access (WCDMA) technology.

MUOS is similar in operation to a smartphone cell tower high in the sky. With BLOS (Beyond-Line-Of-Sight) capabilities, comms will occur between the satellite and warfighters via an Internet-like, protocol-based system and leverages 3G mobile communications technology.

With improved ground communications for U.S. Forces, the ability to use existing systems is a true plus for MUOS. Immediate communication and the reception and distribution of critical data reinforces the capabilities of today's warfighters to more productively counter the forces of destruction around the globe. The MUOS constellation is yet another advanced tool with which to apply effective force against those who wish us harm.

A CASE IN POINT: RESTORING BROADBAND SERVICES TO U.S. NAVY SHIPS AFTER WASHINGTON STATE WILDFIRE

By Tim Turk, Director of Engineering, Intelsat General Corporation (IGC)



As is typical with any large satellite network, not a month goes by without at least one of Intelsat's more than 50 satellites having some sort of issue with connections to the terrestrial antenna network.

Often the issue revolves around a minor signal interference that can be cleared up in minutes by a technician at one of the company's network operations centers. Occasionally, the problem is a dropped link that needs to be restored, or a piece of equipment on the ground that has failed and has to be repaired or replaced.

The key to quickly overcoming the little and the big satellite service issues is having a restoration plan and executing on it. As the expression goes, "Hope for the best, but plan for the worst."

A textbook example of how to react quickly and follow such a plan occurred last summer, when a wildfire in Washington State burned through the terrestrial cables serving a teleport and knocked out commercial satellite service to the U.S. Navy's Pacific Fleet.

The fire, in July 2014, was the largest in the state's recorded history, destroying some 300 homes not far from the USEI teleport in Brewster, Washington. The fire came within a mile from the 54 antenna complex that is the primary connection for the Navy's Commercial Broadband Satellite Communications Program (CBSP) services.

After the fire burned the fiber connections, cell phones were the only connection the USEI engineers had to the outside world. They used them to quickly notify David Wilson and Gabriel Clark at the Intelsat General CBSP Secure Control Center (CSCC).

Wilson and Clark immediately issued a "Code Red Alert" to the CBSP Management Team, which consisted of Intelsat General and the other dozen companies involved in providing the CBSP service.

As the first to respond, Luis Nakpil of Intelsat General and Mike DiLandro of SES immediately initiated a response plan in accordance with the team's established procedures.

Members of the team assembled in the CBSP Situation Room at Intelsat General's offices in Bethesda, Maryland. They immediately went to work to identify all the affected customers and implement a recovery solution.

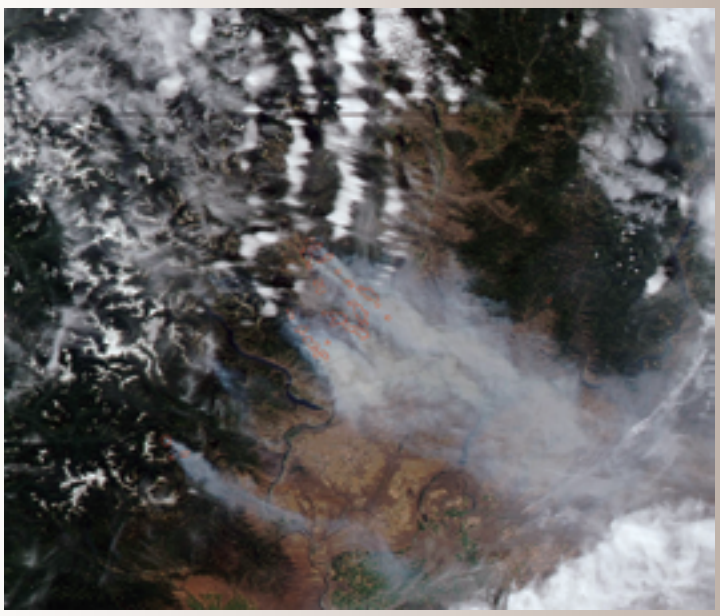
Recovery of services impacted by the loss of connectivity proved to be a complex technical challenge. The team had to quickly locate candidate teleports and antennas available to restore both C-Band and Ku-Band services to the ships, which were in the midst of a large-scale, multi-national exercise.

In accordance with a restoration plan, the rapid recovery solution involved transferring services to teleports in New Jersey and Hawaii, as well as adding several new satellites to the CBSP network. In New Jersey, the solution required a simple repointing of an antenna to the AMC-9 satellite.

In Hawaii, things were more challenging. One of the antennas needed for restoration of service had been disassembled in preparation for a scheduled overhaul and upgrade. As such, this antenna had to be reassembled and tested to support the transition.

Finally, there was another other antenna with a massive 19.2 meter dish that could be used, but belonged to a third party. Engineers needed to contact the company for authorization to repoint it, and make other technical modifications for restoring service.

Within five hours, the team restored service to the first ship with the others restored shortly thereafter. In less than 15 hours, restoration services and link budgets were provided to the Navy—in substantially less time than the threshold allowed and within the bounds of the CBSP contract.



The Moderate Resolution Imaging Spectroradiometers (MODIS) on NASA's Aqua and Terra satellites captured these images of the Carlton Complex Fire. Ignited by lightning, the blaze had charred nearly 370 square miles (960 square kilometers) of forest in northern Washington and about 200 homes were lost to the fire, according to news reports. Actively burning areas, detected by the thermal bands on MODIS, are outlined in red.
NASA image courtesy Jeff Schmaltz, LANCE/EOSDIS MODIS Rapid Response Team at NASA GSFC. Caption by Adam Voiland.
Instrument(s): Aqua - MODIS

The reason service could be restored so quickly is that the CBSP team had an emergency plan, and then followed the plan with the disaster struck. Happily, such plans rarely need to be taken off the shelf. When they are implemented, everyone is relieved that they work according to plan.

About CBSP

Under the Commercial Broadband Satellite Program (CBSP), Intelsat General and its team of partners deliver worldwide commercial telecommunications services to the U.S. Navy's fleet of ships.

CBSP provides the Navy unparalleled flexibility, depth of operations, growth and surge options and a future vision for network enhancements and customized coverage for ships at sea.

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As the Director of Engineering for Intelsat General, Tim ensures that the engineering team provides support for technical proposals to government customers, including monitoring the integration, installation and testing of equipment and resolution of any technical issues associated with implementation. Tim is leading the Intelsat General team working with Intelsat on development, fleet planning, transitions, and spacecraft design of the new Intelsat EpicNG constellation of satellites. Tim served in the U.S. Navy and completed his career there as an Electronic Warfare Officer and Information Operations Planning Officer for the entire Pacific Fleet. Tim holds a BS in electrical engineering, and a masters in space systems operation as well as an MBA.

REVOLUTIONIZING MILSATCOM ON-THE-MOVE TECHNOLOGY

By Ed Zoiss, Harris Government Communication Systems Vice President + General Manager, Defense Business Unit

Situational awareness is essential for warfighters involved in combat operations and critical for those responsible with force protection.

Unfortunately, situational awareness in convoys can come at a cost for commanders in-the-field who find vital communications marked as targets due to the telltale signs of a satellite antenna. This dilemma is one the U.S. Army is looking to change with a contract recently awarded to Harris Corporation to develop a revolutionary new satellite communication system.

Traditionally, tactical satellite communications (SATCOM) antennas have been housed in a single large antenna dome on top of a combat vehicle. The antenna must be mounted high on the hull and clear of anything that might block its line-of-sight toward the sky. Furthermore, the antenna dome cannot interfere with the vehicle's crucial weapons systems. The awkward placement of an antenna dome inherently makes the antenna vulnerable to enemy fire—and also marks the vehicle as a command and control platform.

Imagine, if you will, being a battalion commander of an armored unit that operates a mixed fleet of M1A2 Abrams main battle tanks and M2A3 Bradley infantry fighting vehicles. As a battalion commander, your communications capability provides the vision needed to lead the frontline battle.

Thus, at least one armored vehicle under your command should be equipped with a SATCOM terminal to provide that long distance vision. A traditional satellite antenna for that system instantly sets your Bradley fighting vehicle apart from the others in the unit. The enemy can instantly recognize your machine as a communications vehicle and focus their attacks on you leaving your troops leaderless—if the worst should happen.

However, Harris' Distributed Aperture Architectures could change all of the that. Working under a new contract from the Army's Communications-Electronics Research, Development and Engineering Center (CERDEC), Harris will develop a SATCOM system that would lower the profile of a communications vehicle to where such would be difficult to distinguish from a regular armored combat vehicle.

Called the distributed embedded satellite communications on-the-move terminal, the program aims to develop an entirely new kind of antenna system. Instead of a single large dome, the distributed aperture architecture would incorporate four low profile, electronically steered, phased array antennas.

These four antennas would work together to coherently combine beams and potentially outperform traditional satellite antennas. While distributed aperture receivers are not new, this terminal will represent the first time anyone has ever attempted to use the technology for an on-the-move satellite terminal. The end result will be revolutionary.

The four distributed phased array antennas, which are small and have little resemblance to a traditional device, would be distributed around the hull of the vehicle, which for CERDEC's initial demonstration purposes will be a Bradley fighting vehicle.

From an outside observer's perspective, it would be difficult to distinguish that fully equipped command vehicle from a regular M2A3 Bradley, and that is the point—the antennas will blend in with the the other vehicles in the battalion. There is no way for the enemy to tell the difference unless they know exactly what minute details to look for.

There are other advantages as well. Traditional satellite dome antennas require a large hole to be cut into a combat

vehicle's armor, which weakens overall protection and introduces a point of vulnerability.

A distributed aperture system does not need huge holes to be cut into a vehicle's armor. In fact, it might be possible to use existing hull penetrations to mount the smaller distributed apertures.

As the overall system is more conformal than traditional satellite communications antennas, integration is simple, even on smaller vehicles. Everything from a 70-ton Abrams main battle tank, to a Bradley, to a Striker, to a diminutive Humvee, all could be equipped with this system. Once the system is proven to be successful, the technology will inevitably spread to the Marine Corps, the Navy and, possibly, the Air Force. This is because it would be possible to mount a distributed aperture system onto the conformal surfaces on an aircraft, such as a helicopter.

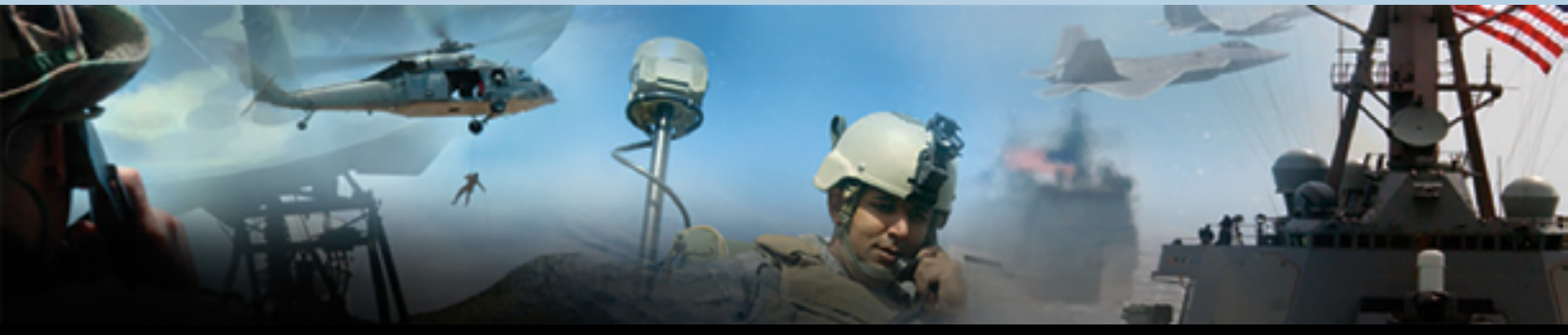
There are also other advantages in battle for a distributed aperture antenna system. While a single dome antenna's signal can be interrupted if something blocks its line-of-sight, a distributed aperture system has four or more separate antennas. Even if several of those are blocked, it can still transmit with the remaining antennas. In fact, the system could keep transmitting even if multiple antennas were damaged or destroyed. Furthermore, elements of the collective array could form multiple beams, or adaptively null out enemy jammers. Thus, the system adds a level of resiliency that will help troops engaged in combat where battle damage is inevitable.

This is just the prototype. Harris' future versions of the system will be scalable and will be able to add or subtract antennas as needed for the specific application. Nor does the Army have to limit itself to phased array antennas; one day it could opt for cheaper hardware, or even more capable active electronically scanned systems, if it so chooses. The possibilities are endless, and Harris is laying the foundation for the future.

For the Army—and more importantly for the soldiers whose lives depend on reliable equipment—the service's small initial investment in a distributed aperture satellite antenna promises huge dividends. Once CERDEC and Harris demonstrate the true potential of this new technology, the door will be open for full-scale development and integration into the Army's future communications networks. This is a revolutionary capability, and only time will tell what the possibilities might be. The sky's the limit.

Harris COTM (Communications-On-The-Move) infosite:
http://govcomm.harris.com/solutions/products/000020.asp

Edward J. (Ed) Zoiss is vice president and general manager of the Defense business unit for Harris Government Communications Systems (GCS). GCS develops, produces, integrates, and supports advanced communications and information systems that solve the mission critical challenges of its defense, national intelligence, and civil agency customers worldwide. The Defense business unit serves domestic and international customers with critical military interoperable communication products, as well as Intelligence, Surveillance, and Reconnaissance (ISR) solutions that protect national security and aid public safety agencies.



2014 WAS A GOOD YEAR FOR SPACE. 2015 WILL BE EVEN BETTER.

OpEd by Elliot Pulham, Chief Executive Officer, Space Foundation

2014 was a very good year for space.

Not great. Not perfect. Not without a stumble here and there. But, overall, a very good year—one that we can build upon.

I know this because at the end of each calendar year, right before the holiday break, the Space Foundation works through the process of short-listing worthy candidates for the awards that we present at the annual Space Symposium.

Sometimes the exercise is difficult, and we find ourselves beating the bushes for ideas. At other times, the pickings are so slim that we aren't able to present an award in one category or another.

But, then, there are years like 2014, where there are multiple potential award winners all across the global space enterprise—for space achievement, public outreach, space exploration and STEM education.

When you find yourself murder-boarding the short lists, and moderating passionate debates about the merits of the candidates, you know it has been a stellar year.

Don't look for me to give away any secrets about our award winners just yet. We're in the process of notifying them, and we'll announce each award in due course. However, if you haven't already made your plans to attend the 31st Space Symposium in April, you're going to want to get those plans in order pretty quick. You're not going to want to miss this!

Why do I think 2015 is going to be better?

For one thing, 2015 is the year that most people in our industry are going to get over ITAR. That may sound weird, because most of the significant ITAR reform we've been banging our gongs about for years did, in fact, finally get across the finish line in 2014—only to hear people singing the same old "woe is ITAR, woe is me!" song over the last several months of the year. You'd think that nobody got the news. In the vernacular of the season just passed, "Yes, Virginia, there is ITAR reform!"

Of course, something like ITAR reform can never go far enough for some people, but where we are today is a good place. The U.S., and other countries, of course, still protects those exquisite and sensitive technologies that ought to be controlled.

The State Department and others have their bald, hairy eyeballs on that—as they should. But the parts and pieces and components that should be traded freely and competitively are back on the market; regulation of them, from the U.S. side, is back at the Commerce Department. I had one customer recently confide, quite giddily, that 100 percent of his company's products and services had moved from the ITAR list to the Commerce list.

That means it is time to stop making complaints and start making deals. This will happen in 2015, which will be very good for business.

Another reason that 2015 is going to be a very good year in space is that the U.S. and China—finally—have begun talking to one another on certain space matters. Now, this is not the same as détente, and it is not yet opening the floodgates of collaboration and trade, but it is a start.

For nearly a decade, the Space Foundation has been rather a lone voice in the wilderness in terms of our willingness to collaborate with our friends and colleagues in the People's Republic. (Shout out to our friends at Secure World Foundation and the United Nations Office for Outer Space Affairs, who have also kept this lamp burning.) But recent diplomacy has cracked open the door for some basic communication about human and civil space programs.

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The U.S. appears to be on a path to sharing SSA and conjunction analysis data with our colleagues in China. These are very, very small and tentative steps. But they are a start.

Civil space programs certainly seem poised for a good year, too. In the U.S., Congress ended 2014 by passing a 2015 spending bill that provides about $500 million more for NASA than the White House requested. This money will be important to continuing the momentum of the commercial cargo and commercial crew programs at NASA, as well as keeping Orion and SLS on track in the wake of the stunning year-end success of Exploration Flight Test 1.

The same week as EFT-1, our colleagues in Europe conducted a hugely successful and important ESA ministerial meeting—which solidified ESA support for further utilization of the International Space Station, and finally settled the long-running Franco-Germanic dispute on the future of Europe's launcher programs.

Japan's exploration program continues to move forward with the recent launch of Hayabusa-2; form and detail is beginning to emerge around the establishment, in 2014, of the United Arab Emirates space agency; South Korea's space plans should move forward in the wake of first-ever space bilateral meetings held a few months ago with the U.S.—and the beat goes on.

The small but important launch sector is also poised for greatness in 2015. As already mentioned, the way forward for Europe has been found. Now it just remains to be seen whether powerful, strike-happy unions in Europe will embrace the deal, or torch it. SpaceX, of course, continues to rock the boat—this time, quite literally, by planning to land a four-legged Falcon 9 first stage on a sea-going barge.

Nor is SpaceX the only company chasing the Holy Grail of re-usability, as Amazon.com founder Jeff Bezos' clandestine Blue Origin is preparing for a critical test flight of New Shepherd-related hardware

Blue Origin is also teamed with United Launch Alliance after a stunning announcement a few months back that the upstart start-up will produce new main engines for the Atlas 5. And all my friends at ULA and Air Force Space Command are going to cringe and go running for wood to knock their knuckles upon, but you heard it here first: ULA is on pace to rack up its 100th consecutive successful launch later this year, with an August mission of the Atlas V out of SLC-41 at Cape Canaveral.

The late-December launch by ILS of the Yamal 401 satellite, from Kazakhstan, on a commercial Proton, certainly fuels hope that Russia's troubled Proton program is back on track—something ILS is counting on, with a backlog of commercial satellites on dock for 2015.

If there's a potential cloud in the generally sunny space forecast for 2015, that cloud hangs over the future of Russian space programs—which is anything but certain in the current geopolitical environment. Isolated by the international community, Russia's path forward in space is anything but clear, and on any given day the west is either (A) no longer buying Russian engines, (B) signing new deals to buy new Russian engines, or (C) both.

While Russia's role in the ISS seems stable, there are sporadic threats of withdrawal from the program, or that Russia will launch its own station. Europe's new launcher policy is also seen by some as the beginning of the end of Russia's brief adventure in launching Soyuz from the Kourou spaceport in French Guyana.

Too seldom discussed is the impact of all this on our friends in Ukraine—who have such a deep history and capability in space; Kyiv and Dnepepetrovsk need the west to step up to greater partnerships going forward.

At $314 billion in turnover in 2013, the global space industry is clearly too large and too diverse to comment upon every sector within the editorial confines of this newsletter. Generally speaking, I think we're going to see the commercial side of the business, especially downstream and value-added applications, grow nicely in 2015.

Commercial SATCOM will continue to dominate space commerce, especially if traditionally inefficient government customers can learn new ways of doing business—which they must, in view of continuing government budget pressures. Those budget pressures are also telling government to divest itself of some of its "pet rocks," and turn to efficient, experienced commercial operators to conduct routine space operations.

The blossoming commercial space start-up sector will continue to excite and attract new investment. Personal space flight will maintain its momentum, as some players recover from 2014 setbacks and other players continue their forward progress.

Space is the most exciting business in the world. And while the start of a new year is always a cause for optimism, we have more to be upbeat about than most.

The ***View from Here*** is that 2014 was a good year for space—and 2015 will be even better.

Named chief executive officer of the Space Foundation in 2001, Elliot Pulham leads a premier team of space and education professionals providing services to educators and students, government officials, news media and the space industry around the world. He is widely quoted by national, international and trade media in coverage of space activities and space-related issues. Before joining the Space Foundation, he was senior manager of public relations, employee communication and advertising for all space programs of Boeing, serving as spokesperson at the Kennedy Space Center for the Magellan, Galileo and Ulysses interplanetary missions, among others. He is a recipient of the coveted Silver Anvil Award from the Public Relations Society of America - the profession's highest honor. In 2003, the Rotary National Awards for Space Achievement Foundation presented him with the coveted Space Communicator Award, an honor he shares with the late legendary CBS News Anchor Walter Cronkite and former CNN News Anchor Miles O'Brien. Pulham is a former Air Force Civic Leader and advisor to the Chief of Staff and Secretary of the Air Force and a recipient of the U.S. Air Force Distinguished Public Service Medal. He serves on the editorial board of New Space Journal.

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