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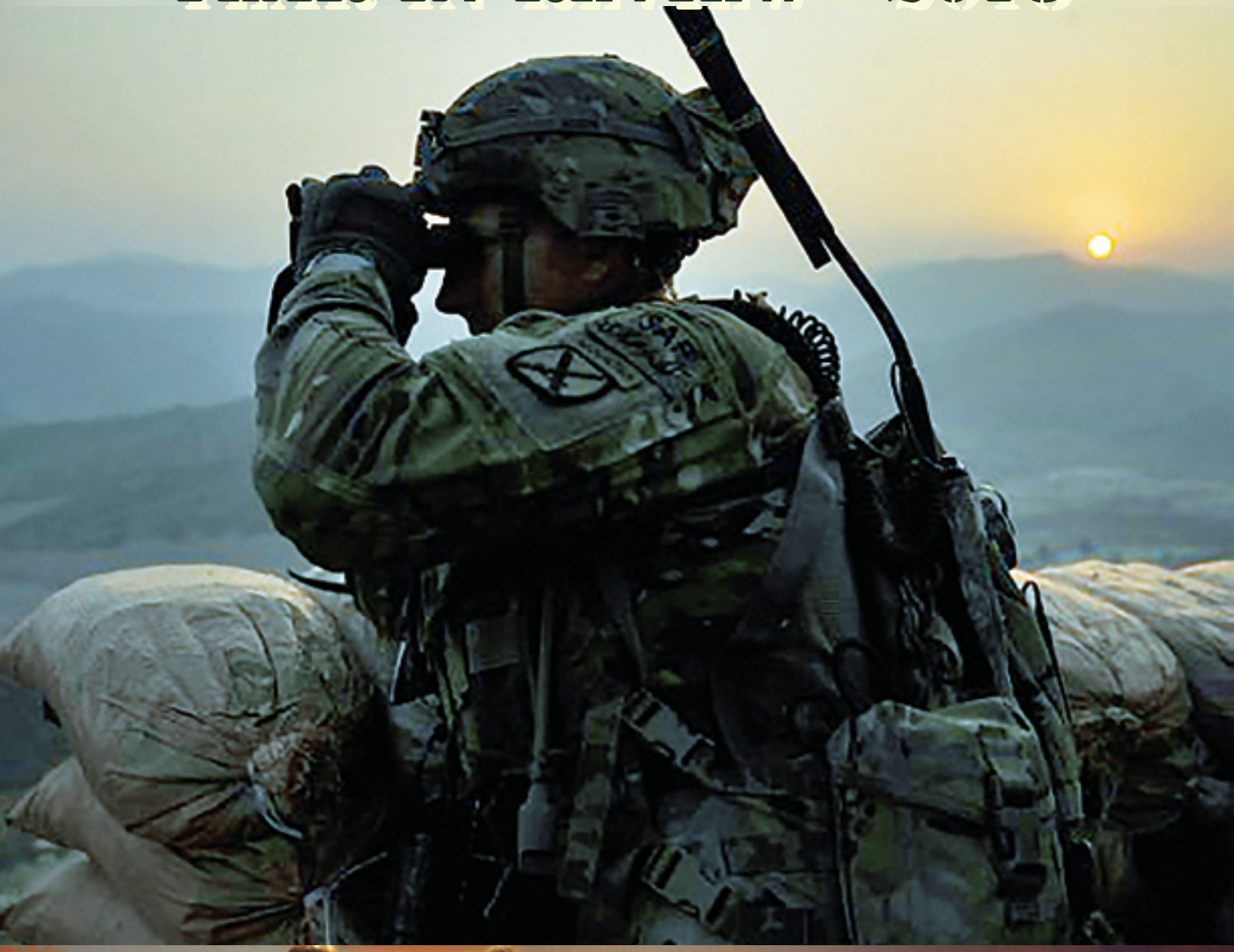
MilsatMagazine

YEAR IN REVIEW—2013



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Cover and Table of masthead Image...
Staff Sgt. Shelby Johnson, a squad leader with the 4th Brigade Combat Team, 10th Mountain Division (Light Infantry), observes the area around Forward Operating Base Torkham, Afghanistan, while wearing the new Capability Set 13 communications suite. Before it was delivered to Afghanistan, Capability Set 13 was integrated and validated through the Army's Network Integration Evaluation process, which is now adapting to drive continued innovation for a service in transition. Original photo courtesy of U.S. Army.

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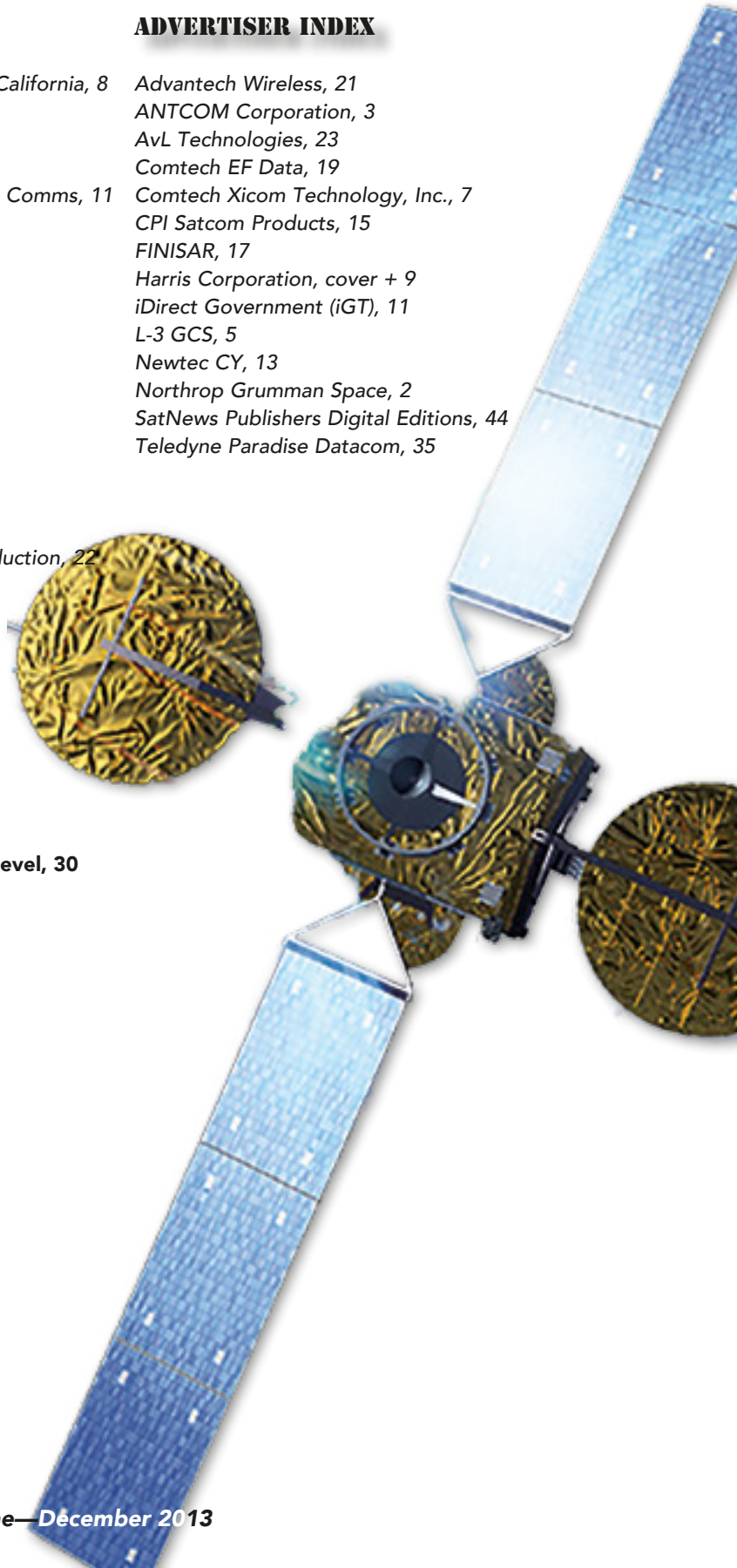

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ULA, NRO + NASA—SECRET SAT + COLD CUBES LAUNCH FROM FRIGID CALIFORNIA

A United Launch Alliance (ULA) Atlas V rocket carrying a payload for the National Reconnaissance Office (NRO) lifted off from Space Launch Complex-3 on December 5th at 11:14 p.m. PST. Designated NROL-39, the mission is in support of national defense. Photo is courtesy of ULA / Pat Corkery.

A United Launch Alliance (ULA) Atlas V rocket carrying a payload for the National Reconnaissance Office (NRO) lifted off from Space Launch Complex-3 on December 5th at 11:14 p.m. PST.

Designated NROL-39, the mission is in support of national defense.

"Today's successful launch of the NROL-39 mission is a testament to the tremendous government-industry partnership. We greatly appreciate the teamwork with the NRO Office of Space Launch and our many mission partners," said Jim Sponnick, ULA vice president, Atlas and Delta Programs. "We are honored to be entrusted to launch these one-of-a-kind national assets to orbit to protect our national security and to support the many brave men and women serving around the world."

This mission was launched aboard a United Launch Alliance Atlas V Evolved Expendable Launch Vehicle 501 configuration vehicle, which includes a 5-meter diameter payload fairing. The Atlas booster for this mission was powered by the RD AMROSS RD-180 engine and the Centaur upper stage was powered by a single Aerojet Rocketdyne RL10A-4 engine.

Developed by he 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.

In addition to the NROL-39 payload, the Government Experimental Multi-Satellite (GEMSat), consisting of 12 CubeSats, took advantage of the Atlas V launch vehicle ride share capabilities and were deployed following completion of the primary mission.

The NRO and ULA partnered to develop an Aft Bulkhead Carrier (ABC) on the Centaur upper stage, which is a platform for accommodating auxiliary payloads aboard Atlas V missions.

The CubeSats were developed under a sponsorship of the NRO and NASA. The Aerospace Corporation, the Air Force Institute of Technology and the Army developed the seven NRO-sponsored CubeSats.

The five NASA-sponsored CubeSats were developed by Montana State University, California Polytechnic State University, the University of Michigan, and Medgar Evers College of the City University of New York.

"We are pleased we could support the NRO, NASA, and all of the associated institutions by successfully delivering these important auxiliary payloads which will test and validate new technologies for debris mitigation, propulsion, space weather, communications, on-orbit data processing and the use of commercially available components," said Sponnick.

ULA program management, engineering, test, and mission support functions are headquartered in Denver, Colorado. Manufacturing, assembly and integration operations are located at Decatur, Alabama, and Harlingen, Texas. Launch operations are located at Cape Canaveral AFS, Florida, and Vandenberg AFB, California. For more information on ULA, visit the ULA website at.

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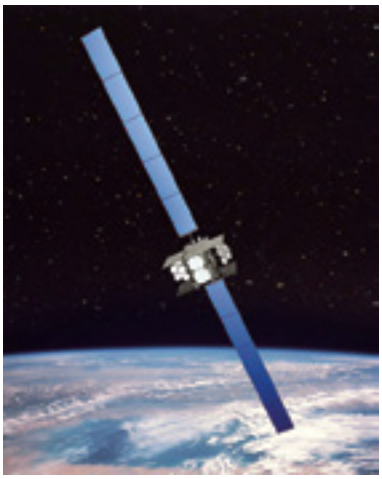
USAF SMC—TAKING WGS-5 TO FULL OPS



Artistic rendition of the WGS Block II satellite in orbit. Image is courtesy of Boeing.

The Space and Missile Systems Center recommended to HQ Air Force Space Command the release of WGS-5 communications satellite to the operational constellation.

This significant achievement reflects the successful collaboration between numerous organizations including the Space and Missile Systems Center, Air Force Space Command, Army Space and Missile Defense Command /Army Forces Strategic Command, and the Boeing Company.

WGS provides flexible, high-capacity communications for marines, soldiers, sailors and airmen throughout the world. WGS is a key enabler of Command and Control, Communications Computers, Intelligence, Surveillance and Reconnaissance, as well as battle management and combat support information functions.

WGS-5 is the fifth of ten planned satellites in the wideband constellation and was launched from Cape Canaveral Air Force Station, Florida, May 24, 2013.

WGS-5 is at its operational orbit location providing coverage over the Atlantic Ocean for the European theater and full coverage of the CONUS for the first time.

"I am proud of the tremendous dedication and commitment of the Military Satellite Communications Wideband Division as we field this critical communication capability," said Ms. Charlotte M. Gerhart, chief of the Wideband Global SATCOM Division. "The success of WGS-5 is a testament to the hard work and dedication of the entire Wideband SATCOM team."

VIASAT—BUILDING BLOCK UPGRADES

The U.S. government has awarded ViaSat Inc. (Nasdaq:VSAT) a development contract for Block Upgrade 2 (BU2) hardware and software upgrades to its Multifunctional Information Distribution System-Low Volume Terminals (MIDS-LVT) Link-16 terminals, valued at $33,469,487 with options of $5,713,160.

The order resulted from a solicitation from Space and Naval Warfare Systems Command (SPAWAR). The order adds new functionality to the MIDS-LVT system fleet worldwide.

MIDS-LVT forms the backbone of the Link-16 network across the U.S. DoD and the international coalition. Core terminal functions include Link-16 data as well as secure voice with TACAN capabilities on selected terminals.

HARRIS—CHATTING WITH MUOS

Harris Corporation's Falcon III® AN/PRC-117G multiband manpack radio has successfully communicated with the new Mobile User Objective System (MUOS) satellite constellation.

Harris demonstrated third-generation wireless compatibility with the MUOS constellation during a recent high-latitude experiment over the North Pole. The Falcon III radio received and displayed MUOS satellite transmissions during the experiment, demonstrating the viability of MUOS terminals in polar regions, which have been underserved by legacy military UHF satellite communications.

The high latitude experiment was led by Lockheed Martin, the prime contractor to the U.S. government for the MUOS satellite system. The experiment involved repeated transmissions between the MUOS system and the Harris radio onboard a cargo plane flying from Alaska to the North Pole and back. The experiment's success follows favorable results in a similar test during the summer in U.S. government testing labs in San Diego.

Harris is able to deliver the MUOS waveform to users through a software upgrade to the widely fielded and combat proven Falcon III AN/PRC-117G manpack radio platform.

U.S. SOUTHERN COMMAND—FIRST STEP TOWARD LOWER COST FOR SPACE COMMS

U.S. Southern Command took a first step in an effort to evaluate how low-cost space communication capabilities can support information sharing and tactical communications across wide geographic expanses, including remote and densely forested areas.

A SOUTHCOM-sponsored nanosatellite was one of the payloads of a United Launch Alliance Atlas V rocket that successfully launched at 11:14 p.m. December 5th from Vandenberg Air Force Base, California. Two additional nanosatellites are scheduled to launch in December 2014.

The nanosatellite will be set to a Low-Earth-Orbit (LEO) and evaluated in partnership with Brazil and Peru as part of a technology program.

"This is just an evaluation, but we think this space capability could help improve communication during various operations," said General John Kelly, SOUTHCOM Commander. "Investing in nanosatellites is also an opportunity for us to collaborate from the ground up with partner nations who are looking to develop this capability for a variety of security and commercial uses."

About 11 pounds and roughly the size of a loaf of bread, nanosatellites currently cost $500,000 to build, offering uses similar to those of large-scale satellites at a significantly lower cost.

Their size makes deploying them to space relatively affordable, and their reduced cost means several can be deployed in a short time to expand communication coverage to ground forces in support of a wide array of mission requirements, including humanitarian assistance and disaster relief operations.

The deployment of this first SOUTHCOM nanosatellite is part of a Joint Capability Technology Demonstration funded by the U.S. Department of Defense and spearheaded by SOUTHCOM's Science, Technology and Experimentation Division.

The first of two evaluations is planned for May 2014 and will take three months to complete. The final evaluation is scheduled for February 2015 and will span five months using all three satellites.

Under this program, the U.S. Army's Space and Missile Defense Command is in charge of developing a total of three nanosatellites that will serve as one component of a communications suite that will also include a ground station, ground sensors and tactical radios.

The U.S. Naval Postgraduate School (logo to the right) will support SOUTHCOM's assessment of the operational value of the technology.

USAF 45TH SPACE WING—WORKING WONDERS FOR SES-8

The 45th Space Wing provided flawless Eastern Range support as Space Exploration Technologies (SpaceX) completed a successful launch of the SES-8 communications satellite from Launch Complex 40 here at 5:41 p.m. December 3rd.

Airmen, Air Force civilians and contractors from throughout the 45th Space Wing provided vital support, including weather forecasts, launch and range operations, security, safety, medical and public affairs.

The wing also provided its vast network of radar, telemetry, optical and communications instrumentation to facilitate a safe launch on the Eastern Range.

Launched aboard a SpaceX Falcon 9 rocket, the payload flew on the Falcon 9 v1.1 configuration with upgraded Merlin 1D engines, stretched fuel tanks, and a payload fairing.

The launch of SES-8, which will be released in a super synchronous transfer orbit stretching above its 22,300-mile-high operating post, requires two burns of the Falcon 9 second stage.

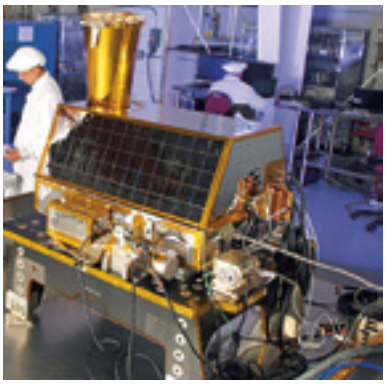
The first firing placed SES-8 in a low-altitude parking orbit, then the second burn injected the 7,055-pound craft in an oval-shaped orbit. SES-8 maneuvered itself into a circular orbit 22,300 miles over the equator, sliding into position in the geostationary arc at 95 degrees east longitude.

The satellite features up to 33 Ku-band transponders (36MHz equivalent). SES-8 will be co-located with NSS-6 at the orbital location of 95 degrees East to provide growth capacity over Asia-Pacific.

The spacecraft's high performance beams will support the rapidly growing markets in South Asia and Indo-China, as well as provide expansion capacity for DTH, VSAT and government applications.

"For the second time in a little more than two weeks, the 45th Space Wing and our mission partners have worked together to ensure another successful launch here on the Eastern Range," said Brigadier General Nina Armagno, commander, 45th Space Wing, who also served as the Launch Decision Authority for this mission. "It's gratifying to see a varied, high-performing team like this come together time and time again. We are truly grateful for the outstanding space team we have here on the Space Coast," she said.

USAF SINGS PRAISES OF CHIRP'S ACCOMPLISHMENTS



An Orbital Sciences technician prepares the USAF's CHIRP sensor for inclusion aboard the SES-2 satellite as a hosted payload. Photo courtesy of Orbital Sciences.

The knowledge gained from CHIRP's successful operation will continue to contribute to the Air Force's space modernization initiatives for years to come.

Following 27 months of successful operation, during which all mission objectives were met, the Space and Missile Systems Center decommissioned the Commercially Hosted Infrared Payload (CHIRP) December 6, 2013.

An experimental CHIRP sensor is hosted on a commercial SES satellite operating in geosynchronous orbit over the United States.

The CHIRP sensor, designed and built by Leidos (formerly Science Applications International Corporation), was successfully launched on September 21, 2011, as a hosted payload on an SES commercial communications satellite built by the Orbital Sciences Corporation.

CHIRP was designed for a one-year mission life. The payload completed its initial demonstration period in July 2012, and the contract was extended three times to conduct additional demonstrations employing wide field-of-view staring technology.

During its operations, the CHIRP system accomplished all objectives by collecting more than 300 terabytes of Overhead Persistent Infrared (OPIR) data, enabling analysis of more than 70 missile- and rocket-launch events and more than 150 other infrared events.

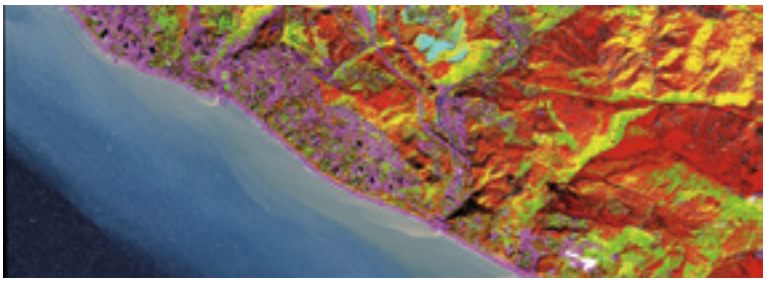
CHIRP mission products stimulated new applications of OPIR data by defense and civil users. Given the successful accomplishment of the project's mission objectives, and increasing budgetary constraints, the Air Force chose not to extend the current contract period.

"CHIRP proved the viability of commercially hosted OPIR payloads, and gave us tremendous insights into the applicability of wide field-of-view staring technology to our missile warning, missile defense, technical intelligence, and battlespace awareness missions," said Lt. Gen. Ellen Pawlikowski, SMC commander.

The CHIRP demonstration team was led by the Infrared Space Systems Directorate at the U.S. Air Force Space and Missile Systems Center, Los Angeles Air Force Base, California.

DISPATCHES

PROTEUS FZC—AN IN-DEPTH LOOK @ CORSICA



Proteus FZC, a provider of satellite-derived mapping solutions, delivered accurate bathymetric and seafloor classification maps for a joint UK-France amphibious military exercise on the Island of Corsica.

In the pilot managed by the UK Hydrographic Office (UKHO), Proteus partnered with DigitalGlobe to derive accurate bathymetric measurements and identify four seabed types to a depth of 12 meters from multispectral satellite imagery without ground control.

"We completed the Corsica coastal marine mapping project at about one-tenth the time and cost of traditional sonar or LiDAR," said Proteus CEO David Critchley. "Because the data is derived exclusively from satellite imagery, we leave no environmental footprint and face no airspace restrictions."

For the joint military operation, the British and French armed forces requested detailed information about water depth and the submerged seabed along specific sections of the Corsican coastline so that amphibious military vehicles could be launched from larger vessels anchored offshore and safely landed on the island's beaches.

The custom maps created by Proteus were used by the military to select precisely where the landings would occur.

"The vertical accuracy of our bathymetric maps was verified at 10-15 percent of water depth," said Critchley. "If ground truth data were available, the measurements would have been accurate to a solid 10 percent of depth."

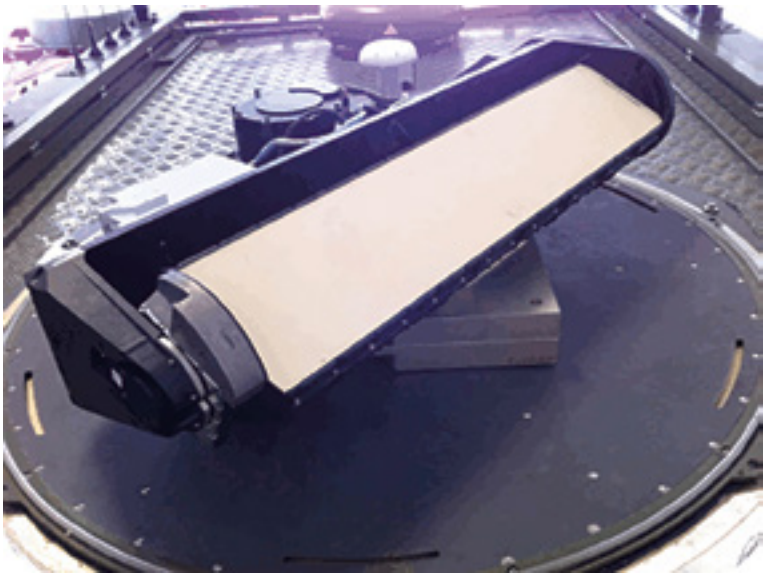
Working with eight-band multispectral image data with two-meter resolution collected by DigitalGlobe's WorldView-2 satellite, the Proteus-led team achieved the bathymetric measurements in Corsica's Mediterranean coastal zone to a total depth of 12 meters.

In a separate processing procedure, the team also extracted four critical seafloor types from the imagery—sand, rock/debris, vegetation and mixed seabed.

Since 2011, Proteus has been producing seafloor survey and seabed classification projects using multispectral satellite imagery. The product generation technology that can be carried out in a fraction of the time and cost of traditional methods.

These mapping projects have been delivered for environmental, oil and gas, marine biology and other coastal zone applications in Europe, the Middle East and Caribbean. Derived products have high accuracy, meeting the requirements of engineering, environmental monitoring and strategic geospatial planning applications.

IBETOR S.L.—EXTREME DRIVING CONDITIONS ARE NO DETERRENT



IBETOR S.L. is currently delivering to the Spanish Military Emergencies Unit (UME) and Ministry of Defense (MOD) Land Forces groups a quantity of 55, X-band Satellite-On-The-Move (SOTM) systems.

The product, named Ib-SOTM, is designed and manufactured by IBETOR using ThinKom Solution's planar phased array antenna technology called Continuous Transverse Stub (CTS).

The Ib-SOTM system uses an IBETOR developed, high performance, closed-loop antenna control and positioning system.

The Antenna Control Unit (ACU) in conjunction with a dual GPS antenna and an Inertial Navigation System (INS) that samples the attitude of the vehicle at 1KHz supports operation on-the-move, maintaining miss-pointing losses of less than 0.5dB.

Operational advantages of the IBETOR SOTM system ensure X-band communications on-the-move in the most extreme driving conditions (Churville B compatible).

The low profile (<7 inches) ThinKom CTS antenna minimizes the visible signature and vehicle vulnerability, a key feature in military operations. The antenna radiation patterns are well behaved, compliant with 47 CFR 25.138 and allow for very high operating spectral efficiency.

The IBETOR system has been tested under extreme environmental conditions (MIL-STD-810F) and has successfully uplinked (return link) data rates of 8Mbps. Ib-SOTM has been certified by the Spanish satellite government operator (HISDESAT) and is currently in the process of certification for other military constellations.

CJTF-HOA—KENYAN DEFENSE FORCES OBTAIN WEATHER SYSTEM

U.S. Navy Lt. Cmdr. Rachel Martin (center), the officer-in-charge of the Metrological and Oceanographic Operations Center, speaks to U.S. Navy Capt. Timothy Sheridan and Kenyan Defense Forces Col. Ngirithia Lekaunye regarding a TMQ-53 Tactical Meteorological Observing System at the Kenyan Military Airport in Nairobi.

A team from Combined Joint Task Force – Horn of Africa recently installed a new weather system at the Kenyan Military Airport in Nairobi.

The team included U.S. service members from, J3 Meteorological and Oceanographic Office, J3 Special Operations Command and Control Element Weather System and Support Cadre and the 411th Civil Affairs Battalion.

Before the new system was installed, the Kenyan Defense Forces relied on data from a civilian weather system which can be very time consuming.

The system, officially called the TMQ-53 Tactical Meteorological Observing System, assists war planners and combat weather teams through a collection of weather sensors connected to a computer.

The system uses low-Earth orbiting satellites to collect data, enabling the transmission of mission-critical weather data within an hour after receiving it.

The new system provides current weather conditions to the Kenyan Defense Forces, which will enhance the safety of future missions.

"Enhancing safety and effectiveness of the Kenyan Defense Forces ground and air operations was one of many positive results of the mil-to-mil engagement," said U.S. Navy Lt. Cmdr. Rachel Martin, Combined Joint Task Force-Horn of Africa Joint Meteorological and Oceanographic Officer.

Joining the mission with METOC were J3 WSSC technicians to help install and provide working knowledge of the system to KDF personnel.

"As subject matter experts, we went there to ensure the location was right for the system and properly installed," said U.S. Air Force Master Sgt. Harlan Rogers, noncommissioned officer in charge of the cadre. "The Kenyans we were working with were very sharp, fast learners, and their attention to detail was amazing."

Senior Airman Michael Becker, the cadre's lead technician, explained how the TMQ-53 system worked.

"The event in Kenya was a unique experience and very rewarding," Becker said. "Going to Kenya to install the TMQ-53 while communicating to the Kenyan Defense Force how proper maintenance and handling the equipment helps it last longer builds that trust in our relationship with them."

Becker also noted that he enjoyed learning some of their language and culture, and liked trying their cuisine. He said it was an experience he will never forget and would love to go there again.

CJTF-HOA supports partner nations such as Kenya in military-to-military engagements in order to defeat violent extremist organizations in East Africa.

Story by U.S. Navy Petty Officer 1st Class Rafael Martie, combined Joint Task Force—Horn of Africa Public Affairs.

CHINA + BRAZIL—AWRY

All looked well at the Taiyuan space center in China's Shanxi province when the Long March 4B rocket pushed the CBERS 3 satellite away from Earth.

The China/Brazil developed, $250 million, 2.3 ton satellite packed infrared and thermal imagers and was intended to capture black and white imagery at a top resolution of 5m (16 feet) to discover sources of water, examine urban development, assist with identifying deforestation and land use cycles in Brazil.

However, something went amiss... the Chinese Xinhua news agency as well as the Folha de S. Paulo newspaper both indicated that the CBERS 3 did not attain its orbital slot and is believed to have unceremoniously returned to Earth.

An otherwise stellar record for the Long March B rocket—which had 20 previous, successful lift-offs—now appears to be undone. This event, according to reports, indicates the launch vehicle encountered an unspecified difficulty during its ascent, resulting in the satellite failing to reach its orbital slot.

Brazil's INPE (National Institute for Space Research) and China are developing the next CBERS 4 satellite in tandem, with an expected launch sometime in 2015.

DISPATCHES

PRIORIA ROBOTICS—COMPANY LEVEL TACTICAL ASSET

The U.S. Army recently purchased 36 Maveric unmanned aerial systems as a result of an urgent request from soldiers in combat.

The request was made to the Rapid Equipping Force, or REF, at Fort Belvoir, Virginia, in March, and Soldiers will receive them by December.

The 36 Maverics, which are not in the Army's current unmanned aerial system, or UAS, inventory, cost $4.5 million and are made by Prioria Robotics Inc., a technology firm in Gainesville, Florida.

The Maveric is classified in the micro-UAS category as it is smaller than the Army's Raven and Puma systems, according to Tami Johnson, project manager, REF. Maveric will support Soldiers at the squad level, she added, while Raven and Puma are company-level tactical assets.

Another difference, she pointed out, is Maveric's wings are flexible and enable the system to naturally blend into the environment.

"Puma and Raven are both dependable systems," she said. "However, this requirement called for a small, subtle capability that could be employed by a single Soldier. Maveric meets this unique requirement."

Johnson said Maveric can be flown for 60 minutes before it needs to be refueled. It also contains sensors for day, night or obscured hazy environmental reconnaissance work.

The Maveric cruises at 26 knots and dashes up to 55 knots, but more importantly, it can fly in sustained winds of 20 knots and up to 30-knot gusts.

At this time, the REF has no plans to purchase more Mavericks, but that could change pending Soldier feedback or additional requirements from theater, Johnson said. She added the REF will continue to work closely with the program manager for Army UAS, informing them of any Soldier assessments or requirements as they come in.

"We anticipate that the systems will be equipped in late 2013 and we are eagerly awaiting Soldier feedback on performance," she said.

Maveric did undergo testing earlier this year at Yuma Test Center in Arizona by the Army Testing and Evaluation Command, which published a Safety Release for Soldier Training, Safety Confirmation and Capabilities and Limitation report.

Johnson explained the role REF plays in acquiring new technologies, "As the REF procures emerging capabilities to meet urgent Soldier requirements, we are often inserting technologies for the first time and assessing operational performance," Johnson explained. "Maveric UAS is a good news story for the REF. It demonstrates our ability to validate a unique requirement, canvass emerging commercial-off-the-shelf and government-off-the-shelf technologies, and partner with other Army organizations to quickly place capabilities into the hands of Soldiers."

GVF—UNPRECEDENTED SATCOM EFFORTS FOR PHILIPPINES

In the devastating aftermath of Typhoon Haiyan, the international satellite sector has implemented an unprecedented collaborative effort through GVF, the satellite industry's non-profit association, to provide communications solutions optimized for support of the disaster-response efforts underway in the Philippines.

In the hours immediately before and after Typhoon Haiyan's landfall, Steve Birnbaum, GVF's Disaster Response Director, issued an emergency notification calling upon Members of the association to provide closely co-ordinated support for disaster-relief efforts conducted by the humanitarian community.

"With relief efforts underway in the Philippines—and recognizing the severity of the nation's crisis—the satellite industry responded with invaluable offers of communications services and bandwidth to facilitate immediate delivery of mission-critical satellite communications," said Mr. Birnbaum.

With coordination from GVF Members, the Initiative collaborated to create a new, premium VSAT service exclusively for the humanitarian response effort in the Philippines.

This level of industry collaboration is unprecedented, and provided the humanitarian response community with an optimal common platform from which to operate.

The collaboration minimized the duplication of effort and resources often criticized in past humanitarian responses, achieving a key objective of the GVF's Humanitarian Assistance & Disaster Response programs.

The GVF Disaster Response Initiative included co-ordination with a host of key emergency-management stakeholders, which have been mobilizing communications, personnel and other vital assets to the affected area.

"The importance of satellite communications has long been recognized as effective for use in disaster relief and mitigation," said David Hartshorn, Secretary General of the GVF. "But the scale of the Philippine disaster has required the fullest measure of support and co-ordination for the delivery of rapidly-deployable communications."

As the Initiative's focal point, Mr. Birnbaum coordinated an international effort to identify satellite communications assets that could be applied to the ongoing relief efforts. They include a wide range of satellite solutions, including provision of three vital services:

- Rapid Access to State-of-the-Art Services: GVF posted emergency notices to the global industry for disaster-recovery requirements.
- In addition, direct and immediate access to the world's leading suppliers of satellite-based emergency-management systems and services was provided.
- The GVF Members, which include approximately 200 companies from throughout the world, offered an extensive range of satellite solutions: Bandwidth, mobile systems, VSAT networks and equipment, fly-aways, ruggedized terminals, integration and installation, consulting, legal services, and more.
- Provision of GVF-Certified Technicians: Contact details for GVF-Certified VSAT Installers are available to first responders via http://www.gvf.org/. These technicians, all of whom have completed the GVF's Certification Program, include personnel from the UN, NGOs, government, and industry.
- Implementation of Effective Regulation: Regulations often inhibit or prevent the industry's ability to rapidly provide satellite communications during and after disasters. To address this issue, GVF has co-ordinated closely with the Philippines' government and contributed to the initiation of emergency licensing procedures.

"The relevance of satellite communications to emergency managers and the humanitarian & aid sectors has never been higher... nor has there ever been greater recognition that the industry has a vital role to play in saving lives," said Mr. Birnbaum. "The GVF's Disaster Response Programs continue to represent an important opportunity for everyone involved in the satellite industry to help save lives when disasters strike anywhere I the world. If your company has assets that can be used in support of future disasters—please contact me directly at ***steve.birnbaum@gvf.org*** to be registered with the GVF's Humanitarian Assistance & Disaster Response programs."

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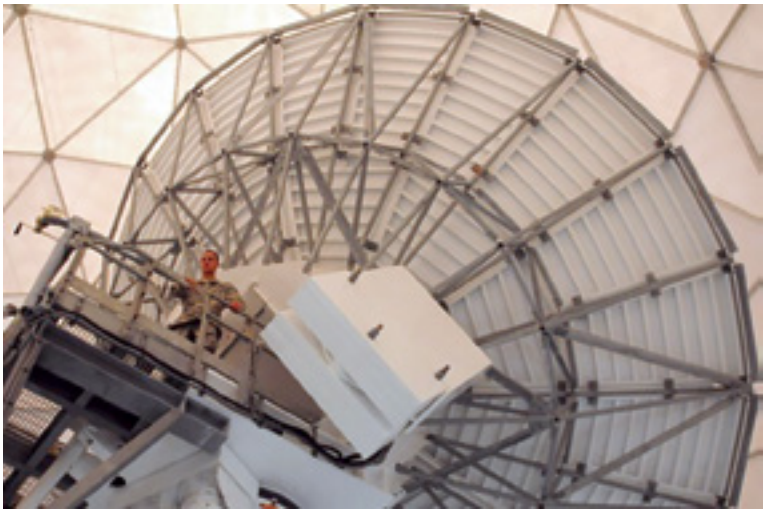


By building a "slice" of its larger Network-Centric Teleport system at the Army's Regional Hub Node in Guam, the Department of Defense can access an additional military satellite that was previously out of its reach and improve its support in the Asia-Pacific region.

"The DoD Teleport program has gained a whole new venue to support its customer base, which includes the Air Force, Marine Corps, and Navy," said Joe Vano, Regional Hub Node, or RHN, project lead for the Army's Project Manager, Warfighter Information Network-Tactical, which manages the RHNs. "It's going to enable DoD customers across the board to be much more functional in the Pacific theater."

The joint project began in July, and following testing, recently began supporting new users. The endeavor is another win for the DoD in its continued push to veer away from expensive commercial satellite use toward the more efficient utilization of its own military Wideband Global SATCOM, known as WGS, satellites, Vano said.

The extensive SATCOM capabilities of RHNs enable regionalized reach-back to the Army's global network. WIN-T is the backbone of the Army's tactical communications network, which provides Soldiers with high-speed, high-capacity voice, data and video communications.

The five RHNs strategically located around the globe reside at the upper-most level of the WIN-T network architecture and support Army and Marine Corps users.

"Without the RHN, the DoD would have to invest millions in new SATCOM terminals to make this happen," said Mike McClelland, Pacific Region PM for the DoD Teleport Program Office.

Managed by the Defense Information Systems Agency, the DoD Teleport System is a SATCOM gateway that links the deployed Warfighter to Defense Information System Network services, the DoD's enterprise network, through a variety of DoD Teleport sites strategically located around the world. Its role is similar to the Army's RHNs, but it supports a different customer base that includes the Air Force, Marine Corps, and Navy.

The new joint Teleport effort is unique in that it relies on the transport capabilities of an Army RHN to deliver voice, video and data to the Ka-band (military satellite radio frequency) DoD Teleport user, and for the first time leverages the WGS-4 spacecraft, McClelland said.

The DoD's WGS system, a constellation of highly capable military communications satellites, leverages cost-effective methods and technological advances to provide worldwide, high data rate and long-haul communications for U.S. forces and international partners.

WGS satellites are positioned above the equator at different locations to provide global coverage. Prior to the effort, DoD Teleport only had one Ka-band terminal operating in the Pacific region—its Teleport in Hawaii. However, there are two WGS satellites on station in the Pacific. The Defense Information Systems Agency could only conduct missions on the WGS-1 satellite through the Hawaii Teleport; it didn't have the capability to conduct missions on WGS-4.

In order to utilize WGS-4, it needed a ground satellite dish pointed directly at the WGS-4 satellite in space, and it didn't have that large, very expensive infrastructure in the required location.

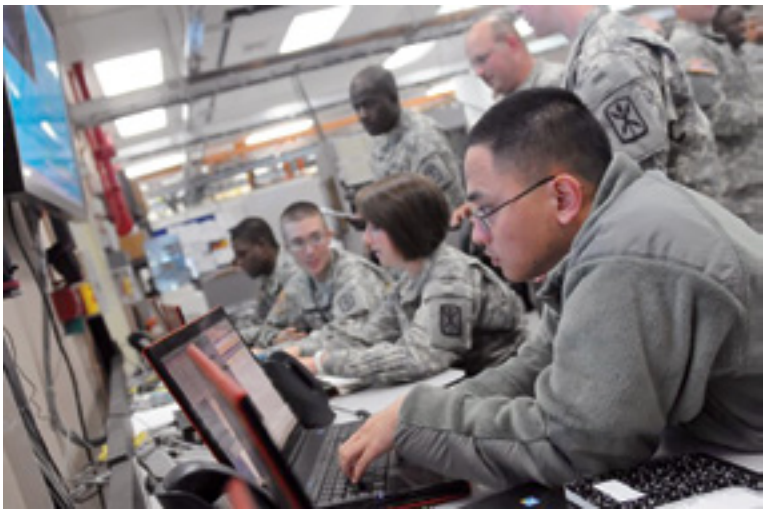
"WGS-4 is positioned further west than WGS-1, which is very attractive for the DoD Teleport user base because of current operational requirements that require a better 'view' of the Pacific region," Vano said.

Project Manager, Warfighter Information Network-Tactical and the DoD Teleport Program Office developed a cooperative work-around to satisfy these requirements.

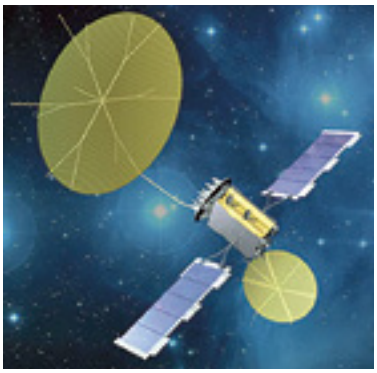
By installing an interconnecting circuit and a small Teleport contingency package at the Guam RHN, DoD Teleport will now be able to use up to 30 percent of the RHN Guam WGS-4 antenna radio frequency capability. In addition, DoD Teleport assets at the Guam RHN can be managed from its Hawaii Teleport site, eliminating the need for DoD Teleport personnel at the Army's site.

"This cooperative effort allows DoD Teleport to come into the Army's 'house' and leverage its assets in a very cost effective manner," Vano said. "And given the current fiscal environment, this kind of joint teamwork is not only a big win for our forces, but for the taxpayer as well. It works out great for all parties involved."

Story by Amy Walker, PEO C3T



LOCKHEED MARTIN + U.S. NAVY—IT'S A HAND-OFF



The spacecraft systems and integrated ground and network systems were evaluated with three radio access facilities and new MUOS-compatible terminals.

A growing number of terminals are taking advantage of the MUOS advantage since first connections with the advanced waveform began earlier this year.

Government testing will take place before MUOS-2 is turned over to U.S. Strategic Command for operational use.z

MUOS-2 launch aboard an Atlas V rocket. Photo courtesy of United Launch Alliance.

Lockheed Martin has completed on-orbit testing of the second Mobile User Objective System (MUOS) satellite and handed over spacecraft operations to the U.S. Navy.

The handover also includes acceptance of three MUOS ground stations that will relay voice and high-speed data signals for mobile users worldwide. MUOS-2 was launched July 19, 2013 aboard a United Launch Alliance Atlas V rocket from Cape Canaveral Air Force Station, Florida.

The system dramatically improves secure communications, delivering simultaneous and prioritized voice, video and data for the first time to users on the move.

"MUOS-2 benefits from continuous improvement. We completed our baseline on-orbit testing in half the time compared to MUOS-1," said Iris Bombelyn, vice president of Narrowband Communications at Lockheed Martin.

"We look forward to supporting the Navy's test and evaluation phase to demonstrate the total capability of the Mobile User Objective System. When commissioned, the full digital data and flexible network management capabilities will be available to users for both MUOS-1 and MUOS-2."

The Naval Satellite Operations Center will soon begin relocation operations to place MUOS-2 in its operational slot. There, it will undergo testing and evaluation prior to formal government commissioning in 2014.

MUOS satellites are equipped with a wideband code division multiple access (WCDMA) payload that provides a 10-fold increase in transmission throughput over the current Ultra High Frequency (UHF) satellite system, which is also on board.

The WCDMA payload gives users the advantage of high-speed data and priority access that legacy systems did not.

Lockheed Martin's MUOS operations team conducted the on-orbit deployment and checkout of all spacecraft systems over a four month period.

INTERNATIONAL LAUNCH SERVICES + INMARSAT—LAUNCH IS A BREEZE

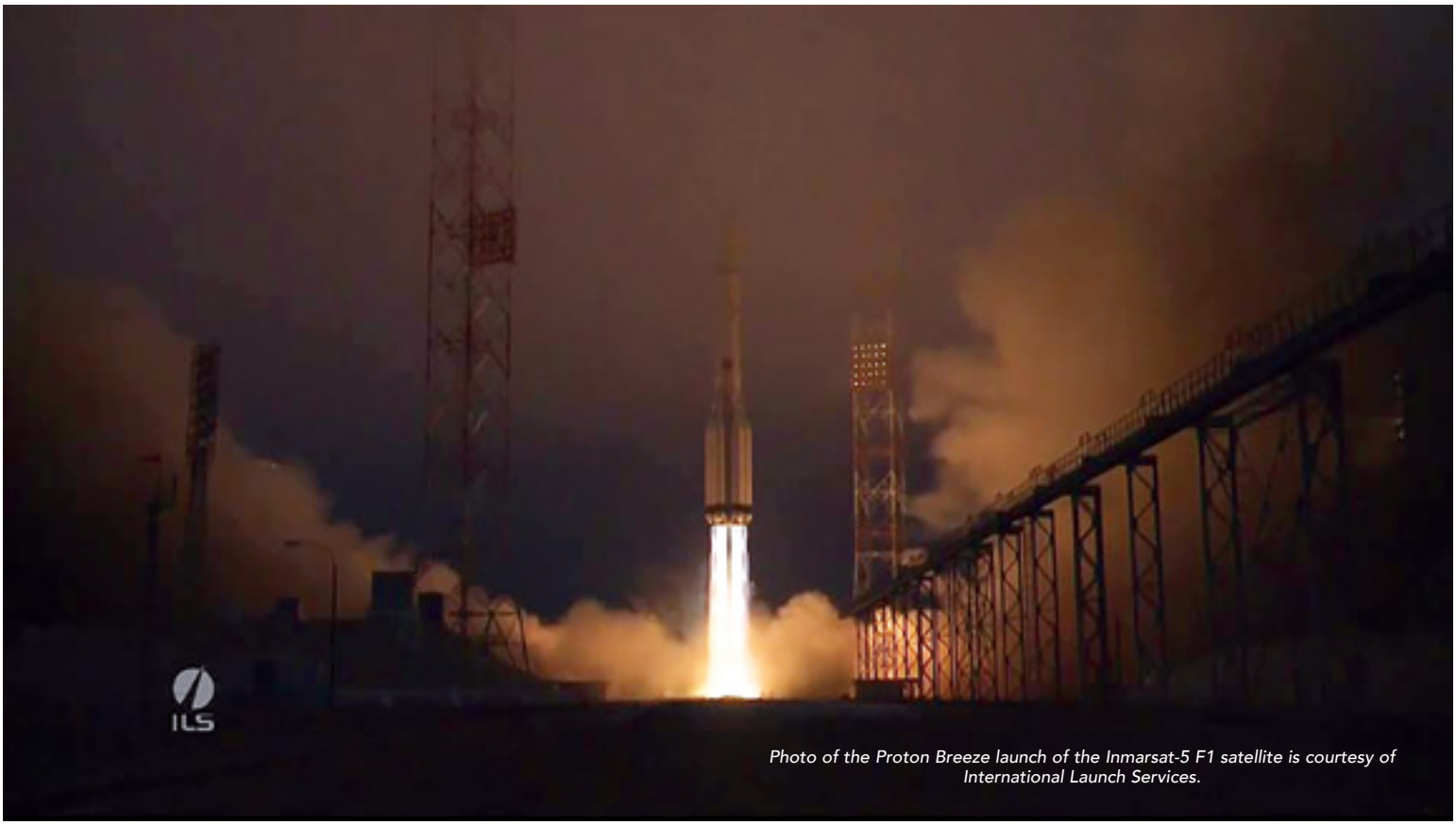


Photo of the Proton Breeze launch of the Inmarsat-5 F1 satellite is courtesy of International Launch Services.

The most recent ILS launch of the Inmarsat-5 F1 satellite on December 8th will bring data services to both commercial and government users who could be on land, sea and in the air.

To generate such high power, each spacecraft's two solar wings employ five panels each of ultra triple-junction gallium arsenide solar cells.

The Proton booster that launched the Inmarsat-5 F1 satellite was 4.1m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4m (24.3 ft). Overall, height of the three stages of the Proton booster was 42.3m (138.8 ft).

The Proton vehicle's history, built by Khrunichev Research and State Production Center, includes nearly 400 launches since 1965. Khrunichev Research and State Production Center is a major player of the global space industry, and the majority owner of ILS.

The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

Of a conventional cylindrical design, the second stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

Powered by one RD-0213 engine, the third stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Each Inmarsat-5 satellite will carry 89 Ka-band beams that will operate in geosynchronous orbit with flexible global coverage. The satellites are designed to generate approximately 15 kilowatts of power at the start of service and approximately 13.8 kilowatts at the end of their 15-year design life.

The mission used a five-burn Breeze M mission design, using the Supersynchronous Transfer Orbit mission design.

The first three stages of the Proton used a standard ascent profile to place the orbital unit (Breeze M upper stage and the Inmarsat-5 F1 satellite) into a sub-orbital trajectory.

This Inmarsat satellite is one of three Ka-band Inmarsat-5 satellites that were ordered from Boeing by the London-based company, at a cost of about $1 billion under a fixed-price contract, with options.

"We remain focused on continuing to complete crucial milestones to successfully deliver this series of satellites," said Craig Cooning, vice president and general manager of Boeing Space & Intelligence Systems. "The spacecraft has two solar wings with five panels, each of ultra triple-junction gallium arsenide solar cells. The BSS-702HP carries the xenon ion propulsion system (XIPS) for all on-orbit attitude control."

When operational, the Inmarsat-5 satellites will provide Inmarsat with a comprehensive range of global mobile satellite services, including mobile broadband communications for deep-sea vessels, in-flight connectivity for airline passengers and streaming high-resolution video, voice and data

with the ability to adapt to shifting subscriber usage patterns of high data rates, specialized applications and evolving demographics.

The Boeing 702HP carries the xenon ion propulsion system (XIPS) for all on-orbit maneuvering.

When operational, the Inmarsat-5 satellites will provide Inmarsat with a comprehensive range of global mobile satellite services, including mobile broadband communications for deep-sea vessels, in-flight connectivity for airline passengers and streaming high-resolution video, voice and data.

Also, in a separate arrangement, Boeing also entered into a distribution partnership with Inmarsat to provide L- and Ka-band capacity to key users within the U.S. government.

This launch marks the seventh ILS Proton launch in 2013, the 84th ILS Proton launch overall, the third Inmarsat satellite to be launched on Proton and the 16th Boeing satellite launched on an ILS Proton.

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

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USMC—ENSURING SAFETY DURING OPERATION DAMAYAN

Marines lock the satellite dish of an air traffic navigational, integration and coordination system during Operation Damayan at Tacloban airport November 18. The 3rd Marine Expeditionary Brigade is assisting the Philippine government's ongoing relief efforts in response to the aftermath of Typhoon Haiyan. The Marines are with Marine Air Control Squadron 4 currently assigned to 3rd MEB in support of Joint Task Force 505. (U.S. Marine Corps photo by Lance Cpl. Stephen D. Himes/Released)

An MV-22B Osprey prepares to take off near an air traffic navigation, integration and coordination system here November 20 as part of Operation Damayan, a humanitarian and disaster relief operation underway in the Philippines. The expeditionary navigation system provides air traffic controllers a platform to guide and direct aircraft in the absence of a typical tower. The system was deployed for the first time in response to Typhoon Haiyan, which struck the Philippines, November 7 with estimated sustained winds of more than 200 mph. Photo by Lance Corporal Anne Henry, Marine Expeditionary Force / Marine Corps Installations Pacific

Marines with 3rd Marine Expeditionary Brigade, in support of Joint Task Force 505, set up an air traffic navigational, integration and coordination system at Tacloban airport, Leyte, Republic of the Philippines, November 17th during Operation Damayan.

The system allows air traffic controllers to contact incoming and outgoing aircraft and analyze flight patterns. Additionally, the controllers use the mobile system to guide pilots through their final approach to the runway when visibility is poor.

"The last time we were able to use the system was during an exercise, and now it is going to play an effective role during a real-world operation," said Gunnery Sgt. Lee A. Pugh, a radar chief with Marine Air Control Squadron 4, currently assigned to 3rd MEB.

The air traffic control tower at Tacloban airport was severely damaged by Typhoon Haiyan and is limited in its ability to manage the high volume of daily air traffic. The system will assist the Philippine Air Force in operations based out of Tacloban.

With the system in place the Philippine Air Force will better be able to manage multiple flights at once, according to Sgt. Jonathan Haasl, a radar electronics technician with MACS-4.

With frequent inclement weather in the Asia-Pacific region, the system plays a vital role in assuring the pilots, crews, aircrafts and most importantly, the aid supplies make it safely to their destination, according to Pugh.

"There are several components that make up the system, like the portable electric units, air-surveillance radar system, radios and a precision approach radar system," said Pugh.

The unit's expeditionary capabilities are enhanced due to the mobility of the system.

"The unique feature of the system being mounted on multipurpose-tactical vehicles makes it easy for us to move to essential areas where it can make a difference, while not wasting valuable time," said Pugh.

The system is a key capability of Marine Corps crises response around the world, whether a humanitarian assistance and disaster relief scenario or contingency operations.

"The system provides on the spot air surveillance and a rapid response, which is useful to expeditionary airfields like the one at Tacloban," said Col. Brian W. Cavanaugh, the commanding officer for the 3rd MEB aviation combat element.

Besides bringing precision approach information to aircraft preparing to land, it is also useful in joint and bilateral operations, providing a safer environment for aircraft in the area, according to Cavanaugh.

"The safety of all the people on the aircraft is the most important part of the mission," said Cavanaugh. "With this system, we can guide pilots to a three foot by three foot square safely and efficiently."

Story by Corporal Jose Lujano, III Marine Expeditionary Force / Marine Corps Installations Pacific

NORTHROP GRUMMAN + NATO—THE FIRST GLOBAL HAWKS NOW IN PRODUCTION

Photo of the NATO version of the Global Hawk UAV.

Northrop Grumman Corporation's Moss Point, Mississippi, Unmanned Systems Center has started production of the first NATO Alliance Ground Surveillance (AGS) Block 40 Global Hawk aircraft, enhanced to meet NATO operational requirements.

The system will provide NATO with unprecedented near real-time terrestrial and maritime situational awareness information throughout the full range of NATO military and civil-military missions, including peacekeeping and humanitarian relief operations.

The NATO AGS system will be a major contribution to NATO's joint intelligence, surveillance and reconnaissance (ISR) capability.

The NATO AGS system will be equipped with the multimode Multi-Platform Radar Technology Insertion (MP-RTIP) airborne ground surveillance radar sensor to provide all-weather, day or night intelligence to the NATO Alliance. The system also includes an extensive suite of network-centric enabled line-of-sight and beyond-line-of-sight long-range, wide-band data links.

"With the ability to fly up to 60,000 feet and for more than 30 hours, the NATO AGS system is uniquely suited to support NATO missions worldwide," said Jim Culmo, vice president, High-Altitude, Long Endurance Enterprise, Northrop Grumman Aerospace Systems.

The NATO AGS system also includes European-sourced ground assets that will provide in-theater support to commanders of deployed forces. Mobile and transportable ground stations will provide an interface between the AGS core system and a wide range of interoperable NATO and national command, control, intelligence, surveillance and reconnaissance systems.

NATO is acquiring the system with 15 nations participating including Bulgaria, Czech Republic, Denmark, Estonia, Germany, Italy, Latvia, Lithuania, Luxembourg, Norway, Poland, Romania, Slovakia, Slovenia and the United States.

The NATO Alliance Ground Management Agency awarded the prime contract for the system to Northrop Grumman in May 2012 during the NATO Summit. The company's primary industrial team includes EADS Deustchland GmbH (Cassidian), Selex ES and Kongsberg, as well as leading defense companies from all participating nations. The NATO AGS system is a variant of the combat-proven Global Hawk, which has logged more than 100,000 flight hours and has supported operations in Iraq, Afghanistan and Libya. The system has also collected weather data in support of scientific missions and participated in humanitarian relief efforts after the devastating natural disasters in Haiti, Japan and the Philippines.

DISPATCHES

AIR FORCE SMC—A GREAT DEAL OF SENSE

The Air Force Space and Missile Systems Center successfully launched two small satellites into orbit November 19 from Wallops Island, Virgina, on the ORS-3 Enabler mission.

In its 60 year history, the Air Force Space and Missile Systems Center has successfully launched some of the largest and most sophisticated satellites ever created.

On Tuesday, November 19th at 8:15 p.m. EST, SMC charted a new trajectory by launching two small satellites into orbit from Wallops Island, Virginia, on the ORS-3 Enabler mission. The Space Environmental NanoSatellite Experiment, SENSE, was led by SMC's Development Planning Directorate.

In an era of limited fiscal resources, the SENSE mission is SMC's latest demonstration of its commitment to delivering affordable and resilient space capabilities for the United States military.

Sponsored by the SMC Defense Weather Systems Directorate, the SENSE mission will collect data for characterizing Earth's upper atmosphere. The two SENSE satellites were developed by a small team of engineers at Boeing Phantom Works in Huntington Beach, California.

The satellites were designed to conform with the CalPoly CubeSat Design Specification, enabling low-cost launch opportunities for universities and research organizations to fly space experiments.

The sensors on the SENSE satellites were built by the Stanford Research Institute, the Naval Research Laboratory, and The Aerospace Corporation. Combined, the SENSE instrument suite provides an important demonstration for monitoring and forecasting changes in Earth's ionosphere.

While unnoticeable to humans on the ground, the ever-changing ionosphere overhead can wreak havoc on radio transmissions both to and from space. This can disrupt satellite-based communications and GPS signals that military and civilian users depend on.

In addition to its space weather mission, the SENSE program is also an acquisitions experiment. The SENSE satellites were designed to be affordable and rapidly deployable. The SENSE program invested significant effort to employ systems engineering processes selectively to minimize administrative burdens without compromising quality and mission assurance.

The satellites leverage commercial-off-the-shelf electronics and open source standards to minimize research and development investments. Further, the satellites do not use radiation-hardened components and have little redundancy.

These design trades will result in a shorter mission life, but they enable satellites like SENSE to be produced quickly, inexpensively, and in large quantities. Moreover, this acquisitions model enables future generations of satellites to be more responsive to the rapid pace of innovation in the micro-electronics industry.

Beyond the SENSE satellites, the program's ground system is also an innovative solution designed to provide substantial savings over the mission's one- to three-year lifetime. Known as the Common Ground Architecture, this command and control tool was developed by the Naval Research Laboratory.

This tool is highly automated and configurable so that it can fly many satellite missions with minimal operator oversight. The SENSE ground and data processing system is being operated through partnerships with the SMC Space Development and Test Directorate, the SMC Infrared Systems Directorate, and the Air Force Research Laboratory's Space Vehicles Directorate to fly future experimental space missions for the U.S. military.

In summary, the SENSE program is establishing an important precedent for future Air Force space acquisitions. By implementing an agile acquisitions strategy using the CubeSat form factor, SENSE is a pathfinder to future low-cost space architectures for operational military applications.

Story courtesy of Los Angeles Air Force Base Public Affairs.

STILL THE MOST AMAZING INDUSTRY IN THE WORLD

By Elliot Holokauahi Pulham, Chief Executive Officer, Space Foundation

If anything has been amplified to a painful level this year, it is the consequence of political dysfunction, and how the failures to govern by Congress, the Administration and both political parties have negatively affected the United States, both at home and abroad. No sector of society has been spared the impact of this colossal failure of the two-party system, and certainly we've felt it in the space community—both in the U.S. and more broadly around the world.

However, at the end of the day, and at the end of every calendar year, I like to think of myself as a "glass half full" kind of guy. For my final article of 2013, I'd like to forget, for a moment, about the lack of a clear mandate or political consensus for NASA.

I'm going to park, at the door, my frustrations over the way that ITAR reforms still aren't over the finish line. I'm going to forget, for a moment, the damage that is going to be inflicted upon national defense readiness and the global space industrial base if a second round of sequestration is allowed to kick in.

Instead, I'd like to reflect on the many amazing things that have been accomplished by the global space community in 2013, despite the challenges we have faced.

Looking back on 2013, I'm struck by how diverse our industry has become, and how, despite that diversity, we are united by our common commitment to innovation, our mutual pursuit of technical excellence and a fundamental desire to improve human knowledge and make the world a better place.

It's hard to know where to start in making a list of all we've accomplished in 2013. So I've kept it simple, gone back through the calendar and tried to just jot down the most obvious and newsworthy accomplishments of our Space Foundation corporate member companies and strategic partner organizations.

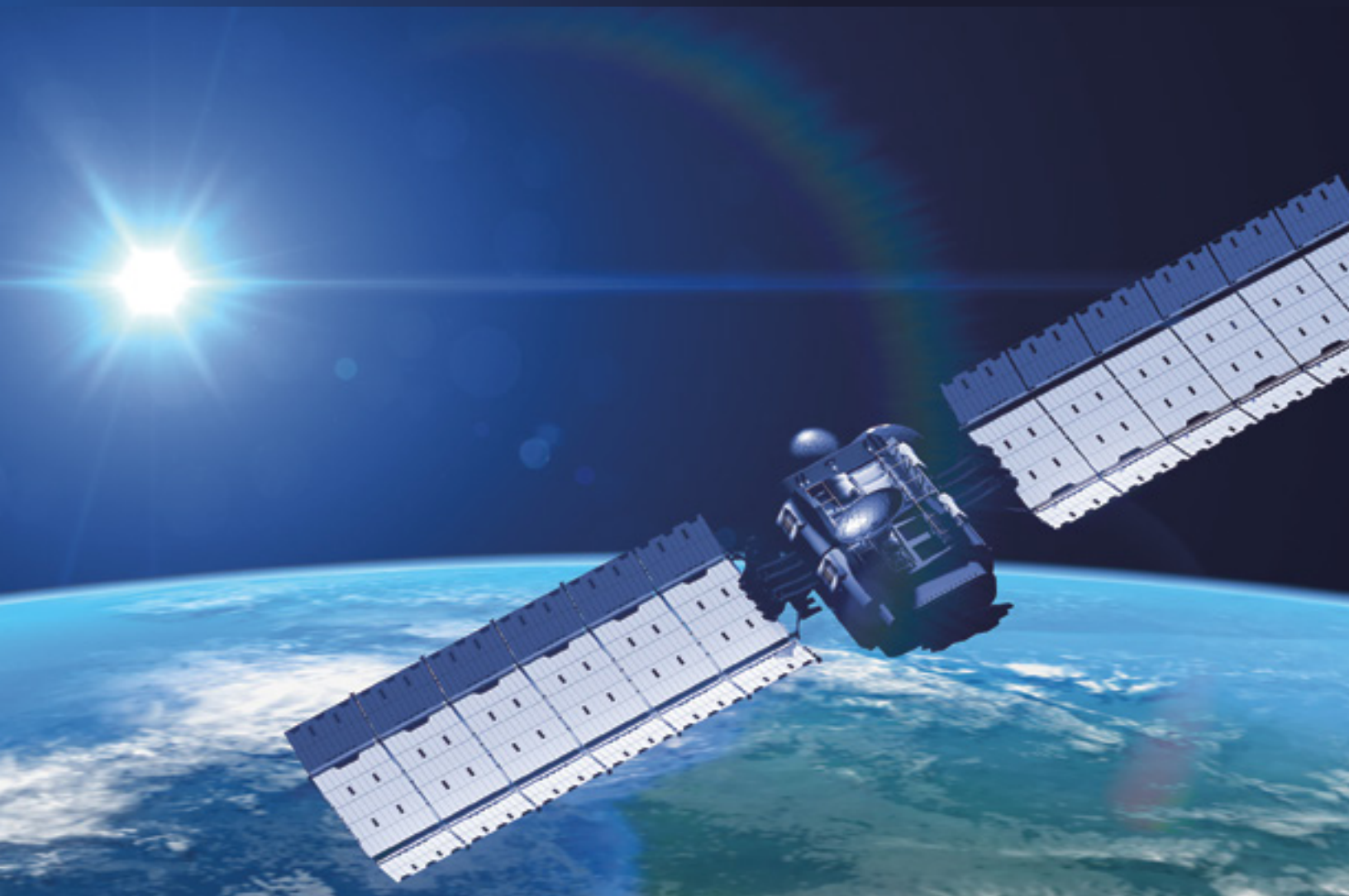
This is dangerous. For brevity's sake, I've omitted more than I've included. I apologize in advance if I've missed something and invite you to email to me any other accomplishments that should have made this list; if I hear back from enough of you, an additional list of your favorite 2013 moments in the January 2014 edition of the Space Foundation's Space Watch newsletter will be published.

With those caveats in mind, here's my list of the accomplishments we saw in the year gone by that make the global space industry the most amazing industry in the world:

January 27: The IGS radar satellite 4, and IGS optical satellite 5V are successfully launched, by Mitsubishi Heavy Industries, on an H-IIA rocket, from the Tanegashima launch complex.

January 30: The TDRS-K satellite is successfully launched, by United Launch Alliance, on an Atlas V-401 rocket, from Cape Canaveral.

February 6: Six Globalstar second-generation satellites are successfully launched, by Arianespace, on a commercial Soyuz rocket, from Kourou spaceport.



The launch of the AEHF-3 satellite via a United Launch Alliance Atlas V 531. Photo courtesy of ULA.

February 7: The Amazonas 3 and Azerspace/Africasat-1a satellites are successfully launched, by Arianespace, on an Ariane 5-ECA rocket, from Kourou spaceport.

February 11: The Landsat Data Continuity mission is successfully launched, by United Launch Alliance, for NASA, on an Atlas V-401 rocket, from Vandenberg AFB.

February 27: Inspiration Mars Foundation, led by Dennis Tito—the world's first private, commercial astronaut—announced plans to work toward launching a man and woman on a round trip to Mars in 2018.

March 1: A Falcon 9 rocket and Dragon spacecraft are successfully launched, by SpaceX, on a NASA Commercial Resupply Services mission to the International Space Station, from Kennedy Space Center. It is the fifth successful Falcon 9 launch, and the second official cargo resupply mission to the ISS for SpaceX.

March 19: SBIRS GEO-2 is successfully launched, by United Launch Alliance, for the U.S. Air Force, on an Atlas V-401 rocket, from Cape Canaveral.

April 5: The James Webb Telescope wings arrive for testing at Marshall Space Flight Center.

April 21: First launch of the Antares rocket. Orbital Sciences Corporation successfully conducts the first launch of its Antares rocket from Pad-OA of the Mid-Atlantic Regional Spaceport.

April 29: Virgin Galactic's SpaceShipTwo successfully completes its first powered flight test, reaching 55,000 feet on thrust provided by a Sierra Nevada Corporation hybrid rocket engine, from the Mojave spaceport.

May 7: The Proba-V, VNREDSat-1 and ESTCube-1 satellites are successfully launched, by Arianespace, on a Vega rocket, from Kourou spaceport.

May 15: GPS IIF-4 is successfully launched, for the U.S. Air Force, by United Launch Alliance, on an Atlas 5-401 rocket, from Cape Canaveral.

May 24: WGS-5 is successfully launched, for the U.S. Air Force, by United Launch Alliance, on a Delta IV-362 rocket, from Cape Canaveral.

May 28: International Space Station Expedition 37 is successfully launched, by Roskosmos, on a Soyuz-FG rocket, from the Baikonur Cosmodrome. (Crew: Fyodor Yurchikhin, Karen Nyberg, Luca Parmitano)

June 5: The Automated Transfer Vehicle "Albert Einstein" is successfully launched, to the International Space Station, by Arianespace, for ESA, on an Ariane 5-ES rocket, from the Kourou spaceport.

June 11: Shenzhou 10, China's second manned spaceflight to the Taingong-1 space lab is successfully launched, by the China Manned Spaceflight Agency, on a Long March 2F rocket, from the Jiuquan space launch complex. (Crew: Nie Haishen, Zhang Xiaoguang, Wang Yaping)

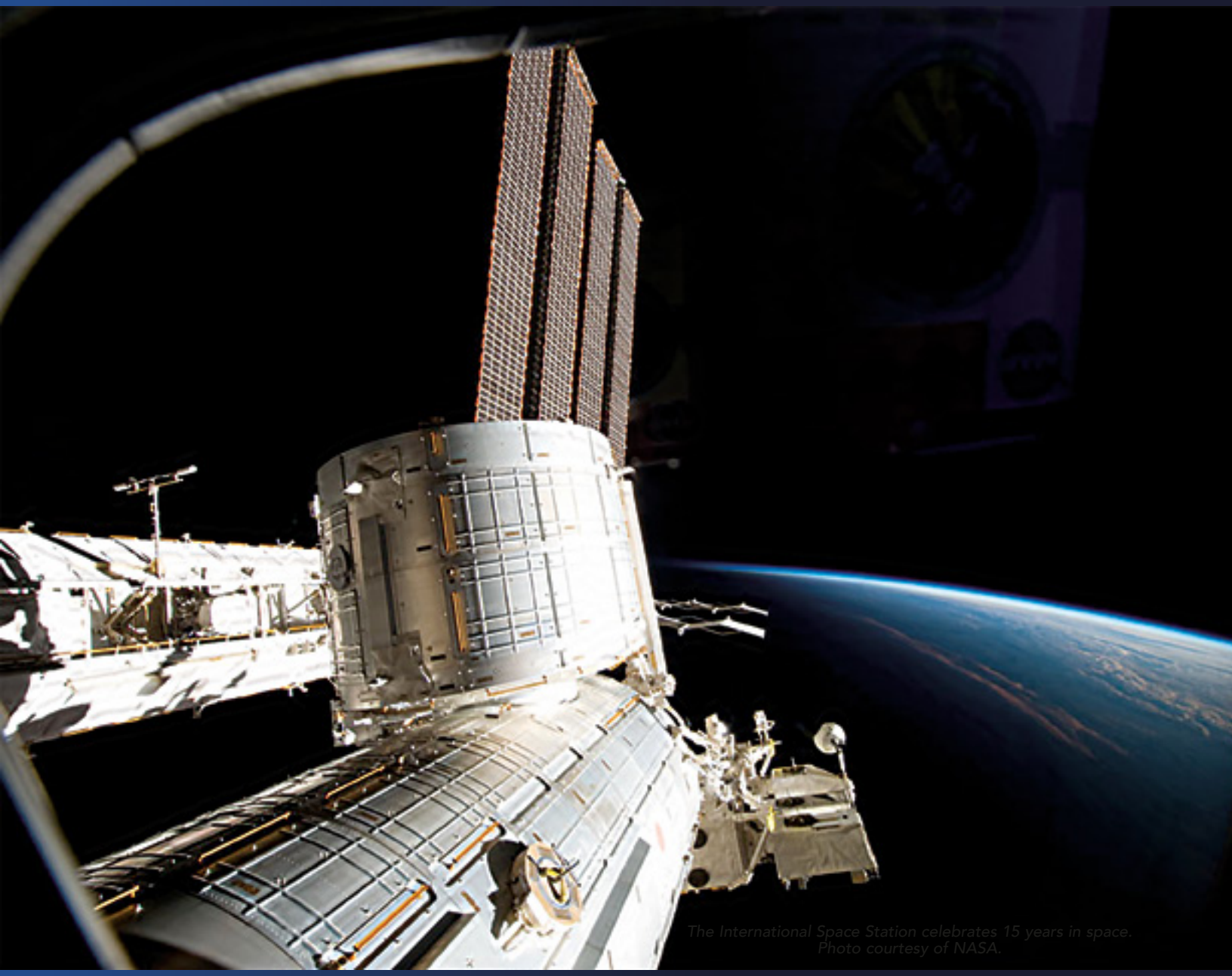
June 14: The Grasshopper experimental rocket makes its highest launch-and-land flight to date, in a SpaceX test flight, from McGregor, Texas. Also on June 14: NASA successfully tests the J2-X rocket engine, an important part of the Space Launch System, at test stand A-1 at Stennis Space Center.

June 25: Four O3b network satellites are successfully launched, by Arianespace, on a commercial Soyuz rocket, from the Kourou spaceport.

June 28: The Stargazer solar astronomy telescope is successfully launched, by Orbital Sciences, for NASA, on a Pegasus-XL launch vehicle.

July 19: MUOS-2 is successfully launched, for the U.S. Navy, by United Launch Alliance, on an Atlas 5, from Cape Canaveral.

July 25: The Alphasat and INSAT-3D satellites are successfully launched, by Arianespace, on an Ariane 5-ECA rocket, from the Kourou spaceport.



The International Space Station celebrates 15 years in space. Photo courtesy of NASA.

August 3: The HTV-4 logistics module is successfully launched, to the International Space Station, on an H-IIB 304 rocket, by Mitsubishi Heavy Industries, from the Tanegashima launch complex.

August 7: WGS-6 is successfully launched, for the U.S. Air Force by United Launch Alliance, from Cape Canaveral, on a Delta IV rocket.

August 19: NASA astronauts successfully demonstrate the communications, ergonomics and crew-interface technologies of the Boeing CTS-100 commercial crew capsule.

August 22: Sierra Nevada Corp.'s DreamChaser test spacecraft successfully completes captive-carry testing at NASA's Dryden Flight Research Center.

August 28: NASA's 2013 astronaut candidate class begins wilderness training as the first phase of their extensive training program that will lead to becoming full-fledged astronauts. Also on August 28: The NROL-65 satellite is successfully launched, by United Launch Alliance on a Delta IV Heavy rocket from Vandenberg AFB.

August 29: The Eutelsat 25B and GSAT-7 satellites are successfully launched, by Arianespace, on an Ariane 5-ECA rocket, from Kourou spaceport.

September 5: Virgin Galactic's SpaceShipTwo successfully completes another key powered flight test, reaching 69,000 feet on thrust provided by a Sierra Nevada Corp hybrid rocket engine, from the Mojave spaceport.

September 6: The lunar exploration orbiter LADEE was successfully launched, for NASA, by Orbital Sciences Corporation, on a Minotaur V rocket on its maiden flight, from the Mid-Atlantic Regional Spaceport.

September 14: The Hisaki space telescope was successfully launched, by JAXA, on an Epsilon rocket making its maiden flight, from the Uchinoura spaceport.

September 18: AEHF-3 launched. United Launch Alliance marks a major milestone with its 75th consecutive successful launch as an Atlas 5-531 orbits the AEHF-3 satellite for the U.S. Air Force. Also September 18: The Cygnus 1 logistics module is successfully launched, to the International Space Station, its maiden flight, by Orbital Sciences Corporation, on an Antares 110 rocket, from the Mid-Atlantic Regional Spaceport.

September 20: Northrop Grumman announces that the manufacturing of all template layers for NASA's James Webb Space Telescope sunshield is complete.

September 25: A Soyuz capsule is successfully launched, to the International Space Station, carrying Expedition 38 crew, by Roskosmos, on a Soyuz-FG rocket, from the Baikonur Cosmodrome. (Crew: Oleg Kotov, Sergey Ryazansky, Michael Hopkins)

September 29: An upgraded Falcon 9 rocket is successfully test-launched, by SpaceX, from Vandenberg AFB. On board is the Cassiope spacecraft, launched for MDA of Canada.

October 26: The DreamChaser spacecraft test flight vehicle makes its first free flight tests at Edwards AFB. Built by Sierra Nevada Corporation as part of the NASA commercial crew initiative, the test spacecraft meets all in-flight test objectives, but suffers minor damage when a landing gear fails to deploy properly on landing.

October 28: NASA's first-ever deep space craft, Orion, being built by Lockheed Martin, powered on for the first time, marking a major milestone in the final year of preparations for flight.

November 5: The Mars Orbiter Mission is successfully launched, by the Indian Space Research Organization, on a PSLV-XL rocket, from the Satish Dhawan space launch facility—marking India's first interplanetary space exploration mission.

November 7: A Soyuz capsule is successfully launched, to the International Space Station, carrying Expedition 39 crew, by Roskosmos, on a Soyuz-FG rocket, from Baikonur Cosmodrome. The crew carries a replica of the Olympic Torch, highlighting the 2014 Winter Olympics to be held in Sochi, Russia. (Crew: Koichi Wakata, Richard Mastracchio, Mikhail Tyurin)

November 18: A United Launch Alliance Atlas 5 rocket flawlessly launches the NASA MAVEN spacecraft toward an orbital rendezvous with Mars. Once there, MAVEN will study the Martian atmosphere in hopes of understanding what happened to water and water vapor on the Red Planet.

November 19: The U.S. Air Force Test Program Satellite 3 and 28 cubesats on an integrated payload stack were successfully launched, by Orbital Sciences Corporation, on a Minotaur I rocket, from the Mid-Atlantic Regional Spaceport, for the Air Force Operationally Responsive Space organization, the Air Force Space and Missile Systems Center Space Test Program, and the NASA Educational Launch of Nanosatellites program.

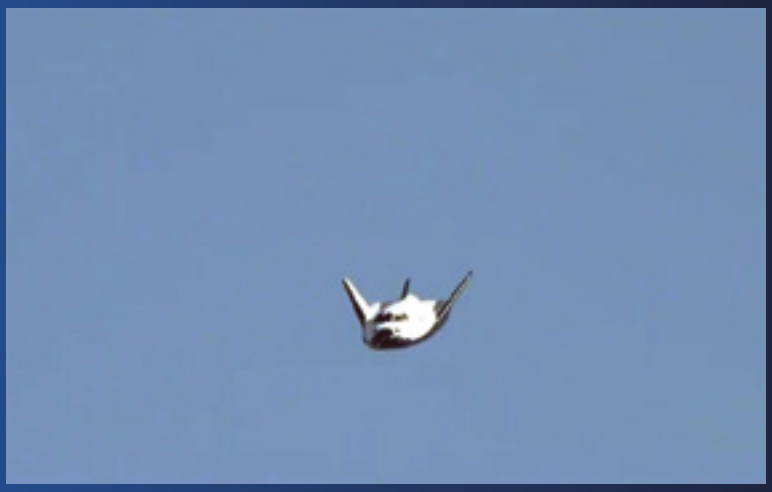
November 20: The International Space Station celebrates 15 years in space.

November 21: Breaking the record set just the day before, for number of satellites launched atop a single launch vehicle, a Dnepr rocket lofted from the Dombarovsky missile base near Yasny, Russia, orbited 29 tiny Cubesat spacecraft. Moscow-based Kosmotras, a joint Russian-Ukrainian commercial space company, orbited the satellites for a diverse range of customers from Dubai, South Korea, the United Arab Emirates, the U.S., Italy and Peru.

Of course, these are just the easy-to-pinpoint highlights, and, as noted above, I've just focused on Space Foundation partner organizations. Even at that, I've just skimmed the surface.

Let's not forget that the Curiosity Rover has been trundling all over Mars for all of 2013, poking, prodding, drilling and analyzing the red planet. We've had stunning announcements on the discovery of as many as 10 to 20 billion Earth-like planets in our Milky Way Galaxy.

China, Japan and Russia launched dozens of commercial and scientific satellites in 2013. Science on the ISS continues unabated. Terrestrial applications for space-derived data continue to explode. The commercial space sector, especially satellite products and services and attendant infrastructure, continues to build momentum like some massive wave.



A photo from the following helicopter of the Dream Chaser spaceplane starting its glide to the runway at Edwards Air Force Base, California, during first free flight landing test on October 26, 2013.
Photo courtesy of Sierra Nevada Corporation.

The astronomy community is also quietly surging ahead, with major developments in 2013 for the Advanced Technology Solar Telescope project (Haleakala), the European Extremely Large Telescope (Cerro Armazones) and the Thirty Meter Telescope (Maua Kea).

This is not to say that the industry has been without its challenges and failures in 2013. Anyone in this business can tell you that it remains a complex, difficult, unforgiving and continuously challenging way to make a living:

A Rokot/Briz launch January 15 from the Plesetsk spaceport suffered the loss of one of three communications satellites that were being launched.

On February 1, a Sea Launch LLC attempt suffered a failure just seconds into its mission from the Odyssey platform, putting Intelsat 27 into a subsurface orbit of the Pacific Ocean.

A Roskosmos launch failure, featuring a Proton-M flying out of the Baikonur Cosmodrome, resulted in the loss of three navigation satellites.

Nor was it a good year for suborbital launches, with a half-dozen small rocket failures from various launch sites around the planet.

By our very nature, most of the people in the space community are problem solvers. We will do the analyses, do the math and figure out how to get something done—no matter how difficult it is to do. And so, we spend a lot of our time fixated on our problems and challenges, and probably not enough of our time in celebrating our accomplishments and success.

The View From Here is that, despite the extremely challenging environment that we confront, our accomplishments continue to far outweigh our disappointments—and ours is still the most amazing industry in the world.

Wishing you happy holidays, and a fantastically successful and prosperous 2014.

For further information regarding Space Foundation, their website is:
http://www.spacefoundation.org/

***Editor's note**: Our thanks to Elliot and Space Foundation for allowing MilsatMagazine to republish his "View From Here" from the organization's Space Watch newsletter, December 2013 edition.*

About the author

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 their 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 chairman of the Hawaii Aerospace Advisory Committee, 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.

THE CHALLENGES OF NORTH POLE COMMUNICATIONS

By Michael Mantz, EPS CAPS Program Manager, Northrop Grumman Information Systems

When one thinks of the North Pole, it's probably not about how our military forces communicate in that frigid region of the world. Thankfully, there are plenty of people that do think about these challenges every day and they work on a program called EPS.

Whether it's via emails, instant messaging, or secure media and data communications, all in order to support our national security objectives, our military forces need to communicate in this remote region, which is out of view to traditional MILSATCOM assets.

What Is EPS?

EPS is the next-generation SATCOM system that will replace the current Interim Polar System (IPS) and serve as a polar adjunct to the Advanced EHF system, which will provide communications for the National Command Authority (NCA), military

tactical and strategic forces, and other user communities. EPS will provide continuous coverage to terminals operating in the polar region and support secure, jam-resistant, strategic and tactical communications between forces operating above 65 degrees north latitude (defined as the Polar Field of View or PFOV) and mid-latitude users.

EPS consists of the following segments:

- EPS Payload Segment
- EPS Terminal Segment
- EPS Control and Planning Segment (CAPS)
- EPS Gateway Segment

Northrop Grumman's Role

Northrop Grumman is the prime contractor for the EPS payloads and the CAPS program and has delivered both EPS payloads that will be hosted on government satellites. EPS takes advantage of technologies Northrop Grumman developed for Advanced EHF satellite payloads, such as the eXtended Data Rate waveform. This approach allows the payloads to be developed at a fraction of the time and cost. Mission success for EPS is greatly enhanced by the government's leveraging of Northrop Grumman's AEHF payload designs, processes, facilities and people.

EPS CAPS is being developed using a combination of proven processes, experienced staff and software reuse from its heritage customer base and products originally developed to support Wideband Global SATCOM. The team has since completed its segment preliminary design review, supported the EPS Program Office's system preliminary design review, and is in the midst of preparing for a critical design review in the spring of 2014.

Critical Communication Within The Program

As one can imagine—with the challenges of sequestration and ongoing federal budget uncertainties—the environment is tough for a future system to make methodical progress. We have learned that close and frequent communication with our customer in this environment is essential to program success. Northrop Grumman is extremely fortunate to have a customer focused on the program's bottom line budget and schedule, while delivering a system that meets user needs. There is no room or time for requirements creep. Our team continues to have very frank discussions on CAPS program status, ensuring that we remain on cost and schedule.

Although the mix of reuse and new software, driven by Northrop Grumman's low risk development approach, was desired by the customer, the other primary guiding principle was designing for the future, e.g., the early application of Modular Open Systems Approach (MOSA) principles so that the architecture can tolerate change in mission capability as well as technology without significant impacts to cost and schedule.

Innovation Through Design

EPS CAPS is using a design methodology that is quite mature in the airplane segment of the company, but relatively new to the Department of Defense's space side of the business. Model driven engineering (MDE) embraces a top-down, hierarchical breakdown of the systems with many different viewpoints (operational, system, behavioral). MDE bridges the traditional systems engineering process and the software design approach and provides traceability between the user mission threads, system functions, and the software modules that implement the functions.

This tight linking of the operational requirements of the system to the system design minimizes risk to operational suitability. Deploying this "novel" approach to design work also requires a close alignment with the customer as they become familiar with the approach and oversight.

Shortly after our preliminary design review/software architecture review, Northrop Grumman assisted the EPS program office at Los Angeles Air Force Base with their overall system preliminary design review. The system preliminary design review concentrated on ensuring all EPS requirements have been allocated across all three segments. Plans were also reviewed for software development, test and evaluation, specialty engineering analysis, plans for verification and validation, as well as program risk updates.

Also provided were inputs on our overall software architecture and schedule plans. A great job was accomplished with their operational customers as to how each segment of EPS—space, ground, gateways, and terminals—meets their requirements and will all fit together in time for the initial operating capability in 2018.

As CAPS is based on software reuse and other existing products, the real program challenges are proving the usability of those components and then integrating them. We are doing that through risk reduction activities and early confident testing.

Our biggest challenge preparing for the CAPS critical design review (CDR) in April of 2014 is to prove that the overall design and software architecture effectively integrates our new and reused code and satisfies the requirement for the payload control and mission planning. This demonstrates the completeness and effectiveness of the design. The current schedule confidence and risk posture support potential early deliveries.

The idea behind these processes and architectural approaches is to develop a foundation for future ground systems that is tailorable to future mission requirements. CAPS is built on Cornerstone and other reuse products from multiple programs of record. This provides an affordable, expandable baseline applicable to new missions and needs. This architecture is underpinned by our MDE and MOSA-C™ processes.

For further company information, please access their website at:
http://www.northropgrumman.com/AboutUs/BusinessSectors/InformationSystems/Pages/default.aspx

About the author
Michael Mantz is the program manager for EPS CAPS. He has been working with Northrop Grumman for seven years in various capacities from business development to program management. Prior working at Northrop Grumman, he worked for the Air Force for 27 years in space acquisition and operations. Michael graduated with a BS in Electrical Engineering from the United States Air Force Academy in 1976 and with an MS in Aeronautical and Astronautical Engineering from Massachusetts Institute of Technology in 1981. He has attended multiple Air Force and Northrop Grumman Corporation executive management development courses and schools.

Artistic rendition of an AEHF satellite for MILSATCOM.

MAINTAINING + TAKING SPACE SITUATIONAL AWARENESS TO THE NEXT LEVEL

By Colonel Mark A. Baird, U.S.A.F.

Without question, the United States has become increasingly reliant on space. Both economically and militarily, our dependence on space assets is undeniable. Orbiting satellites provide myriad services that we have become dependent on, such as precise position, navigation, and timing (PNT); communications; weather data; missile warning; and intelligence, surveillance, and reconnaissance (ISR).

These functions have served not only as the lifeblood of the global economy over the last decade but also as key enablers in conducting the global war on terror. As the strategic focus shifts to the Pacific region, our reliance on space assets will become even more important, and preserving US space capabilities will prove critical to ensuring America's military dominance in any future conflict.[1]

After the Cold War, space became a sanctuary for the United States, which enjoyed almost complete freedom to operate within its vast realm. That situation is certainly changing, however, as many new players enter the space arena and as China begins to emerge as a near peer in space. With China integrating its military and civilian space endeavors and Russia investing in a revival of its space capabilities, both countries present challenges for the United States that we must address.[2]

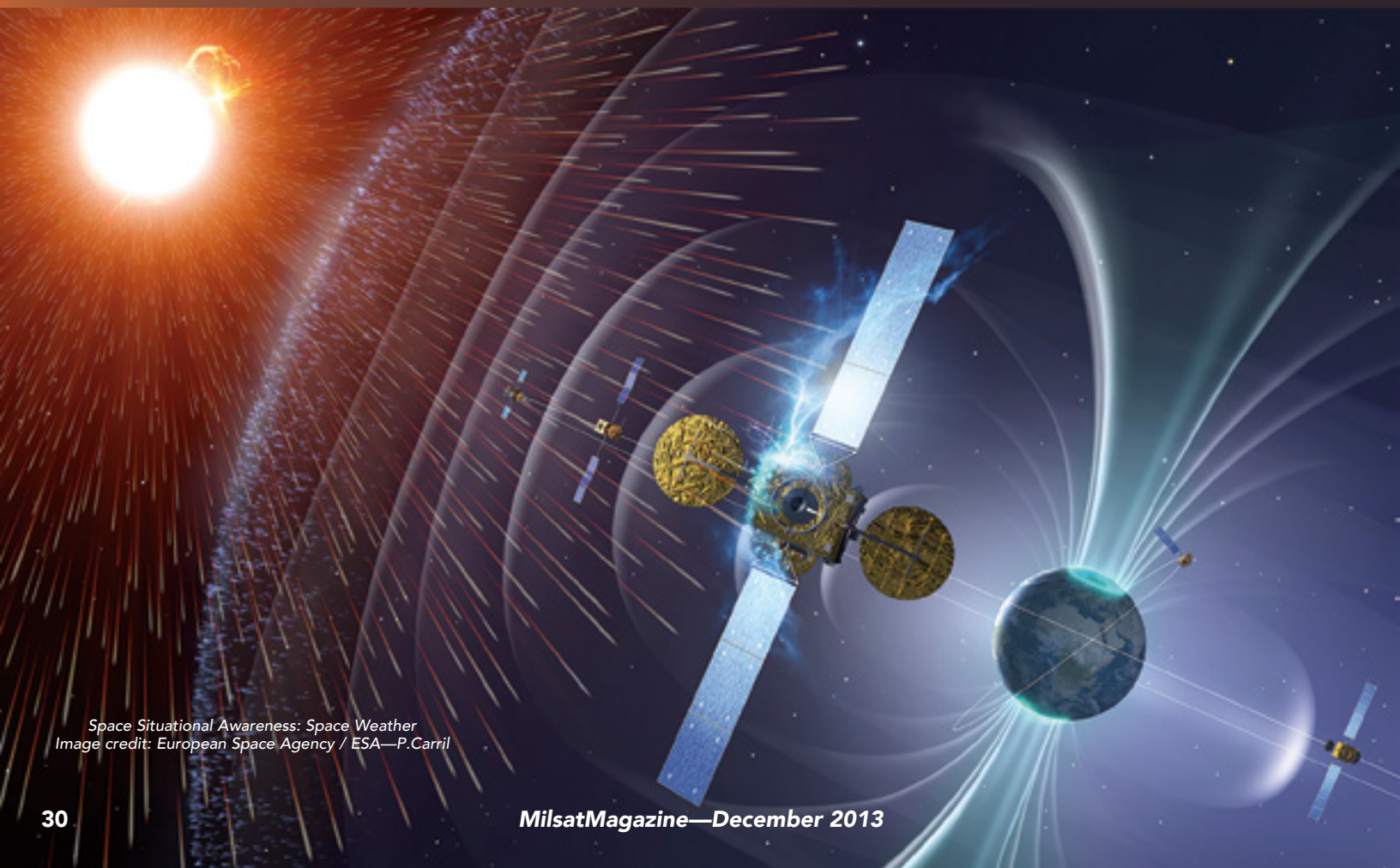
Although Iran and North Korea have less mature space programs, their continued intercontinental ballistic missile (ICBM) development efforts and attempts to launch satellites indicate a desire to establish a larger presence in space.[3] In addition to developing space-based communications platforms, PNT, and ISR systems, Russia, North Korea, and Iran are working to acquire systems that would effectively deny the U.S. military's use of space by jamming Global Positioning System (GPS) satellites and other key communications links.[4]

Imagine a conflict in today's high-tech warfare environment without the ability to drop GPS-guided munitions, offer persistent ISR coverage via remotely piloted vehicles over the battlefield, or detect the launch of a Scud missile. How would a conflict change if weather information over the battlefield were not available or if we had neither strategic communications nor missile warning during a hostile ICBM launch? It is vital that we preserve space-based capabilities critical to the projection of both air power and sea-based power in the contested and congested space environment projected by the latest national threat assessment.[5]

If we wish to maintain our superiority in space, we must first have a clear picture of the environment around our space assets and be able to detect any change or potential threat—in other words, we need space situational awareness (SSA). Historically, our efforts to protect US space-based capabilities have relied upon SSA focused on spaceflight safety, a mission that entails the creation and maintenance of a catalog of orbiting satellites, spent rocket bodies, and other debris used to predict and avoid potential collisions in space.

This critical mission reduces the risk to our satellite launches and protects orbiting space assets (both manned and unmanned), all in an attempt to avoid a conjunction between orbiting objects. In addition to destroying the hit satellite (resulting in loss of mission and the significant investment to deploy it), a collision in space—which can occur at speeds up to 17,000 miles per hour—has the potential to produce a large debris field and render an orbit regime unusable. Even though spaceflight safety is vitally important, an SSA concept of operations focused solely on collision avoidance does not do enough to combat the increasingly contentious environment, which includes anti-satellite (ASAT) weapons, communications jammers, and sensor dazzlers.[6] The sobering bottom line is that the SSA concept of operations we have relied upon for decades can no longer sufficiently protect our crown jewels in space.[7]

This article stresses the necessity of maintaining robust SSA, arguing that, to do so, we must pivot from the traditional SSA that emphasizes catalog maintenance to a more tactical, predictive, and intelligence-driven SSA directed by an integrated Battle Management Command, Control, and Communications (BMC3) infrastructure. We must build a new space superiority enterprise



Space Situational Awareness: Space Weather
Image credit: European Space Agency / ESA—P.Carril

around SSA sensors that utilize common data models to support rapid tasking, processing, exploitation, and dissemination across multiple classification levels. It must incorporate tactical intelligence to ensure timely characterization and identification of threats and include a robust set of executable space-control BMC3 courses of action that, given enough warning, we could use to mitigate a threat.

Space Race Revisited

1950s–1970s: The Dawn Of Space

From the earliest days of armed conflict, military forces have endeavored to occupy the high ground of the battlefield, whether a hill, a mountain, the air, or space. Possessing the high ground has always given a military force the advantage over its adversary, regardless of the technologies or strategies of the time. With the advent of the airplane at the beginning of the twentieth century, air became the new high ground and air superiority the rallying cry.

Since the mid-to-late 1950s, technology has advanced to the point where space has become the ultimate high ground. As the Cold War ramped up, the American and Soviet militaries—building upon technologies originally developed to deliver ICBM-carried nuclear weaponry— launched both communications and spy satellites at the same time they built stove-piped command and control (C2) systems.[8] Space was an enabler at this point; weather satellites, communications relays, and the earliest spy satellites did not gain further significant utility until the Vietnam War.

1970s–1990: Buildup of Contested Space

During the height of the Cold War, both the United States and USSR developed and tested several ASAT weapons in an effort to gain the ability to hold adversary space assets at risk—to control space. The Soviet Union worked on a co-orbital satellite destroyer or "Istrebitel Sputnikov" throughout much of the cold war.[9] One of the most well known ASAT tests involved the direct-ascent ASAT destruction of an experimental satellite nearing the end of its operational life (the Solwind P78-1) by a US Air Force ASM-135 missile launched from a specially modified F-15 on 13 September 1985. The fighter launched the ASAT missile from a location 200 miles west of Vandenberg AFB, California, to its target 345 miles above in low Earth orbit. The 30-pound miniature homing vehicle successfully destroyed the 2,000-pound satellite, producing minimal debris, thanks to its relatively small size and low orbit. The remaining pieces of the satellite then burned up as they reentered the atmosphere. This would be the last ASAT test conducted for another two decades.[10]

1990s–2007: America's Growing Dependence on Space

> *Our experience in Desert Storm was a watershed for space power. . . . Space is now so integral to joint and combined military operations that were we to remove space assets from our military arsenal . . . we would be relegated to employing warfighting tactics much like those of World War II. —General Charles A. Horner, USAF, Retired*

The United States conducted a massive integration of space into the American way of war during the decade between the 1991 Gulf War and the wars in Afghanistan and Iraq of 2001 and 2003, respectively. During Operation Desert Storm, which some have called the first "space war," the breadth and scale of the utilization of space had increased significantly since the Vietnam War, both militarily and commercially.[11]

The Blue Space Order of Battle (assets used in the execution of the operation plan) included 51 military and 12 commercial satellites.[12] Every space mission played a part in Desert Storm (which, by all accounts, involved the greatest deployment of satellite ground stations and pieces of user equipment in history), with each providing a significant edge to the war fighter on the ground.

Even so, we had not yet fully integrated space into our concept of operations—we did not yet have GPS-guided precision munitions, robust satellite communication devices, and tactical ISR at the forward edge of the battlespace. Yet, our forces understood the edge that space systems could provide. A good example is the emergency procurement of early commercial GPS receivers, which were "duct-taped" into helicopters to aid in navigation. Just a decade later in Operations Enduring Freedom and Iraqi Freedom, we used B-52s for close air support missions called in via satellite communications by special operations troops on horseback using laser range finders integrated with the ubiquitous GPS receivers to direct munitions to a precise "danger close" point[13].

The Importance of Space Control

Admiral Alfred Thayer Mahan, one of America's foremost naval strategists, viewed Earth's oceans as a medium for force projection and commerce, which, when controlled by the appropriate strategies, policies, and doctrine, could provide a nation an advantage in economic and military terms.[14] In a similar vein, our nation's growing use of and dependence on space necessitated the development of effective policies and doctrine, as well as the tools and resources to ensure our effective and proper use of space.

Taking it a step further, Admiral Mahan advocated the principle of "sea control" for the unfettered use of the oceans for a nation's purposes, an idea that directly translates to the concept of "space control." To gain superiority in space, the space control mission needed to address not only the surveillance of space but also the protection of US and friendly space systems used for battle management, communications, and intelligence, and the prevention of an adversary's ability to use space systems and services for purposes hostile to US national security interests. In 1979 the Space Defense Operations Center (SPADOC, later the Space Control Center) was established at Cheyenne Mountain, Colorado, to command and control the space surveillance network, followed by the establishment of Air Force Space Command in 1982 and the unified US Space Command in 1985. For the first time, space was viewed as a theater of operations, and many of the space control systems we are dependent on today had their genesis during those years.[15]

Soon after the first "space war" and with the demise of the Soviet Union, Russia bowed out of the space race, and the United States effectively ceased major upgrades to its space control enterprise. The SPADOC at Cheyenne Mountain received only a few minor upgrades in the years after Desert Storm. The SPADOC computer system, which still operates, will remain in its current state until a modernized replacement— the Joint Space Operations Center (JSpOC) Mission System (JMS)—comes online in 2016.

In the years after Desert Storm, America's reliance on space-based platforms became an ingrained part of our military through the use of precision-guided munitions as well as ship and aircraft navigation. We repurposed satellites originally designed for more basic objectives as global communications relays for commanding remotely piloted vehicles or platforms that relayed ISR data to the war fighter in the air, on the ground, and at sea. This dependence also permeated our civil culture, with space applications becoming part of the shipping, banking, agriculture, and entertainment industries. The loss of GPS alone would have an impact of more than $96 billion per year.[16] The satellite industry flourished as the world found new ways to use space systems— both on the military front and in the commercial sector. Faced with few challenges to our superiority in space, we rested on our laurels and enjoyed the unimpeded benefits of a burgeoning space industry.

2007–Present: Space Control at a Crossroads

On 11 January 2007, China changed the status quo in space warfare by firing an SC-19 direct-ascent ASAT missile at its own weather satellite— the Fengyun-1C.[17] The kinetic-kill vehicle, a modified version of China's DF-21 medium-range ballistic missile, and launcher system engaged the satellite at a closing velocity of approximately 17,000 miles per hour at an altitude of 537 miles—200 miles higher than the US ASAT test in 1985.

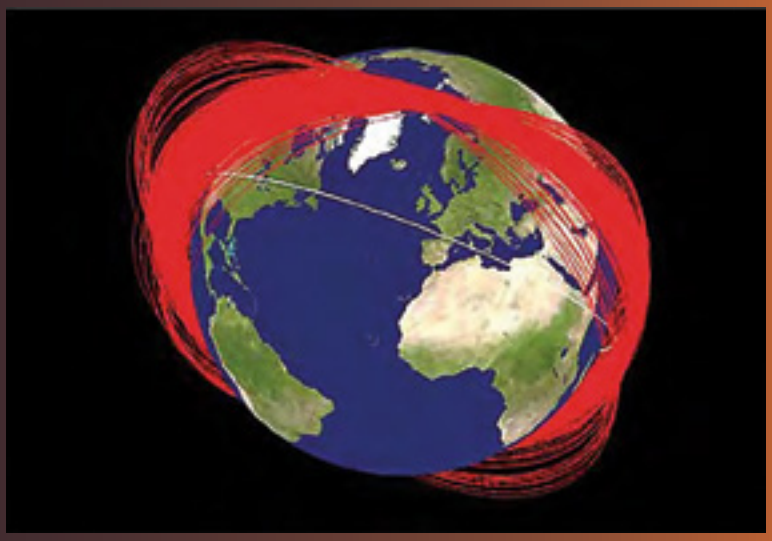


Figure 1. Representation of debris from the Fengyun-1C Chinese weather satellite. (From National Aeronautics and Space Administration, "United Nations Adopts Space Debris Mitigation Guidelines," Orbital Debris Quarterly News, April 2007, 2, http://orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv11i2.pdf.)

Unlike the results of the 1985 US test, destruction of the refrigerator-sized Fengyun-1C created a sizable debris field—the largest in history. With that one test, the space catalog grew by over 15,000 debris particles trackable by the space surveillance network (SSN) and the JSpOC and hundreds of thousands of debris particles too small to be tracked by the SSN but still large enough to be a safety concern for human space activities in low Earth orbit.[18] ***Figure 1*** below illustrates the extent of the debris field created by destruction of the Fengyun-1C.

The satellite collision between the American Iridium 33 and the Russian Kosmos 2251 communications satellites over Siberia in 2009 was the first publicly confirmed hypervelocity accident between two intact artificial satellites in Earth orbit.[19] NASA estimated that the satellite collision created 1,000 pieces of debris, each larger than 10 centimeters (cm) (four inches). The debris field continued to grow, and by July 2011 the SSN had cataloged more than 2,000

large fragments of debris. NASA determined that the field presented only a low risk to the International Space Station, which was orbiting approximately 430 kilometers (270 miles) below the collision course, and to the next shuttle launch (STS-119), planned for late February 2009.

However, to this day, NASA assesses the potential for a collision with this debris field prior to every space launch. As recently as 22 January 2013, a piece of the Fengyun-1C from the 2007 ASAT test is believed to have hit a Russian experimental Ball Lens in the Space (BLITS) satellite, knocking it out of its useful orbit.[20] In light of America's unquestioned dependence on its space assets, it is absolutely critical to the nation that we gain and maintain SSA—to detect, track, and identify orbiting assets as well as any other threat to our systems and to perform conjunction assessments within a time frame and with sufficient certainty to take action to avoid any threat, whether accidental or intentional.

Space Superiority Enterprise

Current SSA Concept of Operations: Routine Catalog Maintenance

At present, the SSA mission focuses on the ability to view, understand, and predict the physical location of natural and man-made objects in orbit around Earth with the objective of avoiding collisions. The Secure World Foundation reports 450 operational satellites and more than 10,000 pieces of trackable debris at low Earth orbit, 55 operational satellites and over 500 pieces of trackable debris at medium Earth orbit, and 400 operational satellites and in excess of 1,000 pieces of trackable debris at geostationary orbit. The JSpOC has the best orbital tracking network in the world with a catalog of more than 21,000 resident space objects greater than 10 cm in size.[21] However, we must also contend with at least 500,000 bits of debris of 1–10 cm and another several hundred million bits smaller than 1 cm. Moving at orbital velocities of thousands of miles per hour, any of these objects could pose a threat as more manned and unmanned spacecraft are launched and exposed to a debris field growing at an alarming rate. This problem affects the United States and all other spacefaring entities—both government and commercial.

We track the location of satellites and space debris with a collection of radars and telescopes (*see Figure 2*), many of which are quite old and were not built with SSA as a primary mission. Ground radars such as Globus II, Millstone/Haystack, ALTAIR/TRADEX, the Ballistic Missile Early Warning System, the Perimeter Acquisition Vehicle Entry Phased Array Warning System, and the Perimeter Acquisition Radar Attack Characterization System all have a pedigree in missile warning from the days when the SPADOC was located within Cheyenne Mountain.

Figure 2. Space surveillance network (2012) and notional additions

Originally, the US Army built and operated the ALTAIR radar between 1968 and 1970 at the Reagan Test Site on Kwajalein Atoll to simulate Soviet radar capabilities.[22] Over time, it became apparent that radars could be repurposed or dual-purposed for the SSA mission. Much of our current SSA network is built upon cooperative agreements between government entities in order to fully leverage systems that support multiple missions. Several efforts are in progress to expand this cooperation to global partners, including friendly nations and commercial entities, as a means of increasing our efficiency in monitoring the global space environment. One such example, the new S-Band Space Fence, is scheduled to come online in 2017 and will assume a critical role within the SSA network.[23]

In addition to ground radars, optical systems are essential contributors to the SSA mission. The Ground-Based Electro-Optical Deep Space Surveillance (GEODSS) system, which has operational sites in New Mexico, Hawaii, and Diego Garcia, can track objects as small as a basketball more than 20,000 miles away in space.

The GEODSS plays a vital role in tracking space objects, particularly those in deep space. More than 1,200 objects are in deep space in medium Earth orbit, geostationary orbit (GEO), and highly elliptical orbits. At GEO are the vitally important strategic and wideband communications and missile warning satellites.

The Space Surveillance Telescope—an advanced ground-based optical instrument—can search an area in space the size of the United States in seconds and can scan the geostationary orbit belt multiple times per night. It has a field of view three times better than that of the most capable GEODSS, and each night the telescope captures more than 1 terabyte (1 billion bytes) of data. Given this large amount, it is important that we have adequate capabilities on the ground to process and use the information. In the very near future, as new radars and optical sensors come online, the JMS will be the glue that binds the new and legacy capabilities, allowing us to best use the data they provide.

Ground-based radar and optical systems are the workhorses of the SSN for characterizing objects in space, but they are limited by weather, solar blind spots, and their geographical location on Earth. In order to augment these limitations and exploit the ultimate high ground of space, the United States launched the Space Based Space Surveillance System in 2010. The most capable of the SSN sensors, this system provides high capacity and agility, collecting day or night above the weather and improving revisit rates of objects. Ground optical, ground radar, and space optical systems provide a critical contribution to achieving SSA, but each has inherent limitations. Thus, the United States must have all three components in order to gain and maintain robust SSA. Given our dependence on space, it is imperative that we effectively resource and utilize our SSA sensor network to provide the knowledge we need to enable the safe operation of our on-orbit fleet.

Future SSA: Rapid Characterization of Emerging Threats

Because of emerging threats, the SSA mission must move beyond routine catalog maintenance towards a predictive, time-critical BMC3 environment. The Defense Intelligence Agency's national threat assessments to the Senate Armed Services Committee in 2012 and 2013 both cited China's growing, increasingly capable military space efforts.[24]

In its 2013 Annual Report to Congress, which detailed China's military developments, the Office of the Secretary of Defense highlighted that country's "multi-dimensional program to improve its capabilities to limit or prevent the use of space-based assets by adversaries during times of crisis or conflict."[25] From the counterspace perspective, Russia and China continue to develop systems and technologies that can interfere with or disable vital US space-based navigation, communications, and intelligence-collection satellites. North Korea has mounted Soviet-made jamming devices on vehicles near the North-South demarcation line that can disturb GPS signals within a radius of 50–100 kilometers. Reportedly, it is also developing an indigenous GPS jammer with an extended range of more than 100 kilometers. Other state and non-state actors rely on denial and deception techniques to defeat space-based imagery collection, conduct electronic warfare or signal jamming, and possibly attack ground sites for space assets.[26] It is critical that the United States ensure the capability to rapidly understand when and where its space systems are compromised.

Today's Command and Control: Modernizing the Space Defense Operations Center

The JMS program, the cornerstone of the space superiority enterprise, will replace the 1980s-era SPADOC system as the C2 system that focuses on planning and executing US Strategic Command's joint functional component command for the space mission. Unlike other AOC systems, the JSpOC has specialized C2, SSA, and ISR capabilities in support of space control that make inroads into many mission areas.

The JSpOC can be thought of as a combination air traffic control center and AOC but with a span of control extending 22,236 miles outwards into space. For the sake of comparison, an air traffic controller in a tower is responsible for aircraft flying within a 200 nautical mile range of the tower and up to 10,000 feet in altitude—an effective volume of 315,000 cubic miles. Between Earth and the Geostationary Belt, the effective volume of control is 46 trillion cubic miles—about 150 million times as much volume to control! To exacerbate the problem, space offers unique physics limitations, such as a sun-induced blind spot that can render sensitive optics useless for multiple hours per day and vast distances across which electromagnetic waves must travel. Such factors make it difficult to obtain radar returns from which we can glean accurate range measurements and identification of space objects.

To undertake the complex and computationally intensive job of integrating data from our sensor platforms and fusing a useful SSA picture, the current JSpOC operator relies on disparate—in most cases, antiquated—technology platforms such as the SPADOC computer system; Astrodynamics Support Workstation; and Command, Analysis, and Verification of Ephemerides Network (CAVENet).[27] Given the growth in the number of spaceborne objects posing a threat to the space systems upon which we so heavily rely, conducting our SSA mission with these legacy systems is not an acceptable way to move forward.

The JMS will replace the legacy SPADOC and ASW processes and capabilities with a modernized, scalable, extensible, and sustainable platform upon which

to build the SSA mission set that the United States requires for the twenty-first century. To meet the legacy-replacement goal, the JMS program is developing a government service-oriented architecture (SOA) infrastructure that supports the integration of mission applications while acquiring mature, commercially developed government mission applications. Building the JMS on a robust, disciplined SOA platform is essential to making sure that the JSpOC can evolve over time with new functionalities replacing outdated services and revised software applications integrating new operator-defined tactics, techniques, and procedures. Future capabilities required by the JSpOC after 2015 will call for the development of new applications and procedures as well as the exploitation of new SSA data sources. Further, we can assume that operators will find innovative ways of using the system's capabilities not imagined when the system was designed— they always do. JMS must enable the JSpOC to exploit this learning.

This is one of the key objectives for the JMS—better, faster, and extensible data integration with a wider variety of data sources. In contrast to the SPADOC system, we expect the JMS to accept and integrate not only traditional SSN tracking data, including information from US missile-warning radars, but also nontraditional formatted observations and ephemerides from a variety of sources, positional data derived from satellite telemetry, and tracking data from foreign sensors. In many cases, the data will be delivered net-centrically, based on work with the Net-Centric Sensors and Data Sources effort, intended to expose such sources.[28]

Pivoting to Space Battle Management Command, Control, and Communications

The Iridium/Kosmos collision in 2009 and the BLITS conjunction of 2013 remind us that poor SSA is not an option. Moreover, in light of the rising number of spacefaring nations (e.g., China, North Korea, and India), clearly space is becoming more crowded. Because some nations have both stated and demonstrated their intent to attack our dependence on space, we must be able to protect our assets.[29] If America intends to maintain its status as the most capable space nation, then—in the face of growing threats—we must evolve our SSA paradigm to do more than just routine catalog maintenance and monitoring of potential conjunctions. Like its AOC counterpart, the space community needs to develop a BMC3 capability that includes AOC-like analysis, data fusion, and identification of threats.

The routine (peacetime) timelines associated with developing our catalog-maintenance-focused SSA are not sufficient to respond to or even anticipate a would-be adversary's attack in time. Before the joint functional component command for space could start formulating courses of action in response to an on-orbit event—such as a satellite conjunction, debris breakup, or a potential ASAT—decision makers at the satellite operations centers and at the JSpOC would need to develop a timely operational picture of the situation in space. The latter would include all ground assets that can affect objects in space, on sufficient timelines within which to perform observe-orient-decide-act analysis and reach "act" decisions from the appropriate levels in the chain of command—no easy task.

Elements within Air Force Space Command have begun to examine this issue through "kill-chain" analysis—an in-depth examination of technological needs, materiel solutions, procedural changes, ISR requirements, and concepts of operations necessary for a decision maker to execute a course of action that has been planned for, exercised, and refined by space operators. The kill-chain analysis calls for elements of traditional C2; however, now that space is no longer a sanctuary and response timelines are being compressed more than they have been in the history of space control, our C2 must become even more tightly integrated with communications nodes outside the JSpOC—at the National Air and Space Intelligence Center, National Security Agency, National Reconnaissance Operations Center, or any organization with the requisite space control, ISR, or space warfare expertise.

This modern C2—or C3 when merged with communications—is essential for effective crisis management. The convolution of battle management and C3—BMC3—is what the space superiority enterprise needs in this era of contested, congested, and competitive space control. Space BMC3 goes beyond a routine, steady-state picture, creating a tactical monitoring posture for high-interest items that can affect space assets. With timely indications-and-warning systems, the enterprise can tailor its prepared responses to tactical events without sacrificing its global commitments to catalog maintenance (*see Figure 3*).

This new space posture demands much more than upgrades to legacy hardware and software. To enhance current operations, the Space Superiority Systems

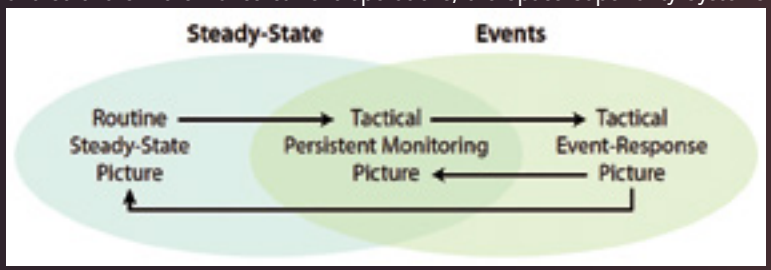


Figure 3. Transitioning the operations tempo of space situational awareness

Directorate has teamed with the JSpOC, US Strategic Command, and other combatant commands in designing and exercising new and evolved tactical scenarios. We use collaborative "scrimmages" to extract and exercise exactly how and which parts of currently operational and prototype systems will support a particular crisis scenario. The exercises make use of test-bed and prototype analyst tools, reducing overall execution risk by buying down technical risk, smoothing out integration schedule risks, providing exercise quality feedback on potential real-world performance for prioritization purposes, and opening up tactical-response problems for an expanded community of research-and-development problem solvers.

Despite these great strides in evolving the space superiority mission to enhance its flexibility to change, we must take care to ensure that currently static tasking processes become flexible and adaptive to rapidly evolving threats. These processes need to account for the integration of nontraditional sensors into the JSpOC SOA and the operator's workspace. Data will be delivered to the JSpOC in various formats and classification levels. The JSpOC SOA platform will interpret and fuse the data, feeding them to space operators and intelligence analysts through a user-defined operating picture at the speed of need—not with the hours or even days of delay with which we currently operate. As the volume of data available to the space operator grows, it becomes more important to rapidly collect, process, and exploit the information, using methods not yet refined.

This capability exists today, but we need to automate it for execution without intervention by the developer or a cadre of engineers. The data will be compatible with various systems through agreed-upon exchange formats and have outputs that can be readily shared among military and civilian operators. Intelligence operators will have to exploit data on the fly through tactical timelines and rapidly disseminate raw intelligence through netcentric means to operators around the world who can interpret information through their user-defined operating picture.

In this new space posture, the roles of some of our existing capabilities will require adjustment. Intelligence assets already play a critical role in characterizing assets in space and focusing indications and warning resources. Although they already lay the groundwork for planning courses of action in space, they are moving into a new role of tactical corroboration and attribution of space events. Take the air world example of foundational intelligence sources discovering information about a potential adversary's new developmental aircraft. The intelligence community would then use its resources and expertise to determine the capabilities and exquisite features of the new threat.

This foundational intelligence collection is critical and long term, but after the aircraft is produced and enters operations, a different type of intelligence is necessary—one that concentrates on rapid and fleeting collection of very sparse data as an adversary actively tries to avoid detection. The ultimate goal of collectors at this point is not high-fidelity pictures but quick fingerprinting (*e.g.*, which of the threats does this match?). We can do this, but we must emphasize timeliness. A plethora of information systems already makes intelligence assets available. We need to integrate these systems seamlessly into a series of tactics, techniques, and procedures that offer decision-quality information on requisite timeliness.

Future Architecture

To maintain space superiority, we must tightly couple BMC3, SSA, and tactical intelligence in an architecture that enables decision makers to select courses of action in hours rather than days. Today's BMC3, SSA, and space-control architectures are loosely coupled, but future architectures must have tighter integration. A number of materiel solutions could be integrated into a space superiority architecture. Sequestration hinders our ability to upgrade current capabilities and match those of would-be adversaries; consequently, we must be creative in designing a space superiority architecture for 2020 and beyond.

Like C2 systems in the air world, space superiority BMC3 systems should evolve by leveraging ISR data within federated SOAs and datamining systems. Advances in modern computing make it possible to sort through terabytes of information from many different sources and process these data into actionable information for decision makers. These data must fit within a common data model for exchange among a variety of computing systems. Delivery of the initial SOA in the first increment of JMS, as well as subsequent improvements in future increments, will facilitate cross-domain developments that will allow the JSpOC to connect with AOCs around the world and share BMC3 data at the speed of need.

Air Force and intelligence community agencies have been moving ISR data-fusion centers away from stove-piped systems (e.g., the distributed common ground/surface system [DCGS] and Global Command and Control System [GCCS]) to federated SOAs such as today's DCGS SOA and the GCCS replacement—Joint Command and Control. Moving to interconnected, federated SOAs allows only a limited opportunity to try out new data-fusion techniques between SOAs.

To address this, the Space Superiority Systems Directorate and the Air Force Research Laboratory are collaborating in building the Action-Centered Rapid Collaborative Application Development Environment (ARCADE) as the key risk-reduction tool for future JSpOC needs. ARCADE will run the most current JSpOC software edition, which will mimic the operational SOA at multiple levels of security and enable commercial developers, other government entities, universities, and so forth, to test and develop applications (using the common data model and software development tool kit) that we could use in future JMS software releases. This collaborative development environment will reduce risk

by allowing new technologies to mature before being inserted into the software integration process and hence into the operational SOA, while still allowing testing in an operationally relevant environment. JSpOC operators will gain insight into the ARCADE, and their feedback on candidate upgrades will be a key input to the Requirements and Planning Council—the requirements-setting body within the JMS enterprise.

Through the ARCADE and council process, future JSpOC operators and acquisition leaders in the Space Superiority Systems Directorate can move BMC3 towards a more seamless integration of space and air ISR, giving decision makers the complete, robust, and timely SSA needed in a contested, congested, and competitive space environment.

Conclusion

To maintain space superiority in the face of a changing environment, the United States must find a way to extend the capabilities of current C2, SSA, and ISR systems while investing in new, more capable, but resilient systems to control an increasingly congested environment. More than 1,000 satellites and hundreds of thousands of pieces of debris orbit Earth within an area of 46 trillion cubic miles (*see Figure 4*). With other nations constantly challenging America's status as the leader of the pack in space superiority, maintaining a robust suite of ground- and space-based sensors from which to gather data to build our SSA picture is a paramount imperative.

Better protection of our national interests in space demands that we pivot away from the current metric-track catalog maintenance / forensic analysis

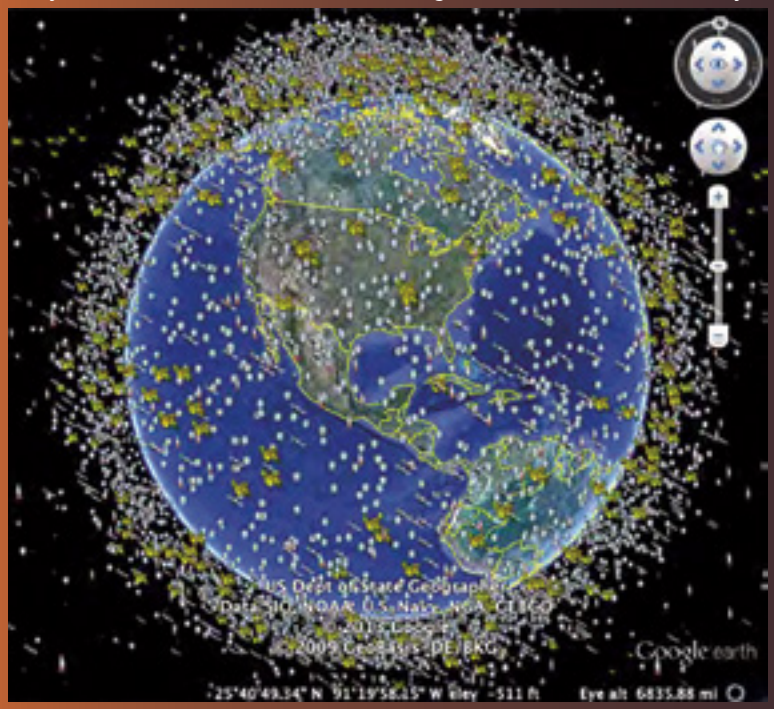


Figure 4. Computer model (not to scale) of man-made debris in low Earth orbit. (From "LEO Images," NASA Orbital Debris Program Office, 2 October 2012, ***http:// orbitaldebris.jsc.nasa.gov/photogallery/beehives.html#leo****.)*

focus towards a seamless integration of SSA, BMC3, and air/space ISR. The key difference is that C2 implies a mind-set based on a stable, uncontested space environment with hours or even days of response time while BMC3 requires a mind-set of enabling near real time decision making in the face of rapidly changing events that affect national security and America's trillion-dollar space investment.

Thanks to more capable sensors and C3 systems, the space battle management center of the future will be better at processing future events, more easily upgraded, and able to seamlessly integrate exponential growth in ground, air, and space ISR. Safeguarding US national security satellites depends upon continued support from the entire space community as we work together to operate and counter attempts by China, Russia, Iran, and North Korea to disrupt, deter, and deny our safe and continued access to space—in peacetime and during conflict.[30]

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Editor's note

Our thanks to the U.S.A.F.'s Air & Space Power Journal (ASPJ) for allowing us to republish Colonel Baird's article from their September-October 2013 issue. For more information regarding the ASPJ's publications, respond to: ***http://www.air power.au.af.mil***

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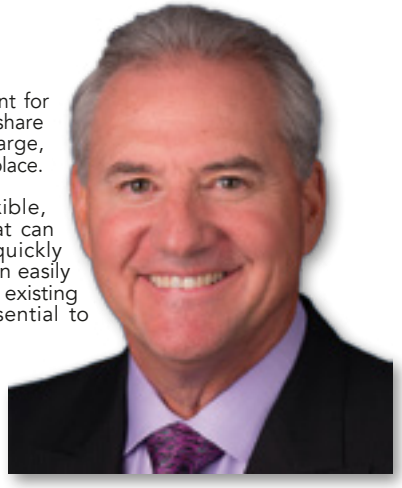


Direct Government Technologies (iGT) came roaring into 2013 as we continued to upgrade the U.S. government to the next generation of satellite technology. We concentrated on four focal points in 2013.

Our first tact carrying over into 2013 is the upgrade of all of the iNFINITI modems in the government networks to Evolution equipment. This current generation of technology substantially increases speed, capability and diversity for critical satellite communications while maintaining a standard interface structure that fits interchangeably into the terminals that are deployed worldwide.

In addition to upgrading the modems, iGT is manufacturing new line cards for our hubs which will enhance network performance while simultaneously adding a FIPS Level 2 TRANSEC capability to meet U.S. DoD standards.

Second, iGT is targeting the airborne market with new SATCOM products. 2013 saw the introduction of the new e8000AR XL a 19-inch 1RU rack-mount airborne modem for roll-on roll-off applications, and the e8000 AE airborne modem based on the ARINC 600 form factor for permanent installation on aircraft.

With the complexity associated with the airborne market, we have developed AIMS, a situational awareness tool for airborne networks that provides a graphical representation of modem and ACU statistics as well as a countdown to when a beam switch will occur. These products have allowed our customers to enhance their current networks with airborne assets.

Third, iGT has undertaken a tenacious effort to develop new technology for our next generation of products, which are due out in late 2014. iGT is currently developing our next generation of modems and line cards that will be compatible with all commercial satellites, the Wideband Global Satellite system (WGS), all of the next generation of HTS satellites currently being launched, as well as the only modem capable of operating within the Inmarsat Global Express Network.

Our next-generation manpack will be less than 20 watts and weigh less than one pound. This manpack will certainly sponsor a paradigm shift in the size, weight and power requirements of portable and mobile military very small aperture terminals. Our next generation rack-mount and airborne products will bring extraordinary speed and software capability to teleports and aircraft around the world and will even reset the exceedingly high iDirect standard that exists today.

The fourth strategy that we employ is one where I am unyielding—superior customer service. I don't think you can ever be satisfied that your interaction and service to your customer is ever good enough. You must constantly drive to assess and improve the manner in which you deliver the support mechanisms to your customers. It's always easy to do the right thing, and we're in this for the long haul. This means iGT wants to be the ruler by which our customers measure all others.

We encountered three big challenges to our business this year. The first was the sequester and the ancillary issues that this caused with our customer base. We are dependent upon the business of the U.S. military and civilian agencies, and the furlough of government employees had a big impact on the timing of our business in 2013. The second challenge, which runs in conjunction with the first, was the government shutdown. The last issue that continues to challenge us is the continuing resolution. We, as well as everyone else, continue to try to understand how this will work for the last quarter of the year and what will be the ramifications in the early months of 2014.

iGT recognizes that an essential element for any military organization is the ability to share information and provide support for large, mobile groups of personnel anytime, anyplace.

Satellite technology provides a flexible, reliable and high-capacity service that can cover a large area. The ability to quickly deploy and manage a network that can easily be scaled without the restrictions of an existing communications infrastructure is essential to military operations.

iGT offers secure, reliable satellite networks that can be deployed on multiple topologies, supporting multiple satellites, including WGS frequency. With built-in AES encryption and TRANSEC, along with STIF compliance and the aforementioned FIPS 140-2, security is paramount. The entire solution is managed using the iVantage Network Management System (NMS), which allows for easy centralized control of the entire network.

iGT offers a highly reliable and extremely scalable satellite network that can be deployed on multiple satellites in C-, X-, Ku-, and Ka-bands and the extended frequency ranges on WGS from a central hub. iGT's broadband capabilities provide the connectivity for all voice, video and data communications and specialized applications, even in the most remote areas.

Industrialized, lightweight and tamper-evident equipment that is easy to carry, maintain and is quickly deployable has been designed specifically for use in field operations.

The iGT solution provides true mobility with spread-spectrum mobile waveform and high-speed COTM features enabling military vehicles, ships or aircrafts broadband connectivity via VSAT antennas.

iGT has, over the past 11 years, been a strong, healthy company that continues to build upon its experience. Our mission is to remain vigilant and continue to be a strong and healthy partner for the U.S. government and to provide our customers with the best satellite network products in the world.

We look forward to another exciting year in 2014 with the introduction of new government-centric products. We'll confront any new challenges that present themselves and, without fail, continue to provide our customers with the exceptional customer service they deserve.

For more information regarding the company, please visit their website:
http://idirectgt.com/

About the author

John Ratigan is the president of iDirect Government Technologies (iGT). He started the federal group for iDirect Technologies in 2003 and then established iGT as a wholly owned subsidiary in 2007. Under his leadership, the group has enjoyed tremendous growth, deploying thousands of terminals in support of Operation Iraqi Freedom and Operation Enduring Freedom, as well as many civilian networks. Ratigan brings more than 20 years of experience in the satellite communications arena.

Prior to joining iGT, Ratigan ran the East Coast operations for both Fairchild Data and EFDATA, and eventually partnered in his own company that helped EFDATA grow from $20 million to $120 million in revenue and up to 700 employees in 2000. EFDATA became the preeminent leader in SCPC satellite technology in the late 1990's and provided the baseline knowledge and expertise that would later benefit his role with iGT and the migration of technology into TDMA. In addition to starting his own company, he held the position of senior vice president of North and South American sales for the start-up, Broadlogic, as companies started to run IP directly over satellite. Ratigan began his career in the United States Senate working for Senator Bill Armstrong (R-Colorado), then joined the legal sales team at the Xerox Corporation. He holds a Bachelor of Science degree in marketing from the University of Maryland.

INMARSAT GOVERNMENT

By Susan Miller, President and Chief Executive Officer

Sequestration forced military and agency leaders into a difficult position for determining which programs are most critical to maintain in light of the 2013 budget cuts.

Even so, continuance in meeting U.S. military, intelligence and civil agencies' space-based communication requirements remained paramount. As selected programs progress, the U.S. government continues to turn to the commercial sector for services, as it moves toward more edge-centered, IP-based connectivity and standard computing platforms, enabling more robust information sharing using mobile devices.

Ensuring a sufficient supply of space capabilities, providing affordable solutions and improving the resiliency of military systems also remained key requirements of the U.S. government in 2013. Continuing Resolution and government furloughs, however, negatively impacted progress, resulting in delayed legacy programs and prohibiting the start of new programs. Military and Intelligence Community planners, as well as commercial service providers, had to wrestle with prioritizing services that would be most critical to their missions, amid shrinking budgets and fewer ground forces at their command.

The U.S. government focused on how it could be more efficient with bandwidth while also increasing throughput globally, specifically to places that have less-than-adequate infrastructure. In 2013, Inmarsat Government, a wholly-owned subsidiary of Inmarsat plc, responsible for Inmarsat's retail U.S. government business, continued to respond with innovative offerings to its U.S. government customers, ensuring they met the critical service requirements for IP-based communication solutions that deliver the needed throughput, speed, network security and seamless coverage.

Solutions such as BGAN Converge met the demands of government L-band BGAN users that could not be achieved by a single BGAN Channel. Inmarsat Government's BGAN Converge solution provides a turnkey alternative to VSAT services. It significantly boosts throughput without compromising the global coverage, reliability, scalability and security characteristics of standard BGAN solutions.

BGAN Converge addressed the government need for cost efficiency because it uses existing equipment and no network overhaul is required. Furthermore, the government's need for increased throughput is met through BGAN Converge since the solution offers data transmit and receive rates of up to 800 Kbps.

Another innovation Inmarsat Government brought to market in 2013 was its L-band Tactical Satellite (L-TAC) solution, which supports robust, low-cost beyond-line-of-sight (BLOS) mobile communications. The service delivers a 'UHF-like' tactical satellite capability for use with existing military radios.

UHF tactical satellite services are in high demand because of its suitability for BLOS push-to-talk networks using tactical radios--either portable or installed in vehicles, helicopters, ships or other mobile platforms.

Military users need to exercise reliable and cost-effective command and control of widely dispersed forces where terrestrial infrastructures are non-existent. Inmarsat Government's global L-TAC service complements the scarce UHF satellite capacity with a single-hop, low-latency voice and data service, providing L-band tactical satellite service when UHF channels are inaccessible or unavailable and without the need to modify existing hardware. Personnel using the L-TAC service benefit from the ability to communicate on the move more effectively due to the smaller omni-directional antennae used at L-band.

Voice over Internet Protocol (VoIP) is proliferating in the DoD and other agencies and is the future cornerstone for government communications. Inmarsat Government has built its scalable infrastructure based on private global Multi-Protocol Label Switched (MPLS) backbone and can provide remote VoIP, as well as video, voice and data reach back communication solutions. This industry expertise makes it possible for its customers to reap the full benefits of VoIP, while being assured that operations are in compliance with the most rigid of security requirements and can be delivered across any technology platform via a secure network.

Looking Ahead:
The Need For Mission-Critical Solutions Remains Paramount

2014 and beyond will bring strategic opportunities to commercial service providers serving the U.S. public sector. A key benefit of the government's use of commercial satellite capacity is the enormous space and ground infrastructure built by the commercial satellite industry, offering government operators worldwide ubiquitous, disaggregated and cost-efficient transmission of voice, video and data.

With continued budget constraints, new innovations will be required to produce robust solutions. The government customer will continue to scrutinize how it uses commercial satellites. For example, the reliance on fixed transponders over a specific location can now be replaced with new Ka-band mobile systems offering higher-density frequency reuse and an ample supply of smaller spot beams.

Ka-band systems also will play a more prominent role in military satellite communications as more systems come online. For the military, Ka-band offers the same throughput capacity as Ku-band but it provides the capability to do that with smaller terminals and with a greater ability to deploy globally and more affordably.

Inmarsat will be ramping up to launch its Global Xpress service, a truly global Ka-band network to deliver secure, end-to-end wideband connectivity for seamless airborne, maritime and land operations worldwide. It will be particularly suited to bandwidth-intensive mobile applications for Airborne Intelligence, Surveillance and Reconnaissance; special operations and expeditionary forces; live full-motion video; intelligence; command and control; and theater backhaul.

Reliance on the commercial sector is not going to decline; rather, the government will examine the ways the commercial sector can help it become more efficient, more effective, more resilient and more reliable with its solutions. Due to its strategic importance in supporting worldwide operations, commercial satellite communications will remain a key component of government and military communication network architectures with mobility and higher bandwidth remaining central to government mission-critical communication needs that global, robust satellite communications provide.

For more information regarding the company, please visit their website:
http://inmarsatgov.com/

About the author

Susan Miller is Inmarsat Government's president and chief executive officer based at the Herndon, Virginia headquarters office. Ms. Miller is responsible for the overall business strategy and direction for Inmarsat Government, a leading provider of secure and reliable mission-critical telecommunications to U.S. military and civilian organizations. Ms. Miller has more than 20 years of senior executive leadership experience across a wide range of technologies that serve the U.S. government and commercial sectors.

Prior to joining Inmarsat Government, Ms. Miller held leadership positions in the satellite and telecommunications industries, including MTN Satellite Communications, where she served as executive vice president for strategy and corporate development; Spacenet Integrated Government Solutions Inc, where she was chief executive officer; and Intelsat General Corporation, where she held the position of president and chairman of the proxy board. Other well-known organizations Miller worked with include LightSquared, Lockheed Martin and Hughes Aircraft Corporation. Ms. Miller holds an MS, Electrical Engineering from the University of Southern California and a BS, Electrical Engineering from the Rensselaer Polytechnic Institute.

INTELSAT GENERAL

By Kay Sears, President and Chief Executive Officer

While federal budget issues and the recent U.S. government shutdown crowded the minds of many in the government-user community, 2013 was a dynamic year for Intelsat General (IGC) and the commercial satellite industry as a whole.

We had a number of business successes and saw real progress by the Department of Defense (DoD) and other agencies to integrate commercial satellite solutions into their future wide-band communications needs.

In 2013, we supported many requirements through the successful CS2 IDIQ segment of the Future COMSATCOM Services Acquisition (FCSA) contract vehicle. These include providing connectivity around the globe to the Asymmetric Warfare Group under By Light Professional IT Services, a small business partner. We are also working with DRS to support two new requirements: The Defense Wide Transmission Systems Comsatcom Network (DCN) supplying capacity across six satellites along with the related ground infrastructure as well as satellite capacity to support SOCOM's worldwide satellite communications network. In addition, we are part of a TCS team that will deliver managed Ku- bandwidth on Intelsat satellites and the associated IntelsatOne℠ teleport and terrestrial services to the U.S. Marine Corps. We look forward to additional opportunities for working closely with our industry partners to come up with the most innovative and efficient solutions for the customer.

Looking at our relationship with the DoD, we certainly want to highlight the exceptional effort put forth by the Air Force's Space and Missile Command (SMC) to help formalize its relationship with its trusted commercial satellite industry partners to bring the warfighter greater efficiency and advanced technology. Just recently, SMC finalized the Hosted Payload Solutions (HoPS) acquisition vehicle. This entailed a collaborative effort with industry, enabling greater understanding of commercial practices so government users can benefit from the efficiency that commercial satellites offer for the variety of payloads needing to reach space as quickly as possible.

More recently, SMC has boldly issued the Pathfinder RFI that calls for procurement dollars to acquire commercial satellite bandwidth for AFRICOM. This effort will result in an RFP in the near term, where we can show the Air Force how we can integrate commercial SATCOM into the existing infrastructure in a way that the Air Force gains greater cost efficiency from owning satellite capacity for the long term rather than leasing it on a year-to-year basis. Both of these steps by SMC reveal that the Air Force understands the necessity of adopting industry's recommendations for acquisition reform, as outlined in our Better Buying paper created for the DoD earlier this year.

Artistic rendition of the Intelsat EpicNG satellite. Image courtesy of Intelsat.

Congress has worked to reform SATCOM acquisition policy, as well, and we hope this will encourage DoD to keep moving to create real change in 2014 for the warfighter and the taxpayer. The House passed a bill with the following language regarding commercial SATCOM: "The Under Secretary in consultation with the DoD's CIO are tasked, within 180 days of this Act being enacted, to create a strategy for the multi-year procurement of commercial satellite services including details on financial and other benefits as well as how to plan, budget and execute this new policy." This encouraging step is complemented by action taken by the Senate Armed Services Committee that directs the Secretary of Defense to provide a report on a 5-, 10- and 25-year strategy for utilization of both Milsatcom and commercial satellite bandwidth. The committee expects this report to be completed by the end of February 2014.

These activities by both the DoD and Congress absolutely encourage operators to continue to invest in military capabilities as specific actionable items move through the system, and we become integrated into the overall satcom architecture.

While the Government considers how to best plan for protecting our future national security interests, Intelsat and Intelsat General are focused on implementing our next-generation high-throughput satellite (HTS) technology. Intelsat continued to make significant strides toward deployment of the Intelsat EpicNG platform, which will provide government and commercial customers with high-powered mobility solutions including airborne service, manned and unmanned ISR (intelligence, surveillance and reconnaissance), and comms-on-the-move.

The initial Intelsat EpicNG satellites will provide Ku-band EIRP and G/T values that are 4 to 7 dB better and nearly 6 to 9 times the aggregate MHz per satellite. These satellites will deliver this improved performance over coverage areas that are 10 to 15 times larger than that possible with two Intelsat IX series Ku-band spot beams. For IGC's customers, this technology will very effectively support their insatiable demand for high-throughput bandwidth to small terminals, but it will also do so at a lower cost per bit. The satellites' increase in G/T performance is particularly helpful in improving the data rates from smaller, disadvantaged terminals. Preliminary link analyses show that Intelsat EpicNG's Ku-band spot beams will support transmission rates of:

- Up to 3Mbps direct mesh links between two 30-inch terminals
- Up to 225Mbps+ from 1.2m Global Hawk terminals

Intelsat's development of its new HTS system shows commercial industry's commitment to anticipating the short- and long-term demands of our government customers and investing in new technology at a time when the U.S. Government is sequestered. As we pursue our aggressive technology development, we expect that the DoD and the government overall will continue to make significant progress in integrating commercial satellite resources into the future military space architecture.

Leaders will be focused on defining and planning how to meet the communications requirements for our rapidly changing, global landscape. Budgetary considerations will continue to impact this planning process, so the lower cost of commercial satellite capacity can play a critical role in the design of this future architecture.

We have developed a strong relationship with the U.S. government, and we are ready to step up and fulfill our role by working closely with our government partner in the next year and beyond.

About the author
Kay Sears was named President of Intelsat General Corporation in 2008 and is responsible for the overall leadership of the organization, setting the strategic direction and managing all facets of the business. Ms. Sears joined Intelsat in 2006 when it acquired PanAmSat. With PanAmSat from 2004-06, she most recently served as Senior Vice President of Sales and Marketing. In 2009, Ms. Sears was appointed to the President's National Security Telecommunications Advisory Committee (NSTAC) and, in 2011, she was named to the board of the Space Foundation.

By Scott Scheimreif, Executive Vice President, Government Division

This year, Iridium made real progress toward the future—to Iridium NEXT and beyond.

We've enjoyed a number of exciting successes in 2013, ranging from continued innovation in hosted payloads with the announcement of Iridium PRIME℠ and our long-term data services contract with NAV CANADA to support Aireon℠, to securing a multi-year contract with the Department of Defense to support their mobile communications needs and passing the critical design review milestone for our next-generation constellation.

Iridium continues to be an innovation leader in the hosted payload space with Aireon, a joint-venture created to provide the only global space-based air traffic surveillance solution, and Iridium PRIME, the world's first, turnkey, hosted payloads solution on stand-alone satellites. In April, Aireon reached a significant milestone when it signed a long-term commercial data services contract with NAV CANADA, further demonstrating Aireon's continued progress toward transforming air traffic communications.

In September, we announced Iridium PRIME, which extends the hosted payload opportunity even further by leveraging Iridium's established global mesh network, ground infrastructure, and flexible spacecraft bus design to provide an affordable opportunity for space-based payload solutions.

Iridium will work directly with hosted payload clients to accommodate the launch and support an Iridium PRIME satellite (or a constellation of satellites) that is right for the customer, providing "launch when ready" flexibility to fit their timelines—all while substantially cutting costs.

In October, we secured a set of contracts worth $438 million over five years with the Defense Information Systems Agency (DISA) to provide satellite airtime services to meet the communications needs of the U.S. Department of Defense (DoD) and their federal partners as well as to maintain and support the DoD's dedicated gateway in Hawaii.

We're proud to continue our longstanding relationship of providing global, mobile communications to the DoD, our largest single customer, with new terms that provide them with unlimited airtime services regardless of their usage demand. This is particularly strategic as the DoD's need for satellite communication services is expected to grow over the next five to 10 years.

The continued development of Iridium NEXT was celebrated in October when we successfully completed a Critical Design Review (CDR) of the complete Iridium NEXT satellite network system, demonstrating its design is valid and on schedule for first launch in early 2015. The review represents an important transition from the network design to the fabrication and testing phase of Iridium's next-generation constellation.

Completing the CDR phase establishes that all components of the satellites will properly function as designed in the dynamic environment of the new constellation, keeping the Iridium NEXT program schedule on track and on budget for first launch in early 2015.

Securing our contract with the DoD and continuing our longstanding relationship was a main priority for us this past year and something we're extremely satisfied to have accomplished.

Also important was the development of Iridium NEXT and that the project stayed on track, on time and on budget. With more than 30 partners comprising the Iridium NEXT Mission Team, contributing vital expertise and components to all aspects of this project, we passed the CDR review milestone with great success and have spent more than $1 billion of the $3 billion spend allocated for Iridium NEXT.

We're continuing to see a lot of momentum around satellite M2M communications or the "Internet of things." Our M2M technology solutions span every vertical we serve and represent the fastest growing segment of our business.

We've garnered a lot of attention this year around our innovations with hosted payloads, and we're going to continue that momentum as we show traction with Aireon and Iridium PRIME. It's only two months after the announcement of Iridium PRIME, and we're already working with new and existing government and commercial customers to assess the opportunities for missions on Iridium PRIME. We're changing the business model around hosted payloads, offering solutions to customers who would otherwise be priced out of space.

In Q1'14, we'll be making some exciting announcements around new products that will make it even easier for consumers to stay connected from anywhere on the globe. We'll be expanding our offerings in maritime communications and extending our handset business to provide even better access to communications for consumers globally. I don't want to give away too much, but stay tuned for some innovative announcements around our mobile communications solutions.

Also, you'll continue to hear more about the Iridium NEXT constellation as we move ever closer to our launch date. The next key milestone is the Low-Rate Initial Production (LRIP) Readiness Review, scheduled for completion in the first quarter of 2014. The review signals the completion of flight hardware design and qualification activities, and it will demonstrate that the processes and procedures, equipment, and personnel are ready for the start of satellite production.

Overall, we're looking forward to another year of providing the only truly global, mobile communications to our partners and customers anywhere on the globe.

For further information regarding the company, please visit their website:
http://www.iridium.com/

About the author

Scott Scheimreif brings more than 10 years of experience to the satellite communications industry as well as over 17 years working closely with the U.S. Government and particularly the Department of Defense in the telecom industry. As executive vice president for Iridium's Government Programs Division, he is responsible for business development and growth of the company's U.S. Department of Defense (DoD) business sector. Mr. Scheimreif manages Iridium's relationship with DISA's EMSS or Enhanced Mobile Satellite Services program which provides Iridium-based services to over 30,000 war fighters and other U.S. Government users.

During his tenure at Iridium, the EMSS program has increased the number of subscribers to this mission critical service by more than 173 percent. More recently, Scheimreif has been expanding Iridium's unique capabilities into the U.S. Department of Defense by offering a multicast, push-to-talk voice and data service. This service, known as Netted Iridium, is envisioned by many to help satisfy the growing demand for tactical, Communications-On-The-Move (COTM) requirements for a variety of vertical markets—specifically the military.

TRUSTCOMM, INC.

By Ian Canning, Chief Operating Officer

This year was truly historic for TrustComm, for all the right reasons. On February 22, 2013, TrustComm was acquired by American investor group Global Secure Networks, allowing us to operate as a U.S. entity under that new ownership.

Enabled by a significant equity infusion, our new team of highly experienced executives led a business expansion that firmly established TrustComm as the preeminent small-business provider of SATCOM services to commercial entities and government agencies.

For many years, TrustComm has been differentiated as the only satellite service provider with a network infrastructure on a secure military base. This year, our expansion featured enhancements to our secure teleport and network operations center (S-NOC) at Ellington Field Joint Reserve Base in Houston. We also completed development of our new corporate headquarters and fully redundant S-NOC at the Quantico Corporate Center in Stafford, Virginia.

Our new executive team brought a great deal of valuable experience and a deep understanding of the MSS market. Therefore, one of our primary objectives in 2013 was to merge that MSS capability with the value of TrustComm's existing FSS services—all within our secure network infrastructure. This has already provided tremendous benefits to our customer base.

Our successful expansion into the MSS market was facilitated by our new partnerships with MSS operators Thuraya and Inmarsat, as well as with Boeing and leading equipment provider Cobham SATCOM.

In November, we jointly launched Starlight with Thuraya, a new end-to-end U.S.-managed implementation of MSS delivered via Thuraya satellites. Starlight delivers high-quality IP and voice communication for end-users who require resilient and assured communications.

With Starlight, the full lifecycle is managed by a U.S. company, satisfying the requirements of customers in the maritime, land, energy and enterprise markets.

Starlight provides broadband IP and voice capabilities that are authenticated and terminated with U.S. IP addresses and phone number designations, based upon infrastructure that is fully controlled by U.S. personnel.

Our new distribution agreement with Inmarsat means we now provide the full Inmarsat Solutions suite, including the Existing and Evolved (E&E) portfolio, the Inmarsat-4 (I-4) Broadband Global Area Network services (BGAN, FBB and SBB), and lease capabilities.

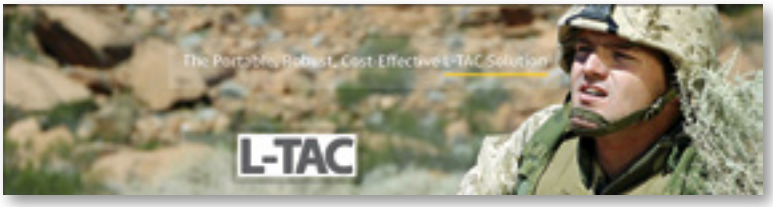
With the advantage of these four new partnerships, we now provide the widest range of assured, end-to-end COMSATCOM solutions to exceed the stringent demands of our commercial and government clients.

TrustComm has made progressive strides with our existing user base through the expanded capabilities now delivered by the organization.

Additionally, we have expanded our reach into the commercial sector through additional capabilities in Africa and the Far East. With the expanding demand in traditional oil & gas and exploration in these territories, we have had the privilege to support new customers with our integrated solutions.

This year proved especially challenging in the federal government market, as all defense contractors took steps to cope with sequestration. Although overall defense budgets are being reduced, the effort to provide more satellite bandwidth is as strong as ever. Smaller budgets are driving the adoption of technologies that are easily developed, easily deployable and seamless.

In this new climate of increased austerity, large integration companies and manufacturers are increasingly looking to partner with qualified small businesses in the COMSATCOM services segment—of which TrustComm is a prime example. These strategic partnerships enable large contractors to diversify beyond equipment provision and integration, and win contracts that feature recurring revenue.



To ensure prosperity in the coming years, we will continue to anticipate the needs of our addressable market by introducing responsive solutions. A good example is our new TRUSTNet offering that has received favorable reviews from customers as we roll it out commercially.

TRUSTNet is a bundled SATCOM solution that supports Internet and private MPLS services requirements in specific regions. It uses the same rigorous design worldwide to ensure consistency of performance and user experience anywhere in the footprint.

With the commercial sector becoming more and more sensitive about the communications they are delivering, TrustComm believes strongly that the resilient and assured solutions being delivered today meet and exceed those needs—ensuring the confidentiality of customer communications.

We also will continue to respond to very strong demand from state agencies such as the National Guard and local emergency responders. Public safety agencies understand the importance of ensuring continuity of operations in the event their infrastructure is temporarily or permanently disabled. Voice, video and high-speed data are essential, to enable reliable communications and coordination with command centers and direct access to Incident Command Systems.

That is why this year we made significant enhancements to our Satellite Emergency Operations Network (SEON). SEON is the only comprehensive, interoperable network of its kind that provides broadband satcom support to emergency-management teams. The enhancements include new, flexible purchase options (now available on GSA Schedule 70) and expanded network configurations. Our SEON solution was proven effective by the Texas National Guard during hurricanes Katrina, Rita and Ike.

Our new capital resources are already helping us increase the availability of our assured COMSATCOM services, terrestrial and end-to-end networks. This enables us to provide maximum reliability to support a broad range of applications—including broadband Internet access, VoIP, video conferencing and data communications—for business continuity, emergency response, tactical field deployment and temporary usage.

Look for upcoming announcements as we develop a range of new solutions leveraging TrustComm's overall satellite capability in multiple commercial markets. We wish you a successful 2014.

For additional information about the company, please visit their website:
http://www.trustcomm.com/

About the author

Ian Canning has more than 25 years' experience in the global satellite communications and telecommunications industries. He joined TrustComm as Chief Operating Officer in January 2012. In this position, he is responsible for the day-to-day operations of the Company. Prior to joining TrustComm, Mr. Canning served as a senior marketing executive for Stratos Global Corp., the leading global provider of advanced mobile and fixed-site remote communications solutions. He was responsible for Stratos' global product and marketing portfolio, generating more than $700 million p.a. from advanced remote communications solutions, including the Stratos Advantage range of value-added services. That period included his tenures as Vice President, Global Product Marketing (2010-11) and Vice President, Marketing and Product Management (2007-10). From 2004-07, he served concurrently as Stratos' Managing Director, EMEA and Vice President, Sales.

From 2001-03, Mr. Canning served as Director, Business Development EMEA and later as Director, Sales EMEA for Iridium Communications Inc., a provider of global voice and data communications services. From 1999-2001, he began his career with Stratos as Director, EMEA and Asia. From 1995-99, Mr. Canning served as Inmarsat's Manager, Partnership Program. From 1983-99, he held senior sales positions with a variety of global satellite, electronics and telecommunications companies, including Nortel Networks, Motorola Codex and Racal Datacom.

Mr. Canning earned an MBA from London's Greenwich School of Management.

VISLINK

By Ali Zarkesh, Business Development Director

The rate of change in advanced military communications continues to increase. Military officials now require all-encompassing solutions spanning reconnaissance, surveillance and real-time monitoring, as today's threats are more mobile and more dangerous than ever before.

There's an immediate industry focus on the need for decisive decision-making based on live information, meaning a highly reliable communications network is at the heart of every critical mission.

As Vislink has established its position in this expanding market, particular emphasis has been placed on listening to the customer. Throughout the year, Vislink has met with end-users to discuss their needs. With investments made, these requirements have been translated into new products to meet changing industry demand. Vislink has worked hard to maintain its position as a premier supplier of SATCOM communication systems and a growing name for full motion video transport, ISR and military communications.

With a deep heritage in providing SATCOM solutions for the defense sector, supported by the company's success in the broadcast market, Vislink's product range has expanded to include man-portable SATCOM units, together with flyaway terminals and vehicle mounted systems.

Over the last 12 months, Vislink has further increased its profile in the defence sector, experiencing growth and success. The company has also demonstrated that it has the expertise to deliver a wide range of advanced technologies to meet the ever-changing demands of the surveillance market.

Vislink's MSAT range has seen a number of improvements in recent months. Following the successful launch of the MIL-SPEC Mantis MSAT terminal late last year, 2013 saw the introduction of a motorized version which is also fully MIL-SPEC compliant. Vislink's new system still has field swappable feeds on X-, Ka-, or Ku-bands and can support a built-in H.264 encoder or customer specified data modem, making it ideal for surveillance missions in challenging or hostile environments. The new product also adds the option of a 90 or 120cm reflector, providing improved data throughput rates of up to 10Mbps and building on the surveillance market's need for HD video, voice and data communications.

Vislink's Advent brand is already well-known for its range of portable and fixed SATCOM systems, including the new MSAT range, and so Advent has become synonymous with ease of use and flexibility. This new motorized version further demonstrates Vislink's commitment to delivering solutions that exceed operational expectations.

Building on its reputation for providing comprehensive solutions, Vislink showcased a number of innovative products at this year's DSEI. As signals can be hampered by terrain, frequency congestion and interference, it's clear that a new technology is required to better distribute information in a cost-effective and timely manner, with minimal delay and latency.

To meet this growing need, Vislink launched a range of products under its LiveGear brand. This new technology is capable of bonding multiple cellular signals together and aggregating the signal in a way that allows data streams of up to 6Mbit/s to be passed over up to six bonded 3G or 4G cell networks.

A new hybrid microwave/cellular transceiver 360 degree six-channel diversity receiver was also unveiled at this year's show. As a hybrid system it's designed to receive across a range of microwave frequencies, from 1.5 to 10GHz. Reception is fully automated and the combining factor allows enhanced gain and availability in a downtown environment. Retransmission is via 3G or 4G cellular lines, allowing operators to transport a video signal at up to 6 Mbit/s. The signal is separated for transmission over these lines, allowing for diversity of cellular provider and path, and then reassembled at the command center.

Vislink has been active in the defense sector for many years, and 2013 saw new ventures into the world of ISR, EW as well as a growing need for C-IED on the battlefield. The predominant requirement from customers was access to the best video distribution techniques possible, very often these being tailored to their own exacting standards and needs. Vislink has met the challenge with a range of modular sub-systems to be interfaced with HD video links to carry next generation sensor signals and IP data. The range of interfacing systems is entirely complementary to existing products to significantly enhance the offering to the airborne data market.

In addition to this, Amplifier Technology, a leading manufacturer of jamming equipment and RF design for the surveillance market, was acquired by Vislink in August 2013. This is further evidence of Vislink's commitment to delivering a broad spectrum of solutions, as Amplifier Technology's products will form a complementary addition to Vislink's existing product ranges. Also, by introducing jamming technology to the product portfolio, Vislink has enhanced its offering to the signals core. Vislink now has a truly global reach, and the ability to fully equip and protect the modern soldier.

The feedback from the marketplace in all areas is that a number of challenges will exist in coming years—not the least being the major budget cuts experienced throughout most of Europe as countries steady themselves after experiencing a major recession. Vislink will continue to listen and react to market demands and provide high quality, robust, reliable communications equipment at highly competitive prices. This will be supported with meaningful, no quibble warranties and logistical support through the lifetime of the equipment.

On the technology side, 2014 will see further additions to Vislink's existing product ranges. With extensive testing of cellular bonding being undertaken in Europe and the USA, Vislink leads the way with a range of exciting and innovative products. Many of these are already engineered into existing systems with hybrid microwave front ends. There is significant expectation of pick-up in the marketplace for these products in the New Year.

High definition airborne surveillance is also becoming more and more critical for real-time decision making and 2013 has already played host to a number of important advances in unmanned systems. Vislink has a long history providing airborne video solutions to government and security agencies around the world, and in coming years it's likely that this technology will be an even more important focus for the company.

With large scale deployments of Vislink SATCOM terminals in 2013 and the quest for smaller, lighter and more innovative equipment, 2014 will see Vislink continue to refine its product offering to meet growing industry demand for more portable technology.

For further information regarding the company, please visit their website:
http://www.vislink.com/

About the author

Ali Zarkesh has been the Business Development Director at Vislink for almost two-and-a-half years. With more than 20 years of experience, 10 of which were within program management, Ali has worked at leading space and IT companies throughout his career such as Inmarsat, Astrium, Eumetsat, Vega and ComDev—as well as his current position at Vislink, a global provider of satellite communications technologies.

Having completed a BSc and then an MSc in Computer Science in the early 1990s, Ali started his career at Inmarsat as an engineer. Following an eight year stint as a consultant to Vega plc, Ali then held two senior management positions at Astrium and ComDev Europe before acquiring his current position of Business Development Director of SATCOM Products at Vislink. His role involves the direction and oversight of product development of the entire range of SATCOM products as well as defining the strategic direction and road map for future products. He also develops new business contacts and markets for the company.

By Andrew Ruszkowski, Vice President, Global Sales + Marketing

Commercial satellite operators, including XTAR, have witnessed—and even contributed—as Pentagon and Air Force leadership, along with Congressional input, devise a variety of acquisition reform initiatives, directives and proposals.

XTAR and others in industry have diligently pursued the essential reforms that would allow the DoD to effectively partner market economy principles to the requirements of government customers. It seems, at times, that our efforts have fallen on deaf ears.

There are certainly leaders within the DoD who are working tirelessly to strengthen the Department's relationship with commercial industry. They recognize that it is essential to protect national security interests today and tomorrow—even more so in the current budget environment. Our Congressional and defense leadership deserves acknowledgement for bringing the issue of commercial SATCOM acquisition to the table in a more active manner.

Between shifting and ever-growing threats, and the fiscal constraints of policies such as Sequestration, it would be easy to assume that change must be imminent. Various studies this year even imply that DoD leadership is ready to move to a new commercial satcom procurement era.

In reality, however, there has been a flurry of mixed signals from various DoD and their branch offices. Real reform, which leverages the opportunities presented by the commercial satellite industry, continues to be hampered by a need for exclusive ownership on the part of some within the government.

At the close of 2012, four commercial satellite operators, including XTAR, authored a paper defining "Seven Ways to Make the DoD a Better Buyer of Commercial Satcom" in response to a request from the DoD for ideas. 2013 has seen no shortage of discussion on the subject of reform, hopefully due to our collaborative industry efforts.

The Office of the Secretary of Defense (OSD), the Air Force Space and Missile Systems Center (SMC) and various House and Senate committees, among others, have since weighed in on this topic. The Defense Business Board (DBB), for example, studied commercial satcom barriers and opportunities at the request of OSD. Essentially, the DBB findings and our Seven Ways paper similarly advocated for common sense changes to acquisition, such as long-term contracts, consideration of hosted payloads, and centralizing satcom administration.

Subsequently, Mr. Frank Kendall, Under Secretary of Defense (Acquisition, Technology & Logistics) announced that his office was embarking on a 90-day study of similar matters. Very recently, a whitepaper authored by staff at Air Force Space Command also echoed the Seven Ways tenets. Mr. Douglas Loverro, OSD Deputy Assistant Secretary of Defense for Space Policy, has recently acknowledged that, for better or for worse, the budget crisis may be the needed impetus to speed up this critical review process.

New acquisition vehicles that have recently surfaced indicate the potential for forward progress. SMC, for example, has worked hard to create new ways to benefit from its trusted commercial satellite industry partners to bring greater efficiency and advanced technology to the warfighter. SMC gained considerable experience over the last decade by working with industry to provide mission-critical support for the exponentially growing role of ISR. A few months ago, SMC helped to expand that relationship by finalizing the Hosted Payload Solutions (HoPS) acquisition vehicle. This entailed a great deal of discussion between industry and SMC including SMC's positive response to its initial HoPS RFP.

These actions have enabled greater understanding of commercial practices so government users can benefit from the efficiency that commercial satellites offer. As both a commercial satellite payload host and an operator of a hosted payload, XTAR anticipates actively sharing its experience and expertise in further deployments of such payloads.

More recently, SMC has moved toward use of long-term purchasing of commercial satcom with the Pathfinder RFI. This vehicle calls for procurement dollars to acquire commercial bandwidth for AFRICOM. This forward-thinking action indicates that SMC understands the substantial cost benefits to be gained from buying satellite capacity for the long term, rather than leasing it on a year-to-year basis. In addition, the Pathfinder RFI indicates that the Air Force wants to determine how innovative, affordable procurement of commercial satcom can capably provide on-orbit resources in the future.

As this is only an RFI, we hope this effort will result in an RFP in the near term. Both of these steps by SMC show that the Air Force recognizes the urgency of adopting industry's recommendations such as were outlined in our Seven Ways paper. A funded contract will be the real measure of whether the Air Force is truly prepared to do more than simply experiment with new procurement methods.

Two steps forward, one step back—or is it the reverse?

Vehicles such as HoPS and Pathfinder seem to be leading us sensibly down a road to broader use of cost-effective, commercial satcom technologies. However, important players still continue to support, to varying degrees, reliance on the status quo. General Shelton's comment that we should not plan any changes for the next 10 ten years certainly gives advocates for change reason for serious concern. Lieutenant General Pawlikowski, while an advocate for hosted payloads, has also said that DoD will need to build "clones" of existing satellites if budget decisions are further delayed. In this we see another reason for concern.

Aside from a culture of control within DoD, commercial acquisition reform is bedeviled by the DoD's long-standing relationships with its prime contractors. Confusing matters even more, the primes, in order to keep their market share, are now playing both sides of the fence by building and supporting PORs while simultaneously seeking potential commercial opportunities.

As commercial enterprises, this is entirely understandable. However, the fundamental question for DoD and Congressional leadership is how to put in place a renewed space capabilities architecture that addresses evolving threats and the reality of shrinking fiscal resources. Commercial SATCOM industry partners, such as XTAR, can resoundingly affirm that they are ready, willing and able to be active partners in this new paradigm.

We believe the warfighter and the taxpayer deserve no less.

For further information regarding the company, please visit their website:
http://xtar.com/

About the author

Appointed in September 2010, Andrew Ruszkowski provides strategic leadership for XTAR's global sales and marketing programs, with responsibility for expanding XTAR's sales opportunities and visibility in new markets worldwide. Prior to joining XTAR, Mr. Ruszkowski headed the North American Sales team of SES World Skies, where he was responsible for formulating sales strategies aimed at enterprise network operators, ISPs, and U.S. government and military users. He joined New Skies Satellites in 2000 as Director of Sales with primary focus on the Internet market. Mr. Ruszkowski began his satellite industry career in 1998 as manager of VSAT and business networks for PanAmSat, and subsequently, manager of its New Media business.

Mr. Ruszkowski holds a BA degree in world politics from The Catholic University and an MA in international affairs from American University.