

MilsatMagazine

Command Centers

- *Chen of ATK*
- *Fountain of Kratos SecureInfo*
- *Gardefjord of SSC*

Heyman on the Proton

The HPA Corner

Industry As Partners For Uncle Sam

Disaster Crisis Management

Cover image: MUOS-2 successfully lifts off from Cape Canaveral Air Force Station on July 19, 2013, aboard an Atlas V—photo courtesy of United Launch Alliance.

MilsatMagazine

July/August 2013

Publishing Operations

Silvano Payne, Publisher + Writer
Hartley G. Lesser, Editorial Director
Pattie Waldt, Executive Editor
Jill Durfee, Sales Director, Editorial Assistant
Simon Payne, Development Director
Donald McGee, Production Manager
Dan Makinster, Technical Advisor

Published 11 times a year by
SatNews Publishers
800 Siesta Way
Sonoma, CA 95476 USA
Phone: (707) 939-9306
Fax: (707) 838-9235
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Senior Contributors

Tony Bardo, Hughes
Chris Forrester, Broadgate Publications
Karl Fuchs, iDirect Government Services
Bob Gough, Carrick Communications
Jos Heyman, TIROS Space Information
David Leichner, Gilat Satellite Networks
Giles Peeters, Track24 Defence
Mike Antonovich, ATEME
Richard Dutchik
Bert Sadtler, Boxwood Executive Search

This Issue's Authors

Dylan Browne
Jos Heyman
Sgt. Coltin Heller
Hartley Lesser
Rick Lober
Ken Parrish
Anu Sood
Pattie Waldt

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The U.S. Navy's second Mobile User Object System 2 aboard an ULA Atlas 5 being prepared for launch.

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Features



Command Center: Warren Chen, Director of Business Development, ATK's Integrated Thermal Systems Business Unit—Page 18

Warren Chen is the ATK Director of Business Development for the Integrated Thermal Systems Business Unit, out of the Space Systems Division located in Beltsville, Maryland. Warren has more than 18 years of spaceflight hardware design, analysis, manufacturing, integration and test experience in addition to program management and business operations experience.



Challenges For Proton—Page 22

Following the somewhat spectacular failure of a Proton M/DM3 launch vehicle on July 2, 2013, the launch vehicle has been grounded pending an investigation into the cause.

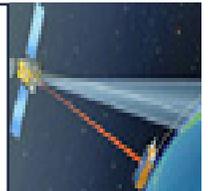
By Jos Heyman



The HPA Corner: Building Strong Partnerships—Page 26

To measure the success of a hosted payload program, one should measure the success of the underlying partnership.

By Dylan Browne



Command Center: Christopher Fountain, President & CEO, Kratos SecureInfo—Page 30

As president and chief executive officer, Christopher Fountain provides strategic direction to SecureInfo and is responsible for leading overall operations. He is focused on expanding upon SecureInfo's success by maintaining a customer-centric, results-oriented culture.



Uncle Sam Needs To Look At Industry As A Mission Critical Partner—Page 34

Today's warfare and homeland defense operations no longer begin with warfighters on the front lines. In the new age of communications, information is foundational to all military missions.

By Rick Lober



Satellite Technology Delivers Dependability For Disaster Crisis Management—Page 36

According to The International Disaster Database (EM-DAT), 196 natural disasters occurred during 2011, worldwide, affecting more than 85 million people and resulting in an...

By Anu Sood



Command Center: Stefan Gardefjord, President & CEO, SSC—Page 40

Stefan Gardefjord recently celebrated his first anniversary as president and CEO of SSC. Prior to joining SSC, he was CEO of Logica Sweden, the country's largest IT services company, as well as having served on Logica's executive committee.



ULA, LMC + USN—Launch Of A Moose Of MUOS-2

A United Launch Alliance Atlas V rocket carrying the second Mobile User Objective System (MUOS-2) satellite for the United States Navy lifted off from Space Launch Complex-41 at 9:00 a.m. EDT on July 19, 2013. This was ULA's 6th launch of an aggressive 12 mission schedule for the year and the 72nd ULA mission since its formation in 2006.

ULA's statement regarding the launch said, "United Launch Alliance is honored to serve with our mission partners in the preparation and launch of this critical mission for the U.S. Navy and for our U.S. Air Force customer," said Jim Spornick, ULA vice president, Atlas and Delta Programs. "This joint government and industry team is keenly focused on mission success and enabling MUOS-2 to provide vital communications capability to the women and men protecting our freedom around the world." The MUOS-2

mission was launched aboard an Atlas V Evolved Expendable Launch Vehicle (EELV) 551 configuration vehicle, which includes a 5.4-meter diameter RUAG Space payload fairing along with five Aerojet Rocketdyne solid rocket motors attached to the Atlas booster. 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 engine.

"At nearly 15,000 pounds, MUOS-2 is the heaviest satellite launched to date by an Atlas launch vehicle, and today's Atlas vehicle provided 2.5 million pounds of thrust during the boost phase," said Spornick.

MUOS is a next-generation narrowband tactical satellite communications system designed to significantly improve beyond-line-of-sight communications for U.S. forces on the move. MUOS will provide military users 10 times more communications capacity over the existing system by leveraging 3G mobile communications technology, and will provide simultaneous voice and data capability.

Developed by the United States Air Force to assure access to space for Department of Defense and other government payloads, the EELV Program supports the full range of government mission requirements, while delivering on schedule and providing significant cost savings over the heritage launch systems.

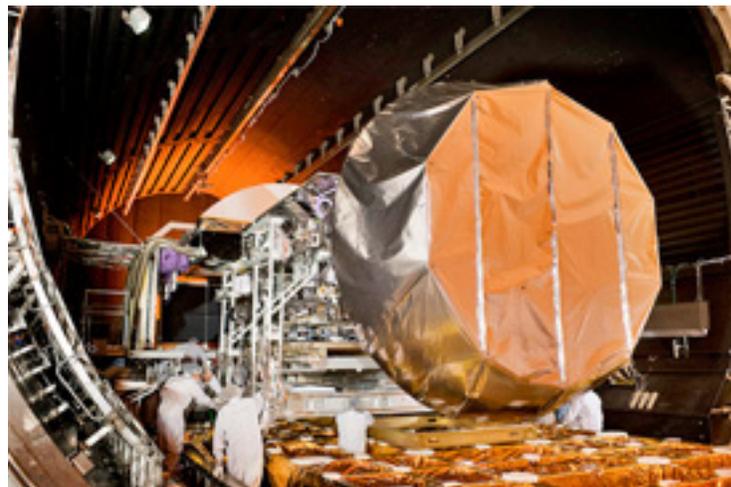
ULA's next launch is the Delta IV WGS-6 mission for the U.S. Air Force scheduled August 7 from Space Launch Complex-37 at Cape Canaveral Air Force Station, Florida.

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.

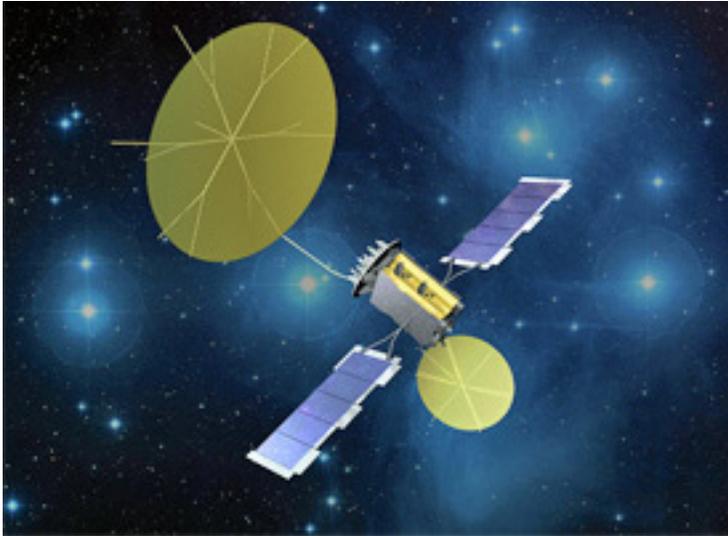
Lockheed Martin, the satellite's builder, stated that the second Mobile User Objective System (MUOS) satellite for the U.S. Navy is responding to commands after being launched today from Cape Canaveral Air Force Station, Florida. The Lockheed Martin-led initialization team is commanding the satellite from the Naval Satellite Operations Center located at the Naval Base Ventura County, Point Mugu, California.

The MUOS constellation replaces the legacy Ultra High Frequency (UHF) Follow-On system and delivers secure, prioritized voice and data communications, a first for mobile users who need high-speed mission data on the go.

"MUOS is providing capability for mobile users that never existed before," said Iris Bombelyn, Lockheed Martin's vice president of Narrowband Communications. "We look forward to testing and delivering the second satellite of the MUOS constellation to our Navy customer. This on-orbit testing will prove the MUOS system capabilities and allow us to deliver the full suite



MUOS-2 undergoing environmental testing. Photo courtesy of Lockheed Martin.



Artistic rendition of the MUOS-2 satellite. Courtesy of Lockheed Martin.

of services available through the MUOS payloads, on MUOS-1 as well as MUOS-2.”

MUOS-2 launched at 9 a.m. EDT aboard a United Launch Alliance Atlas V rocket and will transition over the next nine days to reach its geosynchronous orbit location 22,000 miles above the Earth. The solar arrays and antennas will then be deployed, and on-orbit testing will start for subsequent turn-over to the Navy for test and commissioning to service.

At the launch, Lockheed Martin hosted teachers from the National Science Teachers Association (NSTA) New Science Teacher Academy. The Lockheed Martin-NSTA fellows experienced how science can solve real-world challenges, helping teachers inspire and encourage student interest in science and math once they return to the classroom.

The first MUOS satellite, launched in 2012, has been providing high quality legacy voice communications for users, and terminals are already testing using the advanced payload that enables data exchanges. More than 20,000 existing terminals are compatible with, and can access the MUOS legacy payload, and with the release of the new waveform developed for increased data-handling capacity, many of these terminals can be retrofitted to access the Wideband Code Division Multiple Access (WCDMA) payload.

This advanced WCDMA payload incorporates commercial technology designed to provide 16 times the number of accesses above requirements for the legacy UHF Follow-On system. The satellites also include a hosted legacy UHF payload that will be fully compatible with the current ultra-high frequency system and legacy terminals.

The geosynchronous constellation consists of four satellites and one on-orbit spare, which are expected to achieve full operational capability in 2015, extending UHF narrowband communications availability well past 2025.

Astrium—A Sounding Success



Artistic rendition of the MetOp-SG satellite.

Astrium has been selected by the European Space Agency (ESA) to supply the MicroWave Sounder (MWS) instruments for the MetOp Second Generation series of satellites (MetOp-SG). The contract for the MWS instruments, worth up to 155.5 million euros, has been awarded to Astrium in the UK and the satellites will be operated by EUMETSAT, the European Organisation for the Exploitation of Meteorological Satellites.

The MWS instrument is the follow on to the highly successful MicroWave Humidity Sounder (MHS), also primed from Astrium in Portsmouth and currently flying on the first generation MetOp missions. The new generation of instruments will provide a much higher level of performance over a greater spectral range. The instrument delivers atmospheric temperature and water vapour information for use in Numerical Weather Prediction (NWP) forecasts enabling short term weather forecasts to be made with greater accuracy.

There will be a minimum of two MWS instruments, each with a mission life of 7.5 years. A team of 40 at Astrium in Portsmouth will develop the MWS instruments together with 15 major sub-contractors across UK and Europe. In the UK key contributions to the program will also be made by SEA Ltd., STFC/RAL, JCR Systems Ltd. and Queens University in Belfast together with other opportunities for UK companies to bid to provide equipment/services.



MetOp-B instruments provided by Astrium. ASCAT, GRAS and MHS.

ESA has the option of ordering a third instrument, to ensure that the MWS instruments will provide accurate forecasting data until 2040 and beyond. The first MetOp SG satellite is due to be launched in 2021

Astrium UK Managing Director, Colin Paynter, said, "This contract is a direct result of the government increasing its ambition in space which has allowed our great innovation and engineering talent to have a route to market. It builds on Astrium's proven expertise in meteorological and space-borne instruments, and is great news for the UK team. The unique experience built up in developing and manufacturing the microwave instruments for the current MetOp satellites firmly put Portsmouth as one of the world leaders in this area."

Minister for Universities and Science, David Willetts, said, "This substantial contract shows that the UK's increased investment in the European Space Agency is already paying dividends and getting us ahead in the global race and the space race. It confirms our space industry's world-class position and will see Astrium working with other leading businesses, scientists and engineers to develop cutting edge satellite technology."

There are currently four MHS instruments in orbit, on the European MetOp satellites and the U.S. NOAA meteorological satellites. The first instrument was launched in 2005. Altogether they have accumulated 17 years of faultless mission operation across the four instruments. A fifth MHS instrument is in long term storage and will be launched on the third and final MetOp satellite in 2018.

In addition to the MHS sounders in orbit on the current MetOp satellites, several other instruments were procured by Astrium and largely built at its sites across Europe. They include the Advanced Scatterometer (ASCAT), a radar system that measures wind speed and direction above the surface of the oceans, and the Global Navigation Satellite System Receiver for Atmospheric Sounding (GRAS), a GPS receiver that supplies atmospheric sounding data.

Russia—Totally Burned Up



Artistic rendition of the Geo-IK-2 satellite.

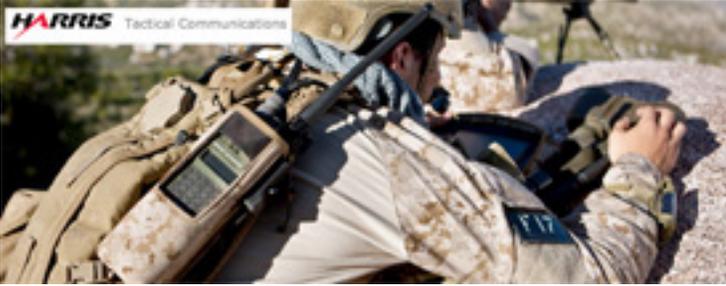
RIA Novosti is now reporting that a wayward Russian military satellite completely burned up in the atmosphere and did not crash in northwestern China, contrary to previous reports, Russian space agency Roscosmos said on Tuesday.

Spokeswoman Anna Vedishcheva said the satellite, designed to help precisely locate military targets, had entered the atmosphere around 6:00 p.m. Moscow time the day before and then "ceased to exist," having "burned up completely."

Earlier media reports said the Geo-IK-2 satellite, which failed to respond to commands in early 2011 due to power loss and was located months later in a different orbit, crashed in China's Qinghai Province.

For more information, please access the following URL:
http://en.rian.ru/military_news/20110202/162413597.html

Harris—Upgraded Radios En Route For USMC



The United States Marine Corps has awarded Harris Corporation (NYSE:HRS) a contract to replace its existing radio systems throughout Eastern Region U.S. Marine Corps bases and other locations.

Harris received an initial \$6 million order in the third quarter of the company's fiscal year 2013 to design and deploy radio systems at four bases in North Carolina and Georgia. The full contract has a potential value of more than \$16 million and includes system design and deployment, equipment, managed services, maintenance and other options.

The new Harris system will leverage the latest standards-based digital technology and allow first responders to communicate and coordinate efforts more easily with neighboring civilian agencies than the existing analog-based solution.

The new radio system is based upon Project 25 technology standards and Harris' VIDA® network, which delivers powerful network management tools using a modern IP (Internet Protocol) architecture.

In public safety and professional communications Harris is a leading supplier of assured communications® systems and equipment for public safety, federal, utility, commercial and transportation markets—with products ranging from the most advanced IP voice and data networks, to next-generation, secure public safety-grade LTE (Long-Term Evolution) solutions for voice, video and data applications, to industry leading multiband, multimode radios.

Harris has more than 80 years of experience in public safety and professional communications and supports over 500 systems around the world.

U.S. Navy—Readiness Could Potentially Be Affected

Navy Admiral Samuel J. Locklear III

As reported by Karen Parrish of the American Forces Press Service, budget cuts and spending restrictions are forcing defense leaders into measures that are “basically hollowing out the force through sequestration,” the commander of the U.S. Pacific Command said.

Defense Secretary Chuck Hagel’s letter sent to Congress on July 10th is “an accurate description of what’s happening to the force at-large,” Navy Adm. Samuel J. Locklear III told Pentagon reporters. Hagel’s letter outlined the department’s “plan B” for defense spending if sequester continues, which would mean a roughly \$50 billion cut per year over a decade.

The secretary warned lawmakers this would necessitate a RIF, or involuntary reductions in force, for civilian employees and a severe slowdown to military modernization. Hagel’s worst-case scenario included an essential halt to recruitment, change-of-station moves and promotions.

Locklear said that before finalizing the approach he outlined in his letter, Hagel “did reach out, as always, to all the [geographic combatant commanders] to get our perspectives on what’s happening to readiness.”

The admiral added that as the letter describes, the driving forces that would make those measures necessary involve both “the money ... [and] the way that the money is being managed.”

The law protects much of the defense budget, he said, so funding cuts have to come mostly in operations and maintenance accounts, while leaders must also push resources to essential operations such as those in Afghanistan and Korea.

“What happens is that the services are then required to not overhaul ships, not fix airplanes [and] not do training at home,” Locklear said. “... So we’re basically hollowing out the force through sequestration.” The Navy and the military he joined 41 years ago were hollow, the admiral said. Hollowing out a high-performing military force, he told reporters, “... doesn’t take [more than] a year or two.”

Shrinking the force can be done, he said, but it must be managed efficiently to bring a high quality result. “And the sequestration is not allowing that to happen,” he said. Pacom canceled several exercises this year alone because of the budget pressure, Locklear said.

“We maintain the main exercises with our allies, even though in some of those exercises we actually dialed down the amount of participation we had,” he said, adding most of the cancellations were of U.S.-only exercises.

“For today, if you ask the chief of the Air Force, he’ll tell you that about one-third of his airplanes and air crews back in the United States are not flying,” Locklear said. “The number of steaming days and flying hours that are allocated to me in the Pacific ... are being decremented. It just pushes the risk up for those service members who are potentially out there in harm’s way. And that’s going to exacerbate through ‘14 if the sequestration is not relieved.”

Boeing—Now In Full Operation

Artistic rendition of the GPS IIF-4 satellite, now officially known as SVN-66.

The Global Positioning System, which millions of people use every day for precise navigation and timing, recently became more accurate and reliable as the fourth Boeing GPS IIF satellite began operating in the U.S. Air Force network.

Launched May 15th, that satellite was handed over to the Air Force after 19 days of post-launch validation to stabilize the vehicle and activate the navigation payload, and set healthy on June 21st.

“With each IIF that we add to the network, the Air Force and Boeing give military and civilian users around the world better GPS navigation and timing information,” said Craig Cooning, Boeing vice president and general manager of Space & Intelligence Systems.

SVN-66, the official name of the new satellite, is now part of the active 31-satellite network. The next GPS IIF, the fifth of 12 planned, is slated for launch in October. The new satellite replaces an earlier Boeing-built model launched in 1996.

Lockheed Martin—Antenna Assemblies Delivered



Artistic rendition of a GPS III satellite. Courtesy of Lockheed Martin.

Lockheed Martin has completed, and is preparing to install, the navigation, communication, and hosted payload antenna assemblies for the first satellite of the next generation, Global Positioning System, known as GPS III.

Seven antenna assemblies, produced at Lockheed Martin's Newtown, Pennsylvania, facility were delivered to the company's GPS III Processing Facility (GPF) near Denver, Colorado, on June 14th. The antennas will be installed on the first GPS III space vehicle (SV 01), which Lockheed Martin will deliver to the U.S. Air Force on schedule, "flight-ready", in 2014.

The new antennas for GPS III SV 01 will provide the satellite's capability to send and/or receive data for Earth-coverage and military Earth-coverage navigation; a UHF crosslink for inter-satellite data transfer; telemetry, tracking and control for satellite-ground communications; and data acquisition and communication for the nuclear detection system hosted payload.

The antenna designs enable three to eight times greater anti-jamming signal power to be broadcast to military users across the globe when compared to previous GPS generations.

"These antennas on the next generation of GPS III satellites will transmit data utilized by more than one billion users with navigation, positioning and timing needs," explained Keoki Jackson, vice president of Lockheed Martin's Navigation Systems mission area. "We have become reliant on GPS for providing signals that affect everything from cell phones and wristwatches, to shipping containers and commercial air traffic, to ATMs and financial transactions worldwide."

GPS III is a critically important program for the Air Force, affordably replacing aging GPS satellites in orbit, while improving capability to meet the evolving demands of military, commercial and civilian users. *(Story continues on the next page...)*

(Story continued from previous page...)

GPS III satellites will deliver three times better accuracy, include enhancements which extend spacecraft life 25 percent further than the prior GPS block, and a new civil signal designed to be interoperable with international global navigation satellite systems.

The production of the first GPS III satellite continues on schedule. Recent testing of the SV 01 bus—the portion of the space vehicle that carries mission payloads and hosts them in orbit—assured that all bus subsystems are functioning normally and that they are ready for final integration with the satellite’s navigation payload.

This milestone follows February’s successful initial power on of the SV 01 spacecraft bus, which demonstrated the electrical-mechanical integration, validated the satellite’s interfaces and led the way for functional electrical hardware-software integration testing.

Lockheed Martin is currently under contract for production of the first four GPS III satellites (SV 01-04), and has received

advanced procurement funding for long-lead components for the fifth, sixth, seventh and eighth satellites (SV 05-08).

The GPS III team is led by the Global Positioning Systems Directorate at the U.S. Air Force Space and Missile Systems Center. Lockheed Martin is the GPS III prime contractor with teammates ITT Exelis, General Dynamics, Infinity Systems Engineering, Honeywell, ATK and other

subcontractors. Air Force Space Command’s 2nd Space Operations Squadron (2SOPS), based at Schriever Air Force Base, Colorado, manages and operates the GPS constellation for both civil and military users.



AFSC + Lockheed Martin—AEHF Advances



Artistic rendition of the AEHF satellite. Courtesy of Lockheed Martin.

The U.S. Air Force and Lockheed Martin team successfully delivered the third Advanced Extremely High Frequency communication satellite to Cape Canaveral Air Force Station, Florida, where it will be prepared for launch aboard a United Launch Alliance Atlas V launch vehicle.

AEHF-3 completed its California-to-Florida journey July 10th aboard an Air Force C-5 Galaxy aircraft, operated by the 60th Air Mobility Wing from Travis Air Force Base, California. Over the next several months, the satellite will undergo final launch preparations, including encapsulation in the rocket’s payload fairing, and transport to Launch Complex 41 at CCAFS for integration with the Atlas V. AEHF-3 is scheduled to launch in fall of 2013. AEHF is a joint service satellite communications system that will provide survivable, global, secure, protected, and jam-resistant communications for high-priority military ground, sea and air assets. The AEHF system is the follow-on to the Milstar system, augmenting, improving and expanding the Department of Defense’s Military Satellite Communications architecture.

AEHF-3 was procured from Lockheed Martin Space Systems Company by the MILSATCOM Systems Directorate, part of the Air Force’s Space and Missile Systems Center.

Northrop Grumman—Arrested Development



Northrop Grumman and the U.S. Navy complete the first arrested landing of a Tailless Unmanned Aircraft aboard an aircraft carrier.

Northrop Grumman Corporation and the U.S. Navy have completed the first arrested landing of the X-47B Unmanned Combat Air System (UCAS) carrier demonstration aircraft on the deck of the USS George H.W. Bush (CVN 77).

The Northrop Grumman-built aircraft landed at 12:23 p.m. Eastern time on July 10th, while the aircraft carrier was under way off the coast of Virginia—this marks the latest and most significant achievement for the program during carrier sea trials, which began in May.

The X-47B aircraft took off from Naval Air Station (NAS) Patuxent River, Maryland, July 10. A mission operator aboard the carrier took control of the aircraft and monitored the flight operations, which included several planned precision approaches in preparation for the first arrested landing. During the testing, the X-47B completed the 35 minute journey from Pax River to the carrier and caught the three-wire with the aircraft’s tailhook. The arrested landing effectively brought the aircraft from approximately 145 knots to stop in less than 350 feet.

The arrested landings aboard the Bush mark the third major aviation achievement by the UCAS-D program since May. On May 14, the X-47B became the first unmanned aircraft to be catapult launched from a Nimitz class aircraft carrier. On May 17, the aircraft performed the first in a series of precision approaches and touch-and-go landings on a carrier by an unmanned system.

Northrop Grumman is the Navy’s UCAS-D prime contractor. The company designed and produced the program’s two X-47B air vehicles. An integrated test team of Northrop Grumman and Navy personnel executed the rigorous flight test and carrier suitability test sequence that culminated in today’s first arrested landing of an autonomous unmanned aircraft. Northrop Grumman’s UCAS-D industry team includes Pratt & Whitney, GKN Aerospace, Eaton, General Electric, UTC Aerospace Systems, Dell, Honeywell, Moog, Wind River, Parker Aerospace, Rockwell Collins and Lockheed Martin.

U.S. Army—Taking On Golden Coyote

U.S. Army Capt. Frank Brown, communication officer with Headquarters and Headquarters Detachment, 213th Regional Support Group, Pennsylvania Army National Guard, attaches a feed horn to the stabilizing arm of a portable satellite system during exercise Golden Coyote at Forward Operating Base Custer at Custer State Park in Rapid City, South Dakota, June 5, 2013. Golden Coyote is an annual training exercise that joins U.S. Service members from 11 states and Soldiers from four foreign nations.

(U.S. Army National Guard photo by Sgt. Coltin Heller/Released)

Any training exercise presents challenges to soldiers participating in them. While the word challenge means something different to each soldier, one challenge remains across the board—communication—one, if not, the most vital requirements to all soldiers, regardless of their military occupational specialty. This was proven again at Camp Rapid in South Dakota.

Capt. Frank Brown, communications officer with Headquarters and Headquarters Detachment, 213th Regional Support Group, Pennsylvania Army National Guard, faced the challenge of setting up and maintaining the various means of communication used by 213th RSG soldiers during Golden Coyote, an annual training exercise, held in the Black Hills of South Dakota.

The exercise provides U.S. service members from 11 states and four foreign nations training opportunities in logistical and tactical environments in addition to real world missions such as bridge construction and humanitarian aid.

"We're charged with providing voice and data communication assets to the Regional Support Group," said Brown, who calls Harrisburg, Pennsylvania, home. "We're also pulling voice and data from the signal support elements from the 443rd signal, providing [non-classified Internet protocol router] and [secret Internet protocol router] voice and data through those services."

Brown accepted the position of brigade signal officer, prior to Golden Coyote, after being approached by Lt. Col. Robby Robinson, Executive Officer for 213th RSG.

"I've only been in the position for two to three months, so I'm still assessing my soldiers and their capabilities and we're trying to find common ground, who's good at what, and task them accordingly and share that knowledge amongst the soldiers so that we all learn from each other," said Brown.

Brown and his soldiers began their work in a building on Camp Rapid the 213th RSG used as a headquarters. He established a working network within the building before heading out to the field with his team. While in the field, Brown and his team faced several obstacles.

"We have several FOB's displaced by hundreds of miles, so the communication challenges are going to be unique," said Brown. "The learning curve of some of the communication assets we've had to deploy, due to the displaced locations, is something that some of us haven't touched in several years."

Brown assisted his soldiers setting up various communication equipment such as a radio antennas, which widen the range on military radios and multiple systems such as the deployed digital training campus and a mobile satellite dish enabling Internet connectivity for units in the field.

Spending time in the field is nothing new to Brown who enlisted into the Marine Corps after he graduated high school in 1993.

"I joined the active duty Marine Corp as a parachute rigger [...] then I joined the Marine Security Force in Washington state, served out there for a couple years, and I transferred up to Maine to a cold weather infantry unit up there," Brown said.

During his time in Maine, Brown went to college majoring in criminology. After spending some years in Maine, Brown transferred to Pennsylvania to attend Indiana University of Pennsylvania.

"At that point I was going to the University of Maine, in the Marine Reserves up there as an infantryman, and I wanted to transfer to IUP for criminology program, they had one of the better degree programs for criminology there."

Brown transferred to the Pennsylvania Guard during his time at IUP, leaving the enlisted ranks and joining the officer corps with a direct commission he received from IUP.

My friend's dad was a first sergeant in the signal battalion, so the transition was easy, added Brown.

Despite the challenges he and his soldiers faced, such as weather and technical issues, Brown looked forward to the training during Golden Coyote and had confidence in his soldiers.

"I'm looking forward to the challenges out here. I'm looking forward to getting to collaborate with my soldiers' and build a cohesive team there so we can overcome the challenges that the signal community is going to bring us in the future," said Brown. "I have a good group of soldiers in the section, so we are going to do the best we can to support the [213th RSG]."

*Story by Sgt. Coltin Heller
109th Mobile Public Affairs Detachment, U.S. Army*

SMC & SpaceX—CRADA Now In Place



SpaceX's Falcon 9 v.1.1 launch vehicle. Photo courtesy of NASA.

**COMMAND CENTER
WARREN CHEN, DIRECTOR OF BUSINESS DEVELOPMENT
ATK'S INTEGRATED THERMAL SYSTEMS BUSINESS UNIT**



Warren Chen is the ATK Director of Business Development for the Integrated Thermal Systems Business Unit, out of the Space Systems Division located in Beltsville, Maryland.

Warren has more than 18 years of spaceflight hardware design, analysis, manufacturing, integration and test experience in addition to program management and business operations experience.

Over his career, Warren has held positions at ATK in Manufacturing Engineering, Program Management, Thermal Product Line Management, Spacecraft Systems Engineering, Director of the Thermal Program Office, and Vice President of the Integrated Thermal Systems Business Unit at the Space Systems Division.

Warren holds a Bachelor of Science in Mechanical Engineering from the University of Maryland, College Park and a Master of Science Degree in Systems Engineering from the Johns Hopkins University.

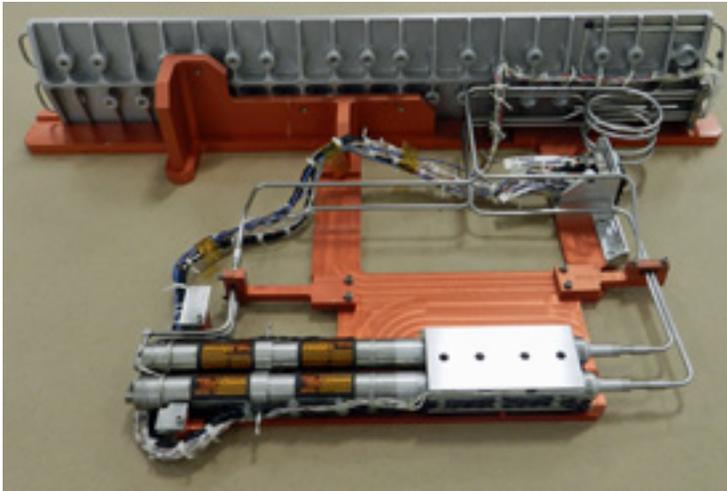
MilsatMagazine (MSM)

Please explain to our readers exactly what "thermal products" encompass in regard to spacecraft.

Warren Chen

ATK has been involved in the cooling and temperature control of satellites for over 20 years. In space, the primary means of thermal control is by conduction and radiative heat rejection. ATK designs to specification and/or builds to print the applicable products for thermal control elements by acquiring heat from the satellite and rejecting the satellite waste heat out into space.

The devices for performing this function consist of passive two phase thermal products that do not contain any moving parts and transport heat using two phase capillary pumped flow. The thermal products that ATK produces consist of heat pipes, aluminum radiators and embedded heat pipe panels with thermal coatings, advanced thermal control devices such as loop heat pipes, loop heat pipe radiators, and deployable radiators. ATK also produces Multi-Layer Insulation (MLI), thermal straps, and thermal storage units using phase change materials.



The loop heat pipe assembly for Lockheed Martin's Global Lightning Mapper (GLM) instrument. Photo courtesy of ATK.

MSM

What is ATK's history as far as the manufacture of thermal products for satellites and launch vehicles? How did the firm decide to enter this crucial market segment?

Warren Chen

ATK's history in thermal products began over 20 years ago in the production of constant conductance heat pipes for spacecraft prime contractors. From our heat pipe past performance, we evolved our flight heritage into the next higher order assemblies in embedded heat pipe radiator panels and integrated thermal systems.

These capabilities were demonstrated in our work on the International Space Station for the 21 foot long radiator and high capacity heat transport assembly that currently support the Central Integrated Truss Assembly. ATK continued to evolve its heat pipe and radiator manufacturing into more advanced thermal products in capillary pumped loops and loop heat pipes with continued research and development activities leading to flight demonstration experiments on various space shuttle flights in the 1990's.

ATK has taken its flight experiment success to flight production products with extensive heritage on high power payload instrument loop heat pipe cooling and deployable radiator systems for defense, commercial, and international programs.

MSM

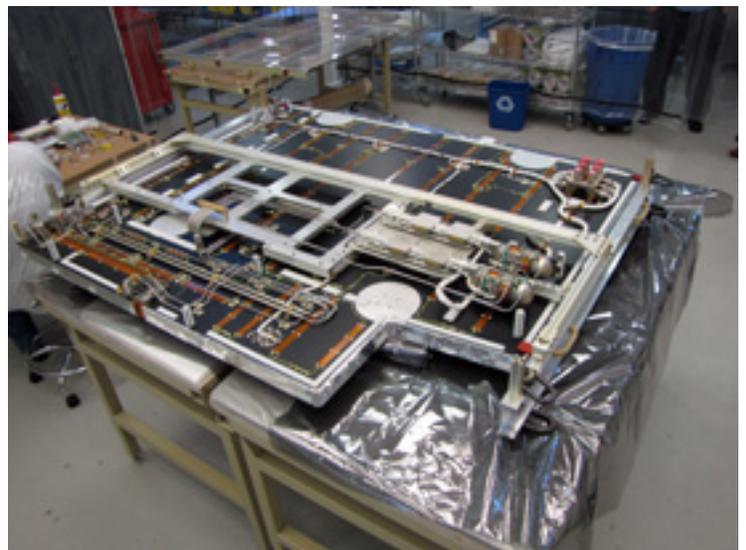
Describe the market for ATK thermal products in terms of your customers. How would you characterize the ATK "sweet spot" for your products?

Warren Chen

ATK produces heat pipes and other thermal products for basically all the major commercial satellite manufacturing primes. Our benefit is in advanced production facilities to gain cost and schedule efficiencies coupled with our thermal technology department's significant experience in two phase thermal engineering.

MSM

What is the value proposition for ATK Integrated Thermal Systems as a global leader in the design, development and manufacturing of heat pipe and two phase heat transfer technology?



Loop heat pipe radiator for Exelis' GOES Advanced Baseline Imager (ABI) instrument. Photo courtesy of ATK.

Warren Chen

ATK's key value proposition is an unwavering commitment to customers that began on our first day of business. Those relationships, combined with best in class facilities and demonstrated superior performance have established us as a leader in space thermal control solutions. During our history, we have

COMMAND CENTER—WARREN CHEN, ATK

developed extensive flight heritage high end performance and no known flight failures in our delivered products.

ATK also has the ability to design a custom solution or build high production volume recurring products. ATK provides customers with a one-stop-shop approach. We are one of the few companies who can provide design and analysis capability, produce heat pipes and then integrate them into the next level assembly, which are most commonly aluminum honeycomb radiator panels.

MSM

Given the fact that ATK-produced parts are on just about every domestically produced satellite—how many approximate hours have ATK heat pipes logged in orbit? What does that say about your manufacturing and testing capabilities?

Warren Chen

We have delivered more than 65,000 heat pipes, over 1,000 radiator panels, and more than 500 custom advanced thermal control systems for many various flight programs. Most of the programs are typically at least 15 year missions. A conservative number of operating hours would be five trillion hours.

MSM

ATK expanded its manufacturing capabilities at the Beltsville, Maryland, site due to demand for the product. How does the one stop shop for integrated thermal solutions benefit your customers?

Warren Chen

ATK recently expanded manufacturing capabilities to support our customer needs and to assure the implementation of lean manufacturing principles into our process through dedicated work cells and manufacturing lines. ATK believes that the one-stop-shop for integrated thermal solutions benefits our customers given our unique capability of producing the heat pipes and embedding them into radiator panels in one single facility. This allows for a more cost effective approach as well as having the heat pipe expertise on site to support the structural build and vice versa.

MSM

Please tell us about some of the company's recent programs, such as the thermal control hardware for the WGS-5 satellite that recently launched and the upcoming WGS-6 satellite that's expected to be launched in August. What else is in the works for ATK?



Radiator panels for Boeing's Wideband Global SATCOM (WGS) satellite. Photo courtesy of ATK.

Warren Chen

ATK has been involved since the first WGS satellite. ATK thermal control hardware is in support of our valued prime customer, Boeing, the manufacturer of the WGS satellites. For the WGS-5 satellite, ATK provided thermal control hardware manufactured at our facility in Beltsville, Maryland. We are looking forward to the upcoming WGS-6 satellite launch later this summer

MSM

What progress has been made in the international market for the acceptance and installation of your products?

Warren Chen

ATK has been a supplier for Europe for more than 15 years supplying heat pipes. ATK recently has been involved with Thales Alenia Space in support of the Equipped Structural Panels to support the Iridium Next Main Mission Antenna. Thales Alenia Space is the prime contractor for Iridium Next as well as the Main Mission Antenna payload designer and manufacturer. TAS has selected ATK for its one-stop-shop capabilities in providing a panel that has the mechanical, thermal, and electrical elements all in one.

MSM

How will the recent relaxation of U.S. ITAR export restrictions on international sales of satellites and components help with ATK's marketing efforts?

Warren Chen

The recent relaxation of U.S. ITAR export restrictions should benefit our thermal products as they have historically been on the ITAR munitions list, and that fact has not always been well received by our European customers. First, this will help from an initial general systems dialogue and applications engineering standpoint. Second, from implementation, we expect to see more efficiency gained in technical data exchange.

MSM

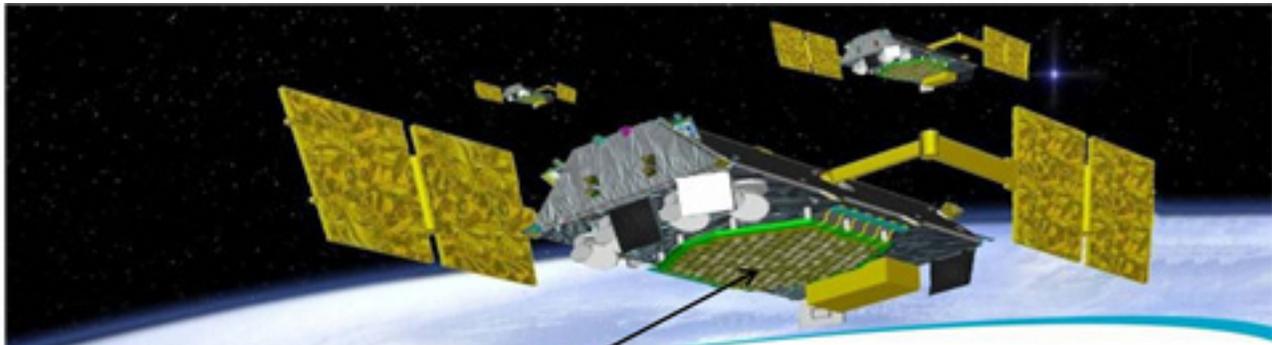
What are the future significant market trends for integrated thermal products?

Warren Chen

The future market trends show that we must continue to provide affordable solutions to our customers and develop new innovative techniques to improve cost, schedule, and performance. At the same time, we will focus on R&D and innovative strategic programs to assure that we are offering the high end thermal technology

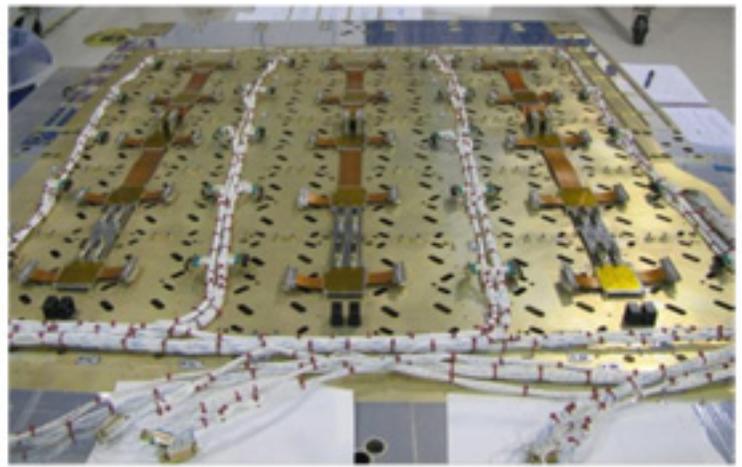
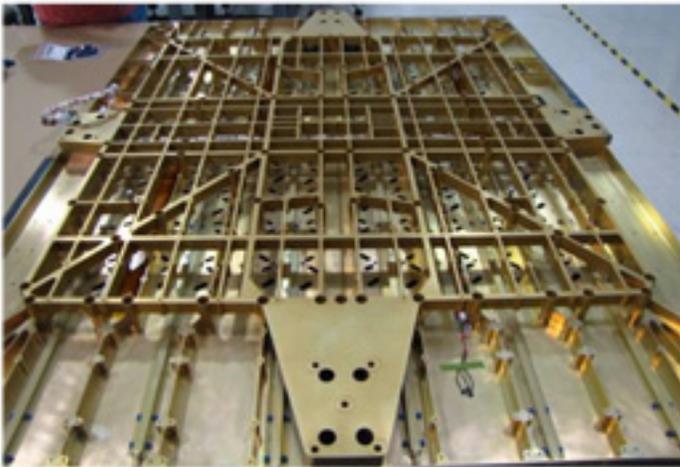


North and south radiator panels for Lockheed Martin's Mobile User Object System (MUOS) satellite. Photo courtesy of ATK.



**Main Mission Antenna
Equipped Structural Panel**

**Iridium Next Satellite
EQM, PFM, and 80 Flight
Sets**



The ATK Equipped Structural Panels provides Mechanical Structural Support, Thermal Control, and Electrical Functional Harnessing for the Iridium Next Main Mission Antenna

that is being demanded for increased payload power, higher flux electronics, and larger satellite throughput capacity demands.

MSM

What additional products and/or services are offered by ATK's Thermal Products Division? What is their importance to the overall mission of the firm?

Warren Chen

Along with the typical production of thermal products, ATK's strength is in its systems engineering and conceptual design. ATK has demonstrated its ability for design to specification in unique applications. These include deployable radiator systems including mechanisms devices and loop heat pipe radiator systems for instruments for NASA and Department of Defense programs.

Within ATK Beltsville, we have the benefit of having the capability of many aerospace disciplined engineers in our Engineering Services and Space Mission Systems business units. We also contribute to the overall ATK space components offerings along with our product sites in San Diego, California, that produce geostationary communications satellite bus structures and antenna reflectors. Our Goleta, California, site produces solar arrays and deployment mechanisms and our facility in Commerce, California, produces propulsion propellant tanks. We produce precision payload composite structures in Magna, Utah.

MSM

What is the ITS future market?

Warren Chen

ATK Integrated Thermal Systems looks to advance in Adjacent Markets where we use our space based products in applications for non-space applications such as aircraft and terrestrial systems.

For more information about ATK and all capabilities, visit the company's website at <http://www.atk.com>

About ATK ITS

ATK Integrated Thermal System (ITS) continues as the acknowledged leader in space thermal systems with best in class, high end systems. ATK specializes in advanced thermal control technology system solutions for our customer's high end architecture needs as well as high volume recurring production products. ATK annually produces more than 4,000 heat pipes, advanced thermal products such as loop heat pipe radiators and deployable radiators, embedded heat pipe aluminum radiator panels, and other thermal control hardware for domestic spacecraft programs, such as Mobile User Objective System (MUOS), Advanced Extremely High Frequency (AEHF) and Wideband Global SATCOM system (WGS). The ITS unit is also expanding into adjacent and emerging markets that include extreme thermal regime terrestrial systems for applications such as aircraft and submarines. As the U.S. leader in the production of satellite parts and components, nearly every domestically produced satellite in orbit possesses an ATK-produced part.

CHALLENGES FOR PROTON

By Jos Heyman, Senior Contributor

Following the somewhat spectacular failure of a Proton M/DM3 launch vehicle on July 2, 2013, the launch vehicle has been grounded pending an investigation into the cause.

An early analysis has suggested that the start occurred too early. This caused the control system to treat this as an emergency situation and started to divert the rocket away from the launch pad to a safe distance of a few kilometres from the launch site, just the way the control system was programmed to do.

The failure impacted on a number of Proton launches that had been scheduled for the remainder of the year: Astra-2E (late July 2013) as well as Sirius FM-6, Ekspress AM-5, Turksat-4A and a Russian military satellite.

As the only launch vehicle in the Russian inventory not derived from a military missile, the Proton launch vehicle was conceived by OKB-52 under V.N. Chelomei in the early 1960's as a heavy two stage vehicle that could place large military payloads into orbit. With the demise of the OKB-52 in 1965, the design was taken over by Krunichev.

The basic Proton, which was also known as UR500, was a two stage vehicle that had a length of 32.10m and was capable of placing 8,400kg. into a low-Earth orbit. The first launch was on July 16, 1965.



The first development was a three stage version known as the Proton K that was introduced in 1968 and was intended to place the Almaz military space station in space and to also undertake manned circumlunar flights.

With the cancellation of those programs, the vehicle was used for the Salyut and Mir programs. The Proton K had a capacity for 19,760kg. payloads for placement into a low-Earth orbit and the vehicle remained in use until 2002.

The addition of a fourth upper stage was just a matter of time and, using the Block D upper stage developed by the Korolev design bureau, this resulted in the 55.40m Proton K/D, which made its first flight on March 10, 1967.

The Block D upper stage was initially developed for the lunar program and was also used for a number of interplanetary missions. This upper stage was originally planned for use with the N1 lunar launch vehicle, as well as the Energiya launch vehicle.

The Proton K was also matched with an improved D upper stage to create the Proton K/D-1 and the Proton K/D-2, the latter used for launching interplanetary spacecraft.

The Block DM upper stage was a further development and was used as an upper stage for the Proton K in several combinations.

The Proton K/DM version was used to place, among others, the Russian Ekran and Gorizont communications satellites in orbit, while the Proton K/DM2 version had a guidance system incorporated in the fourth stage and was used extensively to place Ekspress and Raduga communications satellites, as well as Iridium satellites, into orbit. The Proton K/DM2M was a further improved version.

The Proton K/DM3 was another version of the Proton K-DM2M, with the upper stage adapted to accommodate the FS-1300 satellite platform and similar payloads, whereas the Proton K/DM4 was a version optimized for the Hughes/Boeing 601 satellite. A Proton K/DM1 version, which was to be used with the Lockheed Martin AS4000 satellite platform, never reached flight status. Finally, the Proton K/DM5 was a version of the DM2M with an upper stage configuration to accommodate heavier payloads.

Another upper stage used with the Proton K was the Briz M that replaced the Block DM. The Briz M was constructed by Khruinichev and was a derivative of the Briz K that had been used with the Rokot small launch vehicle.

| Type | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|-----------------|----------|-----------|-----------|----------|
| Proton | 6 RD-253 | 4 RD-0210 | | |
| Proton K | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | |
| Proton K/D | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58 |
| Proton K/D-1 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58M |
| Proton K/D-2 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58M |
| Proton K/DM | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58M |
| Proton K/DM2 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |
| Proton K/DM2M | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |
| Proton K/DM3 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |
| Proton K/DM4 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |
| Proton K/DM5 | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 RD-58M |
| Proton K/Briz M | 6 RD-253 | 4 RD-0210 | 1 RD-0212 | 1 S5.98M |
| Proton M/Briz M | 6 RD-275 | 4 RD-0210 | 1 RD-0212 | 1 S5.98M |
| Proton M-DM2 | 6 RD-275 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |
| Proton M-DM3 | 6 RD-275 | 4 RD-0210 | 1 RD-0212 | 1 RD-58S |

Details of Proton launch vehicles

| Type | First flight | orbital | failed |
|-----------------|------------------|---------|--------|
| Proton | 16 July 1965 | 3 | 1 |
| Proton K | 16 November 1968 | 27 | 4 |
| Proton K/D | 10 March 1967 | 28 | 11 |
| Proton K/D-1 | 9 August 1976 | 11 | 0 |
| Proton K/D-2 | 7 July 1968 | 3 | 0 |
| Proton K/DM | 26 March 1974 | 61 | 5 |
| Proton K/DM2 | 12 October 1982 | 109 | 4 |
| Proton K/DM2M | 20 January 1994 | 15 | 0 |
| Proton K/DM3 | 30 March 2002 | 26 | 0 |
| Proton K/DM4 | 25 May 1997 | 1 | 0 |
| Proton K/DM5 | 6 June 1997 | 2 | 0 |
| Proton K/Briz M | 5 July 1999 | 3 | 1 |
| Proton M/Briz M | 7 April 2001 | 65 | 1 |
| Proton M/DM2 | 25 December 2007 | 6 | 0 |
| Proton M/DM3 | 5 December 2010 | 0 | 2 |

Proton launch record to 30 June 2013

CHALLENGES FOR PROTON (CONT.)



A Proton K launch. Photo courtesy of Khrunichev Space Center.

Eventually, the Proton K was replaced by the Proton M, which had different first stage engines. The Proton M was matched with the Briz M as well as the DM2 and DM3 upper stages.

Between January 1, 2000, and June 30, 2013, there were 119 launches of the Proton (all versions), of which three were launch failures, two of which occurred since 2010.

During the same period of time, there were 155 launches of Khrunichev's other launch vehicle, the Soyuz (all versions), of which three were failures, with two occurring since 2010.

In comparison, during the same period, there were 63 launches of the Atlas launch vehicle (all versions) and 87 launches of the Delta launch vehicle (all versions), all without any failure—there were 65 Ariane 5 launches and 120 Long March (CZ) (all versions) launches, each suffering only one failure.

Being concerned about the image of the Russian space industry in the commercial launch market, the Russian government has ordered a high level investigation into the recent failure. It is understood that the investigation is not simply restricted to Khrunichev's engineering practices—the investigation will also extend to the management levels of the company.

About the author

Jos Heyman is the Managing Director of Tiros Space Information, a Western Australian consultancy specializing in the dissemination of information on the scientific exploration and commercial application of space for use by educational as well as commercial organisations. An accountant by profession, Jos is the editor of the TSI News Bulletin and is also a regular contributor to the British Interplanetary Society's Spaceflight journal. Jos is also a Senior Contributor for SatMagazine.



Proton-M launch vehicle and service tower. Photo courtesy of Khrunichev Space Center

THE HPA CORNER: BUILDING STRONG PARTNERSHIPS

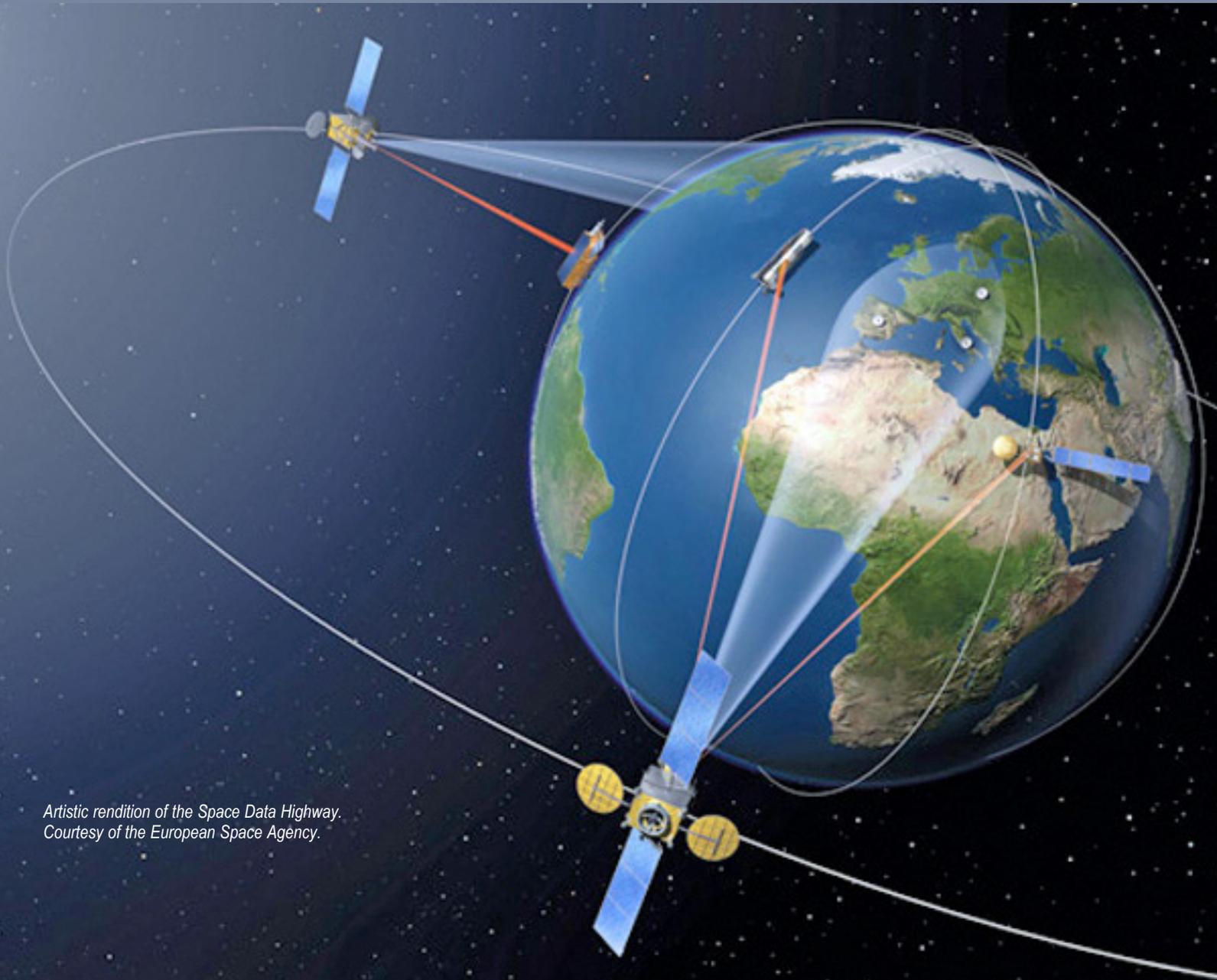
By Dylan Browne, Vice President Business and Market Development, Astrium Services Government



To measure the success of a hosted payload program, one should measure the success of the underlying partnership. This may be more difficult to assess for public-private partnerships as commercial and governmental entities measure success differently; however, success for each can be defined and evaluated. One such example is the SpaceDataHighway, which is being developed and implemented within a

Public-Private Partnership program between the European Space Agency (ESA) and Astrium Services. The SpaceDataHighway will consist of two ESA telecommunication payloads in geostationary orbit which will enable broadband, bi-directional data relay between Low Earth Orbit (LEO) satellites and associated ground segment, via either of the payloads.

Currently one portion of the SpaceDataHighway network is already providing data relay services for the Sentinel satellites within the European initiative Global Monitoring for Environment and Security (GMES), facilitating a rapid downlink of large volumes of imagery.



Artistic rendition of the Space Data Highway.
Courtesy of the European Space Agency.

This landmark public-private partnership demonstrates the mutual benefits provided to both commercial and government entities. Astrium Services, on the one hand, is in a unique position to implement and operate this revolutionary service, capitalizing on its extensive expertise as an operator of Earth Observation and telecommunications satellites.

On the other hand, the government entity, ESA will benefit from access to readily available commercial capacity without incurring the costs of building-out its own network, both space and ground segments.

The benefits of developing strong government-industry partnerships are key to exploring new opportunities in an era of government budget austerity, and building strong relationships for future collaboration. The commercial space industry should continue to provide leadership by identifying additional, innovative opportunities for affordable government space capabilities, by developing effective partnerships through hosting payloads on commercial spacecraft.

The following question was posed to a roundtable of members of the Hosted Payload Alliance to obtain their thoughts on this subject.

What does industry view as essential elements for building an effective, mutually beneficial public-private partnership for hosted payloads?

"With looming budget cuts and increasing demand for space-based solutions, government agencies are looking for innovative and cost-effective ways to get missions into space when they don't necessarily have the resources to make it happen any time soon. Hosted payloads are a valuable alternative for missions that agencies can't afford on their own. In order to make hosted payloads a viable option, both sides will have to work together on the unique mission requirements and overcome cultural apprehensions regarding commercial systems to enable hosted payloads to offer significant benefits to the industry," **Don Thoma**, President and CEO, **Aireon**.

"One of the essential elements in the successful hosting of government payloads on commercial satellites is trust in the ability of the commercial company to successfully fulfill the contract. Commercial companies can provide the

government with insight into the hosting program and its activities; however, companies with a successful track record in satellite procurement, launch and network operations that have met the government's requirements as an approved vendor can save the government time and money if they are allowed to move forward without the oversight traditionally employed by the U.S. government," **Nancy Nolting**, **Intelsat General Corporation**.

"In order for hosted payloads to become a mainstay in the DoD's Space Enterprise, industry and government must collaborate and jointly adopt repeatable business processes based on tailored DoD

Acquisition practices that don't compromise the agility and affordability inherent in the commercial space industry. Users formulating DoD's requirements and industry responding with HP opportunities must offer compelling business cases that convince programmers that the ventures are affordable, achievable and will result in real cost savings in the future years defense program (as opposed to merely cost avoidance). Furthermore, the acquisition community must be empowered at the PEO-level to execute with agility within the timeframes typical of commercial space deals and adopt the willingness to manage the programs according to established and proven commercial best practices," **Chuck Cynamon**, Vice President, U.S. Government Business Development and Strategy, **SSL**.

"Effective partnerships for hosted payloads will occur once a policy for hosted payloads is adopted. Industry is ready, but the government requires a senior level champion chartered to develop the path to overcome implementation challenges and enable commitments from the commercial sector. To date, most hosted payload activities rely on foreign commitment or licensing. This is because the government decision making process is substantially longer than the private decision making process. Also, it is unclear which part of the overall government architecture or mission portfolio could be best supported by hosted payloads vs. dedicated government spacecraft. As a result, industry is uncertain about where to focus its efforts. Industry is willing to make investments, but it needs some form of commitment from the government to use the system when it is launched, particularly given that private customers are willing to make these kinds of commitments," **Jim Simpson**, Vice President, Business Development, **Boeing Space & Intelligence Systems**.

"There are many essential elements to any hosted payload arrangement. At the core of the relationship is a business model that's beneficial to the satellite operator, the satellite manufacturer and the hosted payload client. Financial considerations that benefit both the satellite operator and the hosted payload client are probably the most basic aspect of the business model. As always, a thorough understanding of the contracting process goes a long way in ensuring a successful partnership. Finally, the need for adequate planning and realistic expectations on the part of the hosted payload owner are key ingredients, especially when commercial satellites are involved. A technical understanding of spacecraft operations by the hosted payload client may be acquired over time, but some familiarity with standard on-orbit operation

procedures up front will help all the other pieces and parts work for both parties from the beginning," **Tim Frei**, Vice President Communication Systems, **Northrop Grumman Aerospace Systems**.

Hosted Payload Alliance Charter Justification

The Hosted Payload Alliance (HPA) is a satellite industry alliance formed to increase awareness of the benefits of hosted government payloads on commercial satellites.

The U.S. National Space Policy published in 2010 calls for an increasing role for commercial space to meet government requirements. It also explicitly directs the use of non-traditional options for the acquisition of space goods and services, and cites hosted payloads as one of these non-traditional options. The policy notes that public-private partnerships with the commercial space industry can offer timely, cost-effective options to fill government requirements.

Goals

- Serve as a bridge between government and private industry to foster open communication between potential users and providers of hosted payload capabilities.
- Build awareness of the benefits to be realized from hosted payloads on commercial satellites.
- Provide a forum for discussions, ranging from policy to specific missions, related to acquisition and operation of hosted payloads.
- Act as a source of subject-matter expertise to educate stakeholders in industry and government.

Membership in HPA is open to satellite operators, satellite manufacturers, system integrators and other interested parties.



HPA Roundtable members, from left to right:
Don Thoma of Aireon; Nancy Nolting of Intelsat General; Chuck Cynamon of SSL;
Jim Simpson of Boeing Space & Intelligence Systems; Tim Frei of Northrop Grumman Aerospace Systems.

**COMMAND CENTER
CHRISTOPHER FOUNTAIN, PRESIDENT & CEO
KRATOS SECUREINFO**



As president and chief executive officer, Christopher Fountain provides strategic direction to SecureInfo and is responsible for leading overall operations. He is focused on expanding upon SecureInfo's success by maintaining a customer-centric, results-oriented culture.

Mr. Fountain is recognized for his expertise and passion across a spectrum of cybersecurity issues and technologies. He has testified before the U.S. Congress regarding pending cybersecurity legislation and is directly involved in SecureInfo customer strategies to effectively protect information assets used across the Federal government and critical infrastructure industries.

Mr. Fountain has a successful track record of leading and growing companies, with more than 23 years of experience in the information technology industry. His experience includes work with security, enterprise resource planning, supply chain, content management and infrastructure software and services companies, serving customers across many industries. He has held senior executive leadership and board positions over the past 16 years. Mr. Fountain has led global operations for companies headquartered in the United States and the United Kingdom, where he lived in 2004 and 2005.

Mr. Fountain graduated cum laude from the University of Michigan with a B.S. degree in Industrial & Operations Engineering.

MilsatMagazine (MSM)

What makes Kratos SecureInfo different from other organization involved in the business of cybersecurity?

Chris Fountain

Kratos SecureInfo is exclusively focused on protecting information assets in support of our customer's mission. We address systems and networks of all types and sizes, including large scale, highly classified SATCOM networks that deliver warfighter communications.

We are one of the few cybersecurity providers that understand the SATCOM industry. We were recently designated as an Air Force Agent of the Certifying Authority (ACA) for Space Systems. This allows us to leverage our satellite and cybersecurity subject matter expertise to provide comprehensive information security assessments in support of space systems. In addition, Kratos SecureInfo also recently introduced a new SATCOM Cybersecurity Assessment service which commercial satellite operators and service providers can use to proactively reduce their risk and to evaluate readiness in advance of regulations and enforcement.

Kratos SecureInfo is also unique in that we work within a larger organization that is an industry leading provider of a broad suite of SATCOM solutions that ensure the reliability and availability of these networks. We work in close coordination with other Kratos business units to bring in-depth cybersecurity and satellite expertise

```
error_reporting(E_ALL ^ E_NOTICE);
```

```
POST /DataRetrieve HTTP/1.1
```

```
Host: 192.168.1.1
```

```
Content-Type: application/soap+xml; charset=utf-8
```

```
Content-Length: 3932
```

```
<?xml version="1.0"?>
```

```
<soap:Envelope soap:encodingStyle="">
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```

```
<m:SecurityArray>
```

```
<m:PasswordIn>*****</m:PasswordIn>
```

```
</m:SecurityArray>
```

```
</soap:Body>
```

```
</soap:Envelope>
```

COMMAND CENTER: CHRISTOPHER FOUNTAIN, KRATOS SECUREINFO

and solutions in a range of areas to our SATCOM customers. These areas include cyber protection for satellite ground networks, interference detection and geo-location for signals, situational awareness of the network, RF link monitoring and assurance and physical security for critical infrastructure.

MSM

When was SecureInfo acquired by Kratos and what made the acquisition such a good fit?

Chris Fountain

SecureInfo was acquired by Kratos in November of 2011 and was a natural fit for Kratos, given its national security focus and strong interest in building a cybersecurity focused organization. We have the best of both worlds—a highly focused team of cybersecurity experts and the resources and reach of a billion dollar public company. Working to help some of the most security conscious organizations in the world meet their mission objectives has, and continues to be, an exciting challenge. Doing business as a part of Kratos has opened new opportunities for us.

MSM

What services and solutions does Kratos SecureInfo provide and what is your role within the company?

Chris Fountain

With more than 20 years as a leading cybersecurity firm and hundreds of years of cumulative field experience, Kratos SecureInfo serves as a trusted and proven advisor to its customers. Federal agencies, government solution providers and companies in the critical infrastructure industries rely on us to improve their cybersecurity posture. Kratos SecureInfo delivers a range of solutions and services including cloud security, continuous monitoring, operational cybersecurity and cybersecurity risk management services to our customers.

My role is focused on leading overall operations, providing strategic direction and taking our success to the next level of growth. Part of my role also includes working closely with other Kratos divisions to capitalize on the internal synergies available to us.

MSM

What do you see as the cybersecurity challenges affecting the satellite industry?

Chris Fountain

Historically, satellite networks have been isolated from other systems, but change is underway. It's well accepted now that an "air gapped" system is not necessarily a secure system. Today, SATCOM networks are an integral part of a larger network, which introduces new cybersecurity issues. Using an air gap as a security measure is no longer adequate. The line between SATCOM networks and IT networks have blurred substantially—especially with stovepipe serial technologies moving to lower cost and interoperable IP-based technologies. Newer IP based systems are bringing additional cybersecurity risks. This is against an environment where cyber-attacks and threats continue to increase.

MSM

What are the key regulations required today in terms of security?

Chris Fountain

With the increasing number of cyber-attacks, the U.S. government is placing even more emphasis on cybersecurity risk management to combat the ever changing threats. A good example is the DISA Future COMSATCOM Services Acquisition (FCSA) contract which requires compliance with NIST Information Assurance (IA) standards.

Another example is the latest revision of the Committee on National Security Systems Policy 12 (CNSSP-12) which requires compliance with IA standards for the entire SATCOM system life cycle. It is becoming clear that cybersecurity legislation will soon likely require the application of NIST IA standards for all US critical infrastructure, including SATCOM communication.

MSM

What are the potential effects of these regulations?

Chris Fountain

The effect is that compliance regulations will eventually be enforced on critical infrastructure companies, including commercial satellite operators and service providers. Cybersecurity compliance will become a cost of doing business and early adopters will have a competitive advantage. Compliant bids will enable enforcement, creating barriers to entry for others.

There will be a need for more control and planning over the implementation of compliance efforts and ongoing compliance management and measurement. By taking a pro-active approach, organizations can ensure compliance efforts support and enable operations versus dictating them.

MSM

What makes satellite systems different from other systems from a security standpoint?

Chris Fountain

The operational issues for satellite systems are different from the ground IP network paradigm. A good example is the limitation on how encryption can be used on satellite systems based on bandwidth constraints. Ensuring a strong security posture for satellite systems requires a deep understanding of the information security controls that need to be implemented across systems, especially commercial satellite systems. Information system security controls need to be adapted and applied to address the technical challenges and needs of satellite systems.

MSM

From a satellite perspective, what steps should organizations undertake to ensure a strong, security posture?

Chris Fountain

First, you need to gain a complete understanding of the existing security posture. This is critical to the other steps and tasks in the process. Kratos SecureInfo launched the SATCOM Cybersecurity Assessment to serve this specific purpose. Using a risk-based management approach is key to assuring secure SATCOM development and operations. An effective security program incorporates both technical and non-technical information security controls. From a satellite perspective some key areas to focus on include, Space and ground segments, Tracking, Telemetry and Command (TT&C) functions, Uplink and Downlink transmissions, and Network performance. Organizations should develop a comprehensive security plan to mitigate identified cybersecurity risks and vulnerabilities in the context of existing and likely threats. In addition, they need to create an ongoing program known as continuous monitoring to maintain a strong security posture and to manage risks.

MSM

A key need for warfighters is the ability to receive information in a secure and timely fashion—how does Kratos SecureInfo facilitate this requirement to help save lives and shorten missions?

Chris Fountain

The information assurance solutions and services we provide help to mitigate IT security risk and ensure continued operational use of military enterprise systems in support of the warfighters' mission. We are experts in assuring the critical technologies that provide information superiority for the military.

Two great examples include cloud environments and satellite systems. As a Federal Risk and Authorization Management Program (FedRAMP) Third Party Assessment Organization (3PAO) we ensure that Cloud Service Providers (CSPs) meet stringent security requirements before they can provide cloud services to the government. In addition, with so much dependence from the military on satellite communications, we deliver a SATCOM Cybersecurity Assessment that helps commercial satellite providers ensure their systems are secure and provide the communications the Warfighter needs to be successful.

We are also a Special Agent of the Certifying Authority (ACA) for the Air Force Space Command (AFSPC), where we provide comprehensive information security assessments in support of space systems.

MSM

Given your wealth of experience in this industry, what project or projects have brought you the most satisfaction?

Chris Fountain

We currently serve some of the most security conscious and mission critical customers in the government. I'm proud of the work we do securing Army networks across the Middle East and Southwest Asia. We work at Camp Arifjan in Kuwait performing 7x24 monitoring over networks critical to warfighter operations. In addition, we've had the pleasure to work closely with the Pacific Air Forces (PACAF), the U.S. Air Force major command with operations all over the Pacific. We are involved in helping the Air Force secure systems and networks used across the entire Pacific region, including places like Diego Garcia, Guam, Korea, Japan and Alaska.

On the commercial side of things, we work with companies like Microsoft and Amazon Web Services and a host of other industry leading cloud service providers where we apply U.S. government

cybersecurity frameworks to their cloud computing solutions. This works takes us into the exciting and quickly evolving world of cloud computing.

MSM

How will your division work within the new budgetary guidelines due to sequestration?

Chris Fountain

We've been working with budgetary constraints for years. Cybersecurity continues to be a high priority for the government, but sequestration certainly brings tighter constraints. Our approach is to provide a very good value for every dollar our customers invest with us. We are also very flexible in working with the government to ensure their security goals are met even during these challenging economic times. By helping our clients manage risk and ensure compliance they often are also able to increase the cost effectiveness of their operations. Moving to the cloud is a great example of where agencies can increase cost savings, while enhancing security at the same time.

MSM

Lastly, as more and more agencies and commercial companies see the need for security, where do you foresee the technologies taking us over the next year or two? Is Kratos SecureInfo prepared to address these areas?

Chris Fountain

As the need for security continues to increase we see cloud computing and satellite communications as two rapidly evolving areas. Cloud computing is becoming more and more important to the way computing resources are delivered and consumed by government and commercial organizations. The large cloud service providers realize that security concerns are one of the biggest obstacles to adoption. This has led to vastly improved security in the cloud which will only improve over time.

From a satellite perspective, we believe cybersecurity legislation will soon require the application of NIST Information Assurance (IA) standards for all U.S. critical infrastructures, including satellite communications.

We have delivered thousands of cybersecurity assessments and validations to commercial and government organizations and have extensive cloud and satellite expertise, so we are well prepared to help our clients address these critical areas and others as they evolve.

UNCLE SAM NEEDS TO LOOK TO INDUSTRY AS A MISSION-CRITICAL PARTNER

By Rick Lober, Vice President and General Manager, Defense & Intelligence Systems, Hughes Network Systems, LLC

Today's warfare and homeland defense operations no longer begin with warfighters on the front lines. In the new age of communications, information is foundational to all military missions. Our warfighters, whether in theater, in garrison or back home at headquarters require net-centric communications to obtain and share intelligence, surveillance and reconnaissance (ISR) information in real-time.

As we drawdown from current operations in Central Asia, and continue to monitor ongoing challenges that may require multi-national support, such as the current uprising in Syria, airborne ISR becomes increasingly crucial for protecting our warfighters and civilians as well as enabling mission success.



Airborne ISR is accomplished over SATCOM. The Department of Defense (DoD) partners with commercial satellite providers to acquire approximately 80 percent of its SATCOM bandwidth used today. Given the increased need for ISR overseas and at home, helping to monitor borders as well as being used in disaster/emergency response situations, the DoD and industry should continue to work together to find solutions that not only meet the mission, but also to assist in increasing capabilities and providing more cost-effective uses of leading technologies.

Industry partners have an inherent need to continue to innovate and evolve their solutions to provide the highest quality at the lowest cost, given competition in the marketplace. Today's satellite industry is able to help the DoD fill its SATCOM bandwidth gap with manned and unmanned, fixed or rotary wing solutions that deliver real-time video, voice and data to support the DoD's airborne ISR needs.



In addition to airborne ISR, the DoD faces the challenge of meeting the growing need for more bandwidth to support highly mobile users in a variety of environments. The vision for the Future Force is a smaller, more agile operation. Thus, warfighters may have greater distances to cover in shorter timeframes making situational awareness more critical, ensuring the right resources are deployed to the right areas. The commercial satellite industry is well positioned to partner with the DoD to continue to drive enhanced ISR, efficiencies and cost-cutting measures through proven airborne solutions that provide the following benefits:

Fueling In-Flight Communications

Bandwidth is considered the "fuel" that powers military communications; however, a bigger pipeline is needed to carry data-rich information that includes live, streaming video to and from aircraft as they complete their missions across the world. In addition to video-based ISR implementations, SATCOM can support the fleet, allowing government and military leaders continual connectivity whether traveling short distances or across the globe, ensuring Command and Control is always informed and accessible. Commercial satellite partners can offer global fleets of satellites, allowing for seamless streaming when moving from one area of satellite coverage to another.

Resilient Data In The Air

Technology continues to evolve at an exponential pace. Potential future adversaries may have the capability to attempt to interfere with communications capabilities. Through an ongoing BAA, the USAF Space and Missile Command, along with numerous

Photo of UAV on an ISR mission is courtesy of Hughes D&IS





industry partners, is studying and demonstrating how lower cost, commercial techniques can be applied to this problem for operations in a “contested” environment. In addition, new modem technologies coupled with adaptable beam forming within the satellite offer even nearer-term solutions to this evolving threat.

Meeting Technological & Budget Challenges

The current fiscal challenges make it cost-prohibitive for the DoD to develop a new fleet of satellites in the near future. Commercial satellite is a more cost-effective alternative that enables the DoD to reduce the stress on its own satellite networks while meeting bandwidth and budget requirements. Using a bandwidth allocation scheme ensures optimal utilization of satellite bandwidth by releasing assignments to idle terminals, resulting in lower operational costs and improved efficiency.

Commercial SATCOM providers deliver bandwidth-efficient solutions to help reduce costs while providing the most advanced airborne communications-on-the-move (COTM) technologies available to military and government customers.

Hughes has developed some of the most advanced bandwidth-efficient technologies to provide high throughput and real-time video, audio and data sharing while implementing cost-cutting measures by not requiring often overestimated amounts of dedicated bandwidth available at all times.

More Than Competent Delivery

The commercial SATCOM industry has proven through decades of operation that it can deliver solutions more quickly and cost-effectively than equivalent government-sponsored programs. Warfighters depend on COTM to make the best informed decisions that positively affect the security of our nation and that of our Allies. Commercial SATCOM stanww fill the gap for increased satellite capacity.

To view a 30 second video presentation on the Hughes airborne technology, please visit: <http://vimeo.com/39436266>

About the author

Rick Lober joined Hughes in late 2008 as Vice President and General Manager of the Defense and Intelligence Systems Division (DISD). He has more than 25 years experience with COTS-based and full MIL communications and intelligence systems, starting as a design engineer and progressing to a P&L executive. He had previously worked at Cubic Communications, Inc. and Watkins-Johnson Company.



SATELLITE TECHNOLOGY DELIVERS DEPENDABILITY FOR DISASTER CRISIS MANAGEMENT

By Anu Sood, Channel Marketing Manager, SkyWave Mobile Communications

According to The International Disaster Database (EM-DAT), 196 natural disasters occurred during 2011, worldwide, affecting more than 85 million people and resulting in an estimated \$290 billion in economic damages. Combined with the amount spent on natural disaster recovery and response-related activities, the cost for worldwide natural disasters is estimated to be \$380 billion.

Fortunately for emergency preparedness managers, communication technology is quickly advancing with new, improved ways to collect and manage the vital information needed before, during and after natural disasters. One technology that is changing the face of emergency preparedness is satellite machine-to-machine (M2M) communication. The dependability of the technology results in better communication for emergency preparedness, quicker evacuations, and improved logistics during post-disaster crisis management.

Hawaii Improves Disaster Preparedness With Satellite Technology

Hawaii State Civil Defense is a cutting edge example of what can be accomplished with satellite M2M technology. As part of its mandate, State Civil Defense maintains the state-wide outdoor siren warning system. It is designed to alert the public to any emergency that may pose a threat to life and property. In addition to natural and technological hazards, the siren warning system could be used for terrorist incidents or acts of war.

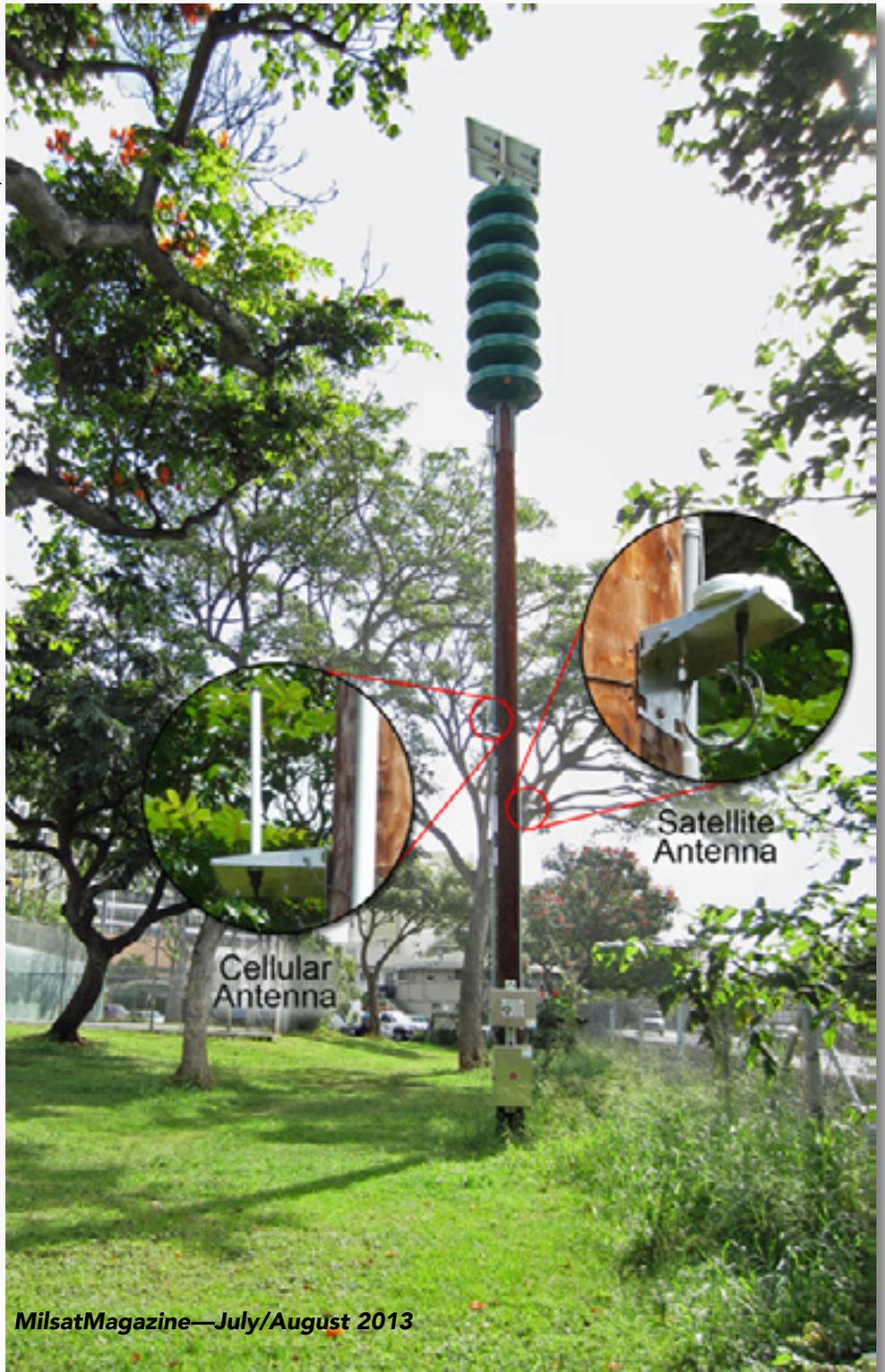


Hawaii's siren system ran on a "decades-old high-frequency radio system", according to George Burnett, Hawaii Civil Defense Telecommunications Branch Chief. "Our sirens pretty well exceeded their life cycle. It was taking extraordinary efforts from our maintenance staff to keep them running properly. You can't just have a technician with a meter at each siren checking electrical currents to see if it's going to work."

The VHF/800MHz radio frequency sirens installed across all of the islands could not be monitored from a central location. Unless there was a reason to visit a specific siren, technicians had almost no way of knowing when a siren was malfunctioning or had completely stopped working. The preventive maintenance check was scheduled to be performed only twice a year. As there were no remote monitoring capabilities defining when to follow up on reported issues, such as a failed siren, the crew needed to visit the site, conduct tests, return to the office to source replacement parts and then return to the site to make repairs. Between the age of the siren system and the

amount of time and budget necessary to maintain it, Hawaii needed to upgrade the state-wide outdoor siren warning system that would alert the public properly.

Any new state-wide replacement warning siren control system had to meet a long list of requirements:



- A state-of-the-art solution that would abide by the Federal Communications Commission's mandate that states move away from high bandwidth communications to one that uses lower bandwidth
- A unified and standardized control system that would work across all of the State's counties
- The ability to remotely monitor and test area-specific sirens regardless of the island they were located on
- Technology that withstood Hawaii's geographical topology and allowed sirens to be installed where previously not possible
- Communication redundancy to ensure all sirens were activated to ensure proper warnings

Hawaii worked with SkyWave and its Solution Provider, Federal Signal, a provider of safety and security solutions, to develop the new statewide siren system.

The system relies on M2M (machine-to-machine) satellite hardware from SkyWave and cell towers to transmit data from remote sites to the central office and provide total control and execution of the warning system. The new sirens use solar panels and batteries rather than relying on the electrical grid.

By the time the project is completed, a total of 490 sites will be using Federal Signal sirens and SkyWaveM2M terminals to warn residents of possible emergencies. The benefits of the alarm system include:

Redundancy: "The sat/cell solution gives us better ability to expand in areas where we don't have radio coverage," explained Tom Simon, Systems Engineer at Hawaii Civil Defense. "Everywhere we have a siren currently installed, we're able to verify that cellular and satellite service is available. This is the most foolproof way to make sure that the sirens will sound during an emergency."



Efficiencies: "Our standard system allows us to monitor and test sirens from our office in Oahu. We no longer have to rely on the public to report a failed siren," said Simon. "As well, the time spent having to physically verify the issue, head back to the office to find parts and then return to fix the problem, is eliminated. The new system includes the ability to query and change the status of specific sirens; confirm that sirens operate as expected during tests and emergencies; monitor the solar charger, battery voltage; and alert authorities if someone intrudes into the system."

Budget-Wise: "Buying new, lower bandwidth 800 MHz trunk radios costs about \$570,000 more than leasing space on commercial satellite and cellular networks," Burnett said. "The service cost of operating sirens via satellite and cellular is \$11 per month. Amortized over a 10-year period, combined with the lower cost of related equipment, there was a cost advantage."

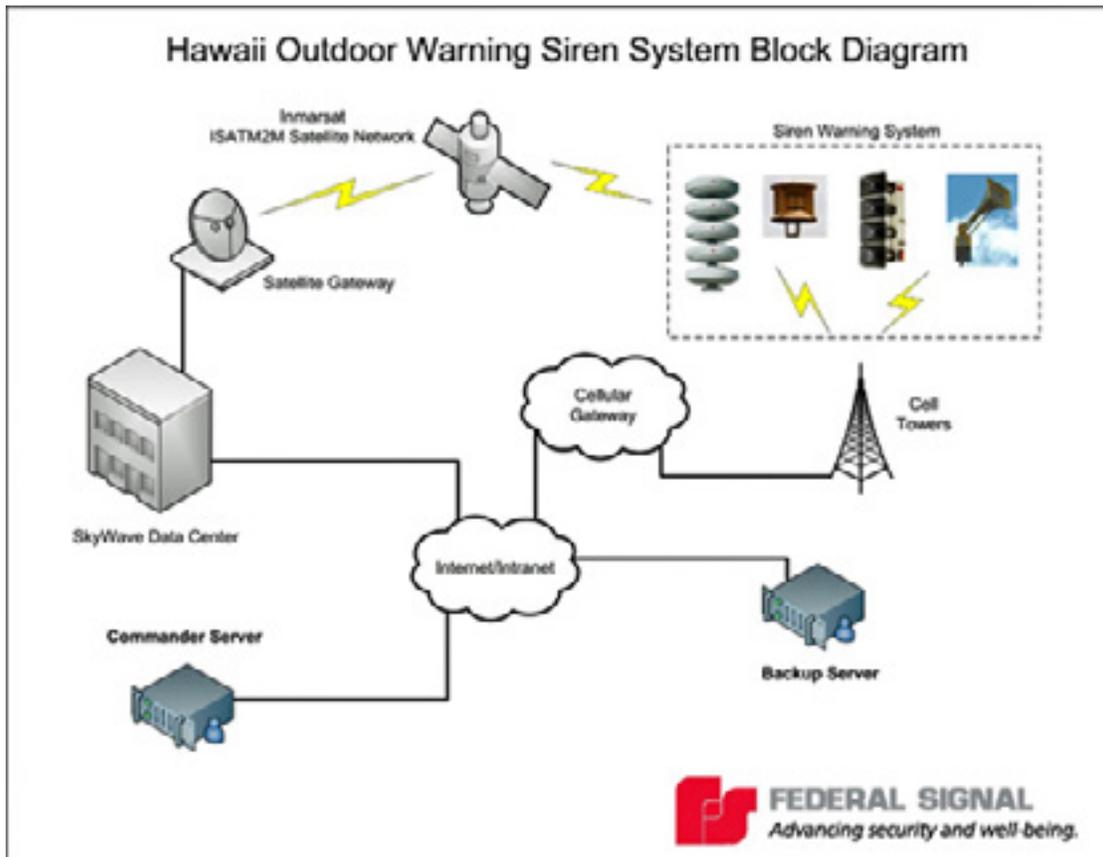
Total Visibility During Inclement Weather

Satellite M2M communication can also play a critical role in predicting the effects of natural disasters through weather monitoring. Early detection of natural disasters is a considerable part of public preparedness and safety. This type of weather monitoring often involves detecting and monitoring unusual geographic or weather fluctuations.

A variety of environmental elements can be monitored, including the strength of coastal tides; humidity, rain levels, wind speed, temperature; air pressure and air quality.

Satellite M2M is an efficient way to collect and transmit data from weather instruments or data loggers connected to sensors. This technology also offers the added benefit of near real-time data frequency, transmitting as frequently as needed at any time of the day.

By collecting full weather information in real-time, governments can model events that may affect public safety. Communities can be advised in advance of the high risk areas and how to protect themselves. Disaster warnings can also be issued earlier allowing the necessary precautions or



SATELLITE TECHNOLOGY DELIVERS DEPENDABILITY... (CONT.)

plan evacuation procedures to be executed before the high-risk event occurs.

Fleet Management During Emergencies

Once the sirens have been activated, fleet tracking and logistics play a large part in rescue and recovery operations. From first responders to clean-up crews, fleets of vehicles are heavily used during and after the crisis. When cellular and radio systems are unavailable, mobile workers cannot report on the status of affected areas or request additional assistance.

Satellite M2M technology can play a huge role in fleet management and mobile worker communication during disasters. Because the system does not rely on terrestrial towers, satellite M2M service can be used for GPS tracking of rescue vehicles. When equipped with a handheld device, satellite M2M terminals are also able to send and receive text-messages and are significantly less costly to use than satellite phones.

Understanding the location and maintaining consistent communication with first responders and emergency management crews is critical for the safety of disaster victims as well as mobile workers. With satellite, stable communication is possible even in unstable situations.

In addition to tracking vehicles, satellite M2M terminals are also used to track trailers and containers of supplies. Their slim profile allows them to be easily installed in the grooves of containers. The terminals are typically self-powered with AA batteries, which means they can report their location even when they are not connected to vehicle power supply.

Post-disaster Resource Monitoring

During a natural disaster, the geographic landscape can change significantly. This puts many natural resource and resource management systems at risk, most significantly clean drinking water. For communities near oceans, rivers or mountains, the ground and surface water quality is most often at risk. After Hurricane Sandy, the United States Geological Survey (USGS) used measurement tools in existing wells to monitor water concentrations of nutrients, sediment, and contaminants in order to accurately report water safety information to the general public.

Many wells and pump systems are equipped with sensors to monitor water fluctuations like volume, flow, and sediment. After an emergency, sending out employees to check on these sensors can be dangerous as well as impractical. Satellite M2M can help with this issue. Equipping existing sensors and measurement tools with satellite M2M terminals provides a method for transmitting

water quality data in real-time without the costs and time delays associated with sending employees to manually check the system.

With a distinct upward trend for economic damages caused by natural disasters, emerging technologies are becoming more important in lessening the impact of natural disasters. Early detection and management not only helps to save the people who are affected but also helps the rest of the connected global economy contribute to recovery and stabilization.

Satellite M2M terminals can play a critical role in providing a communication link before, during and after natural events. They provide a cost-effective communication link especially when terrestrial-based communication networks, like cellular and radio, fail or are unavailable.

For additional information, please access the company's website at: <http://www.skywave.com>

About the author

For the past decade, Anu Sood has been working with customers around the world to develop, promote and market their unique satellite-based Machine-to-Machine (M2M) solutions. Ms. Sood brings nearly two decades of technology expertise in the telecommunications, software development and satellite industries to her current role. Ms. Sood holds a Bachelor of Electrical Engineering from University of Western Ontario, is a published author as well as a regular speaker at international conferences.



**COMMAND CENTER
STEFAN GARDEFJORD, PRESIDENT & CEO, SSC**



Stefan Gardefjord recently celebrated his first anniversary as president and CEO of SSC. Prior to joining SSC, he was CEO of Logica Sweden, the country's largest IT services company, as well as having served on Logica's executive committee.

With an IT career spanning more than 25 years, Gardefjord held numerous senior management positions. He spent nearly two decades with the Nordic WM-data group, later assuming the role of CEO of WM-data Sweden, which was later acquired by Logica. Trained as an analyst programmer, Gardefjord began his career at Dow Chemical Company, where he became an IT manager in the Nordic countries.

Gardefjord is a past chairman of the Swedish IT and Telecom Employers Association and is currently a non-executive director of the publicly listed BTS Group (Nasdaq OMX Nordic).

MilsatMagazine (MSM)

Mr. Gardefjord, your career experience prior to SSC has certainly delved into many differing areas of the Information Technology (IT) community. How did you decide to move to the SSC Group's parent company with its emphasis on space and air systems?

Stefan Gardefjord

I was ready to do something new and considered SSC an exciting and uniquely competent business with great innovative capacity and enormous global potential. I saw a tremendous development opportunity in the space industry as it matures and globalizes

further and the competition grows. I wanted become a part of this interesting business and to be able to lead SSC into a new phase of development, customer focus, growth and global integration.

MSM

What makes SSC such a unique company within your targeted market segments?

Stefan Gardefjord

I would say our skilled people and excellent facilities. We always strive to do what is best for our customers. Also the close collaboration between our business units with unique competencies in a customer centric approach contributes to our success.

MSM

You have been CEO of SSC for a year now. Can you please explain any new initiatives you implemented over the past year that have contributed to the company's recent growth?

Stefan Gardefjord

We have a clear assignment from our owner and we have an attractive and shared vision for the future as well as the strategy to get there. We are taking a global approach to meet our customers' demands and gradually transforming towards becoming a global provider of advanced space services.

In an industry that is heavily focused on technology itself, we instead have shifted focus to effectively manage these complex technologies and, based on our own unique skills, competencies



The Esrange Space Center. Esrange was built in 1964 by ESRO, the European Space Research Organisation, which later became the European Space Agency via merger with ELDO, the European Launcher Development Organisation. In 1972, ownership was transferred to the Swedish Space Corporation (SSC).

and facilities turn them into highly valuable services that are really critical to our customer's success. Plus, of course, our sales have increased.

MSM

How has your extensive background in Information Technology contributed to the mission and objectives of SSC over the past year?

Stefan Gardefjord

IT is driven by new customer requirements, technology development and service innovation, so is space. Services must continuously develop and transform while still being reliable and affordable as innovation brings new technologies into the market. My experience from globalization, industrialization and standardization from the IT sector has also contributed.

The IT sector has truly transformed over the last 10 to 15 years and today the IT industry is one of the most competitive global industry sectors you can think of. I understand these dynamics and how to manage complex technologies in this environment and turn them into user friendly, value-added services.

MSM

SSC has recently gained new business in the U.S. with more opportunity on the horizon. Can you explain some of these new business opportunities and contracts?

Stefan Gardefjord

SSC is working in three areas right now in the US. First, in the area of satellite ground services, our U.S. subsidiary, Universal Space Network (USN), continues as a reliable partner of NASA's Near Earth Network and several commercial satellite companies. Secondly, in the area of on orbit propulsion systems, our non-hydrazine offering from ECAPS known as HPGP (High Performance Green Propulsion) has flown on orbit and produced outstanding results. Finally, our small satellite component manufacturing business (NanoSpace) is working closely with industry partners to deliver satellite components based on Micro-Electro-Mechanical Systems (MEMS) technology to satellite builders in the U.S.

HPGP - The next level of propulsion. The development of High Performance Green Propulsion (HPGP) was initiated with the goal of meeting the requirements for future satellite missions. After more than 10 years of R&D and a successful in-orbit demonstration during the PRISMA mission, the HPGP technology has proven to provide improved performance, enhanced volumetric efficiency, reduction of propellant handling hazards and safer launch operations.

We see the demand for SmallSat solutions from space growing quickly over the next few years and the successes we've had to date are impressive. For example the National Security Space customers are engaging with USN to better understand how a commercial ground segment provider of Telemetry, Tracking and Commanding (TT&C) and Payload downlink services can be deployed to meet their often unique mission demands.

ECAPS signed its first commercial U.S. contract with Skybox regarding the propulsion system on their third Earth observation satellite that will serve to qualify the system for subsequent Skybox satellites. ECAPS partner in the U.S., ATK, has successfully completed the tests of the HPGP technology for the NASA Goddard Space Flight Center. Overall, SSC is well positioned for supporting the space needs across the globe.

MSM

SSC has a diverse portfolio of products and services to help your customers make Earth benefit from space. Can you explain how SSC fits into the U.S. military satellite market?

Stefan Gardefjord

There are two primary reasons the U.S. military satellite programs currently reach out to partner with USN. First is that the satellite ground network they own is fixed and there is not a lot of budget to build out new capabilities, so when they have a coverage gap, it makes sense to use the secure and proven ground station infrastructure we have readily available. Sometimes this is for very short term Launch and Early Orbit activities, and at other times it is for a longer term agreement.

Secondly, their system is focused on providing low data rate command and control functionality for the spacecraft bus, but the sensors on those spacecraft may need a high data rate downlink to be able to process and exploit the system. When we act as a bent pipe, the stovepipe details become nonexistent. In the near future, it appears the need for resilience and cost savings may also drive U.S. military customers to augment their own networks with commercial assets.

MSM

Would you tell us about SSC's overland test area in Northern Europe? How is this used to facilitate the testing of spacecraft? Some recent examples, please?

Stefan Gardefjord

Actually, it is the Swedish Defence Materiel Administration that markets what used to be called NEAT (North European Aerospace Test range). It was cooperation between Swedish Defence Materiel Administration and us and that enabled the flight-restriction areas for the Esrange and Vidsel testing ranges to be



SSC operates and maintains test systems for the Swedish Defence Materiel Administration (FMV) at the Vidsel Test Range.

interconnected with each other into a unique 350km long flight corridor. So far it has only been used once under contract from the Swedish Armed Forces.

SSC is, however, contracted to continuously manage the development, maintenance and operations of the test systems at the Vidsel test range. Esrange on the other hand is ideal for performing drop tests from balloons; JAXA's supersonic aircraft is one example, where we together will perform their second drop test this summer. The first one was conducted at Esrange in 2011.

MSM

Where would you like to see SSC positioned in the market over the next two to three years?

Stefan Gardefjord

Our vision is to become the leading global provider of advanced space services, and we already have some 600 skilled staff in 18 locations in 11 countries. We will have grown our global ground station capabilities and engineering services regarding mission planning, launch support and operations both in markets where we are already present and also in new markets.

We have expanded our capabilities at our launch facility Esrange Space Center located in the northern part of Sweden through improved general infrastructure as well as scientific facilities. We have also advanced in our work towards being able to launch smaller satellites into orbit from Esrange. Both NanoSpace (MEMS products for space applications) and ECAPS (green propulsion) have made commercial break-throughs and developed from being primarily technology development oriented companies into commercially focused companies.

MSM

What challenges do you believe the satellite industry will face over the next year or so, and how do you believe these challenges will be successfully overcome?

Stefan Gardefjord

There has been a lot of talk lately about "new space" and I guess what we really see now is the "second generation of new space". Since we've been around for both generations, and as one of the few survivors, I think one challenge we need to be aware of in the near term is how to satisfy the smallsat and hosted payload customers with a quality of service they expected of big space programs. But this is solvable and really needs to be dealt with through transparency, information sharing and customer expectation management.

Coming out of the IT world, I think the more difficult problem is the Information Assurance and Computer Network Defense issues. These need to be solved across domains and in ways that address metrics such as anticipation, continuity, recovery, and evolution. There is no such thing as a "closed" network anymore, so our approach is to work with our customers to understand what is important about their satellite data and figure out how we can help solve some of those concerns while remaining a viable commercial entity.

MSM

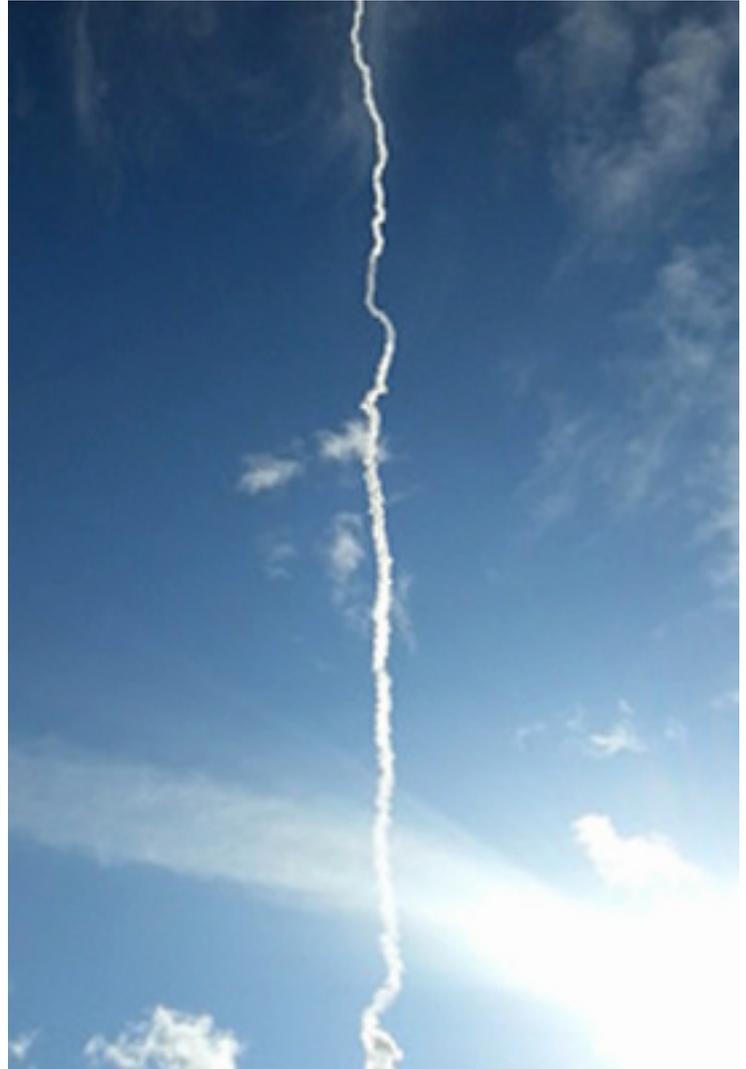
Given the various budgetary retrenching activities being undertaken by many Allied governments, how will SSC manage its businesses to ensure the company is among those at the forefront of contract acquisition?

Stefan Gardefjord

We will continue to focus on our customers' needs and develop our services further to meet our customers' demands. We aim to become the leading provider of advanced space services by

offering cost effective, reliable and highly secure solutions. We can provide a world leading global network for satellite communication. We have unique facilities, leading edge technologies and highly skilled people that collaborate closely with our customers, wherever they are located.

For further information, access the company's website at:
<http://sscspace.com/>



Editors note: On July 15th, SSC completed the successful launch of MAPHEUS 4 from the Esrange Space Center, Kiruna, pictured above.

MAPHEUS 4=Material Physics under Microgravity Conditions. The rocket reached an altitude of approximately 151 kilometers and landed 60km north of Esrange Space Center. The rocket recovery was successfully made and the payload was returned to the base for analysis.

MAPHEUS 4 is a DLR research rocket program conducting annual launches of scientific payloads dedicated to material studies. Experiments on MAPHEUS cover a wide range of material physics topics such as gelation, the behaviour of granulates, diffusion and the mixing and demixing of metallic alloys. Propelled by a S30 motor, MAPHEUS typically offers more than three minutes of microgravity time at 10-4g.

