

# SatMagazine

**SatBroadcasting™**

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Senior Contributor Forrester  
NSR's Grady

**PoVs**

SES GS' Osterthaler  
Space Foundation's Pulham

**Executive Spotlights**

KenCast's Steele  
Telstra Global's Clarke

**Plus**

The University of Hawai'i + Ho'oponopono 2  
VSAT Auto-Commissioning  
Smallsat Fleets  
GaN-Based SSPAs  
Multi-Service Revolutions  
Senior Contributor Placido on LATAM  
Senior Contributor Sadtler on Careers  
CABSAT 2014  
30th Space Symposium











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March 2014

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## InfoBeam: A Breeze Of An ILS Turksat-4A Launch

**International Launch Services (ILS) successfully launched the Mitsubishi Electric Corporation-built TURKSAT-4A satellite into orbit on February 15th at 6:09 a.m. (Japanese time)—21:09 GMT and 16:09 EST, February 14th, on an ILS Proton vehicle.**

The satellite was built by Mitsubishi Electric Corporation for TURKSAT Satellite Communication, Cable TV and Operation Inc. Co. (TURKSAT A.S.), one of the world's leading operators in the satellite communication business. This was the first ILS Proton launch for both the satellite operator and the manufacturer; it was also the first Proton launch of the year.

The ILS Proton Breeze M vehicle launched from Pad 24 at the Baikonur Cosmodrome. The first three stages of the Proton used a standard ascent profile to place the orbital unit (Breeze M upper stage and the TURKSAT-4A satellite) into a sub-orbital trajectory. From that point in the mission, the Breeze M performed planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geostationary transfer orbit. Separation of the TURKSAT-4A satellite occurred approximately 9 hours and 13 minutes after liftoff.

TURKSAT-4A is a multi-band satellite with an expected on-orbit lifespan of 30 years. The satellite will provide high flexibility of switchability and connectivity among different service areas to its customers.

The satellite weighed 4.8 metric tons at liftoff and is the ninth satellite built on Mitsubishi Electric's DS2000 platform, a fully proven modular platform with the flexibility to handle a broad range of payload applications.

ILS President Phil Slack said, "This is the first ILS Proton launch for our partners, Mitsubishi Electric and TURKSAT, and we are happy to have such a strong foundation for our new relationship. We are honored to be entrusted to deliver our customers' satellites to orbit."

Ozkan Dalbay, TURKSAT A.S. CEO and Chairman of the Board, said, "Today's launch is a significant milestone that strengthens our ties with both ILS and Khrunichev."

Mitsubishi Electric General Manager of Space Systems Division, Yasunori Kamochi, added, "We appreciate that through ILS' conscientious efforts, they conducted a flawless mission leading to the successful launch of TURKSAT 4A, our first Proton launch."

TURKSAT-4A will provide telecommunication and direct TV broadcasting services over a wide geographic region ranging between the west of China and the east of England, spanning Turkey, Europe, Central Asia, as well as the Middle East and Africa.



The ILS Proton M launch of the TURKSAT-4A satellite from the Baikonur Cosmodrome in Kazakhstan on February 15th.

Photo is courtesy of International Launch Services (ILS). This was the 85th ILS Proton Launch and the 394th launch for Proton overall since its maiden flight in 1965. The Proton Breeze M vehicle is developed and built by Khrunichev Research and Production Space Center of Moscow, Russia's premier space industry manufacturer and majority shareholder in ILS.



Artistic rendition of the TURKSAT-4A satellite on orbit.



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## InfoBeam: A Flock Of Doves Fly Out Of The ISS

**Considered the largest single constellation of Earth-imaging satellites ever to launch into space... the 28 Dove satellites that comprise the Planet Labs' Flock 1 mission will be the largest single constellation of Earth-imaging satellites ever to launch into space**

The Flock 1 constellation of satellites deployed on February 11th from the International Space Station. Built and operated by Planet Labs of San Francisco, the Flock 1 small satellites are individually referred to as Doves. The Dove satellites are part of a class of miniature satellites often called CubeSats. These small satellites will capture imagery of Earth for use in humanitarian, environmental and commercial applications. Data collected by the Flock 1 constellation will be universally accessible to anyone who wishes to use it.

"We believe that the democratization of information about a changing planet is the mission that we are focused on, and that, in and of itself, is going to be quite valuable for the planet," said Robbie Schingler, co-founder of Planet Labs. "One tenet that we have is to make sure that we produce more value than we actually capture, so we have an open principle within the company with respect to anyone getting access to the data."

The Dove CubeSats use an automated approach where the spacecraft take pictures over various areas, store them, and transmit them when positioned over a ground station. Planet Labs then processes the imagery and uploads it online for anyone to access it. The Flock 1 constellation of satellites may also be used in concert with high-resolution assets like unmanned aerial vehicles and large imaging satellites in order to follow-up on an identified area and gather more imagery in greater detail.

Imagery from Flock 1 enables identification of areas for disaster relief and improved agricultural yields in developing countries around the globe. Users also can apply this imagery resource to global environmental protection measures, such as monitoring deforestation and changes to polar ice caps.

"Our company goal is to image everywhere very frequently, for everyone," explains Schingler. "If you image everywhere, then that actually means that you can image anywhere. That's going to be quite transformative for a number of countries, for a number of companies, and so forth. Our monitoring capability is always on. We are always taking a picture."

Commercial applications of the imagery include mapping, real estate and construction, and oil and gas monitoring. If a company has high-value, distributed assets that need regular monitoring, Flock 1 imagery can assist in this type of endeavor. For example, Flock 1 can supplement or replace the need for flying a helicopter over an oil pipeline to monitor for a leak, since the 28 Dove CubeSats can quickly collect the necessary imagery.

The revisit rate, or frequency with which Dove CubeSats pass over a given area, is currently unprecedented among existing satellite systems in orbit. Imagery will be collected at latitudes within 52 degrees of the equator, which encompass expanses north and south of the equator that cover the majority of the world's populated areas and agricultural regions. The Flock 1 constellation will travel in a lower orbit than most satellites, at a distance between 240 and 400 miles above Earth. For comparison, weather and commercial communications satellites are often given geostationary orbits, which are circular orbits above the Earth's equator at a distance of approximately 22,236 miles above Earth.

The Flock 1 constellation deployed from ISS using the NanoRacks Smallsat Deployment Program to launch from the station's Japanese Experiment Module (JEM) airlock. The NanoRacks deployer provides commercial access to space, via the space station, for CubeSats to perform Earth and deep space observation. View the illustrated simulation by NanoRacks to see how these small satellites are deployed into space.

Previous launches of similar CubeSat hardware by Planet Labs served as an extension of their laboratory and optimized the software and hardware to prepare the Dove CubeSats for success. Software for all satellites in the Flock 1 constellation can be reprogrammed very quickly while in orbit.

"Our ability to build and operate spacecraft will allow us to do more with these spacecraft in the future as we begin to think about the satellite segment as a very remote server with a whole bunch of sensors on board that could be reprogrammed to do other things," says Schingler.

Story by Laura Niles, ISS Program Science + Public Affairs Office, NASA's Johnson Space Center



The Small Satellite Orbital Deployer (SSOD), in the grasp of the Kibo laboratory robotic arm, is photographed by an Expedition 38 crew member on the International Space Station as it deploys a set of NanoRacks CubeSats. The CubeSats program contains a variety of experiments such as Earth observations and advanced electronics testing. Station solar array panels, Earth's horizon and the blackness of space provide the backdrop for the scene. Image courtesy: NASA

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## **InfoBeam: ABS-2 Is Away For Asia Broadcast Satellite**

**Asia Broadcast Satellite (ABS) celebrated the launch of their ABS-2 satellite at 17:30 Kourou (8:30 p.m. UTC) on February 14th.**

The satellite was launched on an Ariane ECA launch vehicle by Arianespace from the Guiana Space Center, Europe's Space port in Kourou.

ABS-2 was manufactured by Space Systems/Loral (SSL) and is a highly sophisticated, multi-mission satellite, featuring as many as 89 active C-, Ku- and Ka-band transponders across 10 different beams.

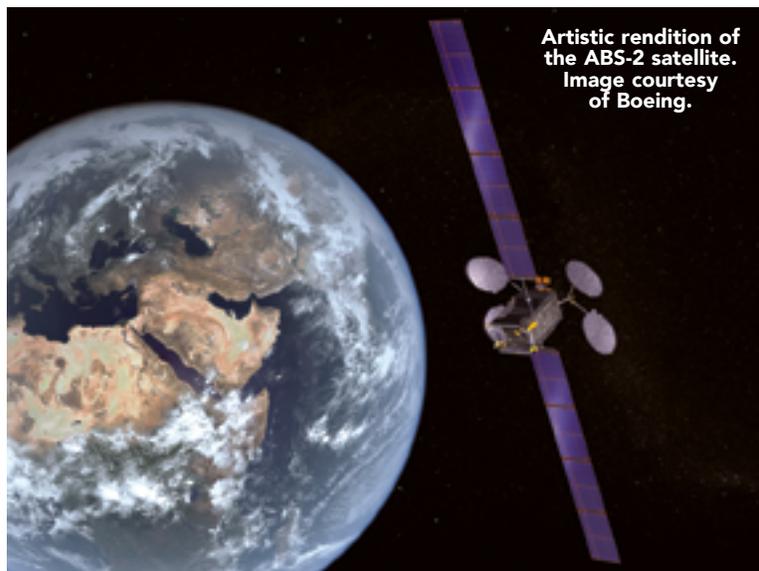
ABS-2 brings unparalleled coverage and expansion capacity at ABS' prime location of 75 degrees East, extending affordable and reliable communications and broadcast services to the emerging markets of the world.

"We are delighted with the launch of ABS-2 satellite, our first satellite launch. We would like to thank both Arianespace and SSL for their collaboration for delivering today's successful launch," said Tom Choi, CEO of ABS. "Our customers are looking forward to the new capacity on ABS-2 at 75E, a new state-of-the-art satellite

servicing the Eastern hemisphere. The ABS-2 satellite will significantly contribute towards our expansion plans and is part of our growth strategy to increase the ABS satellite fleet and becoming a global satellite operator in the coming years."

"We would like to express our pride this evening following the successful launch of ABS-2," said Stéphane Israël, Chairman & CEO of Arianespace. "We are focused on delivering high-quality launch services to commercial satellite operators worldwide and being entrusted by ABS for its first launch contract is a great honor for us. Congratulations also to Space Systems/Loral. It is a great privilege to work with such an experienced and proven team, a leader in the comsat market."

John Celli, president of SSL, said, "A satellite launch is the culmination of collaboration, hard work and relentless focus on quality. ABS-2 is a very advanced satellite that has the capability to improve the human experience in multiple regions of the world."



Artistic rendition of the ABS-2 satellite. Image courtesy of Boeing.



The launch of the ABS-2 satellite. Photo courtesy of Arianespace.



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## InfoBeam: SSTL—A Lot Of Momentum For Rosetta

**On January 20, 2014, after 957 days of deep-space hibernation, ESA's comet-chasing mission Rosetta woke up.**

In August of this year, after traveling for nearly 10 years, the Rosetta spacecraft is due to reach its target—the comet 67P/Churyumov-Gerasimenko. Once there, the spacecraft will map the comet's surface, and then in November Rosetta will dispatch a lander in order to closely inspect the comet's nucleus and to sample its physical and chemical composition. This is when the excitement really begins at Surrey as the lander, Philae, carries a Surrey momentum wheel, delivered for the mission way back in 2001.

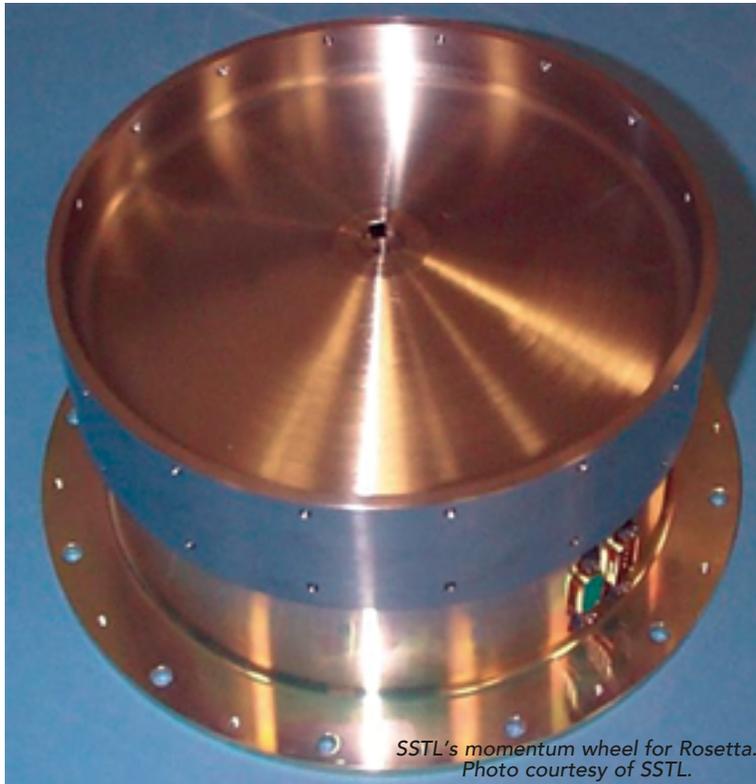
The momentum wheel on board Philae is there to provide gyroscopic stabilization for the lander as it makes its descent to the comet's surface. A momentum wheel is a wheel connected to a motor that is spun up to a high rotational speed—this provides what is referred to as an angular momentum bias to the lander. The bias helps stabilize the lander in the same way that the spinning motion of a gyroscope helps it to stay upright. The Surrey wheel design

was a great choice for this mission because of its special bearing, which is particularly good for long periods of storage in vacuum.

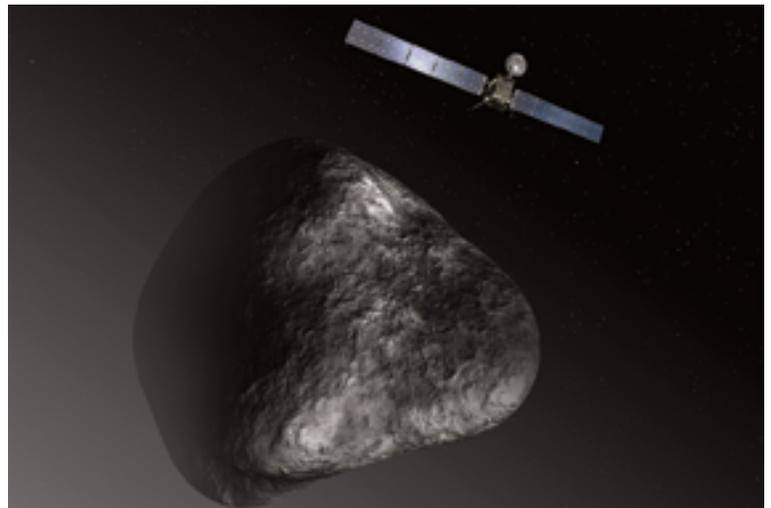
The bearing makes use of a solid lubricant which cannot evaporate into space, unlike the oils used by most wheels in space and on the ground. The wheel is also extremely power efficient, only consuming about 6 watts, which is extremely important on such a power-limited spacecraft. After the lander has rendezvoused with 67P/Churyumov-Gerasimenko, the Rosetta spacecraft will follow the comet, and Philae will beam back data. The comet will be at its closest approach to the sun in August 2015, and as it warms up, Philae will be collecting data about the ever-changing conditions at the comet's surface.

The waking up of the Rosetta spacecraft is just the start of another countdown for SSTL—checking off the days until November when Philae is released to begin its journey toward the surface of the comet.

The SSTL infosite is located at <http://www.sstl.co.uk/>



SSTL's momentum wheel for Rosetta. Photo courtesy of SSTL.



Artist's impression of the Rosetta orbiter at comet 67P/Churyumov-Gerasimenko. Image is courtesy of European Space Agency (ESA).

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## **InfoBeam: COM DEV Int'l + Ontario—Funding Coming**

**The Ontario, Canada, government is providing support to COM DEV International Ltd. to double its production capacity and create 75 new jobs and retain another 917 jobs.**

With support from the province's Southwestern Ontario Development Fund, the company will expand its facility and invest in innovative technology to improve efficiency, increase productivity and lower environmental impacts.

COM DEV is a leading global designer and manufacturer of advanced space hardware. More than 80 percent of commercial communications satellites launched worldwide have included COM DEV technology. Helping Ontario businesses stay competitive and grow is part of the government's economic plan that is creating jobs for today and into tomorrow.

The comprehensive plan and its six priorities focus on Ontario's greatest strength—its people and strategic partnerships.

### Quick Facts

- Ontario is providing a grant of \$1 million to support COM DEV's substantial investment in this project.
- COM DEV International Ltd. is headquartered in Cambridge, Ontario, and employs more than 1,200 people across its facilities in Canada, the United Kingdom and the United States.

The Southwestern Ontario Southwestern Ontario Development Fund is helping to create jobs and diversify the economy by encouraging regional businesses to pursue innovation and new markets. To date, the fund has helped create and protect approximately 9,000 jobs throughout southwestern Ontario.

The COM DEV International infosite: <http://www.comdevinternational.com/>

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### InfoBeam: ESI + Skybox—Joining Forces For Imagery

**Emirates Space Imaging (ESI) has announced the execution of a multi-year agreement with Skybox Imaging (Skybox) to deliver timely, sub-meter resolution satellite imagery and high-resolution, high-definition (HD) video to Middle East, Europe and North Africa (MEENA).**

Space Imaging Middle East (SIME) and European Space Imaging (EUSI) have been assigned to implement operations within their respective regions.

Under this agreement, ESI has purchased two compact ground stations, named SkyNodes, that each consists of a 2.4 meter antenna and two racks of supporting equipment.

The small-footprint system and complete software suite of easy-to-use applications will enable SIME and EUSI to schedule, task, image, downlink, and process imagery and video products captured from the Skybox constellation. The two ground stations will be located near Abu Dhabi and Munich.

SkySat-1, Skybox's first satellite of the planned 24-satellite constellation, was successfully launched on November 21, 2013, and is currently undergoing calibration. SkySat-1 captures sub-meter resolution color imagery, as well as high-resolution, full motion video.

SkySat-2 and SkySat-3 are planned for launch in mid-2014 and early 2015, with the first block launch of six additional satellites planned for late 2015.



SkySat-1 in the clean room during build process.  
Photo courtesy of Skybox Imaging.

**United Launch Alliance—A Momentous Anniversary**



**United Launch Alliance (ULA) has commemorated the 25th anniversary of the proven industry workhorse rocket, the Delta II. The first Delta II mission blasted off from Cape Canaveral on February 14, 1989, successfully placing the GPS BII-01 mission into orbit.**

"We could not be more pleased to take time today to reflect on the tremendous success of the Delta II program and the nearly 150 missions it successfully delivered to orbit," said Michael Gass, ULA president and CEO. "While we count success one mission at a time, the ULA and prior Boeing heritage team have been able to count on the Delta II's success 97 times in a row over the last decade. This is a tribute to our dedicated ULA employees, our supplier teammates and our customers who ensure mission success is the focus of each and every launch."

ULA's Delta II has launched the majority of NASA's critical science missions over the last decade including the Mars' rovers Spirit and Opportunity, Genesis, Phoenix Mars Lander, Stardust, the twin Gravity Recovery and Interior Laboratory (GRAIL) spacecraft and most recently the NPOESS Preparatory Project (NPP) from Vandenberg Air Force Base in California in October 2011.

In addition to the science missions, Delta II has launched nearly 50 GPS satellites, dozens of other military

payloads for the U.S. Air Force, as well as numerous commercial missions.

This year, ULA's Delta II will launch two NASA spacecraft, the Orbiting Carbon Observatory (OCO)-2 mission in July and the Soil Moisture Active Passive (SMAP) mission in November, both from Vandenberg Air Force Base in California. NASA once again selected Delta II to launch its Joint Polar Satellite System-1 (JPSS) and the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2) missions in 2016.

"ULA is in the final stages of manufacturing the Delta II rockets at our factory in Decatur, Alabama, for this year's NASA missions," said Gass. "We look forward to working with NASA for these two missions and the future Delta II launch campaigns."

With more than a century of combined heritage, United Launch Alliance is the nation's most experienced and reliable launch service provider.

ULA has successfully delivered more than 75 satellites to orbit that provide critical capabilities for troops in the field, aid meteorologists in tracking severe weather, enable personal device-based GPS navigation and unlock the mysteries of our solar system. Reliable launch, real-world benefits.

For more information on ULA, visit the ULA website at <http://www.ulalaunch.com/>

**Outernet—New Hope For The World... Free Internet Access For Earthlings Awaits Funding**



*Artist's concept of the Intelligent Payload Experiment (IPEX) and M-Cubed/COVE-2, two NASA CubeSats launched in December.  
Image source: NASA Jet Propulsion Laboratory*

**Hope is an emotion that under the best and worst circumstances has been proven to keep the human spirit going—and there are scientific announcements that provide just that... hope.**

From time to time, the scientific realm comes alive with claims that many hope to be true—that seem like an easy answer and a fix to a major need of many—but leave many questions along the way.

As an example, cold fusion, an energy resource received wide media attention, and raised hopes of a cheap and abundant source of energy. Many scientists tried to replicate the experiment with the few details available.

Cold fusion is a hypothetical type of nuclear reaction that would occur at, or near, room temperature, compared with temperatures in the millions of degrees that is required for "hot" fusion. It was proposed to explain reports of anomalously high energy generation under certain specific laboratory conditions. It has been rejected by the mainstream scientific community because the original experimental results could not be replicated consistently and reliably, and because there is no accepted theoretical model of cold fusion. Thus, an example of an energy source that is yet to be.

From another corner of the satellite communication world in recent news comes a new hope as we learn of a company that is planning to turn the age of online computing on its head by giving free web access to every person on Earth. It's an ambitious project known as Outernet, which will launch hundreds of miniature satellites into Low Earth Orbit (LEO) by June of 2015.

Each satellite will broadcast the Internet to phones and computers giving billions of people across the globe free online access by leveraging datacasting technology over a low-cost satellite constellation.

Outernet is able to bypass censorship, ensure privacy, and offer a universally-accessible information service at no cost to global citizens. It's the modern version of shortwave radio, or BitTorrent from space.

Outernet consists of a constellation of hundreds of low-cost, miniature satellites in Low Earth Orbit (LEO). Each satellite receives data streams from a network of ground stations and transmits that data in a continuous loop until new content is received.

In order to serve the widest possible audience, the entire constellation utilizes globally-accepted, standards-based protocols, such as DVB, Digital Radio Mondiale, and UDP-based WiFi multicasting.

The equality of distribution of all information would mean opening the gates of freedom of information to citizens of countries like China and North Korea that have censored online activity. These folks would be enjoying free and unrestricted cyberspace.

According to the Universal Declaration of Human Rights, a document assembled by the United Nations, "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers."—Article 19 of the Universal Declaration of Human Rights.

While these thoughts may have crossed the minds and desks of many attempting such an endeavor, a company, Outernet, based in New York, is moving ahead with these plans.

The New York company plans to ask NASA to test their Outernet technology on the International Space Station so they can start broadcasting Wi-Fi to web users around the world. Using datacasting technology, which involves sending data over wide radio waves, the New York-based company says they'll be able to broadcast the Internet around the world.

Outernet, in cooperation with a non profit 501(c)3 Media Development Investment Fund (MDIF), plans to finance and provide web access to every person on Earth at no cost.

The group is hoping to raise tens of millions of dollars in donations to get the project on the road. They have a website that welcomes all 'tax deductible contributions'. What will be free to many will be the result of generous donations—free in that there is no charge, however, it does rely on funding from some to continue the service to all.

Media Development Investment Fund (previously Media Development Loan Fund - MDLF) is a mission-driven investment fund providing low-cost financing to independent news media in countries with a history of media oppression.

With investments in 92 media companies in 32 countries since its launch in 1995, MDIF has provided more than \$128 million in financing, including over \$113 million in debt and equity investments, critical to the growth of many of the developing world's preeminent newspapers, radio stations, TV stations and online news media. More than 42 million people in the developing world get their news from MDIF clients.

Citizens from all over the world, through SMS and feature-phone apps, participate in building the information priority list. Users of Outernet's website also make suggestions for content to broadcast; lack of an Internet connection should not prevent anyone from learning about current events, trending topics, and innovative ideas.

The process is as follows:

- Each satellite will receive data from a network of ground stations across the globe. Using a technique known as User Datagram Protocol

(UDP) multitasking, which is the sharing of data between users on a network, Outernet will beam information to users. The process is similar to receiving a signal on television and flicking through channels, Outernet will broadcast the Internet enabling its users to flick through certain websites.

- By transmitting digital content to mobile devices, simple antennae, and existing satellite dishes, a basic level of news, information, education, and entertainment will be available to all of humanity.
- Although Outernet's near-term goal is to provide the entire world with broadcast data, the long-term vision includes the addition of two-way Internet access for everyone, at no cost.

Outernet's Project Timeline is as follows:

- By June of this year the Outernet project aims to begin deploying prototype satellites to test their technology.
- In September 2014 they will make a request to NASA to test their technology on the International Space Station
- By early 2015 they intend to begin manufacturing and launching their satellites
- And in June 2015 the company says they will begin broadcasting the Outernet from space

"We have a very solid understand[ing] of the costs involved, as well as experience working on numerous spacecraft," said Project Lead of Outernet, Syed Karim. "There isn't a lot of raw research that is being done here; much of what is being described has already been proven by other small satellite programs and experiments. There's really nothing that is technically impossible to this."

When asked what his reaction will be if telecom operators attempt to prevent the project before it even begins, he replied, "We will fight... and win."

The services that Outernet plans to deliver are:

News and information, such as;

- International and local news
- Crop prices for farmers
- Bitcoin, which is a peer-to-peer payment system and digital currency, a form of cryptocurrency created by

(story continues on the next page...)

- a process called mining whereby users participate in exchange for bitcoins and transaction fees.
- Blockchain info is a popular Bitcoin wallet and block explorer service owned and operated by the UK-based Qkos Services

#### Applications and content

- Ubuntu which is a Linux-based computer operating system and OpenStreetMap, which is a collaborative project to create a free editable map of the world
- Wikipedia in its entirety
- Movies, music, games

#### Educational courseware

- Khan Academy is a non-profit educational website created in 2006 by educator Salman Khan, a graduate of MIT and Harvard Business School. The stated mission is to provide 'a free world-class education for anyone anywhere'.
- Coursera, a for-profit educational technology company offering massive open online courses (MOOCs) founded by computer science professors Andrew Ng and Daphne Koller from Stanford University. Coursera works with universities to make some of their courses available online, and offers courses in physics, engineering, humanities, medicine, biology, social sciences, mathematics, business, computer science, and other areas.
- British Council's LearnEnglish, Learn English online with the help of this free website from the British Council with games, stories, listening activities and grammar exercises.

#### Teachers Without Borders

- Emergency communications
- Used when cellular networks fail
- Disaster relief coordination
- Global notification system

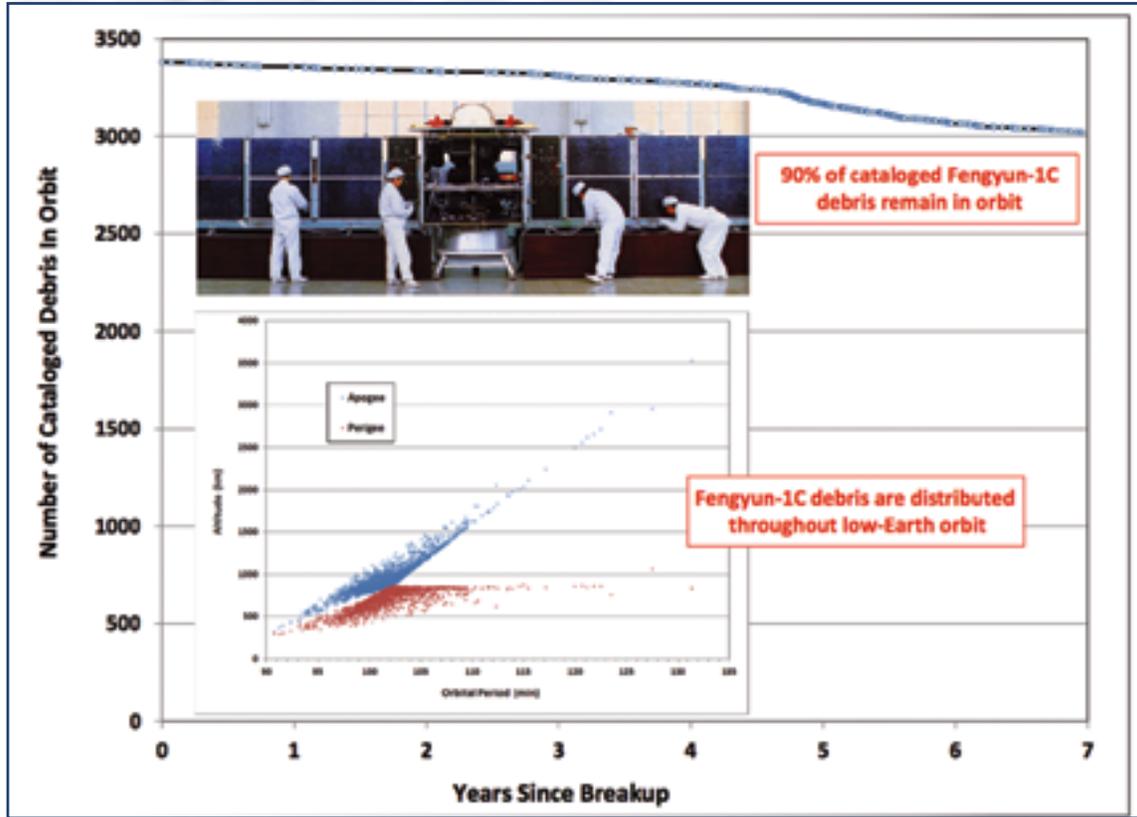
#### The key players building Outernet include

- Aaron Rogers—according to Aaron's LinkedIn page he has been a team member of the AIAA/USS conference on Small Satellites since August 1986 to present. Mission Engineering and Q Space Systems
- Branko Vukelic—Software Developer, Monwara Digital Products
- Edward Birrane—Telecom Protocols, Tolerant Network Solutions, Chief Technical Officer at Tolerant Network Solutions, LLC Assistant Group Supervisor at Johns Hopkins University Applied Physics Laboratory
- Syed Karim—Founder & Project Lead of Media Development Investment Fund, Lead the investment process for seed investments in news and information startups. Identify markets, evaluate opportunities, review financials, and negotiate terms with founders. Refine the internal processes to source deal flow and make investment decisions.
- You—with Ideas & Support

This is an interesting topic for our readers to follow; a concept that is created with high ideals and a great deal of hope. Those involved are aiming for a successful launch and a service that will continue to find ongoing support.

The Outernet infosite is located at <https://www.outernet.is/>

**NASA—Dodging Deadly Debris = Duck + Cover**



*More than 3,000 cataloged debris from Fengyun-1C continue to pose threats to space operations.*

**In October 2013, the number of cataloged objects that posed potential threats to the ISS was in excess of 800...**

Assessing potential close approaches of known space objects to the International Space Station (ISS) has been an integral part of ISS operations since the launch of the first element, the Zarya module, in November 1998.

If a predicted conjunction yields a probability of collision greater than 1 in 10,000, official flight rules call for the execution of a collision avoidance maneuver by the ISS unless such a maneuver would lead to an even greater risk to the ISS or its crew.

After a record number of four collision threats in 2012, no ISS collision avoidance maneuvers were required during 2013, reflecting the chaotic nature of the satellite population.

During its first 15 years of operations, the ISS successfully conducted 16 collision avoidance maneuvers, and on a separate occasion in 1999 a planned maneuver attempt failed.

In addition, three incidents arose when insufficient time permitted a collision avoidance maneuver, forcing the crew of the ISS to retreat to the Soyuz return craft during the time of closest approach, where they were prepared to undock from the ISS quickly in

the event of a collision. In total, the collision avoidance maneuver threshold level has been reached only 20 times for an average of once per year.

However, the number of known objects that routinely transit the ISS orbital altitude is significant. In October 2013, the number of cataloged objects that posed potential threats to the ISS was in excess of 800, representing an increase of 60 percent from the population of November 1998 in an altitude region of ~415-420km.

Of these, 10 percent were spacecraft (operational and non-functional), a third were rocket bodies, and the remainder were miscellaneous debris.

Although the individual masses of these objects varied from less than a kilogram to several metric tons, each was capable of inflicting serious damage to the ISS in the event of a collision.

Space objects in circular orbits intersecting the ISS altitude normally drop below the ISS orbit very quickly (days or weeks), although they intersect the ISS orbital plane up to 30 times per day.

Objects in moderately or highly elliptical orbits (i.e., eccentricities greater than 0.1) typically present threats over much longer periods (years), but they pose potential collision threats much less often, typically passing through the ISS altitude only a few times per day.

More than 80 percent of the cataloged objects transiting the ISS altitude belong to the latter category.

Unfortunately, the accuracies with which these orbits are maintained by the U.S. Space Surveillance Network (SSN) are normally less conducive to high quality conjunction assessments due to fewer tracking opportunities and additional perturbation forces.

In addition to the cataloged satellites, the SSN maintains orbits on a large number (on the order of 5000 or more) of objects which have not yet been officially cataloged.

For October 2013, the number of such objects with orbits passing through the ISS altitude regime exceeded 200. Three of the 20 close approaches noted above involved uncataloged objects, resulting in two collision avoidance maneuvers and one crew retreat to Soyuz spacecraft.

This report and others can be found at the following link:  
<http://orbitaldebris.jsc.nasa.gov/newsletter/newsletter.html>.

**KVH Industries—SATCOM Order Will Assist U.S. Customs**



**KVH Industries, Inc. has received an order from Virginia-based Global Technical Systems (GTS) to support**

**a 10-year indefinite-delivery/indefinite-quantity (IDIQ) contract for ULAD platforms that will be used in U.S. Customs and Border Protection programs.**

KVH will provide communications for the platforms via its TracPhone V7-IP satellite communications systems and mini-VSAT Broadband service. KVH is already fulfilling the order delivering the initial shipment of TracPhone V7-IP systems to GTS; There is potential for KVH to supply 144 systems to GTS over a five-year ordering period of a 10-year IDIQ contract.

The mini-VSAT Broadband service will be used to transmit data from a mobile platform that houses surveillance radar and other sensors for homeland security.

"The TracPhone V7-IP is perfect for the ULAD platform because it offers outstanding performance in on-the-move and on-the-halt applications, transmitting data with the agility needed to support any number of operational scenarios," said Dan Conway, executive vice president of KVH's guidance and stabilization group. "Our mini-VSAT Broadband network is fully licensed by the FCC to provide seamless coverage across North America, ensuring that communications are always available in remote locations."

TracPhone V7-IP is a compact, rugged solution featuring an antenna that is approximately 24 inches (60 cm) in diameter, with uploads as fast as 1 Mbps and downloads as fast as 2 Mbps. Spread spectrum technology enables

the system to deliver VSAT service using antennas that are 85 percent smaller and lighter than competing solutions.

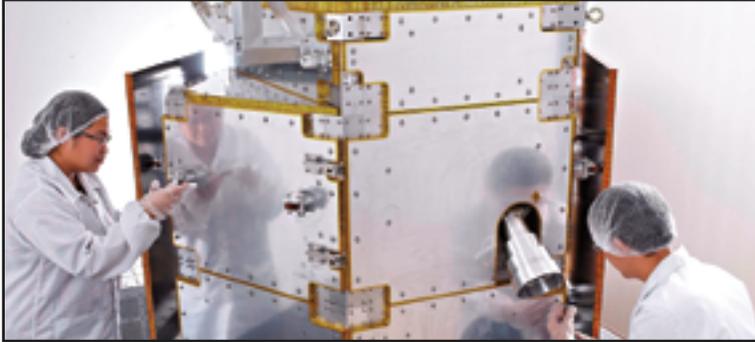
TracPhone V7-IP's Integrated CommBox Modem (ICM) controls the one-to-one connectivity of the mini-VSAT Broadband service, including fast, low latency data connections and exceptionally high-quality VoIP phone service.

The ICM also provides network management functionality that includes such services as email management, transmission optimization, and assured file delivery, key elements for mission-critical data transmissions.

Additional TracPhone info at <http://www.kvh.com/>



**ST Electronics, Antrix, ATK, Satrec Initiative + SPOT Asia—The TeLEOS-1 Adventure Is Underway**



The TeLEOS-1 satellite.

**Singapore Technologies Electronics Limited (ST Electronics) has announced its plans for the launch of its first commercial satellite.**

The company's wholly owned subsidiary, ST Electronics (Satcom & Sensor Systems) Pte. Ltd. has signed a launch service agreement with Antrix Corporation Limited, India, to launch their first commercial Earth Observation (EO) satellite, the TeLEOS-1, into a Near Equatorial Orbit, using the Indian Space Research Organization's (ISRO) Polar Satellite Launch Vehicle (PSLV) in the fourth quarter of 2015.

TeLEOS-1 will ride on the PSLV and will be launched into space at 550km above the Earth at a low inclination.

The 400-kilogram satellite is equipped with an electro-optical camera capable of taking images at ground resolution of one meter. It is suited for applications such as disaster and environment monitoring, maritime safety, urban planning and homeland security.

The unique Near Equatorial Orbit allows frequent revisits to areas of interest in equatorial regions at approximately 96-minute intervals, delivering high data availability and responsiveness.

At GSTC 2013, ST Electronics had announced that it had started the design and development of its first commercial remote sensing satellite, TeLEOS-1. STEE-SatComS offers end-to-end satellite communication and sensor solutions marketing to

more than 100 countries around the world today.

ST Electronics also announced that they have entered into an agreement with ATK to jointly develop, manufacture and supply microsattelites and integration services to the world market.

STEE-SatComS announced this development during the 2014 Global Space and Technology Convention in Singapore. ATK is an industry leader in small satellite bus technology. The partnership positions both companies to jointly develop the A150S/SS150 microsatellite and offer this system to meet a growing worldwide demand from government and commercial space customers.

ST Electronics also announced that they have partnered with Satrec Initiative Co. Ltd. and SPOT Asia Pte. Ltd. for the distribution of satellite imagery from TeLEOS-1.

TeLEOS-1 is Singapore's first commercial Earth Observation satellite and is being locally designed and developed by ST Electronics Pte Ltd, a joint venture company operated under STEE-SatComS.

TeLEOS-1 will have a high revisit rate of 12 to 16 hours, as compared to Sun Synchronous Orbit (SSO) satellites with revisit rates of 24 hours or more.

Imagery from the TeLEOS-1 is expected to be commercially available in the first half of 2016 after the launch



Mr. Lee Fook Sun, President, ST Electronics, and Mr. Tom Wilson, General Manager + Vice President, ATK, upon signing their microsattelite agreement.

of the 400-kilogram satellite in the fourth quarter of 2015.

With its high satellite data availability and responsiveness over the equatorial region, imagery from the TeLEOS-1 will complement those from SSO satellites thereby enhancing the services of its two partners and benefiting their end-users worldwide.

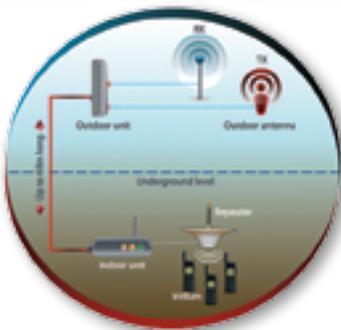
"ST Electronics' partnership with Satrec Initiative and SPOT Asia will allow us to provide TeLEOS-1 satellite images that will complement our partners' services with high data availability and responsiveness over the equatorial region for their customers. We look forward to working closely with our partners, leveraging their experiences and extensive reseller networks to market the TeLEOS-1 imagery worldwide," said TANG Kum Chuen, President, Communication & Sensor Systems Group, ST Electronics, & President, ST Electronics (Satcom & Sensor Systems).

Satrec Initiative is a leading solution provider for Earth observation missions and is the worldwide marketing and sales representative of KOMPSAT-2, 3 and 5 Image data for Korea Aerospace Research Institute (KARI).

Spot Asia belongs to Airbus Defence and Space (integrating the former GEO-Information activities of Astrium Services) with a core business into three main groups—satellite data, software and value-added services. The company has expanded its reach in the South East Asian market through a wide regional network of distributors, resellers and partners.

The ST Electronics infosite is readily accessible at <http://www.stee.stengg.com/>

**Foxcom—Pardon Me, Would You Please Repeat That?**



**Foxcom has announced that the company's latest Suricate PRO™ Iridium Repeater Solution has been successfully deployed in multiple indoor and underground facilities around the world.**

The Suricate PRO™ became the industry's first and only fiber-based satphone indoor satellite repeater, following its launch less than two years ago.

Foxcom's Suricate PRO™ posts an antenna with a view to the sky maintaining communications with orbiting satellites overhead.

Just as the suricate clan on the ground relies upon their sentinel to maintain vigilant watch and communications, Suricate PRO™ provides Iridium satphone users with constant and reliable communications indoors or underground.

The Suricate PRO™ enables seamless indoor coverage by connecting passive outdoor antennas with indoor repeaters by means of fiber optic cable. The solution comes in a small plug-and-play kit enabling one or several Iridium satphone users to make simultaneous phone calls and send text messages.

Foxcom, founded in 1993, provides RF-over-Fiber solutions to the commercial, government and military markets. Foxcom is also the preferred supplier of RF-optical solutions to leading satellite, military and wireless system integrators and operators around the globe.

To find out more about Foxcom's latest range of optical/RF transmission products, please visit: <http://www.foxcom.com/>

**Thuraya Telecommunications—A First Offering For A Growth Sector**



**Thuraya Telecommunications has launched its first dedicated maritime broadband terminal as it strengthens its focus on this growing segment.**

Thuraya Orion IP is a maritime-specific broadband terminal manufactured by Hughes Network Systems, LLC (Hughes), the global leader in broadband satellite solutions.

Capable of data transfer at rates of up to 444kbps, Thuraya Orion IP leverages the Company's highly reliable and uncongested network, with Maritime Broadband pricing packages to provide the best value for connectivity available to users in the shipping sector.

Building on Thuraya's well-established voice and narrowband maritime offerings, Thuraya Orion IP further increases the choice available to owners and operators looking to combine reliable hardware with cost-effective, flexible pricing plans.

Randy Roberts, Vice President of Innovation at Thuraya said, "At a time when the other players are either increasing prices or expecting their customers to upgrade to unproven platforms, Thuraya's commitment is to maritime users who want broadband communications at a competitive rate, with hardware they can rely on and without the threat of punitive price increases. Orion IP is the first important step in a 2014 maritime strategy that will increase choice and provide greater value for maritime users, no matter how big or small their operations are."

The terminal is being designed for users who want simplicity in installation, flexible operations, and a platform that enables vessel operators to use their own value-added services as well as those from Thuraya.

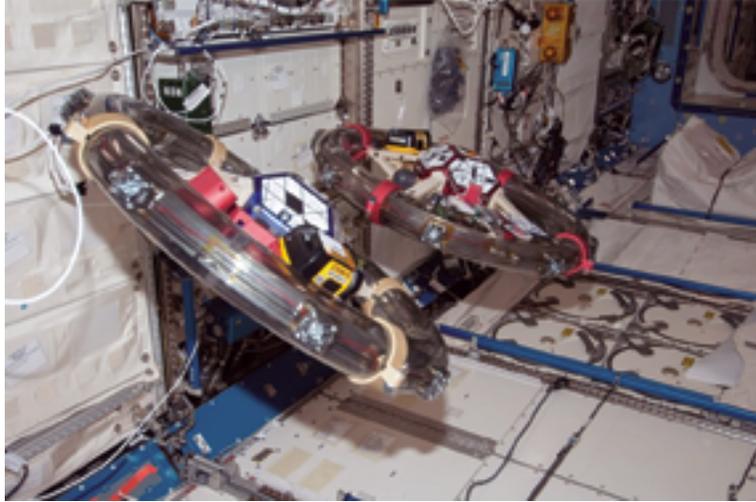
The Thuraya Maritime Broadband pricing plan, launched in 2013, has proved popular with owners and operators thanks to its flexibility: post-paid plans enable users to choose from high volume, low usage or VSAT backup options.

Geoff Davison, Product Manager for Maritime at Thuraya said: "The maritime satellite market is definitely changing but L-band will continue to play an important role in maritime communications for many years to come. The launch of Orion IP illustrates that Thuraya and our partners understand what maritime users want from their communications solutions: choice, performance and value."

The Thuraya satellite network provides high quality L-band coverage spanning Northern Europe, Africa, the Middle East, North and South Asia and Australia. Current estimates suggest that at least 30,000 merchant maritime vessels operate under its footprint, including thousands of vessels that previously could not justify the higher CAPEX and running costs of competitor offerings.

For additional details, access <http://www.thuraya.com/orion-ip>

## NASA—Significant SPHERE Science



DOD SPHERES-Rings fly freely on the International Space Station during demonstration testing of electromagnetic formation flight and wireless power transfer in microgravity. Photo is courtesy of NASA.

**Inspired by a floating droid battling Luke Skywalker in the film *Star Wars*, the free-flying satellites known as Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES) have been flying aboard the International Space Station since Expedition 8 in 2003.**

Although there have been numerous SPHERES investigations held on the orbiting laboratory, four current and upcoming SPHERES projects are of particular significance to robotics engineers, rocket launch companies, NASA exploration and anyone who uses communications systems on Earth.

These are, in fact, the droids that NASA and its research partners are looking for. Inspired by a floating droid battling Luke Skywalker in the film *Star Wars*, the free-flying satellites known as Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES) have been flying aboard the International Space Station since Expedition 8 in 2003.

Vertigo, Department of Defense (DoD) SPHERES-Rings, SPHERES-Slosh and SPHERES-Inspire II investigations all use the existing SPHERES space station facility of these self-contained satellites.

Powered, not by an astronaut's use of the Force, but by AA batteries, the satellites act as free-flying platforms that can accommodate various mounting features and mechanisms in order to test and examine the physical or mechanical properties of materials in microgravity. Each satellite is an 18-sided polyhedron, and is roughly the size of a soccer ball.

NASA's Ames Research Center at Moffett Field, California, operates and maintains the SPHERES research facility aboard the space station, which is funded by the Human Exploration and Operations Mission Directorate at NASA Headquarters in Washington.

SPHERES provide a unique low risk, low-cost, long-term microgravity research facility that supports quick-reaction testing of technologies that can be repeated numerous times.

Operating intermittently since February of 2013, the SPHERES Visual Estimation and Relative Tracking for Inspection of Generic Objects (SPHERES-Vertigo) investigation uses what looks like eye goggles and other new hardware and software on multiple satellites during testing.

The purpose of the study is to build 3D models of a target using mapping algorithms and computer vision-based navigation. These additions to the satellites help researchers create 3D maps of a previously unknown object for navigation by flying the SPHERES in a path around that object while taking photos.

Brent Tweddle, a postdoctoral associate with the MIT Space Systems Laboratory, said the SPHERES-Vertigo project differs from previous SPHERES experiments by "adding a pair of stereo cameras, which see, perceive and understand their world visually and can communicate with satellites using Vertigo goggles." The goggles act "like their own little intelligence block that sticks on the front end of the SPHERES and allows them to see the rest of the world that they want to navigate through," explained Tweddle.

First, the SPHERES use their updated hardware and software to construct a 3D model of a target object. Then, the satellites test their skills to perform relative navigation using only sensory reference to the 3-D model.

Imaging from projects such as Vertigo could help refurbish old satellites by determining and mapping the specifications of the old satellites and repairing them as they orbit Earth. Other applications include NASA's future mission of visiting an asteroid, where thorough understanding of the

size, shape and motion of an asteroid is necessary to navigate around it as it travels through space. Further, as robots become more autonomous, they will need a pair of eyes, similar to Vertigo, to provide them with navigational capabilities.

The DoD SPHERES-Rings investigation is the first demonstration of electromagnetic formation flight in microgravity, as well as of wireless power transfer in space. The study installs highly advanced rings to existing SPHERES. The crew places the rings around an individual satellite, consisting of resonant coils, coil housing with fans, batteries and support structure hardware.

The Rings project demonstrates the use of electromagnetic coils to maneuver individual SPHERES with respect to one another. The current running through the ring of coils controlled the satellites, so that two ring-outfitted SPHERES are able to attract, repel and rotate.

"Using electrically-generated forces and torques is preferable to using fuel, since electricity can be generated by solar panels, but once fuel is expended, the mission is generally over," said Kathleen Riesing, a graduate student with the MIT Space Systems Laboratory. The software used to control the rings will also demonstrate wireless power transfer, where one satellite sends power to another.

Research goals for SPHERES-Rings include enhanced attitude control performance between separate satellites and the possibility of more efficient power transfer at a distance. Adding an efficient way to transfer power between SPHERES may alleviate the need for alternate power sources. The wireless power transfer experiment establishes the hardware necessary for potential future powering of space and urban robotics and enhanced communications systems in space, on land or underwater.

The new SPHERES-Slosh investigation was launched aboard Orbital Sciences Corporation's first Cygnus cargo resupply spacecraft to the space station on January 9th. The investigation was named for the sound of liquids sloshing. SPHERES-Slosh seeks to understand how fluids move inside containers during long-duration flight in microgravity.

The study will demonstrate how applied external forces impact the contained fluids. The goal is to simulate how rocket fuels move around inside their tanks, as in response to motor thrusts used to push a rocket through space. The study of the physics of liquid motion in microgravity is important because Earth's most powerful rockets use liquid fuels to take satellites and other spacecraft into orbit.

SPHERES-Slosh externally mounts a tank between two of the small satellites. The pair then flies around inside the space station, creating the "slosh" scenario. The tank geometry

simulates a launch vehicle propellant tank and the maneuvers replicate those of real vehicles.

"I believe the results from this experiment can help rocket launch companies design better tanks and control systems which will make a significant impact," said Stephen Gaddis, program manager of the Space Technology Mission Directorate's Game Changing Development Program at NASA's Langley Research Center in Hampton, Virginia. Having a deeper understanding of rocket propellants may lower the cost of industry and taxpayer-funded satellite launches by improving safety and fuel efficiency.

Coming mid-2014, the SPHERES-Inspire II investigation adds a series of universal docking ports and a series of Halo interfaces to existing SPHERES on the space station. The Halos consist of six ports each and surround the small satellites, as the name would suggest. These Halos and ports expand SPHERES processing power and data handling capabilities for extensive testing scenarios. The SPHERES-Vertigo "eye goggles" can be attached to the Halo to provide vision-based navigation.

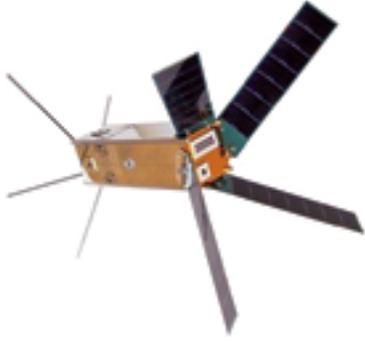
"The testing scenarios that are planned will focus on resource aggregation and satellite reconfiguration as a risk reduction platform for the types of satellite maneuvers expected to be performed by satellites for the Defense Advanced Research Projects Agency (DARPA) Phoenix mission," said David Sternberg, a graduate student with the MIT Space Systems Laboratory.

The DARPA Phoenix mission is working to develop small "satlets" that can robotically attach to aging or non-functioning satellites in geosynchronous orbit approximately 22,000 miles above Earth. This creates new space systems at a reduced cost.

With every new hardware addition to SPHERES, significant advancements are made in robotics proficiencies, and one day, older or non-functional satellites will be repaired or refurbished in orbit.

The science fiction of robotic droids buzzing around to equip and repair spacecraft and space travelers is no longer just the fantasy of *Star Wars*. Rather, the use of robotic capabilities is fast becoming more of a reality thanks to these free-flying SPHERES.

### Ecuadorian Civil Space Company—All Is Not Lost



Artistic rendition of Ecuador's Krysaor satellite.



Artistic rendition of Ecuador's Pegaso satellite.

**The Ecuadorian Civil Space Company, or EXA, captured the first images of South America by its Krysaor satellite, that also recovered the audio signal from another device—the Pegaso—launched several months ago and considered lost after crashing into some space debris last August.**

"The signal is stable," Ecuadorian astronaut and director of EXA, Ronnie Nader, announced from the Samborondón space station near the city of Guayaquil in south eastern Ecuador.

The first images captured were of the coastal areas of Colombia, Ecuador and Peru, emitted by the nanosatellite Krysaor from an altitude of 750 kilometers (465 miles), Nader said.

EXA launched Krysaor on November 21 from the Dombvarovski missile area at the Russian base of Yasni aboard the rocket Dneper Rs20b, which carried satellites from other countries as well.

This second Ecuadorian nanosatellite, similar to Pegaso, a cube weighing 2.1 kilos (4 2/3 pounds) that was launched last April from China, was equipped with a device to try and catch the signal from the first one, which had been sideswiped by debris from an old Russian rocket that sent it spinning on its axis at high speed.

Despite EXA's efforts, Pegaso's signal could never be recovered until recently, when Krysaor managed to connect with it and pick up its audio signal.

"We have recovered Pegaso," said Nader, who, during the television broadcast of the Krysaor operation to capture the signal, spoke with the president of his country, Rafael Correa.

"We saw the coast of our America, of our Great Homeland, very clearly," Correa told Nader.

In the construction of the Ecuadorian nanosatellite Pegaso, which took a year, and its twin Krysaor, EXA and several private companies invested some \$80,000, while the government contributed approximately \$700,000 for the launch, insurance, logistics and certification tests of both satellites.

### Inmarsat + Northrop Grumman—Xpressley Joined

**Inmarsat has selected Northrop Grumman Corporation to field its Spectrum Interference and Monitoring System (SIMS) to government users of Inmarsat's Global Xpress service.**

SIMS will provide improved speed, flexibility, and performance in monitoring Global Xpress services. Northrop Grumman developed SIMS based on the globally-deployed monitoring system it previously developed for the Department of Defense (DoD) Wideband Global System (WGS) constellation.

Through familiar user interfaces, customizable views and graphical reporting, SIMS provides Inmarsat value added resellers (VARs), network operators and government customers with unparalleled insight into their networks' operations. SIMS is the advanced tool needed for spectrum situational awareness, rapid interference detection, and problem resolution, ensuring optimal availability, reliability and quality of service to Global Xpress users.

Inmarsat Global Xpress (GX) will be the first globally available high-speed, mobile commercial satellite wideband network. It will offer the unique combination of global coverage from a single operator, consistent performance everywhere, and the network reliability for which Inmarsat is renowned.

GX is the first satellite fleet from Inmarsat that will access Ka-band frequencies and allow for even higher bandwidth communication, virtually anywhere in the world. The first satellite (Inmarsat-5 F1) was successfully launched on December 8th, 2013 covering Europe, the Middle-East, Africa and Asia. Full global coverage from the GX constellation of three Ka-band satellites is scheduled to be achieved by the end of 2014.

For more information regarding GX:  
<http://www.inmarsat.com/gx-launch/>

## InfoBeam

### WestJet + Panasonic Avionics—Accommodation @ Altitude



**WestJet has signed a multi-year agreement with Panasonic Avionics Corporation to provide the airline with a new in-flight entertainment system with the ability to feature wireless satellite Internet connectivity, live streaming television, on-demand movies, magazines and more.**

Passengers will be able to use their own personal electronic device (PED) or laptop computer to receive live and stored content streamed wirelessly from a server on board each WestJet Boeing Next-Generation 737 aircraft.

Airtime packages will also be available to surf the Internet, access email or plan a vacation on <http://www.westjet.com/>. Tablets will be available for those guests not traveling with a device.

The addition of WiFi is a strategic step forward to enable guests, especially business travelers, to make their time in the air as productive as possible.

"We know that roughly 75 percent of our guests are bringing their own devices on board today," said Marshall Wilmot. "They tell us they want the opportunity to connect to check their email, put the finishing touches on a presentation or keep in touch with family and friends.

Our continually improving schedule and network, now combined with wireless connectivity, along with our WestJet Rewards program and our Plus package with more space to work and additional amenities is part of our ongoing effort to enhance our value proposition for business travelers."

WestJet will also install USB/110 volt power outlets in new, slimmer seats on its aircraft to enable guests to charge their devices or keep them charged while using the entertainment system. And, with a mix of free and paid content, the new system offers the airline additional ancillary revenue opportunities.

There are currently 275 airlines around the world using a Panasonic inflight entertainment system. Panasonic will install the system on one WestJet Boeing Next Generation aircraft before the end of 2014 at which time the airline will perform tests to fine-tune the system.

When installed on WestJet's fleet over the next several years, guests will be able to access live television, movies, magazines and the Internet throughout North America, the Caribbean and Central America, Europe, as well as future WestJet destinations.

For more information regarding WestJet, access <http://www.westjet.com/>

Details regarding Panasonic Aero are available at <http://www.panasonic.aero/Home.aspx#>



### NewSat Limited—Jabiru-1 Satellite Funding Finalized

**NewSat Limited has announced that a financial close has been reached with the US Ex-Im Bank and COFACE for US\$390.1 million of debt funding for the Jabiru-1 satellite project.**

NewSat has completed or obtained waivers for all the conditions precedent to drawdown the debt funding of US\$300.5 million from the U.S. Ex-Im Bank and US\$89.6 million from the COFACE Promesse de Garantie. The drawdown will commence with a US\$78.9 million payment to Lockheed Martin,

taking total progress payments for construction of the Jabiru-1 satellite to US\$169.9 million. In addition, a progress payment of US\$34.7 million will be made to Arianespace for the launch service, following the initiation of mission analysis in December 2013 in Newtown, Pennsylvania, USA.

To satisfy all conditions precedent and to facilitate NewSat's direct loan account of US\$300.5 million with the U.S. Ex-Im Bank becoming operative, NewSat has raised \$2.15 million as a result of closing activities, funds that will be reimbursed through the bank

### ILS Technology—Winning the M2M Platform Battle

**Seamlessly connect your assets with your enterprise systems and databases**  
Our secure, end-to-end platform lets you configure and deploy your own enterprise-grade remote monitoring and control applications without any programming - enabling intelligence in no time.

**device WISE** Seamless Communication and Integration across any Device, any Network, any Application, Anywhere  
FOR REMOTE M2M/IIOT APPLICATIONS OR WITHIN YOUR "FOUR WALLS"

**secure WISE** Secure and Controlled Remote Connectivity and Collaboration Service

SERVICE ENABLEMENT FOR SEMICONDUCTOR AND CLEANTECH INDUSTRIES

**ILS Technology, a Telit company, won big at M2M Evolution—the company took two awards at M2M Evolution's Battle of the Platforms: Best Application Development and Best Horizontal Platform—in addition, two Telit customers, NimbeLink and GeaCom, were named Business Innovators.**

M2M Evolution is the semiannual M2M-focused track of TMC's global information technology show—IT Expo. TMC is a world-leader in technology marketing and the event's Battle of the Platforms featured an afternoon of presentations from nearly ten leading M2M platforms.

Prior to the battle, ILS Technology hosted its fourth M2M Workshop designed to educate and inspire the M2M ecosystem, helping grow the understanding and appreciation of ILS Technology and Telit offerings with content designed to demonstrate value through real-life use cases.

After presenting the platform to a standing-room-only crowd, ILS Technology recognized key partners including Option Wireless, Sprint, Persistent Systems and Abstracta Studios—all a part of the thriving deviceWISE ecosystem centered on the deviceWISE Ready program.

deviceWISE Ready promotes interoperability between devices from our business partners and the deviceWISE M2M platform, thus reducing the risk, time-to-market, complexity and cost of deploying complete end-to-end M2M solutions.

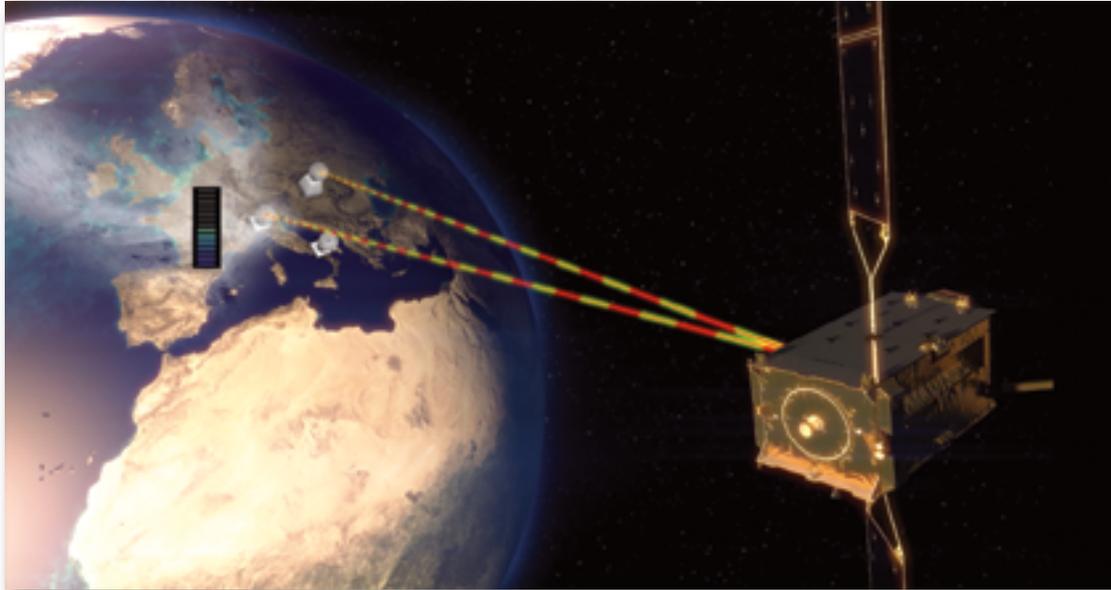
At the M2M Evolution tradeshow that followed, ILS Technology and Telit North America sales teams joined forces to put the Telit ONE STOP. ONE SHOP. strategy into action, setting the bar high with the first collaborative sales event supporting modules, Mobile services and Cloud with a unified face to the marketplace.

Also at the event, two Telit module customers, NimbeLink and GeaCom, received Business Innovator Awards in recognition of their modem and medical translator applications respectively. Both end products feature the Telit xE910 family of cellular modules.

Access: <http://www.m2mevolution.com/videos.aspx?vid=9844> for more information and to watch video of the event.



**European Space Agency—Green Light For Experiments**



*Alphasat's Aldo Paraboni (TDP 5) measures the impact of cloud coverage on its signal. The Aldo Paraboni Q/V Communications and Propagation experiment is one of four Technology Demonstration Payloads carried by Alphasat. It explores new frequencies for future telecom applications. Image is courtesy of European Space Agency.*

**European scientists can now start probing unexplored frequencies, as mega telecom satellite Alphasat's 'Aldo Paraboni Q/V Band' hosted payload has been given the green light to begin experiments.**

Six months after launch, the payload has undergone many commissioning and in-orbit tests before receiving the go-ahead to start operations.

The Q/V-band mission, named after the late Italian scientist Aldo Paraboni who inspired it, is one of four technology demonstration payloads carried by Alphasat. It is dedicated to exploring the higher-frequency Q- and V-bands at 38 and 48 GHz.

It is necessary to look into using the higher frequencies for carrying data because the current information highways—the Ku- and Ka-bands from 12 to 18GHz and 26.5 to 40GHz, respectively—are becoming increasingly congested. Expanding the range of frequencies we can use means more bandwidth availability.

With all tests now complete confirming the payload is healthy and performing well, the scientists can start conducting their experiments. They will be analyzing the data from the two independent packages that make up the Aldo Paraboni payload.

First, the communication experiment receives and relays broadband data between stations in the Q/V-bands and allows their performance to be tested.

This is important, as one of the challenges that these frequencies have presented in the past is their susceptibility to atmospheric conditions. Turbulent weather conditions can cause strong signal fading.

The complementary propagation payload transmits two beacon signals across Europe, allowing scientists to collect the two sets of data, compare their performance and determine how they are affected by weather.

Scientists can now begin analyzing the data produced by the payload, and model future broadband communications from geostationary satellites on their discoveries.



*Alphasat in Kourou. The QVCA of the Aldo Paraboni (TDP 5) Payload is visible on the top left. Photo is courtesy of Airbus Defence and Space.*

The Aldo Paraboni payload is the first to carry communications at such high frequency bands on a commercial geostationary satellite over Europe.

Developed by Italian companies Thales Alenia Space and Space Engineering and supported by Italy's ASI space agency, the Aldo Paraboni mission paves the way for future telecom satellites operating at Q/V frequencies.

This will result in more available bandwidth and the possibility of smaller user terminals, as more research will eradicate the need for oversized links to compensate for fading.

"The Aldo Paraboni payload is the Q/V Band program's space segment," said Enrico Russo, ASI Head of Telecommunications and Integrated Applications Unit, "and it is in line with the long-standing ASI goal to pioneer the use of the higher frequency bands for satellite telecommunications."



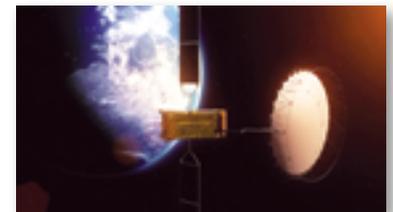
*Artistic concept illustration of Alphasat's Aldo Paraboni (TDP 5) transmitting a beacon back to Earth. The Aldo Paraboni Q/V Communications and Propagation experiment is one of four Technology Demonstration Payloads carried by Alphasat. It explores new frequencies for future telecom applications. Image is courtesy of ESA.*



*Details of the Aldo Paraboni (TDP 5) Payload Q-band and Ka-band horns, after final insulation installation in Kourou. Photo is courtesy of Airbus Defence and Space.*

The payload is carried on Inmarsat's Alphasat, the largest European telecom satellite ever built at 6.6 tons that was launched on July 25, 2013. The satellite is now in its final orbital position at 25 degrees East, having completed testing.

Alphasat and its hosted payloads are also the result of one of ESA's biggest public-private partnerships to date, involving ESA, Inmarsat and approximately a dozen institutional and industrial partners from all over Europe.



*Artistic rendition of Inmarsat's Alphasat. Image courtesy of ESA.*

Stephane Lascar, Head of Telecommunications Satellite Programmes of ESA, added, "The Aldo Paraboni payload is an important and sophisticated piece of technology hosted on Alphasat that will pave the way to future telecom applications. We are pleased to start its operations."

"Alphasat also embodies the next step in SATCOM as a true feat of engineering and partnership; we are looking forward to the unique results of this payload's experiments."



## AST + SRI Int'l—Arctic Access



**Applied Satellite Technologies (AST) is working with SRI International, (SRI), to provide Iridium communications throughout the Arctic.**

Iridium OpenPort provides vital, always-available connectivity, for safety of life purposes, tracking and also allows for improved project logistics.

Iridium OpenPort is primarily used on ice cap traverses, field stations, unmanned sites and on ice breakers, but is also used at remote fixed sites.

SRI has also deployed Iridium OpenPort on U.S. Coast Guard Ice Breakers for communications when positioned at the high latitudes.

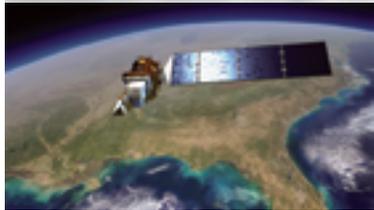
In addition to general communication needs, Iridium OpenPort supports retrieval of ice coverage maps so as to avoid the ice flows and ensure ship and crew safety.

AST also provide valuable satellite IP traffic management and control services via their Point of Presence, (POP), with alerting systems ensuring that unwanted Iridium OpenPort traffic is filtered via a bespoke firewall, notifying customers of any issues with potential errant usage.

More information regarding SRI is available at <http://www.sri.com/research-development/earth-space>

Learn more about AST at their infosite: <http://www.satcomms.com/>

## Landsat 8—Good Things, Getting Better



**It's hard to believe a year has passed since the launch of Landsat 8. This first anniversary is going to be an exciting, upbeat celebration because the new satellite is meeting, if not exceeding, all expectations. "Landsat 8 is nearly perfect," said Jim Lacasse, Landsat Operations and Maintenance Project Manager. "We're getting really high quality data."**

There is, however, a bit of tweaking going on as Landsat calibration and instrument teams work to correct a few small issues. Landsat 8's Operational Land Imager (OLI), for example, is composed of tens of thousands of very sensitive detectors—so sensitive that tiny discrepancies are evident in Landsat 8 images of dark, uniform areas such as large expanses of water. The calibration team has made an overall improvement to the radiometry (color fidelity) of the OLI sensor's bands to resolve this problem.

The satellite's Thermal Infrared Sensor (TIRS) acquires two infrared bands. Both are being affected, to different degrees, by a stray light problem.

"Light from outside the area we are looking at is getting into the telescope—it's being reflected from something in the sensor itself, which is causing 'ghosting' in the images," said Ron Morfitt, Landsat 8 Calibration and Validation Lead. "To fix the problem,

the calibration and instrument teams are scanning the Moon, which is a very bright object with a very dark background, to try to find out exactly where the stray light is coming from. We'll then build a filter to remove the ghosts from the images," Morfitt added. "It is a very novel solution."

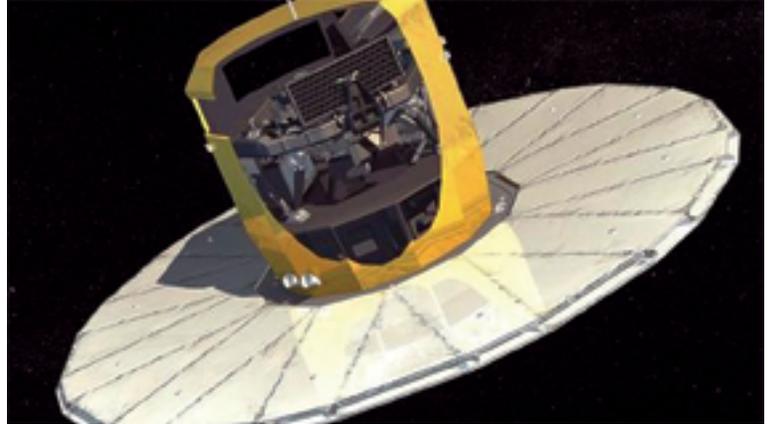
Landsat 8 and Landsat 7 are also being managed in a novel way, with the newer satellite being used to extend the capabilities-and lifespan-of the older one. "Landsat 7 recently went to a continental landmass acquisition strategy," said Lacasse. "Capturing images of islands, for example, was very inefficient due to Landsat 7 scheduling constraints. The responsibility for capturing images of islands has been turned over to Landsat 8, with its much more sensitive sensor. The change helps to conserve the resources of Landsat 7 while still meeting our science goals."

This change has also resulted in more data than anticipated being acquired by both satellites. Freed from routine acquisition of island images—as well as those of water, Antarctica, and night scenes—Landsat 7's output has increased from 375 to 438 scenes per day while at the same time prolonging the life of the ETM+. Landsat 8 is also collecting more than its anticipated 400 scenes per day.

More data. Better data. It's definitely something to celebrate.

*Story by Rebecca Johnson, Contractor to USGS EROS*

## European Space Agency—Gaia On The Correct Track



**Once it reached the Lagrange L2 point on January 14, 2014, Gaia began transmitting its first data to the European Space Agency (ESA) European Space Operations Centre (ESOC) in Darmstadt, Germany.**

There are two types of data: The data about the satellite itself, which enables the space observatory's state of health to be monitored; and the scientific data that are transferred to ESA's European Space Astronomy Centre (ESAC) in Spain.

A dozen Airbus Defence and Space engineers are processing the satellite data in collaboration with ESA personnel based at ESOC, while the scientific data analysis is taking place at the Toulouse operations center. The task the teams are currently tackling is the refining of the image-detection settings by refocusing the main instrument.

"We compare the quality of the images received with the quality we expect, and we can thus calibrate telescope optical quality," Xavier Moisson explained. "We then refine the setting of the M2 mirror—the only one of the three on each of the two telescopes that is adjustable—through tiny movements in the region of a few micrometers. This optimizes the instrument's response whenever it detects a star."

The team also takes into account the observations made by the scientists of the Initial Data Treatment (IDT) unit, who provide a detailed weekly report on the state of health of the satellite's payload.

This initial series of adjustments should last through to April. At this point the telescope will be completely correctly focused, images will meet the expected level of quality in terms of spectral range and magnitude ranges, and the base angle between the two telescopes will not change.

Depending on how successful this first phase is, the team will then proceed to making the very final adjustments, particularly of the Radial-Velocity Spectrometer, which, as Frédéric Faye said, "needs to be able to operate at the level of fractions of electrons in the image in order to take its measurements."

One month later, when Gaia's instruments achieve the absolute level of accuracy expected of them, Airbus Defence and Space will hand Gaia over to the customer, ESA. Of the company's relationship with ESA, Frédéric said, "It's really a partnership. Everything has gone perfectly with them since the start of the project 10 years ago.

"We and the people at ESOC are focusing on operational matters, and ESA's know-how is first rate," he added. Xavier echoed his comments, "We have a superb relationship with ESAC's astronomers and scientists."

Gaia's mission is to produce a detailed map of the Milky Way and reveal the origin, structure and evolution of our galaxy. Gaia will make an inventory of 1 percent of all the stars in our galaxy—of which there are in total around one billion.

During its five-year lifetime, Gaia will observe each of these stars 70 times, recording its light intensity, color and position in the sky. Gaia is also expected to discover a large number of unknown celestial objects: new asteroids in the solar system, extra-solar icy bodies, young stars, planets, distant stellar explosions, black holes—to name just a few!

The light collected by Gaia's two telescopes is analyzed by three instruments:

- The main instrument, which has an astrometry function and determines the position of stars in the sky and the speeds at which they move.
- The photometer, which supplies information on the colors of the celestial objects, enabling stellar properties such as the chemical composition, mass and temperature to be calculated.
- The Radial-Velocity Spectrometer, which measures the speed of the star's movement.

Gaia information is available at <http://www.astrium.eads.net/en/programme/gaia.html>



### Iridium Communications—A Powerful Triple Play With GO!, Burst + Pilot



**Iridium Communications Inc. has debuted their Iridium GO!™ and two additional products to the market—the Iridium Go™ is the industry's first portable satellite hotspot that connects to any smartphone or tablet, dramatically extending voice and data coverage for personal devices when they are out of range of cellular networks.**

Iridium GO! creates a satellite-backed Wi-Fi zone anywhere on the planet, enabling as many as five smartphones to make calls, retrieve their email, text and use some apps, even when terrestrial networks are non-existent, unreliable or costly. This first of its kind product allows users to conduct business, connect with family or access information no matter where they may travel—without the need for a satellite phone.

"Iridium GO! expands our portfolio and speaks to both how people use devices today and the growing and changing needs within enterprises," said Matt Desch, CEO, Iridium. "Iridium GO! enables people to use their own trusted devices—their smartphone or tablet—even when they are off the cellular grid, all while maintaining access to their contacts and applications, as well as reliable voice and data services. It is also the lowest cost device and service offering that Iridium has ever made, making truly global coverage more affordable than ever."

Iridium GO! is also a powerful platform for developers. Created to be flexible, Iridium is licensing the capability to allow app developers to use the Iridium® satellite network through Iridium GO! to tailor their products to meet the needs of organizations or individuals, and extend the capabilities of the product even further.

Iridium GO! is incredibly simple to use, raising the antenna turns on the device, which then automatically connects to the Iridium network and establishes a Wi-Fi connection. By using a special Iridium GO! app on their device, individuals can then use their phone or tablet to make voice calls, text, send their precise location to family and friends and even report a personal emergency through an available SOS service.

Several key features are built into the product. Just like Iridium's satellite phones, Iridium GO! is designed to be rugged; it is built to withstand rain, sand, dust and rough use. The included SOS functionality creates

a fast, two-way connection with an emergency provider—bringing peace of mind anywhere in the world.

With a small form-factor, Iridium GO! is highly portable, providing a Wi-Fi network with a coverage radius of 100 feet. Users can connect devices wirelessly without any special adapters and enjoy great voice quality, thanks to the use of optimized audio fidelity of their smartphones.

In addition, Iridium GO! is Iridium NEXT-ready; it works on the current satellite network and will work with the new Iridium NEXT satellites that will launch in 2015.

Travelers to remote countries can keep an Iridium GO! in their bag and instantly connect at a café through their smartphone to text or call family and friends at home. Outdoor adventurers will never have to worry again about missing an important email while back-country camping. The device is also valuable for the military and first responders, as well as for emerging Machine-To-Machine (M2M) applications. Developers in the transportation industry, for example, can link sensors and monitors from their apps in the vehicle through Iridium GO! Iridium GO! will be available during the first half of 2014 through select Iridium distribution partners. GO! info is available at: <http://www.iridium.com/iridiumgo.aspx>

Also debuting is the company's first one-to-many global data broadcast service, Iridium Burst™, enabling enterprises to send data to an unlimited number of devices anywhere on Earth whether inside buildings, in-vehicle or in aircraft.

Iridium Burst leverages the high power channels of the Iridium® satellite network to offer a cost-efficient, customizable and low-latency broadcast data service that can provide service globally with high signal penetration capabilities superior to traditional paging and broadcast services. From tsunami warnings to weather and traffic alerts, over-the-air updates and other machine-to-machine (M2M) applications, Iridium Burst presents an unrivaled opportunity for businesses, government agencies, militaries, and other entities needing to broadcast data.

As organizations worldwide seek ways to quickly and efficiently communicate with people and devices, Iridium Burst's groundbreaking service offers transmissions that are four times more

powerful than traditional satellite data services, reaching anyplace on the planet in less than 20 seconds. In addition to penetrating vehicles and buildings, transmissions can penetrate partial obstructions and even weather phenomenon.

Users can target Iridium Burst transmissions to specific devices, within specific geographic locations like towns or states, or to broad areas such as an entire continent. Primary uses for Iridium Burst include:

- **Alert networks:** Government agencies, public safety and emergency response organizations can provide timely and reliable alerts for national disaster and weather warnings, terrorism and security alerts and updates, and Amber or Silver alerts
- **Private networks:** Corporations and other private entities wishing to broadcast specific information to a lot of their assets. For example, advertisers updating electronic billboards; software updates, shipping and maritime companies dealing with logistics, fleet updates, and M2M devices
- **Command and control:** M2M data and messaging sent to assets deployed in various locations. Military organizations that need to communicate in a timely, reliable and survivable manner to manage their troops and resources, such as ground troops in combat zones or supply vehicles in remote areas
- **Maritime safety:** Maritime agencies notifying rescue ships using Global Maritime Distress and Safety System (GMDSS) of ships in distress. Rather than having to contact each ship separately, all ships within the relevant area can be contacted simultaneously with one Iridium Burst transmission
- **Disaster recovery:** Governments and emergency response organizations can quickly deploy Iridium Pilot Land Station to restore voice and Internet connections in stricken areas.
- **Remote education or humanitarian missions:** For organizations providing education or humanitarian aid in countries without reliable telecommunications infrastructure, Iridium Pilot Land Station enables the communications they need to stay organized.
- **Science and exploration:** Explorers and scientists can work from anywhere on the planet, easily staying in contact with colleagues. This is especially important when exploring remote, treacherous areas where other satellite coverage falters.
- **Business continuity:** Whether due to an earthquake or a power outage, companies, governments and other organizations can rely on Iridium Pilot Land Station to provide a diverse connectivity solution independent of terrestrial infrastructure.

to-install communications platform that makes connections where no other choice exists. Iridium Pilot Land Station provides pole-to-pole coverage, broadband data speeds, with independent voice lines for simultaneous voice and data communications.

The ruggedized hardware uses the proven Iridium OpenPort broadband service, allowing operation in extreme weather conditions, making it the obvious choice for users with critical communications requirements. Iridium Pilot Land Station has a variety of potential uses, including:

Pilot Land Station info at: <http://www.iridium.com/products/iridium-pilot-land-station.aspx>

The Iridium® global network provides reliable communications solution for locations beyond 75 degrees North and South, and is a proven technology backed by years of testing and use. The unique Iridium constellation of 66 cross-linked Low-Earth Orbit (LEO) satellites provides coverage over the entire globe and there is no need to establish line-of-sight. Available immediately, Iridium Pilot Land Station redefines the entry price point for satellite broadband communications. Iridium OpenPort provides a range of provisioning and pricing options for voice and data services depending on individual needs.

For more information on how and where to purchase Iridium Pilot Land Station, visit the Iridium website: <http://www.iridium.com/Contact/WhereToBuy.aspx>

Iridium Burst is now available as a pay-per-use service compatible with the Iridium 9602GDB receiver, and in future devices from Iridium and Iridium partners. Burst info at the following site: <http://www.iridium.com/products/iridium-burst.aspx>

The third new offering from Iridium finds an expansion of the company's Iridium OpenPort® service to offer broadband communications to terrestrial users with the launch of Iridium Pilot® Land Station.

For the first time, many remote individuals and businesses, working vehicles and off-the-grid locations can obtain reliable Internet connections and voice calling no matter where they are located. Whether deployed as a fixed installation or vehicle-mounted for communications on the move, Iridium Pilot Land Station is an easy-

### Novotronic—Broad Bandwidth Appeal



This unit can be realized as a RX-version (full fan out) or as TX-version (full fan in). Control is managed via the Ethernet—integrated web browser—and manual control via push buttons and a LC display located on the front panel of the unit.

The matrix has unity gain and good values for dynamic range. The unit is powered by redundant hot interchangeable power supplies, which cover the range 90-264VAC

Novotronic's infosite is located at:  
<http://www.novotronic.com/>

**Novotronic GmbH, a well known German manufacturer of RF-switches and Matrix systems, has introducing a new matrix switch which covers the bandwidth from 20 to 4200MHz.**

This compact unit (19inch subrack with 1u and a depth of 380mm) allows the distribution of 8 inputs to 8 outputs in a non-blocking manner.

### Optus + NBN Co—Operational Oversight

**Optus has signed a new, five-year agreement with NBN Co to operate its two new satellites that will deliver high-speed broadband services to rural and remote Australia.**

Under the agreement, Optus satellite will provide tracking, telemetry and control services for the NBN Co satellites, planned to launch into orbit in 2015. This new agreement is in addition to Optus' existing relationship with NBN Co, announced in May 2011, under which Optus supplies managed services for NBN Co's Interim Satellite Service.

Optus currently has five satellites in orbit with another planned for launch in 2014 to provide additional satellite services to its corporate, enterprise and government customers. The two new \*Ka-band NBN Co satellites will be controlled from Optus' satellite ground station facility located in Sydney's northern suburb of Belrose. Optus will use its dedicated resources and expertise in satellite command and control to support NBN Co in the satellite broadband component of its National Broadband Network rollout.

Paul Sheridan, Vice President of Satellite at Optus, said, "Optus looks forward to working with NBN Co to fly these satellites and assist it in meeting the significant demand for high speed

broadband services in regional and remote Australia."

Matt Dawson, Program Director of Satellite at NBN Co, said, "The NBN Co satellite service is key to bridging the divide between the city and the bush. It can give people in the outback, remote regions and Australia's overseas territories access to economic and social opportunities."

Since 1985, Optus has successfully launched and operated nine of its own satellites. Optus satellite services facilitate the provision of free-to-air television, pay television, radio broadcast, voice and data to corporate and government organizations, consumer broadband IP, video conferencing, and mobile satellite services to Australia and New Zealand, including territorial waters. \*Ka-band satellites operate at high frequency to support high-bandwidth applications and critical communications networks worldwide.

More info available at  
<https://www.optus.com.au/>

The NBN Co infosite:  
<http://www.nbnco.com.au/>

**NASA—The Deepest “Capture” Ever Completed**



**This long-exposure Hubble Space Telescope image of massive galaxy cluster Abell 2744 (foreground) is the deepest ever made of any cluster of galaxies and shows some of the faintest and youngest galaxies ever detected in space.**

The immense gravity in Abell 2744 is being used as a lens to warp space and brighten and magnify images of more distant background galaxies—the more distant galaxies appear as they did longer than 12 billion years ago, not long after the big bang.

The Hubble exposure reveals almost 3,000 of these background galaxies interleaved with images of hundreds of foreground galaxies in the cluster.

Their images not only appear brighter, but also smeared, stretched and duplicated across the field. Because of

the gravitational lensing phenomenon, the background galaxies are magnified to appear as much as 10 to 20 times larger than they would normally appear.

Furthermore, the faintest of these highly magnified objects is 10 to 20 times fainter than any galaxy observed previously. Without the boost from gravitational lensing, the many background galaxies would be invisible.

The Hubble exposure will be combined with images from Spitzer and NASA’s Chandra X-ray Observatory to provide new insight into the origin and evolution of galaxies and their accompanying black holes.

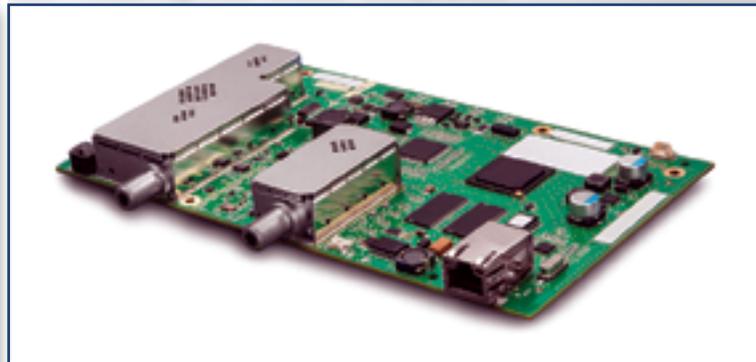
**SpeedCast—Newly Persuasive In Perth**



**SpeedCast has opened its new facilities in Perth, Australia—the company also plans to unveil at Australasian Oil and Gas Exhibition and Conference (February 19-21) its new streamlined global operations to serve the Natural Resources**

**sector, with the consolidation of SpeedCast, Australian Satellite Communications, Pactel International and Elektrikom Satellite Services under one global brand, SpeedCast.**

**iGT—Ensuring DoD Router Compliance**



**iDirect Government Technologies (iGT), a wholly owned subsidiary of VT iDirect, Inc. (iDirect), is releasing its newest satellite router, the e150 Integrated Router Board, designed to meet Department of Defense (DoD) SATCOM requirements for remote sensor monitoring.**

The e150 is ideal for sensor applications. The remote features DVB-S2/ACM and time division multiple access (TDMA), basic routing; virtual local area network functionality; and quality of service.

The 3150 includes spread spectrum for small antenna applications and transmit keyline control for battery power management savings.

Features include:

- Small form factor that enables smaller terminal design
- Low weight for maximum portability
- Spread-spectrum technology provides bandwidth and spectral efficiencies that enable the use of very small antennas

- Transmit keyline provides for significantly lower power consumption resulting in longer battery life and much lower dissipated heat output
- Supports all antenna variants and all satellite frequencies
- Functionality optimized for the sensor market

“The e150 was developed specifically to suit unique military applications and provide our DoD customers with TDMA, QoS and other bandwidth- and power-efficient features to support their overall missions,” said Karl Fuchs, iGT Vice President of Technology.

iDirect Government Technologies infosite is accessible at <http://www.idirectgt.com/>

Launching the new office in Perth is the company’s next step in its strategic investment to address the needs of oil and gas and mining customers. Previously together with its partner Satcomms Australia, SpeedCast invested in state-of-the-art teleport facilities in Perth’s suburb of Henderson.

The Perth office complements SpeedCast’s presence and infrastructure in the region’s other major oil and gas and mining hubs: Singapore, Kuala Lumpur, Jakarta, Port Moresby and Dubai.

SpeedCast’s infosite is located at <http://www.speedcast.com/>

This allows SpeedCast to provide services into Africa, Asia and Australia directly from Perth. SpeedCast has strengthened its position in Australia with the acquisitions of established satellite industry players Australian Satellite Communications and Pactel International.

### PlanetObserver: Something New For You In 2014



**The French company PlanetObserver, specialized in geospatial data, satellite imagery and elevation data, has launched a new website, which offers...**

- *New look: Attractive design, better navigation and user-friendly interface for an easy and quick access to information.*
- *New products: The website presents PlanetObserver three new product ranges : PlanetSAT, PlanetDEM and PlanetAIR.*
- *New features: Revamped with several novelties, the new interactive platform provides users with more efficient access to the different sections. Discover detailed case studies and several imagery and elevation data samples available for free download, so that you may test our products directly in your solutions.*

"[The website] features a better design and improved structure and has become more efficient while offering additional content. In just a few clicks, you can discover our full range of geospatial data," said Laurent Masselot, CEO of PlanetObserver.

PlanetObserver offers a full range of value-added geospatial products: Global imagery mosaics in natural colors with a unique visual quality and truly global high quality Digital Elevation Models.

All products are developed internally, backed up by PlanetObserver's know-how in geospatial data processing and more than 25 years of technological expertise.

PlanetObserver imagery and terrain products are perfect for numerous commercial, military and consumer applications, ranging from web-mapping to 3D visualization and simulation solutions, flight simulation, cartographic mapping to audio-visual production.

Recently, Intercarto and PlanetObserver joined forces to provide an innovative and highly attractive range of maps to all

professionals involved in mapping and communication projects.

Intercarto is a well known supplier of illustrative and vector maps for graphists and GIS users. Its online webshop, **MapAndData.com** already offers more than 5,000 map references available in different formats and pricing for immediate download.

PlanetObserver has a unique know-how in the production of natural color satellite imagery products. Intercarto has selected the company's range of innovative georeferenced images for distribution to graphists and geographic information specialists.

PlanetWeb's new infosite is located at <http://www.planetobserver.com/>

## InfoBeam

### IRG—A Walk For Interference



**Participants will meet the companies involved in all three areas, as well as learning more about the solutions and processes for reducing satellite interference.**

The Satellite Interference Reduction Group (IRG) will be hosting a Carrier ID (CID) Tour at CabSat and Satellite 2014.

The tours will help demonstrate the CID process, walking participants through the three main stages: Transmission, Detection and Resolution.

Participants will meet the companies involved in all three areas, as well as learning more about the solutions and processes for reducing satellite interference.

The tour will start with how CID is included at transmission, visiting encoder manufacturers, Comtech, Ericsson and Newtec for insight.

It will then look at how the CID is detected after transmission, which will involve demos from a number of companies.

This part of the tour will visit Crystal Solutions, SAT Corporation, and Siemens Convergence Creators.

The tour will end by looking at how issues can be resolved thanks to CID. This part is handled by the satellite operator, using the CID Database provided by the Space Data Association, which is currently being created by AGI. Satellite operators in the tour include ArabSat, Eutelsat, Inmarsat, Intelsat, SatMex and SES.

"We have come a long way with the CID initiative over the past couple of years," said Martin Coleman, Executive Director; Satellite Interference Reduction Group.

"We now need to ensure widespread implementation, and in order for that to happen, the industry needs to understand exactly what is entailed, where to source the right solutions, and who can help them achieve that. We hope that this tour will go some way to filling in those gaps."

IRG will also be supporting the GVF Interference Prevention Summit at CabSat and co-hosting an Interference Prevention Summit with GVF at Satellite 2014.

The Satellite Interference Reduction Group (IRG) is a leading organization working to reduce satellite frequency interference.

The organization comprises four main working groups, covering EUI (formed from the former RFI-EUI), Carrier ID, Intentional Interference, and VSAT interference.

The Group's membership is comprised of satellite operators, users, uplinkers, service providers, equipment vendors and other organizations with a stake in combating radio frequency interference.

For further information or to register, please email [angie.mar@gvf.org](mailto:angie.mar@gvf.org)

To view the full schedule or register for one of the tours, please visit <http://satirg.org/carrieridtour>

### Hiltron—Anywhere, Anytime, + Under Two Minutes



**Hiltron Communications new flyaway antenna can locate satellites anywhere, anytime, and in under two minutes.**

Hiltron Communications, Germany's satellite and wireless communications systems integrator, manufacturer and distributor, has selected CABSAT 2014 to introduce their new MAF 1.4m flyaway antenna's introduction into the MENA markets.

Shown in prototype at IBC 2013 and now deliverable, the MAF 1.4 incorporates fully automatic satellite acquisition. Based on the unique Hiltron HSACU SNG antenna controller, it allows a satellite to be found in less than two minutes, from any location and at any time.

"The MAF 1.4 is equipped with a high-precision antenna mount which is guided by a carrier identification algorithm," explains Hiltron Managing Director Michael Schiestl. "Antenna mount and controller are closely integrated. The MAF system provides a level of quality and excellence not seen before in the satellite newsgathering market at such an affordable price."

The antenna can be accommodated in five IATA-compliant cases comprising three for the antenna plus one each for the control electronics and high power amplifier.

Hiltron's award-winning HMCS SNG management software allows fast and easy setup of the uplink without need for deep technical knowledge.

Hiltron Communications operates from headquarters at Backnang near Stuttgart, Germany.

On-site facilities include a large technical operations area with high access doors and ceiling, capable of accommodating satellite-link vehicles and their roof-mounted antennas.

Hiltron is part of the Dan Technologies group, one of Europe's leading suppliers of audio, video, transmission products and digital media solutions.

Additional information is available at <http://www.hiltron.de/>

### Advantech Wireless—WAAS + EGNOS Requirements Met



**Advantech Wireless Inc., a privately-held Canadian corporation and manufacturer of Satellite, RF Equipment and Microwave Systems has released their new Synthesized Frequency Converter Series WAAS/EGNOS Compliant.**

The spectral purity, low phase noise and high stability meet the requirements of WAAS and EGNOS international satellite network operators.

The WE range of converters are used in systems that require accurate location indication, by correcting the GPS signal provided, making them an ideal choice for large Earth stations specialized in WAAS or EGNOS applications.

The flexible and comprehensive monitor and control features on the WE series converters ensure that it will fit into any network management system architecture.

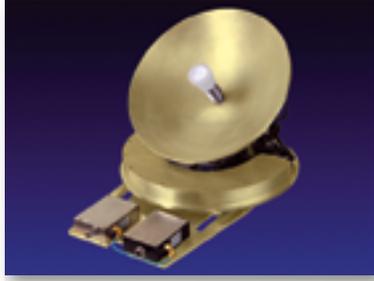
The user-friendly front panel or the RS485 remote interface will provide full set-up and fault monitoring facilities.

The RS232 will provide the Monitor and Control functions via a PC and will also allow for software downloading. Optional Ethernet SNMP or WEB browsing is available.

The converter is fully synthesized with the PLL oscillators either locked to a highly stable internal 10 MHz reference or if the external reference option is fitted and the proper level of signal is present, the PLL will automatically lock to the external reference.

For more information: <http://www.advantechwireless.com/>

### TECOM Industries—Airborne Add-In For Connectivity



#### TECOM, part of the Smiths Microwave Business Unit, announces the introduction of its newest SATCOM product.

The KaStream 5000, mounted in the tail of the aircraft, is part of the Ka-band VSAT solution for airborne in-flight connectivity.

This airborne SATCOM product provides the industry with leading performance for VSAT.

TECOM's products leverage more than five years of experience with more than five million hours of operational flight time with the KuStream@1000.

TECOM offers the following advantages to the industry with its newest Ka-band VSAT product line:

- Market-leading Effective Isotropic Radiated Power (EIRP) in a small form factor allowing higher data rates off the aircraft
- Two Line Replaceable Units (LRUs), a single Antenna Control Unit (ACU) and 11.5-inch Ka-band Satellite Tracking Antenna Assembly (STAA)
- Multi-modem capability supporting different satellite and ground systems worldwide
- Swappable Ku- or Ka-band antenna platforms for maximum network and operational flexibility

The product is designed to be form and fit swappable with either Ka- or Ku-band STAA. TECOM will introduce its new Ku-band VSAT tailmount SATCOM product and swappable STAA later this year.

TECOM's infosite is located at <http://www.tecom-ind.com>.

### ASC Signal—Opening The Gateway In Kuwait

**ASC Signal Corporation was awarded a contract from Kuwait-based Al-Rashed Holdings to provide gateway satellite antennas and equipment for the State of Kuwait's Ministry of Information, to be used for the distribution of television and radio content throughout the Middle East and Africa.**

Under the contract, ASC Signal will provide transmit and receive earth stations to access both Nilesat and Arabsat satellites.

The fully-redundant Ku- and DBS-band, 5.6-meter antennas include interchangeable feed systems that allow the Ministry of Information to use the same antenna at different frequency bands as required for program delivery.

Installation of the ASC Signal antennas will equip the Ministry of Information to deliver content from its own facilities in Kuwait City.

In addition to the high-performance antenna system, Al-Rashed will provide ASC Signal's Next Generation Controller (NGC), which gives users a single, simplified, central device to control and operate multiple antenna systems.

The Ministry will capitalize on the many advanced features of the NGC, including utilizing the remote access and tracking capabilities built into the system, as well as the optional internal spectrum analyzer.

"As ASC Signal continues its rapid expansion into the Middle East, our new relationship with Al-Rashed and Kuwait's Ministry of Information marks an important milestone," said Keith Buckley, President and CEO of ASC Signal. "Our high-performance, competitively-priced antenna systems, along with the feature-rich NGC, opens many opportunities in this fast-growing region."

"Al-Rashed Holdings is delighted to award the contract for gateway antennas to ASC Signal," said Abdulaziz Al-Rashed, Chairman and CEO of Al-Rashed Holdings. "This landmark project is of key strategic importance for Kuwait and the selection of ASC Signal reflects their extensive expertise in this area. Al-Rashed Holdings, as a leading local telecommunications and networking provider, looks forward to working with ASC Signal systems in successfully executing this contract and to future collaboration."

More info is available at <http://ascsignal.com/>

**Raytheon Space + Airborne Systems + SIA —Joining Up**

**The Satellite Industry Association (SIA) today announced that Raytheon Space and Airborne Systems, a division of Raytheon Company (NYSE: RTN), a technology leader specializing in defense, security and civil markets throughout the world, has become SIA's newest member.**

SIA is a full-service trade association that represents commercial satellite companies as the unified voice of the U.S. satellite industry on policy, regulatory, and legislative issues affecting the satellite business.

"SIA is pleased to welcome Raytheon Space and Airborne Systems to our Association," said Patricia Cooper, SIA's President. "Their 45 years of experience in space technology for environmental sensing, space situational awareness and both enterprise and government solutions will augment SIA's growing membership of satellite sensing manufacturers and enhance SIA's representation of the broader U.S. satellite industry."

"We are excited to be a part of the Satellite Industry Association and participate in the Association's efforts to advance the interests of the commercial satellite industry," said Ron Stopher, director, Strategy and Business Development, Space Systems. "We have a unique history as a sensor solution provider with a 45-year record of innovation and successful on-orbit performance, and we look forward to sharing that perspective with the SIA."

Raytheon Company specializes in technology pertaining to defense, security and civil markets throughout the world. Sales in 2013 were \$24 billion and the company has 63,000 employees worldwide. With a history of innovation spanning 92 years, Raytheon provides state-of-the-art electronics, mission systems integration and other capabilities in the areas of sensing; effects; and command, control, communications and intelligence systems, as well as cyber security and a broad range of mission support services. Raytheon is headquartered in Waltham, Massachusetts.

**MTN Communications—Know-How For Norwegian Line**



**MTN Communications (MTN) is supporting Norwegian Cruise Line's launch of the newly-christened Norwegian Getaway with its advanced hybrid communications network—this innovative network enables satellite and terrestrial broadband connectivity for higher performance connections on large vessels at-sea and in-port.**

With approximately 4,000 guests and 1,600 crew, Norwegian Getaway, the world's newest cruise ship, is the first to showcase one of the most visionary communications solutions at sea today. While sailing in the open sea is a remote experience, guests and crew members don't want to leave their "connected lives" back in port. Being able to share experiences as they are happening, and staying connected to friends and family while on vacation, are must-haves for consumers today.

Cruise ships traditionally have relied solely on satellite bandwidth. The new MTN Terrestrial Broadband Network delivers faster, more efficient connections, enables access to applications and content, and optimizes corporate IT data. This allows people to bring their daily online habits with them to sea, including social media, infotainment, content and more. Between 2008 and 2013, MTN managed a six-fold increase in satellite bandwidth requirements as a result of Internet,

content and voice usage. Internet logins on the MTN network more than doubled to almost 33 million per year. Voice communications increased approximately 50 percent.

To support this new hybrid network, MTN equipped Norwegian Getaway with the industry's most sophisticated software systems to maintain multiple types of connections simultaneously. It also uses the fastest data path available so it can access terrestrial broadband when near and in ports. A broadband antenna tracking and stabilization system enables the ship to "lock" onto an MTN access point in-port for terrestrial broadband connectivity with no impact to the end user during the switchover.

Key to this land-like level of service, the shipboard data center of Norwegian Getaway also is equipped with the industry's most advanced processing technologies. Leveraging these technologies, MTN is delivering improved efficiency and throughput for Internet, television and crew calling services on the vessel.

Further information is available at:  
<http://www.mtnsat.com/mtn-markets/cruise>

**Euroconsult—Global Space Program Funding Dives**

**This is the first time since 1995 that public space programs worldwide have entered a downward trend,**

According to Euroconsult's newly released research report, Profiles of Government Space Programs, global budgets for space programs dropped to \$72.1 billion in 2013 following peak spending at \$72.9 billion in 2012.

This is the first time since 1995 that public space programs worldwide have entered a downward trend, a direct result of the cyclical nature of countries' investment in space-based infrastructures combined with governments' belt-tightening efforts during tough economic times.

"Nevertheless, the current global context for public space programs shows many positive signs brought by new leading space nations and an ever-growing number of countries who have initiated plans to build up their space-based capabilities. We anticipate government space spending to recover in the second part of the decade in many countries currently experiencing intense budget pressure," said Steve Boehinger, COO at Euroconsult and Editor of the report.

The report highlights that in a period of budget tension many countries develop innovative mechanisms to implement their space programs notably calling for wider private sector involvement including in areas until now reserved for government initiatives.

This transforming relationship between public agencies and the private sector shall have long lasting effects in the way governments conceive their space programs and industry contractors structure their government business.

In 2013, 58 countries invested \$10 million or more in space applications and technologies, compared to 53 in 2011 and 37 in 2003. 22 more countries have been identified with plans for space investment:

- The U.S. invested \$38.7 billion in its space program (civil and defense) in 2013 confirming the downward trend initiated since the start of the decade. This is an \$8.8 billion reduction compared to the peak spending of \$47.5 billion in 2009.
- Russia recorded a massive increase of its public investment in space and is the only country after the US to pass the \$10 billion cap. In the last five years, Russia's investments have accelerated at an impressive average growth of 32 percent in local currency.

- Another six countries invested over \$1 billion: Japan, China, France, Germany, Italy and India, as well as the European Union. China's 8th place ranking for space spending as a ratio of its GDP indicates there is room for investment growth in the future.

- 19 countries recorded over \$100 million in spending: the UK, Canada, Brazil, Spain, South Korea, Belgium, Kazakhstan, the UAE, Argentina, Mexico, Australia, the Netherlands, Switzerland, Turkey, Sweden, Israel, Nigeria, Iran, and Norway

- 30 other countries invested between \$10 million and \$100 million in their national space programs; only 10 of them were part of that list in 2003.

"Interestingly, we see a period of transition in many national programs which is reflected in their investment profile. This is also true in emerging countries that have been a key market driver for the space industry. After first or second-generation launches, these emerging space nations now need to decide on stable, longer-term spending. Similarly, there is a new 'third wave' of potential space nations, but commitments seem slower to materialize," said Boehinger.

Profiles of Government Space Programs is the only complete assessment of public space programs. The report, published since 1994, is a comprehensive review of all 80+ active space programs around the world, including leading countries and organizations, emerging programs, defense and civil agencies.

Each program is analyzed and assessed by the same criteria, through extensive qualitative and quantitative information and analysis, including current and future policies, budgets and programs.

For further details, access the firm's infosite at  
<http://www.euroconsult-ec.com/>

### Airbus Defence and Space—A Conversion For Astrium Services + 50 Million Sent...

**Astrium Services, a global provider of satellite enabled solutions, has announced that they will operate with immediate effect under its new name—Airbus Defence and Space, a division of Airbus Group.**

The change from Astrium Services to the new Airbus Defence and Space is part of a rebranding throughout the wider EADS organization.

Earlier this year, EADS became Airbus Group, with three distinct divisions: Airbus, Airbus Defence and Space, and Airbus Helicopters. The entire Astrium Services portfolio of satellite communications and geo information services will continue under the newly created Communication, Intelligence & Security (CIS) business line of Airbus Defence and Space. CIS will also integrate secure land communications and integrated system activities of the former Cassidian organization of EADS.

The company will continue to offer best-suit choice of multi-band satellite services, reliably answering communications needs of all key markets.

“The new Airbus Defence and Space set-up will allow bringing all governmental and commercial satellite communication activities together into one integrated SATCOM unit, as part of CIS. The mission of new SatCom unit will be to be the provider of choice for trusted satcom-enabled solutions, with a very strong customer focus across all our key vertical markets,” said Erik Ceuppens, newly appointed Head of the Satellite Communications program line. “We’re proud to operate under the Airbus name and its association with technology excellence.”

The reorganization will be rolled out gradually during the course of 2014. All parts of the new division will be rebranded as Airbus Defence and Space over the coming months.

**Airbus Defence and Space has also just reached a fresh record for its dedicated SkyFile Mail software in 2013, with more than 50 million emails sent by some 40,000 mariners worldwide—a 25 percent growth in email volume over the previous year.**

SkyFile Mail is an intuitive email solution for business and crew working for some of the world’s largest shipping companies.

It is a leading messaging application optimised for SATCOM and the perfect partner for Pharostar, Sealink and WaveCall VSAT services from Airbus Defence and Space.

The increased use of SkyFile in 2013 was similar for both VSAT and MSS, reflecting the ease of migration to SkyFile from other email platforms and from L-band satcom, as users do not need to be retrained when a vessel upgrades its satcom from MSS to VSAT.

SkyFile optimizes bandwidth efficiency on board through sophisticated data compression, which further reduces the size of emails sent.

The remaining VSAT bandwidth can be put to use for other operational or crew applications. Further efficiencies come from enhanced remote management features.

“Owners and operators looking to change to our dedicated maritime email solution can keep their existing email addresses and be confident in SkyFile’s ability to enhance their email communications regardless of the satcom band they use,” said Tore Morten Olsen, Head of maritime activities at Airbus Defence and Space.

SkyFile Anti-Virus also saw growth, with the amount of licences in operation nearly doubling throughout 2013. New over-the-air updates attracted more users, who recognize that up-to-date anti-virus software is important for security and efficiency.

“SkyFile Mail is part of a unique family of satellite optimised data applications that will continue to grow with some exciting developments already in the pipeline,” Tore Morten Olsen said.

The company’s info site:  
<http://airbusdefenceandspace.com/>

# The Satellite Television World Market

By Stéphanie VILLARET and Maxime BAUDRY, Co-Heads, Satellite Practice, IDATE



**DATE examines the threats and opportunities that face the satellite industry, from 2013 through 2017 and offer to assist readers in understanding the digital world that surrounds us. Key findings include:**

- TV viewing times are continuing to increase worldwide. Viewers' appetites for services that enable them to personalize video consumption is also growing. Consumers in developed market regions now own multiple devices and want ATAWADAC (Any Time Any Where Any Device Any Content) for their video consumption. The use of a growing number of devices for watching TV/video content is also an apparent trend in emerging markets.
- With the growth of OTT services, Internet on the TV, multi-screen consumption, multitasking and the ability to use the TV and another screen simultaneously, the television sector is experiencing fundamental changes. These changes will mainly affect developed markets between now and 2017, and appear to be bringing about profound changes all along the value chain. But there are still many questions and the number of different players now descending on the television landscape (film producers, channel producers, commercial distributors, technical broadcasters, ISPs, equipment manufacturers, Internet and IT players) means that predicting the outcome of the battle is not an easy one.
- Globally, demand for satellite capacity for transmitting TV/video services is expected to grow between now and 2017, at an average annual growth rate of 4 percent. This market is valued at more than 5 billion EUR by 2017. Growth in demand for satellite capacity for TV/video broadcast is slowing in developed areas. But satellite operators have growth in the TV market to fall back on in emerging markets, which show an increasing number of TV channels being broadcast (SD and HD) and new pay-TV service providers being launched, especially national DTH service providers.
- In the long term, significant uncertainties are likely to raise questions over the way the TV/video distribution market and the overall ecosystem are organized. Satellite operators have several potential growth drivers:

- » optimizing satellite capacity to serve emerging market regions, or even acquiring local operators
- » lobbying to promote the premium quality of satellite network distribution
- » successfully integrating into hybrid architectures and becoming a mainstay of the digital home in developed market regions.

## DTH Accounts For The Bulk Of Satellite Industry Revenues

The TV programs and video market is, by far, the most important for the satellite industry. Its market share in the overall satellite services market has remained fairly stable between 2007 and 2011, rising from 76 to 78 percent.

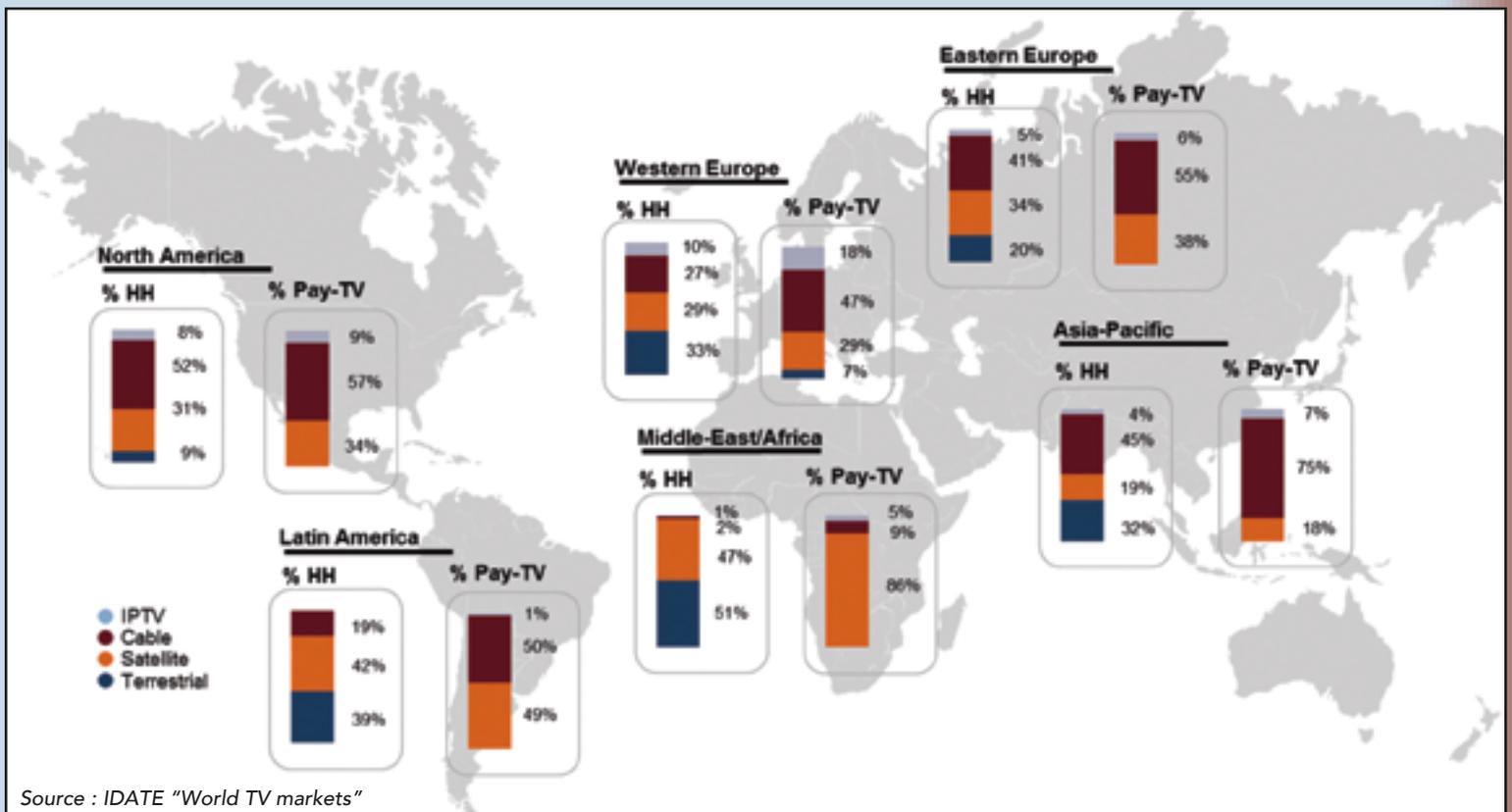
The DTH market has experienced huge growth in emerging market regions, having grown nearly 45 billion USD in just six years. DTH was worth 84.4 billion USD in 2011, worldwide.

Satellite is putting up a decent fight against competing terrestrial TV broadcast networks worldwide. At the end of 2012, its market share was close to 27 percent, showing steady growth on the FTA and payTV distribution market.

However, the situation varies according to the geographical regions studied. The DTH market, and especially that of payTV, showed tremendous growth in many emerging market countries. Thus, satellite is positioned as an essential TV distribution network, having driven growth of payTV in Eastern Europe, in Latin America and Africa-Middle East.

## TV Consumption Patterns Are Changing

Average TV viewing times are continuing to increase around the globe. However, TV consumption is no longer just about linear television.



Source : IDATE "World TV markets"

Figure 1. Satellite's market share worldwide, end of 2012 (percentage of TV households and percentage of payTV households)



In advanced market regions, characterized by a mature TV market, TV and video consumption patterns are heavily influenced by consumers who have multiple connected devices that allow them to access TV programs and video content.

With such universal levels of equipment, consumers want access to content anywhere and with any device. Mobile and portable devices can be used for both on-demand viewing or in combination with TV consumption as a “companion device”

Rather than physical ownership of content, the important thing for consumers now lies with their access to this content, whether it’s linear content, stored on a hard drive or available on the Internet.

In emerging market regions, including the poorest of countries, television is considered an essential piece of equipment. The number of households subscribing to a payTV package is steadily increasing. This is particularly true in Latin America, where the average annual growth rate was close to 20 percent over the 2009-2012 period, while it was more than 10 percent in the Asia-Pacific and Africa-Middle East regions of the world.

The use of a growing number of devices for watching TV/video, especially computers, but also tablets, smartphones and MP3 players, is another consumption trend being observed in these emerging market zones.

With nearly half of all households having only a single TV set, these new patterns allow a basic level of consumption personalization for each of the individuals living in the household.

**Media Players Are Adjusting Their TV + Video Strategies**

Media players, particularly television networks and content packagers (TV channel packages), are adapting their content and services offerings to better respond to the changing habits of consumers.

Strengths	Weaknesses
Low subscription rates	Older content compared to premium TV packages
Extensive content offering (movies, TV series, documentaries, etc.)	Little visibility in markets with limited fixed telecom architecture
Easy to install and use	
Opportunities	Threats
“Premiumization” for newly released content (investment in original productions, exclusive rights acquisition)	Competition from DTH service providers
Improvement in QoE (UHD streaming)	Uncertainty surrounding the viability of the business model
Production of feature films	
Long-term loyalty from younger viewers	

Table 1: SWOT analysis of OTT players — Source: IDATE

In mature markets, OTT SVOD (Over-The-Top Subscription Video on Demand) platforms are being created and should further increase in the coming years, by betting on an improvement in content quality. Substantial investment will be put into exclusive content production, as well as into acquiring exclusive content rights.

To compete against these offerings, traditional media players are betting on on-demand video services (mainly catch-up TV, but also VOD). In addition, their aim is to make their offerings as flexible, interactive and customizable as possible. Multi-screen services, especially aimed at companion devices, as well as interactive applications and personal TV should grow significantly.

TV channels and TV packages are implementing differentiated strategies and have assets that will undoubtedly add value to ensure their positioning on the market.

Television stations with a strong brand image and large audience should maintain, and even strengthen, their positioning on the market. They certainly have the necessary financial resources for creating a wide range of premium content (investment in exclusive rights [especially sports] and film production) and exclusive programs produced in-house (dramas and events): linear TV channels, catch-up TV, VOD and SVOD, interactive services, video streaming, etc.

Strengths	Weaknesses
Reputation for some	Decreasing number of younger viewers
Distribution over multiple networks	Revenues under pressure (decline of ad market)
Linear market still predominant	Audience fragmentation
For larger networks, ability to invest in original productions for exclusive programming and events	Few interactive features
	Unattractive content or too specialized (except premium channels)
Opportunities	Threats
New emerging markets	Rise of on-demand consumption (catch-up TV and VOD)
New services (on-demand, interactivity) as a new source of revenue	Growing number of content offerings via increasing OTT SVOD services, leading to audience fragmentation
	“Cord-shaving” / “Cord-cutting” (for paid channels bundled in packages)
	“Cord-nevers” (for paid channels bundled in packages)

Table 2: SWOT analysis for TV channels. Source: IDATE

Quality should be central to payTV players’ strategies now more than ever (quality of content offered, image and sound quality, quality of service), helping them to retain existing customers and to attract new ones, thus maintaining their revenues. In the long term, payTV service providers could be persuaded to focus on a narrower range of exclusive premium channels with increased image quality, 4K UHD or even 8K in the future (their own channels as well as international premium channels), and to offer a range of services integrating linear TV channels, on-demand services (catch-up TV, VOD and SVOD) and interactive applications.

Strengths	Weaknesses
Control of subscribers	High rates compared to SVOD
Attractive premium content	High proportion of small special interest channels with low audiences
Model based on subscription, which tends to keep customers loyal	
Distribution from major national networks with high profiles	
Distribution via multiple networks (toward a “network agnostic” strategy)	
Subscribers have access to a “smart” box, such as a PVR, offering many features that facilitate TV/video consumption (recommendations, time shifting, etc.)	
Opportunities	Threats
Expansion in emerging markets	Creation of OTT SVOD platforms
Refocusing on ultra-premium (HD/UHD content, exclusive rights, investment in production)	“Premiumization” of OTT SVOD platforms (investment in exclusive content and original programming)
Growth in VOD services	Possible increase in “cord-nevers” in the future
Development of interactive applications, especially formatted for use on remote screens	

Table 3. SWOT analysis for payTV service providers. Source: IDATE

**Demand For Satellite Capacity For Broadcasting Is Continuing To Grow**

Worldwide demand for satellite capacity for broadcasting TV/video services is expected to grow between now and 2017, at an average annual growth rate of 4 percent. The market is estimated to be worth more than 5 billion EUR in 2017 (an annual average growth of about 3 percent of market revenue over the period).



Growth in demand for satellite capacity for distributing TV/video is mainly driven by: As with the launch of HD television, and more recently 3D channels, satellite operators will be the first to experiment with UHD TV channels.

- **Growth in the TV market in emerging markets**, which show an increasing number of TV channels being broadcast (SD and HD) and new payTV service providers being launched, especially national DTH service providers.
- **Growth in high definition TV channels**, free and paid, in all geographical regions (accounting for more than 20 percent of channels broadcast worldwide by the year 2017), assuming that SD/HD simulcast should continue over the 2013-2017 period: in total, more than 7,000 HD channels should be available worldwide in 2017 (compared to just under 5,000 in 2013), 40 percent of which in North America.
- **Increasing availability of ultra HD from 2015 onward**, with the launch of the first test channels, then marketing of the first UHD channels, mainly in developed regions but also in the most advanced countries of emerging market regions. The impact in terms of additional demand for satellite capacity for broadcasting these channels is still speculative for the 2013-2017 period (20 UHD channels worldwide by 2017), but these new services will be a significant growth driver in the long term.

### Satellite Operators Have Solid Growth Drivers In The Long Term

In the long term, there are significant uncertainties that are likely to raise questions over the manner the TV/video distribution market and the overall ecosystem are organized.

However, satellite operators have several growth drivers to fall back on that should allow them to maintain their positioning on the market and preserve their TV/video business.

To optimize available satellite capacity in emerging market regions and to cater to growing needs, satellite operators are planning to launch new satellites and are also reallocating satellite capacity. Acquiring satellite operators already positioned on these emerging markets is also an immediate way for a satellite operator to expand quickly through external growth.

In developed markets, faced with the technical limitations of terrestrial networks to provide enough bandwidth to deliver very high resolution images (apart from satellite, only FTTx networks are able to provide true ultra-high definition video), satellite operators have the chance to promote the strengths of their networks, including coverage and quality of service.

Moreover, the major challenge for satellite operators will be to successfully integrate into hybrid architectures and to reflect on the most effective solutions to meet the needs of the digital home. In effect, the challenge is to successfully transition from a linear TV world, in which satellite excelled, to a world of on-demand and interactivity, in which it will have to offer value-added solutions for both the media players and the viewers.

To acquire additional information regarding IDATE research, please visit <http://www.idate-research.com/>

### About the authors

*Stéphanie Villaret joined IDATE's Marketing and Strategies Department in 1998. After several years in the Media Economics Division as a Senior Consultant, then as a Director of Studies, she is currently Co-Head of the Satellite Practice in the Telecom business unit. Stéphanie works primarily on reports concerning the satellite industry, but also deals with the analysis of consumer ICT usages and services. Ms. Villaret is a graduate of the Institut National des Télécommunications, with a major in Information and Communication Technologies Applied Marketing, and holds a Masters Degree in Management Sciences (1997).*

*She may be reached via her email address: [s.villaret@idate.org](mailto:s.villaret@idate.org)*

*Maxime joined IDATE as a senior consultant in April 2006. His main area of endeavour is monitoring the satellite industry, the telecommunications services market and operator strategies. Before coming to IDATE, Maxime worked for two years for Aon Explorer, a strategic consulting firm specialized in the space industry, where his work focused primarily on industrial analysis of satellite telecommunications for space agencies and the sector's equipment providers. Mr. Baudry holds a Masters degree in Technology & Management (Ecole Centrale de Paris), and is a graduate of the Ecole Multinationale des Affaires/ Multinational Business school (E.S.C Bordeaux & Fachhochschule Münster's ERASMUS program).*

*He may be reached at his email address: [m.baudry@idate.org](mailto:m.baudry@idate.org)*

IN DEVELOPED MARKET REGIONS	
Factors for declining demand for satellite capacity for TV/video distribution	Factors for increasing demand for satellite capacity for TV/video distribution
Use of the HEVC codec for compressing HD channels	Switching off SD/HD for payTV DTH platforms, as part of an "ultra-premium" strategy, for example
Significant decrease in the number of channels being broadcast due to a refocusing of DTH toward "ultra-premium" packages and migration of many special interest channels to the Internet	Significant growth of channels broadcast in 4K UHD
"Network agnostic" payTV platforms	Emergence of channels broadcast in 8K
IN EMERGING MARKET REGIONS	
Factors for declining demand for satellite capacity for TV/video distribution	Factors for increasing demand for satellite capacity for TV/video distribution
Risk of DTH payTV platforms merging	Dynamic growth in the number of channels being broadcast, especially as part of new payTV platform launches
	A greater number of channels broadcast in SD/HD simulcast
	Growth of channels broadcast in 4K UHD in the most advanced market countries
	Analog switch off and use of satellite to complement DTT networks
	Use of satellite by OTT platforms to target new audiences poorly served by terrestrial networks

Table 4: Major disruptive factors that might raise questions over satellite operators' positioning on the TV/video distribution market. Source: IDATE





# Changing The Way The DoD Buys SATCOM

Point of View, by Robert T. (Tip) Osterthaler, President + Chief Executive Officer, SES Government Solutions



**C**ongressman Mike D. Rogers (R-AL) recently published an article entitled, “Changing the Military’s Approach to Commercial Satellite Communications,” which was refreshing to see in that a leading member of the House Armed Services Committee was seriously addressing an important, if somewhat obscure, issue.

I suspect there haven’t been many votes either won or lost over the question of whether (or how) the Department of Defense reforms the way it buys commercial satellite capacity, but the stakes are surprisingly high and the Congressman and his staff deserve a lot of credit for taking the lead in a discussion that has been ongoing (but, unfortunately, going nowhere) for years.

In his article, Congressman Rogers points out that current DoD SATCOM procurement practices are both costly and risky, facts which no one in the industry would dispute. While I doubt it is their official acquisition strategy, today’s reality is that the government buys commercial capacity when and where it needs it, accepting whatever performance it provides, paying whatever it costs, and accepting the risk of non-availability. To be fair, other than being much more expensive than it needs to be, this approach has worked satisfactorily during our decade of heavy engagement in Iraq and Afghanistan. Unfortunately though, that’s not likely to be the case in the future.

Regarding cost, reform efforts to date have focused primarily on changing the way DoD leases satellite capacity. In the 2014 National Defense Authorization Act, Congress calls on the Pentagon to prepare a strategy for the expansion of satellite acquisition authorities that would effectively help to reduce risk and cost to the Department. Specifically, DoD is asked to examine the use of longer and larger quantity leases, and those changes will help bring lease costs into line with what large commercial customers pay.

To his credit, though, Congressman Rogers is looking beyond cost. In his piece, he observed that the current methodology “lacks strategic foresight, puts our troops at risk, and disadvantages our industrial base.” Over the past year, he has led an effort to ensure our warfighters are not dependent for critical communications on satellites that are under the control of unreliable partners, such as China, and his efforts have yielded budget language that places strict limits on the practice. That legislation went a long way toward addressing the risk and industrial base questions, but the issue of “strategic foresight” remains.

In recognizing that the manner in which the government purchases satellite capacity today is short sighted, Congressman Rogers has taken a logical leap that others have missed: Commercial satellite capacity is an essential infrastructure for our troops and will remain so in the future.



Photo of Tip Osterthaler at the Capitol in Washington D.C. courtesy of SES GS. The photo is by Jason Dixon.



*Congressman Rogers is greeted after stepping off the airplane during his recent CODEL he led to United Arab Emirates and Afghanistan. Rogers serves as the Chairman of the House Armed Services Strategic Forces. Photo courtesy of Mike Rogers' Congressional website.*

Given that reality, we should not limit ourselves to buying satellite capacity in the same way we buy janitorial services, using one-year contracts and behaving as if there were an unlimited number of potential providers. In fact, the most important satellite related language in the bill encourages the Defense Department to continue its efforts to implement alternative buying strategies that would better leverage the capabilities of commercial industry and ensure the future availability of adequate commercial bandwidth to meet DoD needs.

By encouraging the Pentagon to explore the use of completely new approaches, and expressing his support for innovation in the acquisition of satellite communications, Congressman Rogers has opened the

door to a variety of alternative approaches, such as the ongoing Space and Missile Systems Center Pathfinder program that seeks to acquire more reliable and affordable communications capabilities to support the U.S. Africa Command.

Although previous, similar initiatives have been killed by defenders of the status quo inside and outside of government, the Chairman's intervention ensures that future attempts to innovate will at a minimum be given a fair hearing.

From an industry perspective, Chairman Rogers' leadership and initiatives such as Pathfinder are welcome because they enable us to look further into the future and justify investments in the capabilities the Department is likely to need from us years from now, something we have had great difficulty doing in the one-year lease environment. This is particularly important if we are to allocate the capital necessary to build up capacity in the vast Asia Pacific region where there is currently little available spare bandwidth.

As the pace of operations slows in the Middle East and Southwest Asia and requirements grow in Africa and the Pacific, demand and supply patterns for satellite communications are changing. However, what is not changing is the fact that commercial satellites provide much of the communications backbone needed by our Soldiers, Sailors, Airmen and Marines wherever they are stationed.

By taking the lead in improving the way the government and the satellite industry work together, Congressman Rogers is looking after the interests of both our warfighters and our taxpayers.

#### **About SES GS**

*In the evolution of SES Government Solutions, SES has combined three decades of Americom's USG experience with the global capabilities and assets of the SES satellite fleet. The result is a new organization, formed in April 2010, created solely to provide bandwidth and hosted payload opportunities to U.S. Government, Intelligence and Civilian agencies.*

*The SES GS infosite is located at: <http://www.ses-gs.com/>*

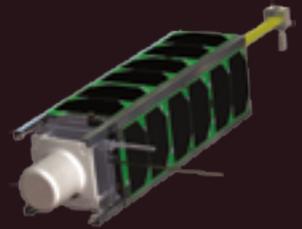
#### **About the author**

*Mr. Robert Tipton (Tip) Osterthaler joined SES in 2006 when he became the President and CEO of AMERICOM Government Services. Since then, the wholly-owned subsidiary of SES SA has grown and integrated with other government focused elements within SES to become SES Government Solutions (SES GS).*

*During his tenure at SES, the U.S. Government business has been transformed from a product oriented sales channel into a solutions-focused independent subsidiary responsible for all aspects of SES's U.S. Government business, including planning for the next generation of satellites that will be needed by government users. Under his leadership, SES Government Solutions transitioned into a Proxy Corporation structure, allowing the company to broaden its business base to include a wider range of customers and technologies. In 2008, SES GS entered into a ground breaking contract with the U.S. Air Force to fly the Commercially Hosted Infra Red Payload known as CHIRP, and in 2009, SES GS did its first ever acquisition, enabling the company to better serve the intelligence community.*

# Good Things Come In Small Packages

By Wayne A. Shiroma, Professor, University of Hawai'i at Mānoa  
Larry K. Martin, Graduate Research Assistant, University of Hawai'i at Mānoa  
Kelli Abe Trifonovitch, Director of Communications and Outreach, University of Hawai'i



**A device no bigger than a loaf of bread, birthed by university students on an island in the middle of the Pacific Ocean, is now in orbit to provide crucial connectivity for the U.S. Department of Defense.**

The University of Hawai'i at Mānoa's student-built satellite was launched as a proof-of-concept experiment from NASA's Wallops Flight Facility on Wallops Island, Virginia, on November 19, 2013. The CubeSat is intended to perform radar calibration and performance monitoring capabilities for more than 100 radar stations around the world that track satellites, asteroids, and space junk.

Dubbed Ho'oponopono 2, or H2, the satellite measures 4 inches by 4 inches by 13 inches, weighs less than 9 pounds and cost \$220,000 to build. Ho'oponopono translates to "make right" in Hawaiian, an appropriate name for a calibration mission. The satellite is intended to perform the functions of RADCAL, a satellite 20 times larger and 40 times more expensive that went offline in May 2013, leaving the radar community without a dedicated calibration satellite.

The University of Hawai'i (UH) is the state's sole provider of public higher education and plays a vital role in the islands' prosperity, sustainability, and advancement of the quality of life. It is a complex and decentralized \$1.5-billion enterprise with 10 accredited campuses and associated education and research centers spread across six islands.

Through the Hawai'i Innovation Initiative, the university system is working in partnership with the private sector and government to expand the state's research sector to create more jobs at the professional level. H2 was built by students in the College of Engineering, which is located at the flagship Mānoa campus. UH Mānoa possesses a Research I classification and is also one of the few universities in the nation with land-, sea-, and space-grant designations.

H2 was a product of the UH Small-Satellite Program, which has trained more than 250 undergraduates since its inception in 2001 to the historic 2013 launch. In fact, UH's high-achieving students may be one of the best-kept secrets in the aerospace and satellite industries.

Over the past 12 years, four UH undergraduates have been named the most outstanding electrical engineering students in the nation. Many have gone on to work at some of the top aerospace engineering companies in the world. And, at least one product of the program, Professor Aaron Ohta, has returned to UH to perpetuate a virtuous cycle of producing excellent engineers, using an exciting new educational model.

## Crawl-Walk-Run-Fly

For many years, undergraduate engineering at UH had been taught in the traditional way, with lectures and assigned readings in core sciences, with no real practical application until a student's senior year. However, that changed radically with the formation of the UH Small-Satellite Program.

In November 2001, UH Mānoa Professor of Electrical Engineering Wayne Shiroma was invited to bring a few students to a conference on the Big Island to learn about satellites small enough to fit into a soda can. The former Hughes Aircraft satellite engineer was hooked and so were his students. Shiroma said, "It was the most exciting, invigorating conference I have ever attended."

They returned to O'ahu all fired up, and the UH Small-Satellite Program was born. As the program developed the first few generations of satellites, undergraduate students gained know-how in satellite-systems engineering as well as professional experience through their involvement in real-world engineering projects. The students took the responsibility for designing and building satellites that provided practical applications and abilities.

UH's Small-Satellite Program adopts the Crawl-Walk-Run-Fly credo. That is, a student starts with simple concepts, gaining insight and confidence, and gradually progresses to the point where he or she is participating on a complex system.

At the Crawl stage, two or three high school juniors are invited every year for a six-week summer internship program in UH's lab. More advanced undergraduates mentor the high school interns in building a BalloonSat that is launched to the edge of outer space. Giving high school students the opportunity to build a BalloonSat that takes photos showing the Earth's curvature is quite convincing in recruiting them to eventually join UH as college students.



**The Minotaur I launch at Wallops Island, Virginia, with Ho'oponopono 2 aboard.**



Tyler Tamashiro, for example, started as a high school intern, became the UH CubeSat Program's leader as a college sophomore, and was eventually recognized as the top engineering graduate in the entire State of Hawai'i. He is now working for Northrop Grumman, supporting space vehicle launches. Since 2001, the UH Small-Satellite Program has hosted more than 25 high school interns.

At the Walk stage, the program recruits freshman and sophomore engineering students into a comprehensive satellite-training course to provide inexperienced students with a basic understanding of satellite systems through a series of discussion and laboratory sessions. The material covered in these one-hour sessions is primarily based on the EyaSat, a fully functioning nanosatellite originally designed by the U.S. Air Force Academy.

Students are grouped into cohorts of three to four students to ensure an interactive and discussion-based learning environment. The students perform hands-on experiments in the laboratory sessions, working with a variety of the EyaSat's components, including the solar panel and light sensors, thermal control surface, and simulated separation switch.

Although the Crawl (BalloonSat) and Walk (EyaSat) stages do not often present bona fide research opportunities, they are invaluable foundation steps for the Run and Fly stages that do offer such opportunities.

In the Run stage, students advance to designing a CubeSat. To accommodate the large number of interested students, and yet to keep the team small enough to be manageable, there are often two teams running simultaneously—one that is usually sponsor-funded and mission-based, and a second team similar to the Navy SEALs (but the students themselves prefer the moniker of "Secret Ninja Club," or SNC). The SNC team is familiar with the overriding concept of the mission, but their focus is on continually evolving the state-of-the-art in bus subsystem technologies. Once a funding opportunity comes along, the SNC team quickly jumps in to start the project. This means there is always a team in the wings, ready to start working on a sponsored project and injecting more advanced technology.

At the Fly stage, students advance to the nanosatellite platform. Funding typically comes from the Air Force's University Nanosatellite Program, which gives students the opportunity to propose and design both a mission and a nanosatellite that could potentially be selected and sponsored for a launch into space.

Students work with industry partners, incorporating the company's best practices as they prepare for a set of structured design reviews by a distinguished panel of government and corporate professionals. In addition to hands-on training in satellite systems engineering, the program also provides students valuable experience in program management training.

Each team receives a grant of \$110,000, which they need to properly manage the successful build of a protoflight nanosatellite for the flight competition. On top of that, students are directly involved in logistical planning for the training workshops and design reviews that are scheduled at various sites throughout the country. The industrial requirements and reviews, as well as the dynamic challenges faced in program management, make this an ideal program in preparing students for the engineering workforce and graduate studies.

### **Mea Huaka'i (Voyager) 2001-2004**

The UH Small-Satellite Program was initiated in 2001, with the development of its first CubeSat, Mea Huaka'i (Voyager). The two primary goals of the project were to develop, test, and launch Hawai'i's first small satellite as a collaborative, undergraduate-based effort, and to perform thermal sensor measurements to verify UH-designed thermal modeling software for a CubeSat form factor.

This was UH's first step in establishing an undergraduate based small-satellite research program. One of the aims of the program's creation was to retain the

best young minds in Hawai'i. Two juniors, Aaron Ohta and Michael Tamamoto, were selected as Project Director and Assistant Project Director, respectively. More than 70 undergraduates and nine faculty advisors participated in this first phase. The team worked to coordinate the overall design effort, secure funds, organize design reviews, and deliver presentations to sponsors.

Project sponsors for Mea Huaka'i's \$120,000 budget included the Hawai'i Space Grant Consortium, Northrop Grumman Space Technology, One Stop Satellite Solutions, Boeing, the UH College of Engineering, and many UH alumni and friends. The project provided an invaluable learning experience for many of the students by building teamwork skills and teaching them the working dynamics of a multi-team engineering project. The satellite launched on a Russian Dnepr rocket from Kazakhstan in July of 2006. Although the repurposed ICBM crashed in the desert and destroyed its payloads in the process, the UH Small-Satellite Program was unharmed and undaunted. The students' work would eventually rise like a phoenix from those ashes.

### **Hokulua (Twin Stars) 2003-2005**

The next phase of the UH Small-Satellite Program was participation in the Air Force University Nanosat Program. One of 13 universities to win a \$100,000 grant, the UH team proposed a satellite payload with a primary focus of communications technology research aimed at cooperative networks of small satellites.

A team of 40 undergraduates developed a pair of tethered CubeSats, dubbed Hokulua (Twin Stars), to demonstrate self-steering antenna array technology for nanosatellite crosslinks. This technology eventually led to the first-place finish in the 2004 UH Business Plan Competition and the formation of start-up company, Pipeline Communications and Technology.

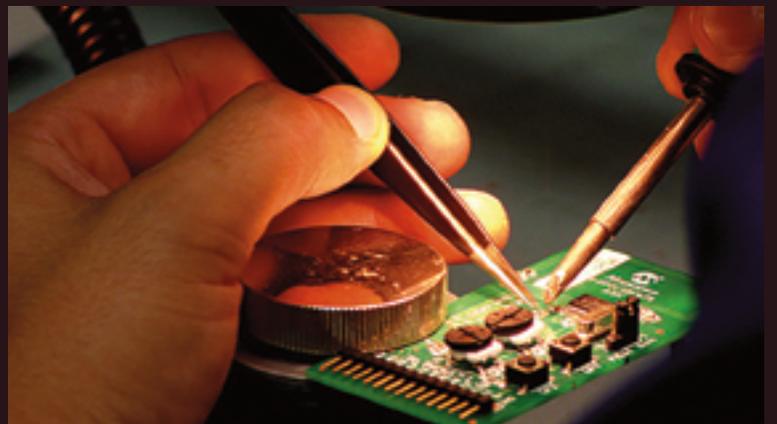
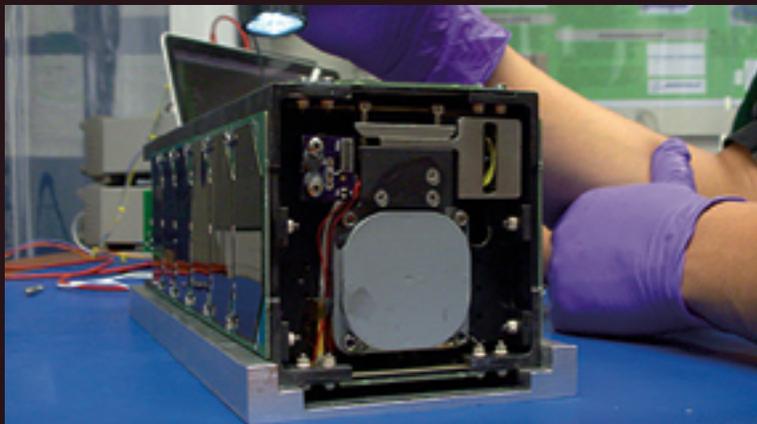
As a result of his many achievements, Blaine Murakami, Hokulua's Systems Engineer, won the 2005 Alton B. Zerby and Carl T. Koerner Outstanding Electrical or Computer Engineering Award, identifying him as the top electrical engineering student in the nation. In 2001 and 2003, Kendall Ching and Aaron Ohta (Mea Huaka'i's Project Director) had won the same award. Seven years later, Larry Martin (H2's Program Manager) won the 2012 award.

### **Ho'okele (Way Finder) 2005-2006**

One of the long-term goals of UH's Small-Satellite Program is to create a distributed network of small satellites. This sparked the third-generation project, Ho'okele, which demonstrated a proof-of-concept CubeSat that could conceivably operate as a node in a crisis management or disaster-monitoring network. The timing was fitting, following the tragic December 2004 tsunami in Southeast Asia and Hurricane Katrina in 2005. Ho'okele's mission was to provide Low-Earth Orbit (LEO) satellite images for use in crisis management and disaster mitigation as well as to demonstrate inter-satellite communication in an expandable satellite network.

This small-satellite project cost \$59,522 and was a collaborative effort between UH and Novasol, a local engineering firm. The UH team was responsible for the development of the image acquisition and tagging payload, which included an on-board CCD network camera, a Global Positioning System (GPS) and an Inertial Measurement Unit (IMU). The UH team was also responsible for designing an engineering model of the satellite bus capable of supporting the imaging payload.

Ho'okele was never launched, however, the engineering model was tested and proven on the ground. This effort would prove to be the most functional satellite project until Ho'oponopono 2 and was staffed by a dream team of undergraduates that included five University of Hawai'i Regents Scholars. (The University of Hawai'i Regents Scholarship is a prestigious, full four-year scholarship that is given to only 20 high school students per year.) In fact, the Novasol engineer who developed the proposal was Jason Akagi, one of the original Mea Huaka'i team leaders and a former UH Regents Scholar, who is currently one of H2's industrial advisors.





The growth of the technologies implemented in the satellite bus between the UH Small-Satellite team's first three projects coincided with advances in the scientific community. Continued success at each phase of the program drove basic system platform improvements for the next generation of small satellites.

### **Ho'okia'i (Watchman) 2005-2007**

The goal of this fourth-phase project, funded by the Missile Defense Agency, was to provide enabling technologies for an autonomous, flexible, dynamically reconfigurable, redundant, and readily deployable constellation of nanosatellites. Ho'okia'i focused on integrating an active micro-thruster propulsion system and improved self-steering array technology into the satellite bus architecture. This satellite bus incorporated many technologies developed in previous satellite generations such as software-level housekeeping, attitude determination, and COTS-based S-band wireless communications.

### **PapioSat (Small Jackfish) 2009**

One of the program's proudest accomplishments may also be its least known. In 2009, the program received funding from a defense contractor to build a sounding rocket payload named "Papio" with a fully functioning accelerometer and GPS. This project took two engineers less than 45 days and \$13,000 to build the unit, something that would have even challenged professionals in that field. That one of the participating students, Bryan Fewell, was in the **eighth grade** at the time he helped to build PapioSat makes this even more impressive.

Success might have been even sweeter had the rocket that PapioSat been aboard not failed during its launch from a New Mexico spaceport. However, efforts were about to change for the better.

### **Ho'oponopono 2 (Make Right) 2009-present**

UH's participation in the Air Force's University Nanosat Program in 2009 funded the development of Ho'oponopono 1 (H1), which would become the engineering model for Ho'oponopono 2 (H2).

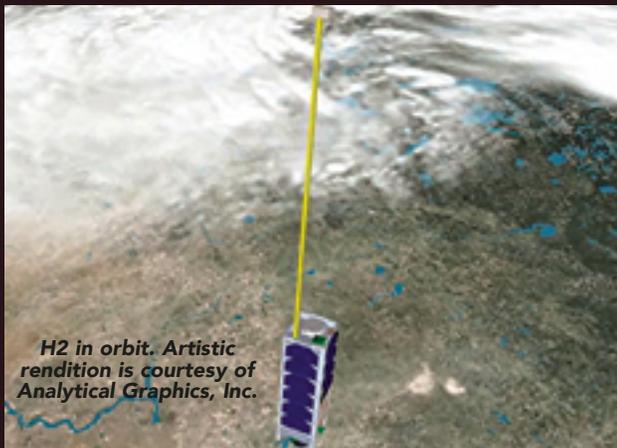
Under the program, participating teams of university students are hosted through a two-year gauntlet of reviews that progress from the conceptual stages of identifying mission objectives and system requirements to the final stages of presenting a fully developed, flight-ready satellite. About 50 engineering students made the four-year journey from concept to launch.

Project Manager Larry Martin said, "Our team of students set sail in January 2009 to negotiate a challenge that some would consider best handled by only the most experienced engineers—to develop a satellite to supplement and potentially replace a \$10-million government sponsored version on a budget of \$110,000."

After completing a rigorous two-year, six-level review process, the Ho'oponopono team was awarded with the Nanosatellite Program's Most Improved and Third Place awards at the 2011 American Institute of Aeronautics and Astronautics (AIAA) Student Satellite Flight Competition Review. Simultaneously, Ho'oponopono was also selected by NASA as a participant in its CubeSat Launch Initiative as part of the Educational Launch of Nanosatellites (ELaNa) Program.

Then it was full speed ahead to Wallops Island, Virginia, for the November 19, 2013, launch. Small-Satellite Program founder Professor Shiroma felt tremendous relief and pride as he saw his students' work blast off into the chilly evening sky. He said, "Seeing that rocket light up and reach orbit was an incredible feeling."

"This has been years in the making and we can finally say we're in space," said Martin. "This project is a testament to the learning opportunities we have at UH."



H2 in orbit. Artistic rendition is courtesy of Analytical Graphics, Inc.

### **The Future: Ho'oponopono 3**

The future is bright for the UH Small-Satellite Program. Based on the lessons learned from H2, the hope is that the Air Force will approve an even more robust iteration of the CubeSat. H3 already has a spot on a future NASA launch and was recently ranked sixth out of 33 proposals.

The one problem is that there isn't sufficient funding currently to build H3. The program needs something on the order of \$800K to bring H3 to fruition. (Still a deal, considering what the government-sponsored, now-defunct RADCAL cost.) However, the UH Small-Satellite program has proven its resilience, having weathered setbacks and blowups, so H3 is probably a good bet.

H2 project manager Martin appreciates the real-world experiences, which have propelled him to work with some top aerospace companies. "The University of Hawai'i is preparing students for the workforce in practical, yet exciting ways," he said.

Interim UH President David Lassner said, "We congratulate Dr. Shiroma and his students on their historic effort. The development and launch of Ho'oponopono 2 illustrates how the University of Hawai'i is helping to solve some of the nation's most pressing problems and is training the workforce for the high quality jobs we are helping to build here."

Shiroma added, "We are changing the paradigm of how we do education with real-world, open-ended projects that make a difference, and our best product is our students."

Moreover, the success of the UH Small-Satellite Program is largely due to the students themselves, who have helped to write proposals that have raised more than \$1 million in extramural funding. Ten students have gone on to pursue Ph.D.s.

Students have also generated patents, a start-up company, and dozens of publications, including the first book dedicated to university small satellites. Two of Mea Huaka'i's original leaders, Byron Wolfe and Jason Akagi, are still advising UH students 13 years later. Small satellites aren't just enabling technological advances, but are—more importantly—producing student excellence.

The hope is with a sister program, the Hawai'i Space Flight Laboratory, getting ready for the state's first space launch and satellite deployment from the Pacific Missile Range Facility (PMRF) on the island of Kaua'i later this year, that the University of Hawai'i will become the first, or one of the few, universities in the world with unique, direct access to space.

This is an exciting time for research and innovation in Hawai'i and an exciting time to be a student in arguably one of the most beautiful states in the world, where space-age dreams can literally take flight.

### **About the University of Hawai'i**

The University of Hawai'i (UH) was established in 1907 and its campuses are all fully accredited by the Western Association of Schools and Colleges. The UH System now comprises all public higher education in the State and provides a rich array of associate, baccalaureate, graduate, and professional degrees and certificates to about 60,000 students through seven community colleges, two baccalaureate campuses and a major research university that holds land-, space- and sea-grant designations. For more information, visit <http://www.hawaii.edu>.

### **About the Hawai'i Innovation Initiative (HI<sup>2</sup>)**

The University of Hawai'i is working in partnership with the private sector and government to build a thriving \$1-billion research enterprise in Hawai'i that will develop a third major economic sector for the State, create thousands of high-quality living-wage jobs, and address the challenges and opportunities that face our communities and the world to improve our quality of life. More information about the Hawai'i Innovation Initiative is available online at <http://hawaii.edu/innovation>.

### **About the University of Hawai'i at Mānoa College of Engineering**

The College of Engineering has launched thousands of successful careers in Hawai'i and throughout the world. Graduates occupy key roles with engineering firms, government agencies, defense contractors, and as entrepreneurs. Many of its 9,000 alumni have made significant engineering contributions to the state's infrastructure and are now set on accomplishing similar tasks abroad. The College's respect for the Hawaiian culture is reflected in its successful mentoring program for under-represented science and engineering students. As the College celebrated 100 years of engineering education at Mānoa in 2008, it is focused on becoming a major contributor to Hawai'i's renewable energy and sustainable future. For more information, visit <http://www.eng.hawaii.edu>

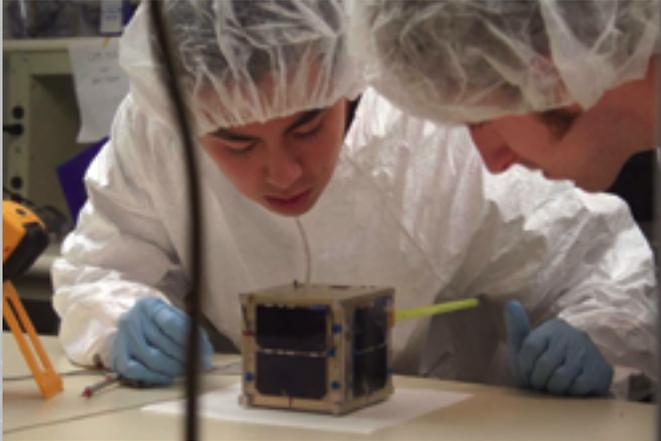
For additional insight:  
Hawaii Space Flight Laboratory  
<http://www.hsfl.hawaii.edu/wordpress/>



# UH Small-Satellite Program Milestones

**2001**

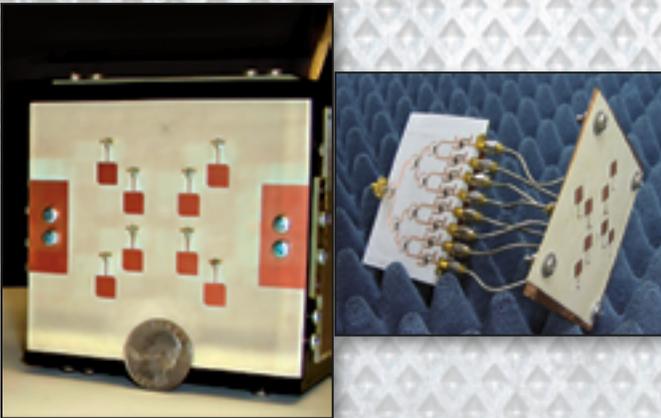
UH undergraduates begin designing its first CubeSat Mea Huaka'i (Voyager), whose mission was to downlink thermal sensor data to confirm predictions based on a novel thermal modeling code. This effort was funded in part by the Hawai'i Space Grant Consortium, Northrop Grumman Space Technology, and Boeing.



UH undergraduate Monte Watanabe testing UH's first CubeSat, Mea Huaka'i. In 2007, the International Electrical Engineering honor society IEEE-HKN recognized him as one of the top three graduating EE students in the nation. By the time he graduated with his MS degree in 2009, he had published two journal papers (including a first-authored paper as a senior), six conference papers, and one book chapter.

**2003**

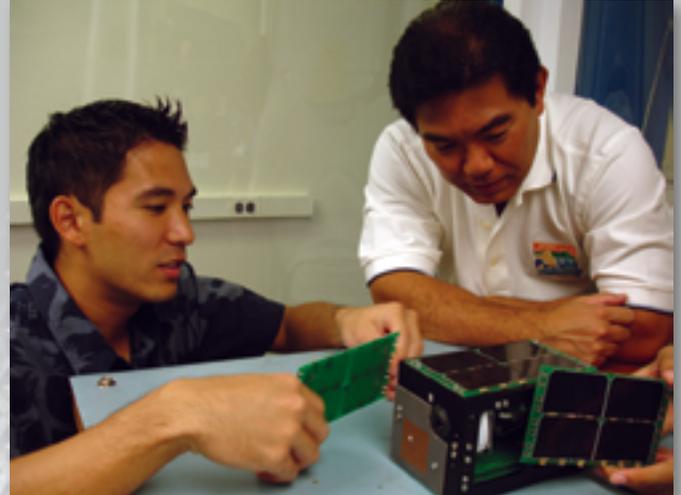
UH is one of 13 universities out of more than 30 proposals to win a \$100,000 award under the AFOSR University Nanosat-3 Program. Hokulua's (Twin Star) mission was to develop self-steering antenna arrays for crosslink communications within a small-satellite network.



Self-steering array showing: (left) placed on one face of Hokulua, and (right) interior circuitry. Self-steering antennas, unlike conventional phased arrays, point autonomously to a target without any prior knowledge of the target location, making them ideal for ad hoc small-satellite networks.

**2005**

Under subcontract to NovaSol, UH is awarded a grant to develop a geo-referenced imaging CubeSat, Ho'okele (Navigator), for crisis management and disaster mitigation. UH is awarded a \$300,000 grant from the Missile Defense Agency to develop retrodirective antennas that further advance the state-of-the-art, as well as develop microthruster propulsion technology. The nanosatellite was known as Ho'okia'i (Watchman).



Graduate student Justin Akagi and Professor Wayne Shiroma with Ho'okele. Akagi secured over \$500K in extramural funding for the UH Small-Satellite Program, in which he worked from the freshman through MS levels.

**2006**

UH's first CubeSat is one of the CubeSats in a failed Dnepr launch. UH receives two patents on its self-steering array technology. Co-inventors include three undergraduates.



Students Justin Akagi and Wade Tonaki with CubeSat engineering models.

**2007**

Under subcontract to Progeny Systems, UH is awarded a DARPA SBIR Phase I grant to develop novel small-satellite constellation antennas. UH begins developing its fifth CubeSat, Kumu A'o (Source of Learning). UH takes a giant leap forward when it establishes the Hawai'i Space Flight Laboratory, an end-to-end design, fabrication, integration, test, and launch facility for small satellites.

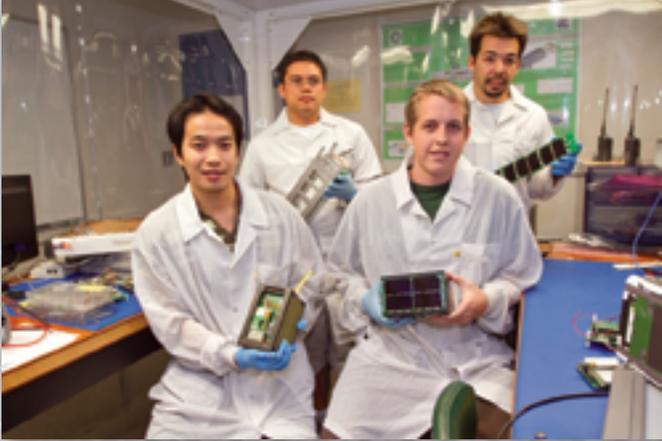


The H1 student team.



**2009**

UH is one of 11 universities to win a \$110,000 award under the AFOSR University Nanosat-6 Program. The mission is to develop a radar-calibration nanosatellite engineering model, Ho'oponopono 1 (Make Right). Within an impressive 45 days of call-up, UH designs, builds, and launches a payload for an UP Aerospace rocket launched at Spaceport America. UH also receives a \$400,000 grant from the Office of Naval Research to develop miniaturized antennas for a CubeSat platform.



From back left, clockwise: Windell Jones, James Ah Heong, Nicholas Fisher, and Andy Pham, with CubeSat engineering models featured in the AIAA book.

**2010**

The American Institute of Aeronautics and Astronautics (AIAA) publishes "The Emergence of Pico/Nano Satellites for Atmospheric Research and Technology Testing," the first book dedicated to the CubeSat platform. Program founder Wayne Shiroma is co-editor for this book, and UH students contribute approximately 25 percent of its contents.



Undergraduates John Furumo, Nicholas Fisher, and Kelson Lau assembling H1. Furumo and Lau now work in the aerospace industry at SpaceX and Raytheon in Southern California, respectively. Fisher is the Systems Engineer for H2.

**2011**

UH wins the third place and most improved awards for Nanosat-6. In parallel, NASA selects Ho'oponopono for its CubeSat Launch Initiative. AFOSR provides continued funding for the Ho'oponopono 2 flight model.

**2013**

Ho'oponopono 2 is launched into orbit as one of 11 NASA ELaNa CubeSats on the ORS-3 mission.



Professor Wayne Shiroma and graduate students Larry Martin and Windell Jones witnessing the launch of H2 at Wallops Flight Facility in November 2013.



## Executive Spotlight

### Dr. William E. Steele, Chairman & CEO, KenCast, Inc.

**D**r. William E. Steele is the Chairman & CEO of KenCast, Inc. Prior to starting KenCast, Dr. Steele worked for GTE for 14 years, spending the last five as General Manager of the GTE ImageSpan division of GTE Spacenet.

Dr. Steele's other positions in the satellite and telecommunications industry include Vice President of Marketing at the Microband subsidiary of McDonnell-Douglas and Sales Manager at the American Satellite Corporation division of Fairchild. Dr. Steele was an Assistant Professor of Economics at Villanova University and holds a Ph.D. in Economics from New York University.

#### SatMagazine (SM)

*Why did you initially become involved in satellite communications and the satellite broadcasting industry? Moving from an Assistant Professor of Economics and to McDonnell-Douglas seems to be a rather profound step from an educational environment into a marketing oriented position?*

#### Dr. Steele

My entry into satellite communications was a doctoral thesis on the benefits of the SEASAT satellite for NASA and the U.S. Maritime Commission. This dealt with ocean routing, fishing fleet support, and similar tasks. My dissertation discussed international trade patterns and identified cargo types and ships on various sea routes.

I was then hired as an economist by Mathematica, a consulting company owned by Princeton University professors, to do cost-benefit studies for NASA. There were two purposes to these studies. We evaluated the candidate's scientific instruments that could be put on the various satellites, estimated the societal and economic benefits, and recommended the optimal instrument payload. Secondly, the financial benefits we identified directed and supported NASA's request for funding from Congress for their various satellite project candidates. In the course of this work, I saw that communications satellites were a major opportunity and subsequently managed my career in that direction.





**SM**

You were an executive with the satellite business division at GTE and the firm's related holdings, the predecessors to Verizon, before founding KenCast. What were some experiences and ideas from your time at GTE that inspired you to launch a software company?

**Dr. Steele**

I was the General Manager during my last 5 years at GTE—actually, GTE ImageSpan, whose mission was to take advantage of satellites that could deliver live video and files to computers. GTE sold their satellite fleet in 1993 to General Electric, which decided not continue the work of GTE ImageSpan. The potential resident within satellites was quite apparent to me, so I subsequently founded KenCast and pursued this market.

**SM**

Moving from a corporate technology giant to a startup must have been quite a change and a challenge. Were there any "take aways" that helped you to build KenCast?

**Dr. Steele**

My early experience with NASA's and Fairchild's and GTE's satellite programs gave me an early appreciation of the potential of the first digital satellites for communications applications in which content was multicast to computers at large numbers of remote sites. We also quickly gained an appreciation for, and solutions for, the requirements to deal with security, reliability, and efficiency. These are complex problems and require a high degree of skill to solve. Our solutions were in many cases unique and patentable. This gave us a strong position early in these emerging markets..

I wanted to solve the problems facing SATCOM that would unlock the technology's full potential. I recognized the need for content delivery and management software. One of the major problems satellite communications faces is the reliable delivery of secure (encrypted) content. Satellite communications is inherently more "noisy" than terrestrial networks, such as fiber optics. When sending encrypted content, loss of even a few bits can render content useless—it cannot be decrypted. Highly reliable content delivery and innovative error correction algorithms are extremely useful to satellite delivery and is a technology KenCast continually works to improve.

**SM**

Speaking of hiring the best talent, how can we, as industry, entice today's students into STEM (Science Technology, Education, and Math) study and the subsequent enjoyment of a fulfilling SATCOM career? How can the industry otherwise ensure a highly viable professional pool of candidates for hiring now and in the future?

**Dr. Steele**

KenCast generally hires staff right out of school, which has been a source of fresh thinking and innovation for the company. We have been doing this for 20 years. As an example, our President, Lewis Wolfgang, was hired in the summer of 1997 when he graduated with a Ph.D. out of MIT. I think the satellite industry would do well to consider hiring, training, and patiently growing the skill sets of talented young people. They are astute, learn and become productive quickly.

**SM**

Were there any surprises in the early days? Didn't an early partner, Dr. Fischer from Yale, help to identify and resolve a particular relevant issue?

**Dr. Steele**

Yes—even though I knew SATCOM needed content delivery software support, I believed I would be prioritizing on the security aspects. I recruited Professor Fischer, a cryptographic expert, to help resolve this issue. It turned out that he was able to highlight, early on, an even higher priority—reliability. Once identified, work on our patented forward error correction technology commenced immediately.

**SM**

Interference plays havoc with content conveyance. How does KenCast advise its clients in regard to this issue? What steps has KenCast taken to mitigate RF obstruction?

**Dr. Steele**

We provide a variety of applicable tools to deal with error correction for file recovery and for cleaning up live streams that have been damaged during transmission. In addition, it is important for satellite application owners to be aware of the trade offs available with respect to dish size, error correction overhead, broadcast power, quality of transmission and receive equipment, as well as the use of software (multiplexing, retransmission, missed packet collection, etc.). This must be followed up with solid expert advice in order to achieve the balance between cost and performance.



**SM**

*There are a number of content delivery networks on the market today, with more under development throughout the industry. All claim to have the ability to deliver mammoth blocks of data, securely and with high reliability. What makes KenCast's Fazzt™ Digital Delivery System different and how does this product play its role in the streaming of satellite content?*

**Dr. Steele**

There are many good CDN companies in this market. Reliable content delivery is constantly growing, evolving, and generating new requirements. Such demands require new solutions, which must be uncovered all the time. Companies that identify their emerging demands and bring solutions to market early, if not first, have the best chance to succeed while others fall by the wayside. KenCast has a solid track record here. Having the large customer base we now serve often means recognition of the fact that when two or more of customers want the same new feature or service, it is evident that the particular technology being requested must get to the market as quickly as possible—and before the competition.

**SM**

*A growing market segment for satellite broadcasting revolves around digital cinema, as well as the relay of live events to screens. May we have your thoughts on the satellite's role in this arena and why acceptance seems to be somewhat slower in North America for digital cinema, as opposed to Europe where the number of digital screens continues to rise*

**Dr. Steele**

The major exhibitors (AMC, Regal, and Cinemark) are 100 percent digital in the USA. The critical mass to move from hard disk delivery of movies to the early digital theaters, to satellite, was reached last year (2013).

The US market, spearheaded by the 3 major exhibitors and the 7 major studios (Warner Bros, NBC Universal, Disney, Lionsgate, Sony Pictures, Paramount, and Fox) through the DCDC (Digital Cinema Distribution Coalition) are now using satellite to deliver first run movies in the USA. Europe does not have a single

entity like DCDC to lead the move to satellite delivery. There are currently several competing efforts underway to bring satellite delivery to the digital theaters in Europe. DVB-S becomes DVB-S2 and so on.

**SM**

*What type of satellite application are you involved in that uses bonding of multiple satellite transponders?*

**Dr. Steele**

For digital cinema, in the DCDC (Digital Cinema Distribution Coalition) system of delivering movies to theaters, we can use two transponders with bonding for speed (at 144Mbps) and redundancy. We also have forward error correcting and validation technology in our content delivery software servers and clients that can reconstruct the content should any data corruption occur. The validation is so accurate that the chance of it being incorrect on zero-error certification is roughly equal to the chance of winning the Lottery 1,200 days in a row.

**SM**

*Do studios deliver, via the DCDC, their movies exclusively by satellite?*

**Dr. Steele**

Not entirely. We are also multicasting to a small percentage of theaters using fiber optic-based MPLS networks. The ability to multicast on satellite and multicast/unicast on fiber gives us the flexibility to deal with various situations, such as when we cannot get rooftop rights or satellite line of sight for the theater.

**SM**

*What role can satellite broadcasting play, or currently plays, within the growing digital signage industry?*

**Dr. Steele**

Use of satellites for digital signage is extensive as it is a method to deliver large files (video content typically) to hundreds/thousands of remote sites via a single satellite multicast. Interoperation of cloud-based facilities and satellite delivery will enable highly scalable, very-efficient, shared-resource signage applications. Many signage companies are exploring this avenue now.

**SM**

*What other areas or applications involving satellite communications is KenCast involved in?*

**Dr. Steele**

Via satellite, those would include Digital Cinema, Learning, Signage, VOTM (Video On The Move), global weather alerts, a significant number of large military systems for the US military and allies, and other systems.

**SM**

*How can you keep up with all those markets?*

**Dr. Steele**

Often we work with partners for a total solution, such as satellite uplink providers, signage and learning software companies, as well as consortiums such as the DCDC and even the federal government.

**SM**

*As the CEO of a digital data delivery systems company with a large footprint among satellite users that spans multiple industries, and with two decades of experience supporting you, do you have any predictions or observations of trends for the future of satellite communications?*

**Dr. Steele**

Enterprises are becoming more familiar with their networking options, including satellite and fiber and the Internet, both wired and wireless. Fiber networks are continuing to extend coverage and the Internet is getting faster. This means there will likely be more hybrid networks in which content will be delivered more optimally—large files and streams targeted to many locations will be multicast by satellite or MPLS fiber, large files going to a few sites will be sent UDP with acceleration on the Internet, and so on. More users, from sophisticated enterprises to individuals in developing countries (helped by new networks such as Google's Other 3 Billion constellation—O3B) will be appearing on all IP networks. This will drive investment in all IP networks, driving coverage footprints, available bandwidth, and devices.

**SM**

*What is your favorite project/customer and how does it highlight the value delivered by satellite communications and your technology?*

**Dr. Steele**

The DCDC (Digital Cinema Distribution Coalition) project to deliver movies for studios to thousands of theaters globally is one of my favorites. Everyone loves the movies, and this implementation put in place more efficient distribution, better security, and higher quality at lower cost. The Studios, Exhibitors, and Viewers all win.

We worked on a variety of projects and relationships in digital cinema for many years before selection for this project. Transmission via multicasting is economical for frequent communication of big data to large target audiences, and satellites will continue to provide great economics and performance for it.

**SM**

*When you look back over your career, what project or projects truly brings a smile to your face, a smile of satisfaction.*

**Dr. Steele**

News is time sensitive. Reliable delivery of news was ripe for a satellite solution in the late nineties. The Associated Press, with 4,500 newspapers, and the TV news agencies (ABC, CBS, NBC, CNN, internationally agencies such as Cihan in Turkey and Kyoto in Japan) and other entities were all looking for reliable service on the new digital satellite networks. KenCast's highly reliable content delivery met the emerging requirements for these customers—this enabled KenCast to successfully launch a growing and dynamic business.

For additional information regarding KenCast, please visit <http://www.kencast.com/>

For an informative video regarding KenCast's Fazzt offering, please access <http://youtu.be/U0RvH3vs0Yo>





# Arqiva: Planning Ahead For 2040

SatBroadcasting™ Column, by Chris Forrester, Senior Contributor



**C**hris Forrester met with Barrie Woolston, the Managing Director of Satellite for the United Kingdom (UK)-based transmission and teleport specialists, Arqiva, for a discussion regarding his view of the market.

Arqiva already has an enviable position in terms of European—and further afield—satellite connectivity, as well as being responsible for much of the UK's TV broadcasting transmission and supply of most of the nation's cellular relay towers. The company's main customers include the BBC, ITV and BSkyB. However, recent moves have seen Arqiva take a much greater interest in Asia—expansion to other regions of the world are all part of the company's plans.

The need to expand beyond the UK is quite easy to explain. At least up until the end of 2013, Arqiva's revenues (around the £821-832 million mark) have been flat. In September, the company opened a new office in Singapore and the staff is seeking new Occasional Use business to support, especially in the sport market segment.

Arqiva has recently added playout and the uplinking of all of Turner Broadcasting's content (other than CNN) to its European and APAC customers. Barrie Woolston said this is a definite trend for the company. "It is all extremely positive for us. The Turner deal was important, and won against tough competition. We moved all

their EMEA operation to our Chalfont HQ and, once that was proven to work, the discussion moved towards Turner's Asia output. Everything, again, went through a tendering process and we managed to put forward a most compelling deal for them."

SES' playout operation near Munich had won a similar contract, effective in November of 2013, to play out five channels for Turner Broadcasting for Germany and Austria, and including 'catch-up' services for the Benelux market.

Woolston said that the recent Eurozone financial crisis forced many broadcasters to re-evaluate their operations, not only in terms of playout, but the very structure of a channel and its appeal. "Some channels have closed, and others launched to take their place," Woolston said. "This means that while we are not seeing massive growth, there is business to be obtained."

Arqiva's Turner contract covers 22 channels over EMEA and 17 channels for Asia. However, the deals do not cover the CNN family of channels. "Turner is looking closely at how their business grows and is being run," added Woolston. "Of course, we do not know what those plans are, or how they might evolve, but we are extremely happy to be part of their current support mechanism."



Questioned as to which other main broadcasters Arqiva might now be targeting for play-out, Woolston was somewhat coy, admitting that he sensed Discovery's London operation might stay in-house, but preferring to stay silent on the other major players.

"We welcome looking at any that might wish to move," he said. "We are set up to invest heavily in core infrastructure and to economically run multiple channels and in all the complexity that's expected these days. It is what we are all about. However, Quality of Service (QoS) is everything to our clients, but they are all quite price conscious. Somehow those two aspects have to blend together. We are proud that we can deliver quality, but neither are not the cheapest—or the most expensive—in the market."

Arqiva is a well-known supplier of Occasional Use facilities, either through its own transponder leases or ad-hoc OU contracts. Woolston said that its OU work has grown 60 percent over the past three years.

"It is quite unbelievable growth, and it seems to be continuing. We concentrate on Sports and Events, although we tend to leave the News segment alone. However, if there is breaking news that needs a quality of service element, then we get involved. But with our main focus being on Sports, we are seeing demand growing and developing for us. This is reflected by the consumer, where there seems to be an insatiable appetite for sport. Indeed, this growth is driving our commitment in Asia where there is just as great a demand, and from the USA in terms of interest in Asian sport."

Woolston is a firm believer in 4K/Ultra-HDTV, but doesn't see it making much of an impact just yet. He recognizes that the 4K demand might well come from sporting events and that such should also make an impact in what he describes as 'long shelf-life programming.'

"Wildlife, natural history and similar programming will originate in 4K, and, why wouldn't they? Trying to make a business model for 4K (for broadcasters) is really challenging. Here we are talking 4K, but we are far from a full conversion to HD yet. There are plenty of people still happy using Standard Definition (SD). It is a common standard, and for some broadcasters, they cannot make a business case for switching to HD, let alone 4K. We also need to see a complete end-to-end technology chain in place for 4K—it isn't there yet. However, we've done some trials on our terrestrial networks and we know it works. We are ready."

Arqiva is—at least, for the moment—also keen on supplying playout services for OTT and second-screens, whether tablets or smart phones, and for which broadcasters seem to have a huge enthusiasm and appetite.

"We have heard a number of people suggesting that the future is OTT and that second screen demand will grow and dominate the business. We are not so certain. Our view is that 'ordinary' linear TV will always be present. Of course, Social Media is, and will, stay important, especially when there's a TV link to something consumers wish to access. People will use Social Media, but it is driven in our business by live TV."

Important as these technology demands are, it is international expansion that's high on Arqiva's agenda, especially in terms of satellite. "Our refinancing last year is now squared away and we know where we are in terms of future Bond issues. As a result, we are now able to undertake some long-term planning, and that takes us to 2040. We have our core business in the UK and Europe, although, as is true in North America, those areas are either flat or challenged and certainly not helped by the Eurozone crisis. This is why our entry into Singapore and Hong Kong is important to us.

"We also have a watching brief on the Middle East, in Dubai, and Qatar, where we have a good relationship with Al Jazeera. But, again, we build on what we have to offer. You cannot enter any market and just say 'here we are, give us your business.' You have to build those relationships and we like to think that—with our customers—we can build for the longer term."



Arqiva's Managing Director, Barrie Woolston

Woolston said Arqiva maintains its commitment to North America, especially as far as the OU business is concerned. The company also maintains relationships with clients in their European and international sectors, but he admits that growth opportunities are somewhat limited. (Arqiva closed its Washington and Los Angeles teleports some three to four years ago).

"When we undertook our recent strategic review, as part of our refinancing process, it was clear that expansion was paramount to the plan. South America was one region of interest, as was Asia and also the Middle East. We have simply taken a pragmatic approach as to where we place our efforts.

"Yes, we would love to enter South America, but that is full of challenges. First, we would be a relative newcomer. Second, the political and financial risks cannot be ignored. The tax regime in some countries is a problem, as well. Nevertheless, we are busy, not that least of which is with the World Cup soccer contracts. It is fair to say that Brazil has relaxed some of its rules for the World Cup, but it is a challenge."

Arqiva's business model, certainly as far as the UK is concerned, has worked well. Its influence over the UK's digital terrestrial 'Freeview' system is considerable and has brought plenty of satellite-related business to its front door. Recently the company added Sonliffe, a religious channel from Jimmy Swaggert Ministries, for distribution on BSkyB and Freeview (via Arqiva's Connect TV platform). In December it added The Jewelry Channels and Propeller TV (for the Chinese community). These are all strong indicators that there are still niches, and sub-niches, to be filled.

Woolston said he is very optimistic about the future, but does mention some anxieties. "We have a perspective on the industry across all aspects of the business and are seen as independent. Our clients know and trust us, and our planning longevity is a strong asset. We are having discussions with some clients in the satellite world that extend way beyond 2016 to 2018. For us, those sorts of dates are close, and we must also look beyond those dates.

*"I'd like to say that the majority of our blue-chip clients will remain being on satellite all the way to 2030. However, will it be the same volume? Will BSkyB still provide the same sort of services as it does now? I am not so sure. Will a satellite-based delivery system still exist? I am certain of that. But there are many, many variables in that mix, and how many services—current or new—will be around in 2025-30. Who knows?"—Barrie Woolston, Arqiva*

### Arqiva, Macquarie + Ownership

Arqiva grew out of the old ITV [UK commercial TV broadcasters] transmission arm (National Transcommunications Ltd-NTL), and then acquired the former BBC transmission business (then owned by National Grid Wireless/Crown Castle). The NTL business was itself acquired by International CableTel (best described as the Barclay Knapp period to readers with a long memory), which rode the crazy dot.com boom to a valuation of a staggering \$34 billion—and borrowings of \$17 billion—before tumbling into Chapter 11 bankruptcy protection in 2001.

By 2004 a 'new' NTL was split in two, with the broadcast arm being sold to Australian investment fund Macquarie Communications. The remaining cable portion eventually morphed into today's Virgin Media.

Macquarie's business was renamed Arqiva in January of 2005. Macquarie portioned off an initial stake to Canada's Pension Plan Investment Board. That stake has now grown to 48 percent. In February of 2013, Arqiva refinanced £3.6 billion of debt.

According to Arqiva its ownership structure is now:

Canada Pension Plan Investment Board (CPPIB)	48%
Macquarie European Infrastructure Fund 2 (MEIF 2)	25%*
Industry Funds Management (IFM)	14.8%
Motor Trades Association of Australia (MTAA)	5.2%
Health Super Investments Pty Ltd	5.4%

A number of small minority holders managed by Macquarie make up the final 1.5 percent.

\*This MEIF-2 fund is in the process of being wound down, and possibly sold this Spring.

"However, for some of our clients, they must first successfully arrive at 2016. The uncertainty in the market means that for some, they are now shortening contracts. People also want flexibility. Is anyone signing up for a 10 or 12-year satellite deal? Those are few and far between. They do happen, but most of our contracts these days are in the three to five year time-frame. The market is dynamic and we have to be appropriately conservative, while at the same time staying optimistic. We hold the view that linear TV will be around for a long time to come."

For additional insights into Arqiva, their infosite is located at <http://www.arqiva.com/>

**About the author**  
Senior Contributor  
Chris Forrester is a

well-known broadcasting journalist and industry consultant. He reports on all aspects of broadcasting with special emphasis on content, the business of television and emerging applications. He founded Rapid TV News and has edited Interspace and its successor Inside Satellite TV since 1996.

Chris also files for **Advanced-Television.com**. In November of 1998, he was appointed an Associate (professor) of the prestigious Adham Center for Television Journalism, part of the American University in Cairo (AUC), in recognition of his extensive coverage of the Arab media market.



# A Fix For The Broken Recruiting Model?

Careers Column, by Bert Sadtler, Senior Contributor



**A**s an employer, do you think of the word “TRUST” when you think of an outside recruiting resource? If not, why not?

To answer that, question let’s dissect the current business relationship between the hiring manager and the outside recruiter.

As business professionals, hiring managers must evaluate the value of contracting with an outside recruiting resource versus attempts to recruit critical talent through alternative means that include in-house resources. Hiring managers ideally want a trusted resource to deliver top level candidates to their company.

If we were involved in the sales of real estate, both the seller and the listing realtor would benefit from the selling price being as high as possible. To that point, “more is better.”

However, in recruiting, the most expensive candidate is not necessarily the best fit—or even the best candidate.

The standard business recruiting model establishes the hiring manager at a juxtaposed position from the recruiting resource. Most recruiting business models use a fee structure that is commission based. In other words, the fee paid to the recruiter is calculated as a percentage of the annual earnings of the talent being hired.

In situations where a revenue producer is being recruited, the fee structure can become more complicated when a final fee or “true-up” is calculated 12 months after the sales employee has been hired. This is done in order to calculate the final recruiting fee payment based on a percentage of the actual 12 month total earnings of the recruited sales employee.

Not many employers want to be paying a portion of recruiting fees 12 months after they have hired new talent.

From an alignment and positioning perspective, the traditional recruiting business model is the start of a mis-aligned relationship between the recruiter and hiring manager, as well as a mis-alignment between the recruiter and the candidates.

The structure of this type of business relationship incentivizes the recruiter to seek the most expensive talent, as this hire would reward the recruiter with the highest fee payment. This model encourages the recruiter to pay less attention to candidates with great potential but whose salary from the hiring company would be lower—resulting in a lower commission for the recruiter.

On the opposite side is the hiring manager who is seeking the finest talent and the best fit. Best Practice Recruiting should attract and consider all qualified candidates, from the seasoned and experienced high earners to those with high potential/less experience with lower earnings. Without objectively seeking a rounded group of candidates, the employer loses and the candidates are underserved.

Some individuals with great potential and lower current earnings turn out to be superb candidates and excellent employees. I have seen this first hand on numerous occasions.

With a commission based business model in place, the recruiter is not aligned with the needs of the company’s hiring manager. The recruiter has been positioned to reap the highest financial rewards or biggest fee. The hiring manager is seeking the best fit all the while attempting to obtain a sense of the candidates under consideration. Hiring managers recognize their recruiting resource has developed some rapport with candidates and they are usually interested in the recruiter’s comments and insight.



However, if the recruiter is under a commission based fee structure, how comfortable is the hiring manager going to be with the recruiter's insight? If the recruiter sings the praise of a seasoned, well qualified and highly compensated candidate, isn't the hiring manager going to wonder if some of the recruiter's praise is an effort to receive the highest possible commission fee? Even if this is not the case, how much can the hiring manager trust the recruiter's comments as long as the hiring manager is wondering about the influence of the commission based fee?

Perhaps it is time to reevaluate the outdated recruiting business model and change the conversation.

Most recruiters would agree that it takes no more time to recruit the highly compensated candidates as it does to recruit lower compensated candidates. The effort is the same.

What if the commission driven recruiting business model were adjusted to a fixed fee model?

What would change and what could improve toward Best Practice Recruiting?

- » *With a fixed fee, the employer would have a clear understanding of their fee and an easier ability to budget accordingly*
- » *With a fixed fee, the recruiter is now equally incentivized to seek the BEST Talent, regardless of current earnings*
- » *With a fixed fee, the recruiter is aligned with the goals of the employer's need to hire the best fit*
- » *With a fixed fee, the hiring manager is closer to trusting the recruiter's insight and comments about various candidates, since the recruiter's fee is the same regardless of who is ultimately hired*
- » *With a fixed fee, there is no need to build-in a "true-up" fee 12 months after date of hire*
- » *With a fixed fee, the recruiter can become a valuable resource during the negotiation of an offer*

In conclusion, impactful talent recruitment is critical for company growth. The value of Best Practices Recruiting is integral to a business's success. With so much at stake, trust must be at the foundation of the hiring process. Alignment of purpose with talent recruitment is what engenders trust between the hiring manager and the outside recruiting resource.

If we change the conversation and adjust the current business model, how much better would the result be for the employer and for the candidates?

*Good hunting.*

#### **About Boxwood Search and Bert Sadtler**

*Boxwood is a management, consulting-recruiting firm with offices in the greater Washington DC region as well in Tampa Bay, Florida, and provides solutions for employers needing critical talent. As a dedicated, consulting resource to the employer, Boxwood has designed compensation models that reflects current trends and develops and launches senior level recruitment campaigns to acquire appropriate talent. Position examples include: CFO, COO, Senior Program Manager, Vice President of Sales, Director of Marketing, Vice President of Engineering, Director of Contracts & Compliance and Vice President of Business Development. Examples of industries have included: Government Contracting, The Intelligence Community and the Communications/Technology Sector.*

*Bert Sadtler is an invited speaker to discuss the shift in the recruitment paradigm toward acquiring critical senior level talent as well as the shift in the employer's performance based compensation model. Bert can be reached at: [BertSadtler@BoxwoodSearch.com](mailto:BertSadtler@BoxwoodSearch.com).*

# Rockin' In The Space World

Point of View, by Elliot Holokauahi Pulham, Chief Executive Officer, Space Foundation

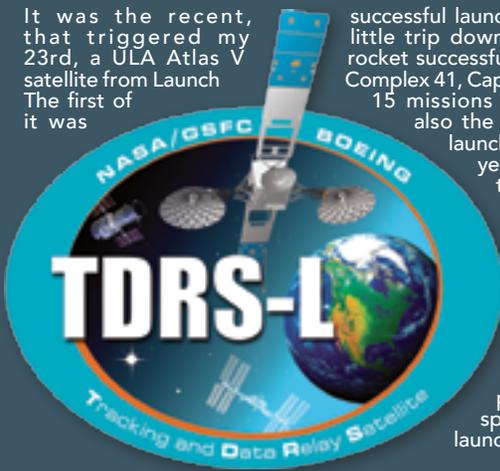


I have to admit that there's a soft spot in my heart for NASA's Tracking and Data Relay Satellites. It was a tad more than 25 years ago that I had the rush of supporting my very first space shuttle launch, and it was a biggie: the launch of space shuttle Discovery on mission STS-26R—NASA's return to flight, our first flight following the loss of Challenger nearly three years before.

The emotional atmosphere was incredibly charged, and the media village that sprouted up at the KSC press center was huge and demanding, both an opportunity and a burden for the public affairs teams supporting the launch. Fortunately for me, I was too focused on the TDRS payload in Discovery's payload bay to get swept up in much of the Return to Flight frenzy.

I suppose I should more accurately say I was focused on the Boeing Inertial Upper Stage (IUS) that would deliver TDRS-C to its final position in orbit, an unprepossessing little workhorse of an upper stage engine that would also deliver such interplanetary spacecraft as Magellan, Galileo and Ulysses, and, in a way, put me in a position to directly support shuttle-based exploration for a decade.

It was the recent, that triggered my 23rd, a ULA Atlas V satellite from Launch The first of it was



successful launch by United Launch Alliance little trip down memory lane. On January rocket successfully launched NASA's TDRS-L Complex 41, Cape Canaveral Air Force Station.

15 missions planned for 2014 by ULA, also the 78th consecutive successful launch for ULA in just over seven years. TDRS-L has quite a legacy to live up to—the TDRS-C we launched in 1988 had a designed life of 10 years... and is still in service more than 25 years later.

The TDRS-L mission pulled off with such aplomb by ULA is part of an incredible burst of specific impulse put on by the worldwide space community in January to launch 2014 on a stellar trajectory:

- In January, the Space Foundation and NASA held several special events at Space Foundation World Headquarters and the Space Foundation Discovery Center, as part of the world premier of Water Falls, a new public education initiative linked to the Global Precipitation Measurement (GPM) mission, set to launch later this month (February 27) aboard a Japanese HIIA rocket from JAXA's Tanegashima Space Center.
- On January 27, 2014, the South Korea Ministry of Science, ICT and Future Planning formally launched its Moon exploration program—which aims to put its first lander on the Moon by 2020.
- On January 6, SpaceX successfully launched the Thaicom 6 satellite, built by Orbital Sciences Corp. for Thai satellite operator Thaicom, from Cape Canaveral Air Force Station. Next up for SpaceX will be CRS-3, the company's third ISS resupply mission for NASA, featuring the company's Dragon capsule riding aboard a Falcon 9 rocket.
- Not to be outdone in the ISS resupply sweepstakes, on January 9, Orbital Sciences successfully launched its Cygnus commercial cargo carrier to the ISS, aboard the company's privately developed commercial rocket, Antares, from the Virginia Spaceport.
- Virgin Galactic conducted its third powered test flight of SpaceShipTwo on January 10, going supersonic (Mach 1.4) and reaching 71,000 feet over the Mojave Air and Space Port in California.
- Also in January, Arianespace announced flight dates for its first three missions from the Kourou Spaceport in 2014—two Ariane 5 flights and one Soyuz flight, lofting five satellites for satellite operators ABS, SES, Hispasat and ESA.
- That almost-forgotten solar system Rip Van Winkle, a.k.a. ESA's Rosetta spacecraft, awoke in January after hibernating for 31 months in the cold of deep space. Returning to the light and warmth of the inner solar system, Rosetta woke up and started preparing for its upcoming comet rendezvous—a gutsy, \$1.7 billion attempt to orbit a comet and place an instrumented lander on its icy surface.

- As if to remind us all of the allure of the Red Planet, the Mars Exploration Rover Opportunity celebrated its 10th anniversary on the Martian surface by turning over a mysterious rock that seemingly appeared out of nowhere—prompting speculation: “are the Martians just messing with us?” Between Opportunity, Spirit and Curiosity, a ton of effort continues to go into answering this question, and two more spacecraft are on the way: NASA's MAVEN orbiter, due to arrive in late September, and India's Mangalyaan spacecraft, also due to arrive at Mars in September of this year.
- And, let's not forget that while at Kennedy Space Center for the launch of TDRS-L, ULA President Michael Gass joined with Sierra Nevada's Mark Sirangelo and Space Florida's Frank DiBello to announce an agreement to parlay currently under-utilized facilities at KSC into a commercial-style operating site for SNC's Dreamchaser reusable spacecraft. The deal includes the purchase of an Atlas V launch vehicle from ULA, the sharing of Operations & Checkout facilities with Lockheed Martin, use of the former Shuttle Landing Facility for Dreamchaser operations—a win-win-win for NASA, the commercial crew program, for KSC Center Director Bob Cabana's efforts to revitalize aging infrastructure, ULA's plans to play in commercial crew, and Space Florida's dreams of a vibrantly repurposed KSC.

Of course, as we've all heard so many times, “No bucks, No Buck Rogers.” Despite the increasingly commercial approach to space exploration, it is important to remember that strong political support for government space programs is crucial to our industry.

In that regard, January was also a good month for us. As the House and Senate quickly moved an historic two-year federal budget, a deep dive into the space accounts therein revealed to the Space Foundation some delightful surprises, including a slight increase to the NASA budget. The U.S. Air Force, working with ULA, was able to craft some significant EELV savings, relieving some of the pressures from other Air Force space accounts.

Far from perfect, but compared to the government shutdowns and sequestration that have characterized the last two years, a much better scenario and another win-win for our industry.

Our view is that we're Rockin' in the Space World. If January is any indication, 2014 is going to be a year of monster hits. Sure, there'll be a sour chord sounded here and there, and we've major challenges ahead in Space Situational Awareness, in Cyberspace, in getting ITAR reform across the finish line, and more. But the sound of missions launching and important programs reaching MaxQ is a sweet, sweet song.

## We're going solid gold, with a bullet!

For further information regarding Space Foundation, access <http://www.spacefoundation.org/>

## About the author

Named chief executive officer of the Space Foundation in 2001, Elliot Pulham leads a premier team of space and education professionals providing services to educators and students, government officials, news media and the space industry around the world. He is widely quoted by national, international and trade media in coverage of space activities and space-related issues.

Before joining the Space Foundation, he was senior manager of public relations, employee communication and advertising for all space programs of Boeing, serving as spokesperson at the Kennedy Space Center for the Magellan, Galileo and Ulysses interplanetary missions, among others. He is a recipient of the coveted Silver Anvil Award from the Public Relations Society of America—the profession's highest honor.

In 2003, the Rotary National Awards for Space Achievement Foundation presented him with the coveted Space Communicator Award, an honor he shares with the late legendary CBS News Anchor Walter Cronkite and former CNN News Anchor Miles O'Brien. Pulham is chairman of the Hawaii Aerospace Advisory Committee, a former Air Force Civic Leader and advisor to the Chief of Staff and Secretary of the Air Force and a recipient of the U.S. Air Force Distinguished Public Service Medal. He serves on the editorial board of New Space Journal.

## Editor's note:

Our thanks to Space Foundation for allowing us to republish Elliot's column from the organization's Space Watch newsletter.



# The Emergence Of HTS Platforms In Latin America

By Carlos Placido, Senior Contributor



**L**atin America is at the early stages of what is poised to become an extremely dynamic and competitive High Throughput Satellite (HTS) marketplace. On the demand side, bandwidth-hungry applications such as residential broadband, 3G/4G data backhaul/offload and mobility (maritime /aero) have long been awaiting the emergence of lower-cost platforms to enable them.

Meanwhile, an increasing number of satellite operators have committed to deploy substantial HTS capacity in the 2014-2016 time period signals, an indication that the evolution of the Latin American HTS market could be driven by supply-side economics.

However, what makes Latin America really interesting from an HTS perspective is the range of HTS architectures and business models; and the diverse set of players driving these. Despite some inevitable degree of overlapping among all surfacing architectures and target markets, HTS platforms in the region tend to fall into three broad categories, based on their respective primary targets: Residential Broadband, National Programs and Open B2B Platforms.

## Residential Broadband

The Latin American HTS residential broadband segment is at an embryonic stage but projected to become a high-growth “volume” market, with most of the growth coming from 2016 onwards. Northern Sky Research (NSR) forecasts that by 2022 there will be over 620 thousand HTS broadband subscribers, almost tripling the current installed base of broadband VSATs - used across the region for enterprise-class services via traditional Ku-band capacity.

In October 2013, Media Networks Latin America (MNLA), a B2B division of Telefonica Digital, kicked off commercial operations of the first regional high throughput satellite network via a hosted HTS payload aboard Hispasat’s Amazonas 3 satellite. With more than 12Gbps of aggregate IP throughput distributed across 9 spot beams covering some of the region’s most populated metropolitan areas, MNLA’s main target is clearly the residential broadband market.

Similarly to how MNLA approached the DTH market, it has adopted a wholesale, white-label HTS service distribution model. This is: MNLA did the heavy-lifting of procuring, deploying, integrating and operating the hybrid broadband infrastructure so that service distributors can rely on such infrastructure to sell and brand their own services, without the need to deal with the complexities of managing core network resources.

## National Programs

Some countries in the region are actively seeking technology independence through government-funded space programs for the design, construction and operation of national communication satellites, usually with hybrid FSS / HTS payloads.

Early in 2014, the Bolivian TKSat-1 satellite, manufactured under the terms of a cooperation agreement between Bolivia and China, entered geostationary orbit with a limited number of spot beams. Argentina’s state-owned operator ARSAT also has plans to include Ka-band spots in the future but Brazil’s satellite program is perhaps the best example of how large and relevant national programs can be for domestic HTS markets.

Brazil’s Defense and Strategic Communications Geostationary Satellites (SGDC) are being purposely designed and built to provide Brazil with independence from the commercial satellite sector to meet the demands of strategic defense, civil and social inclusion objectives. The first SGDC satellite (SGDC-1), expected to launch in 2016, will count on X-band capacity for defense applications but will also host a large multi-spot-beam Ka-band payload with an estimated capacity of over 40Gbps, to be mainly used to bridge the “middle mile” digital divide in key areas of the country.

## Open B2B Platforms

This where most of the traditional Latin American FSS satellite operators, including Intelsat, Telesat, StarOne, will be categorized. With the first of the series of EpicNG satellites (IS-29e) scheduled for launch in 2015, Intelsat will be the operator showing the way for “open” HTS B2B service models.

EpicNG is truly an evolutionary progression of the traditional model of SATCOM capacity agnostically leased to service providers that use such capacity as raw material to craft their own differentiated service offerings. Indeed, initial focus is on Ku-band spot beams ensuring a good degree of backward compatibility for traditional service providers and legacy grounds systems.

Such natural progression is considered vital for the sustainability of non-broadcast B2B satellite applications such as backhaul, being increasingly challenged economically by the expansion of terrestrial networks and the transition from a voice-dominated to a data-dominated mobile environment—with inherently lower ARPU-to-traffic ratios.

## Special Cases: Key Trends

While some industry pundits do not view HTS as a true paradigm shift as—they argue—spot beam satellite technology is a natural progression for satellite architectures, if one looks at HTS’s long term impact, it does appear that the shift will bring big challenges and opportunities to the Latin American satellite service ecosystem.

Key trends shaping HTS uses in Latin America include:

**Residential Broadband:** The number one priority in this segment is achieving the lowest possible operational cost per bit on the satellite. This usually pushes HTS architectures towards some degree of vertical integration; such as when the satellite payload, network infrastructure and service offering are managed by a single player. However, in a region as geographically spread and culturally diverse as Latin America, no single satellite player has the necessary on-the-ground market visibility and retail reach so developing efficient commercial distribution pipelines is as critical as technical efficiencies. Telecom and mobile operators would be ideal HTS distributors if it was not for the fact that, in the grand scheme of things, satellite markets are so small to them nowadays that it could be a challenge for true commercial engagement. On the other hand, smaller, specialized distribution partners can show high engagement levels but have less retail reach and branding power than telecom/mobile operators. As evidenced by the diverse set of partners selected recently by MNLA, the path of least resistance for an efficient regional sales pipeline could rather hinge around cherry-picking partners that provide a good mix between these two extremes.

**National Programs:** Broadband access is a critically important driver for economic growth, prompting national governments to foster development or to directly invest in infrastructure to bridge the digital divide. Key is that end-to-end broadband services can be government-subsidized for social inclusion; and one aspect in Latin America is that paths taken by national administrations vary widely depending on considerations like population size /spread, geographic extension, political shifts and state of the terrestrial infrastructure. As an example, Colombia decided a few years ago that they could make better use of the money budgeted for SatCol (Colombian Satellite) by using such funds to extend the reach of long-haul fiber. On the other hand, with the SGDC government program, Brazil will rely on satellites to complement Telebras’ fiber footprint. Focus on the middle mile means need to efficiently interwork with last mile access technologies. Indeed, Brazil is developing 450 MHz 4G technology which -as a result of the propagation benefits of the 450 Mhz spectrum band- promises to offer a good compromise between coverage and access speed in rural locations. With a rural population of around 30 million people in Brazil—roughly the size of the total population of countries like Peru and Venezuela—Brazil has critical mass to drive economies of scale. Should Brazil’s developments succeed, use of 450 Mhz 4G could then spread into countries like Peru and this could, in turn, change the picture of how satellite HTS can interwork with last-mile wireless access in the region.

**Open B2B Platforms:** Open HTS systems to be provisioned for Latin America will focus on tapping into an established and diversified set of specialized satellite service providers and teleport operators that wish to transition to HTS. This service model is consequently expected to receive great acceptance among satellite service players because they will be able to continue benefiting from capacity intermediation—translating MHz into Mbps and value-add services. What is not yet entirely clear, however, is if, by virtue of the HTS push towards higher traffic volumes, lower prices and IP virtualization, regional transition towards HTS could then sparkle a Darwinian consolidation process among established satellite service providers in the region.

## A Mix Of Opportunities

Risks for HTS can be high but so are the opportunities. Currently, all eyes are on MNLA for better estimations about how big and how fast the HTS residential business can become. With HTS giant players such as Hughes and ViaSat watching and already making capacity commitments, MNLA might not keep its first-mover-

advantage in the long run but has certainly become a leading case for the true demand of residential satellite broadband.

It is worth noting that supply and demand are not fully independent variables. In Mexico, Central America and the Caribbean, the HTS situation appears to be developing quite differently from a supply perspective in comparison to South

America, given that these regions above the Equator are expected to experience a dramatic jump of HTS supply in 2016/2017 as both Hughes and ViaSat plan expand their coverage with their respective launches of the Echostar-19/Jupiter-2 and ViaSat-2 satellites.

Established satellite service providers are anxious to learn how HTS will impact their business, which will largely depend on how local markets evolve towards either closed systems, open systems or hybrid models. A positive aspect of the emergence of HTS is that the satellite sector as a whole will grow by better enabling uses and applications not well served -from an economic perspective- by traditional FSS.

In a sense, HTS will be creating new markets but, what might concern some players, is that this growth will also come with some shacking and shifts within the service ecosystem, affecting the business of established satellite operators and service providers. Also note that FSS supply dominance may not necessarily be transferable to HTS, as evidenced by the large number of players entering the HTS market in Latin America.

Clearly, not all HTS platforms are created equal and Latin America is offering a good mix of opportunities for a number of players and service models to co-reside in a sort of "coo-petition" environment. Long term, however, business pressures could push the region towards wholesale models seeking increasing levels of technical and commercial distribution efficiencies.

### About the author

Carlos Placido is an independent consultant with 20 years of progressive experience in the areas of telecom consulting, business development, engineering and R&D. With focus on emerging satellite markets and technology, he has conducted numerous strategic consulting projects as well as research and management activities, including global market research studies for Northern Sky Research (NSR), business development support for technology vendors and project management at Telefonica. Until 2004, Carlos led a development team at INTELSAT, where he was responsible for identifying and validating future satcom uses of emerging video and IP data technologies. Carlos is also contributor and administrator for Satcom Post, an online professional knowledge-sharing platform. He holds an engineering degree from the University of Buenos Aires and an MBA from the University of Maryland, Smith School of Business.

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<http://www.PlacidoConsulting.com/>



Artistic rendition of the ViaSat-2 satellite, courtesy of Boeing.

# Sleep Tight, While The Multi-Service Revolution Rumbles

By Jean-Pierre De Muyt, Vice President, Strategic Business Development, Newtec



**Predicting the market evolution for the somewhat longer term, all the while having to invest in what seems to be the most profitable option today, is challenging endeavor. Nevertheless, that's what satellite service providers have to accomplish even more than often than ever before.**

This necessity may appear to be somewhat of a daunting task. After all, there is the relentless competition from fiber. However, such concerns shouldn't keep you awake.

Ensuring satellite services remain relevant for the market is not as difficult as it might initially seem—to address this market doesn't require a flawless crystal ball or loads of money. All that's really needed is company agility and flexibility in the way the market is addressed and served.

In the more traditional satellite home territory of broadcast-related services, business opportunity abounds. Growth is ubiquitous, there's more content to deliver, and all requires higher quality viewing for the consumer. Getting more Mbits out of your transponder and being agile in your ability to support changing IP based workflows are the key. The latter does translate into the need to support multiple services, which are now, more than ever, IP-based. For example, offering straightforward, one way, ASI-based contribution-only services might complete the trick for now, however, how long will this service keep the newsroom people happy?

In other areas, growth might be less obvious and the crowd of satellite service providers are all being gathered together in a smaller marketplace. Here, too, a revolution seems to be developing, now still rather quiet, but some might already hear the rumble of change.

The good old days where one could concentrate on a single type of service and continue to safeguard profitability are gone. In example, the decline of high speed IP trunking has definitely ensured that some service providers remain fully awake at night. Here, too, agility allows service providers to survive and even thrive. There's simply too much action in the sky and on the ground that will keep satellite relevant for a long, long time, be that cellular backhauling into areas where terrestrial infrastructure cannot reach, or for Communication On The Move (COTM), where only satellite can maintain the connectivity.

## The Changing Media Rich World

Satellite operators and service providers are being required to respond quickly to changing market dynamics. At least, they are if they wish to diversify, offer improved quality of service and be more flexible on the delivery of Service Level Agreements (SLAs). Today, there is a need for higher service levels, both in terms of speed and volume, to deliver what the customer wants.

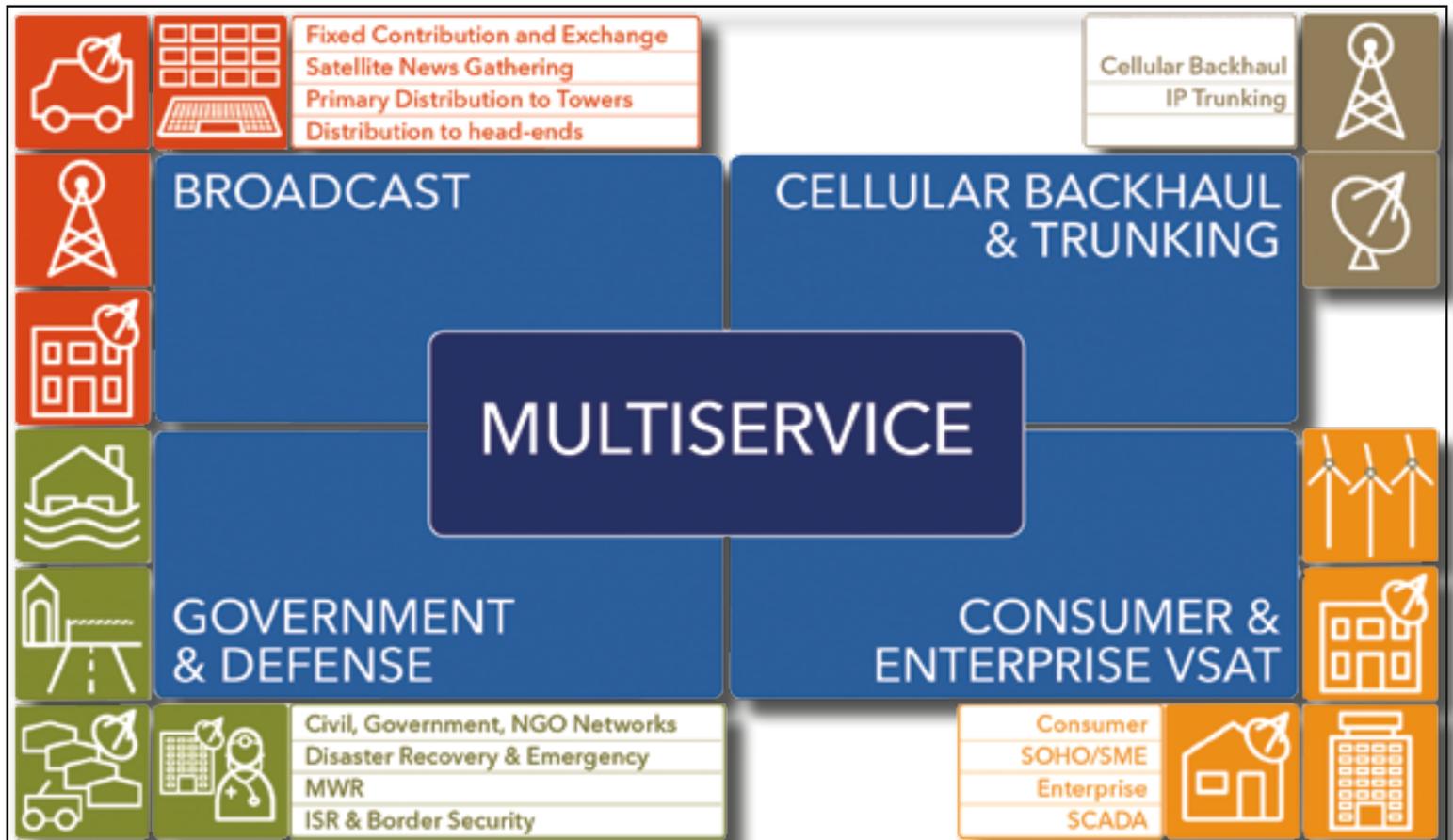
At the same time, applications are placing a strain on capacity by requiring more and more bandwidth. There has been well-documented growth in multimedia rich content, big data, HD video and a proliferation of channels. This is without even mentioning the introduction of 4K or everyone's need to download more and to do it faster (whichever might be more relevant for your region of the world). In addition, the end user's relationship with technology and the media is also changing and customers expect—even demand—an always-on connection which, in turn, leads to demands for higher service availability.

## Low Hanging Fruits Are Harder To Reach

For a host of reasons, the level of profitability in the satellite services sector is under pressure. There is a squeeze going on—there are decreasing price levels on the one hand and higher bandwidth that results in higher satellite capacity costs on the other hand. Caught in-between these two forces is satellite services profitability.

But the forces get welcome backpressure—on the bandwidth supply side, it's obvious and just to name one: We have all heard of Ka-band and how it is poised to mitigate a big part of the OPEX problem by reducing the cost of satellite capacity. At least, in some cases.

It's far from being a fit-for-all but where it fits, it fits really well. On the demand side, challenges remain, but they're not necessarily business stoppers. Yes, customers expect lower prices, but nobody said those expectation can't be met without jeopardizing profitability. You just need to make certain you differentiate among customers and manage their own particular set of expectations in an agile way. This defends against the churn monster, both in the consumer market and the hard-core B2B market alike.



The flexibility to adapt the nature of the services you offer to customers and to make sure they are delighted with your offerings, that they are being treated fairly, and giving them what they pay for (and are willing to pay for) is the route to ongoing success. In the all-ubiquitous IP world, that means fair usage policies are required together with highly diverse Quality of Service and shaping mechanisms.

No one has said such policies cannot be instituted—definitely not Newtec. Yes, profitability needs to be intelligently managed and, yes, there is a good possibility that once the ends have been met, someone might actually move those ends.

Once again, agility comes into play, with fair and efficient bandwidth allocation mechanisms embedded into your platform—in this way, the challenges can be met head on and surmounted.

### **Keeping Pace With Technology**

When agility is required and surety seems lacking, the typical reaction is to revert back to technology. That works well, quite often. Unfortunately, this reliance on technology often means a highly tailored solution for the targeted problem. This is how service providers often end up with numerous, different platforms, each platform of limited fit, and tailored around a single technology. This results in proprietary technology roadmaps and various platform particularities in terms of operational support.

There's good news, as well. While in first instance the need for agility might appear to come with particular technological solutions for particular markets, the ubiquity of IP renders those various needs more similar than one might think. In fact, it again all drills down to being efficient on the lowest layer—squeezing every possible bit out of every Hertz—while at the same time making certain there are numerous options available in terms of speed, throughput quality and higher layer networking functionality.

Once you can combine that agility with controlled availability, based on one single platform with its single and future proof roadmap, you're basically "good to go." You don't need to spend lots of effort and money on different features that all require constant attention, with the concern that all are bound to be obsolete at different points in time in the future.

Some vertical markets will continue to have their own specific needs, however, for as long as your platform is agile from a connectivity point of view, there are always extensions you can add to support specific value added services, from embedded non-linear file transfer contribution in the broadcast world up to specific encryption mechanisms for government application.

### **No Need To Be Afraid**

The solution is the end of single purpose satellite infrastructure and the birth of truly, multi-service, technology platforms. Platforms that can address multiple markets and verticals, while simultaneously putting more customers, in the same transponder, are the goal.

Thanks to advanced QoS management and the simplified switching between SCPC, MF-TDMA and other more optimized return link capabilities, the goal is quite attainable. Together with the emergence of the new DVB standards, service providers will be able to differentiate and complement terrestrial services while adding more flexible and improved service offerings.

Differentiation becomes much more likely and plausible when satellite service providers are able to take rapid advantage of new market opportunities. The business case becomes far easier to make with a lower CAPEX, lower risk to cash flow and the use of a single investment for multiple verticals—your CFO will be less concerned about spending the money and will sleep better.

The CFO will not be the only one enjoying life just that little bit more, as running multiple platforms—as is often the case today—can be a true, operational nightmare.

The message is: Be ready for the era of multi-service infrastructure—this is no longer about making many different choices, but rather, making that single selection of an agile platform that ticks off all of the boxes.

**Sleep tight. Others may need to stay vigilant and awake.**

## **Meet Newtec Dialog® The Platform That Embraces Change.**

March of 2014 marks the launch of the Newtec Dialog® platform, a scalable and flexible multi-service platform that allows operators to build and adapt their infrastructure easily to accommodate their business and the satellite market as growth and change occur.

Newtec Dialog gives operators the power to offer a variety of new services on one platform, always with the knowledge they are using the most optimal modulation and bandwidth allocation possible.

**Flexibility:** Newtec Dialog allows you to adapt your infrastructure easily as your business changes.

Newtec Dialog is built to allow flexibility in the choice of technology and equipment, but also as to the types of services and applications available, ensuring a completely flexible focus for the businesses using the product. Newtec Dialog brings to service providers optimal efficiency and allows them to establish a business case for single or multiple markets using a single platform and Operations Support System / Business Support System (OSS/BSS).

Having a platform with these qualities opens up a multitude of possibilities for optimizing the usage of infrastructure and satellite capacity across different markets. For example, a provider with a history of servicing a majority of IP trunking clients can easily shift focus and start targeting broadcasting, backhauling, consumer and enterprise VSAT or government and defense markets quickly, all by using the same Newtec Dialog infrastructure. The platform enables operators to adapt to any business scenario and provides the capability of delivering tailored services.



Figure 1: The Newtec Dialog® platform consists of hub(s) and terminals. The Newtec Dialog Hubs are modular and scalable and can be configured in different sizes to fit the needs of customers. This picture shows the HUB6501 11F and the HUB6504 41F Hub Modules.



Figure 2: Newtec Dialog® opens up a multitude of possibilities for optimizing the usage of infrastructure and satellite capacity across different markets. The platform enables operators to adapt to any business scenario, including tailored services.

**Efficiency:** Newtec Dialog enables the most optimal modulation and bandwidth allocation.

Newtec's engineers have invented a new patented, return link technology that combines the best qualities of SCPC and MF-TDMA. Taking efficiency a step further, Mx-DMA™ including HighResCoding™ (HRC) is a revolutionary technology which gives MF-TDMA flexibility and on-demand variable bandwidth allocation at SCPC efficiencies. This typically results in doubling the transponder throughput using the same bandwidth, or alternatively reducing the required space segment capacity by 50 percent.

The new technology is ideally suited for low to medium overbooked types of applications having throughput rates up to 21Mbps: Enterprise/corporate networks, government/NGO networks, cellular backhauling and low to medium rate broadcast contribution and news gathering. The new technology also ensures low jitter and delay, perfect for applications such as voice and streaming video.

The platform also supports SCPC DVB-S2, and Newtec S2 extensions return link for applications which demand high bandwidth and MF-TDMA 4CPM technology for highly overbooked services, such as Internet access for consumers, SME/B2B and SCADA.

The MDM3000 series of Newtec modems, which run on the Newtec Dialog platform, support all three return link technologies, which enables operators to optimize the service delivered to individual end-customers via a simple configuration in the NMS and that, at any time, and with minimal impact. The Dialog System is software upgradeable to support the new DVB-S2X in the return link, as well.

All return link technologies are combined with Newtec's core technology FlexACM®, a highly efficient Adaptive Coding and Modulation (ACM) algorithm using Newtec patent pending technology.

With these technologies, Dialog is able to provide the most optimal modulation and bandwidth allocation at any time, for any application and any satellite, while guaranteeing the highest efficiency.

**Scalability:** Newtec Dialog offers you a platform to build your business to the size you need it.

The platform is designed to be used for every type of networking: from the smallest (i.e., five remotes) up to the largest (having hundreds of

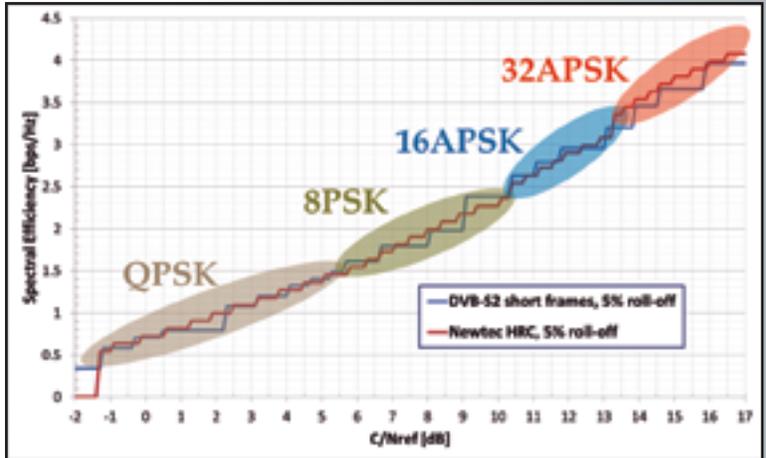


Figure 3: This line chart demonstrates the Newtec HighResCoding™ (HRC) coding and modulation (red line) compared with DVB-S2 Short frames (blue line) both using 5% roll-off. Newtec HRC combined with Newtec patented Mx-DMA™ bandwidth allocation provides S2-alike high efficiency with MF-TDMA-alike on-demand variable bandwidth allocation.

thousands remotes), from single coverage to multi-spot High Throughput Satellite (HTS) networks. Additionally, operators can invest further as their business grows. The HUB scalability and flexibility enables low, up-front CAPEX requirements.

The platform will use Newtec's proven modems, including the MDM2000 and MDM3000 series. The modems have many off-the-shelf features embedded, such as acceleration and compression, encryption, multi-language web GUI and IPv4/IPv6. The modems also have the advantage of being easy to install using Newtec's Point&Play® self-installation system.

Newtec Dialog embraces change by offering an easy to use platform which allows operators to build their business to the size they need, while also allowing them to easily adapt their infrastructure as their businesses or the market changes.

In today's fast changing satellite market, where technology rapidly evolves, Newtec Dialog will provide the peace of mind that any market can be addressed, at any scale, without complexity. This enables companies to drive their profitability by being agile, all the while offering the best quality of service and experience for their customers.

For further information, please access any of the following URLs  
[www.newtec.eu](http://www.newtec.eu)

[Twitter.com/Newtec\\_Satcom](https://twitter.com/Newtec_Satcom) — [Linkedin.com/company/newtec](https://www.linkedin.com/company/newtec)  
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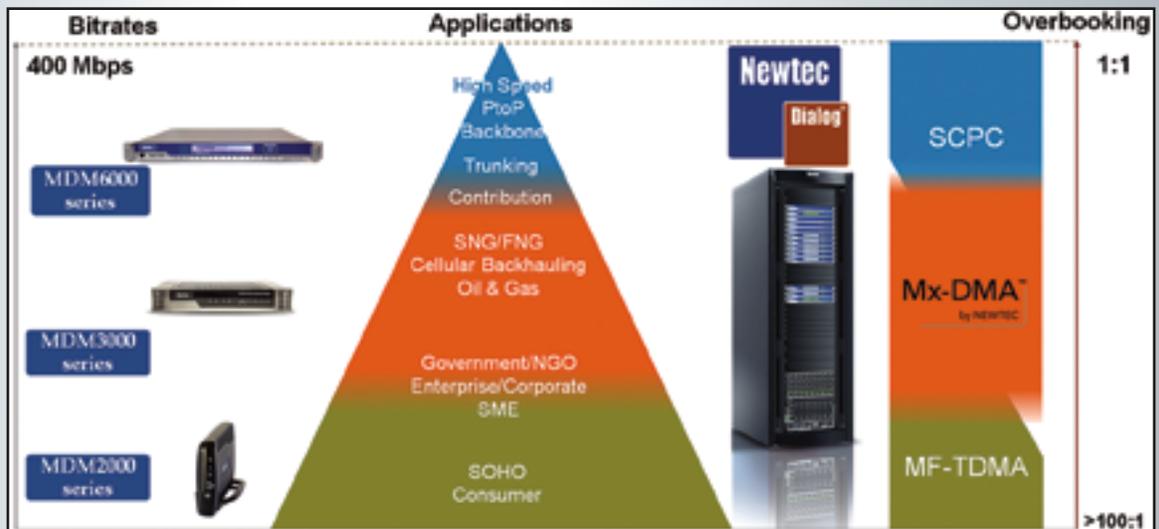


Figure 4: This graphic highlights the different markets that can be optimally addressed using the Newtec Dialog® platform, ranging from consumer broadband, corporate, cellular backhauling and up-to IP trunking, as well as broadcast market applications such as SNG/FNG and fixed contribution and exchange.



# High Resolution Mapping Of The Entire Great Barrier Reef

By Magnus Wettle, Chief Scientist, EOPMAP Asia Pacific, and, Knut Hartmann, Head of Bathymetry + Seafloor Group, EOMAP Germany



**In a world first, the underwater, shallow reef topography of the entire Great Barrier has been comprehensively mapped. This was made possible by satellite-derived bathymetry (SDB) technology.**

EOMAP, the global leader in SDB applications, together with its Australian partners, recently launched high resolution digital maps that are critical for identifying, managing, preserving and protecting what lies within the waters of this global, biodiversity icon.

## Background

The Great Barrier Reef (GBR) is of international importance. Despite the need to monitor, manage and protect this World Heritage Area, the broad-scale, environmental baseline information available to date is surprisingly incomplete. Indeed, project partner Dr. Robin Beaman of James Cook University confirms

that the new satellite-derived product is different than anything else previously available. Until this product, nearly half of the shallow water reef area on the Great Barrier Reef had not been mapped using modern digital surveys. While these shallow coral reefs are the most ecologically significant, they are also the most difficult to map, due to being either too remote or because of their shallow nature, which makes them navigationally dangerous.

Instead of relying on traditional surveying vessels or aircraft to map the many 'un-map-able' areas of the reef, the aquatic remote-sensing company EOMAP used space-borne satellites to overcome these hurdles. The result is the largest project of its kind ever conducted. The 3D water depth maps have a 30m horizontal resolution over approximately 350,000 km<sup>2</sup> of the Great Barrier Reef World Heritage Area and Torres Strait, providing not only more detailed individual reef data, but also a complete picture of Earth's largest coral reef ecosystem.

## Approach

Satellite-derived bathymetry (SDB) is the mapping of water column depth using satellite imagery. Unlike traditional water depth mapping technologies, such as ship-based sonar, which typically acquire depth readings along a number of survey transects, SDB delivers an independent water depth estimate for every usable pixel in a satellite image. This effectively provides a continuous 3D model of seafloor topography, the equivalent of an underwater digital elevation model (DEM), where the horizontal resolution corresponds to the pixel size in the satellite image.

Briefly, SDB relies on

1. *Optical sensors that can detect sunlight reflected from the seafloor, and*
2. *Algorithms that can invert the radiative transfer equations for the in-water light field, which requires solving for water column depth, seafloor reflectance and the optical properties of water column.*

It follows that SDB is dependent on water clarity, typically retrieving depths down to approximately 30 meters in clear waters (such as associated with tropical coral reef environments). As it happens, this is the depth interval that is the most challenging and costly for traditional, ship-based bathymetry surveying

A number of satellite sensors have been tested in SDB applications, including (in alphabetical order) ALOS, IKONOS, Landsat, MERIS, Quickbird, and WV-2, where the selection of the appropriate sensor needs to be done on the basis of fit-for-purpose for the project at hand.



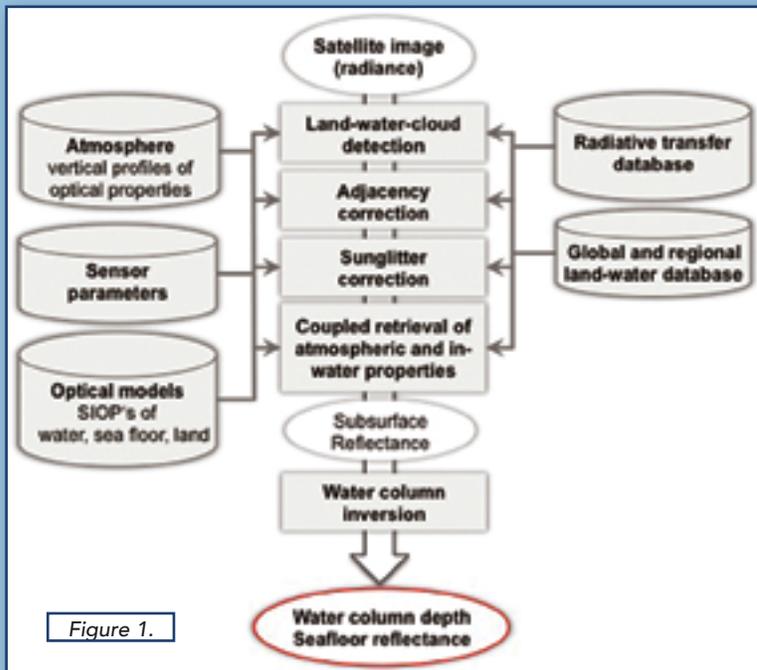


Figure 1.

For this project, imagery from the Landsat 7 satellite series was selected, based on the satellite having a comprehensive archive of (redundant) coverage of the GBR, suitably high horizontal resolution (30 m pixels), a large enough footprint to keep the number of processed scenes to a manageable number, and low cost (essentially free from USGS).

The redundant coverage, or availability of several overlapping images for every part of the GBR, offered the ability to select the most suitable scene for every area. This was an important consideration since environmental conditions such as sunglint on the sea surface or turbidity in the water column limit the ability to retrieve water column depth. In total, 52 Landsat scenes were processed.

For the Great Barrier Reef project, all processing was done using EOMAP's customizable Modular Inversion Processor (MIP) system. In a nutshell, EOMAP's proprietary algorithms are bundled into function-specific modules that are connected through a semi-automated processing chain, which further accesses various databases for additional input. This is illustrated in more detail in Figure 1 above.

Broadly summarizing, image data are first pre-processed for land-water-cloud-masking, adjacency correction, sun glitter correction and atmospheric correction. The processing stage involves the definition of water optical properties and seafloor bottom types—for which databases are accessed—followed by a coupled retrieval of water depth and seafloor reflectance based on the subsurface reflectance image. Post-processing includes tide correction to lowest astronomical tide and a semi-automatic selection of correct depth retrievals.



Figure 2.

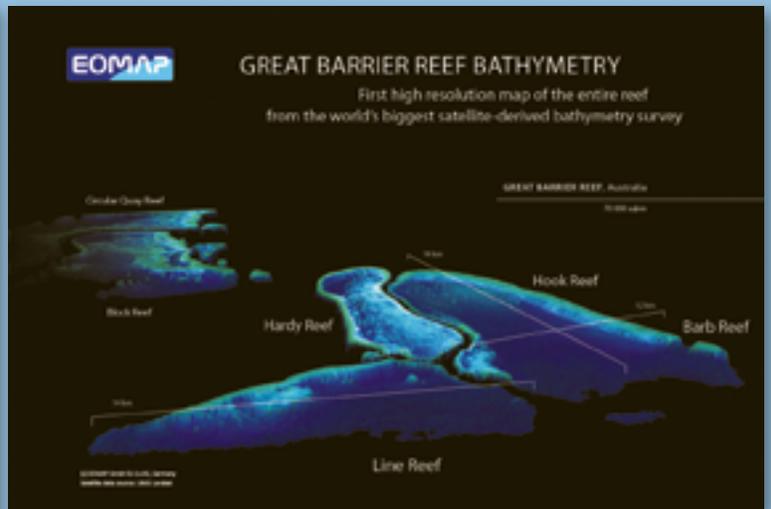


Figure 3.

An important ancillary output is the data quality map, where each pixel is given a quality rating that reflects the reliability of the information retrieved from that pixel. This per-pixel quality assessment takes into account clouds or haze in the atmosphere, glitter on the sea surface, turbidity in the water column, and the viewing and illumination geometry during image acquisition, all of which are environmental parameters that can affect the estimation of SDB. A user can therefore interrogate the bathymetry map in conjunction with the quality map, and apply relative uncertainty measures to any given interpretation.

#### Outcome

For the GBR project, the final result is a digital, high resolution, shallow water bathymetry map of the entire Great Barrier Reef. The product has a nominal vertical resolution of 10cm and a horizontal resolution of 30m. Figure 2 in the previous column illustrates the coverage of the final product, where the bathymetry is in color-coded map form. A zoomed-in 3D version of selected reefs (using the same data set) is shown in Figure 3, below.

The EOMAP product will find uses ranging from studies at individual reef level to bigger picture assessments of the entire Great Barrier Reef. Examples of applications include environmental baseline inventorying and monitoring, water quality modeling, measuring responses to both man-made and natural impacts, such as sediment transportation and tropical cyclones, and helping to predict the likely impacts of climate change effects, such as sea level rise and increased tropical cyclone frequency. It will also help target priority areas for more detailed data collection. As an example, with the considerable improvements this promises to current ocean modeling, scientists can now more accurately model trajectories of crown of thorn starfish larva to where they are next likely to inhabit the Great Barrier Reef.

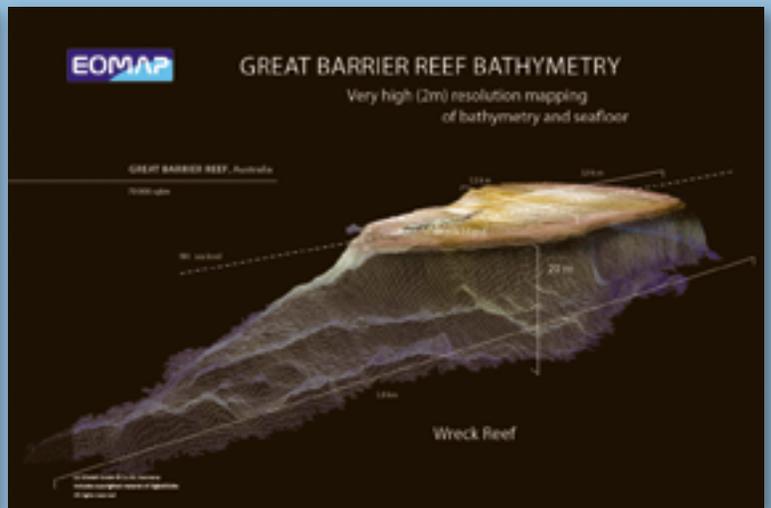


Figure 4.

Commenting on the bigger picture, Professor Stuart Phinn, of the Centre for Spatial

Environmental Research at the University of Queensland, and one of the key project partners in Australia, noted that “[these] reflectance and depth products will form the fundamental baseline data able to be used by government monitoring agencies for monitoring and management planning, research institutions for monitoring and modeling, and private industry to build their own applications for the data. This will provide the basis for a range of derived map products and the need for higher spatial resolution versions of these data.”

### **Outlook**

Looking ahead, EOMAP has already produced samples of a potential next generation GBR product: 2 m horizontal resolution bathymetry and seafloor color using DigitalGlobe’s WV-2 sensor. An example of this can be seen in Figure 4 on the previous page. Mapping the entire GBR with these 2m data would be an even more ambitious undertaking, and would probably require one or more project partners, such as the Australian government.

At the same time, and in parallel with business-as-usual SDB projects (notably in the environmental management and oil and gas sectors), EOMAP will now continue producing SDB maps for selected priority areas worldwide, using data from the most suitable sensor on a case-by-case basis. This is part of an ongoing initiative to build a catalogue of off-the-shelf satellite-derived bathymetry products available for immediate use. To this end, EOMAP welcomes input from potential users in setting the order of priority for areas that will be covered by the off-the-shelf processing initiative.

To learn more about the Great Barrier Reef SDB project, please visit <http://www.eomap.com/great-barrier-reef> where you can access a comprehensive project information booklet, sample data, and sign up for news and updates.

### **About the company**

*EOMAP GmbH & Co.KG is an independent company located in Oberpfaffenhofen, near Munich, Germany. EOMAP creates solutions to produce standardized map products from Earth observation data.*

*Sophisticated map products based on multi- to hyperspectral remote sensing data, as well as classification software solutions, comprise EOMAP’s core business. Our solutions rely on standardized physical models and work independently of scale, sensor type, and geographic location. We offer customized, large-area mapping based on satellite and airborne imagery for a manifold of applications with a focus on aquatic remote sensing. EOMAP’s services can be applied in environmental monitoring and spatial explorations, in particular for coastal zones, inland waters, wetlands, and other areas where high-precision mapping is required.*

*Our software processors are based on the latest scientific findings and deliver standardized products such as suspended matter, phytoplankton, and dissolved organic material (DOM) from both deep inland and coastal waters. We can generate reliable and precise bathymetric charts and sea floor vegetation maps for optically shallow waters.*

*EOMAP’s interdisciplinary team consists of highly specialized individuals with professional experience in software development, physically-based remote sensing product generation, cartography, interdisciplinary research, consultancy, and project management. All of our staff are natural scientists with either Masters or Doctorate degrees.*

# EOMAP's Latest Bathymetry Betterment

In February, EOMAP launched an off-the-shelf bathymetry product line which will transform the uptake and uses of digital bathymetry data.

This world first service makes high-resolution, satellite-derived bathymetry available through online portals and the company's business partners.

Dr. Thomas Heege, CEO, said that, "satellite-derived bathymetry (SDB) technology has matured to a robust and cost effective solution for mapping shallow water bathymetry, especially at high spatial resolutions".

Indeed, Shell Petroleum announced at the recent International Petroleum Technology Conference (IPTC) conference cost savings of more than \$1 million when using EOMAP solutions instead of the previous methods, for mapping a 740 sq km area off the coast of Qatar.

"For this location and coverage, we estimated to have made a cost saving of approximately one million dollar compared to a traditional executed bathymetry and/or topographic LIDAR survey," said Joris Siermann, Qatar Shell GTL Limited during the IPTC meeting.

"Access to this technology solution has—until now—been on a per request basis, with a concomitant price tag and wait times. Now, interested users can browse our off-the-shelf catalogue of already processed data, instantly evaluate the suitability of the product for their purposes, and proceed to acquire it directly." said Dr. Heege.

EOMAP gained significant media attention this past November when they announced that the shallow water bathymetry of the entire Great Barrier Reef had been completely mapped for the first time.

More recently, in the Arabian Gulf, the coastal waters stretching from Bahrain to Dubai were comprehensively mapped at 30m horizontal resolution. For parts of the region, which have never been surveyed before, this represents the first bathymetric dataset ever created.

Further to these, a number of other worldwide locations have already been added and EOMAP will continue populating the off-the-shelf high resolution bathymetry catalog on a priority area basis.

Dr. Knut Hartman, head of EOMAP's Bathymetry Group, said, "we have a system for selecting locations for off-the-shelf processing, but we are flexible, and welcome input from interested parties as to where we should target next."

The online catalog, which is being populated on a priority basis, is accessible at <http://www.eomap.com/off-the-shelf-data>.

## Off The Shelf Data

Click on the desired areas to receive additional information!





# Reliability Of GaN Based SSPAs... A Major Technological Breakthrough

By Cristi Damian, Vice President Business Development, Advantech Wireless

**G**aN based Solid State Power Amplifiers have extremely attractive properties (e.g., small form factor, high efficiency, high linearity wide bandwidth, and radiation hardness that make them ideal for use on ground applications as well as for space-based satellite communication systems.

Advantech Wireless has pioneered the design and manufacturing of GaN SSPAs, with the launch in early 2010 of a full product line, covering S-, C-, X-, and Ku- satellite bands. However, limited reliability data information is available on this new technology.

The purpose of this article is to describe the underlying complexities associated with the task and to present the calculus methodology, as well as the findings of an extensive R&D program developed at Advantech Wireless in the years prior to the product launch. The theoretical results correlate with the field data and underline a major improvement in reliability, superior to all existing technologies.

## 1. Reliability Assumptions

For the last 70 years, the basis for various reliability and availability based decisions has been the Mean Time Between Failures (MTBF). Widely used by the telecom industry, the MTBF calculus has been associated with a large number of methods and procedures. These calculus techniques are based on different failure definition criteria and can lead to a wide range of conflicting results and misconceptions. A common error is to consider MTBF as the "Service Life," in other words, the expected operating time in hours until failure. In many cases, Reliability, Availability, Failure Rate and MTBF are used interchangeably, which adds to the confusion.

For the purpose of this article, Reliability is the ability of a system to perform as specified, under stated conditions, for a specified period of time, without failures. An SSPA mounted on the board of a satellite will have Reliability as a clear figure of merit, as repairs are not possible

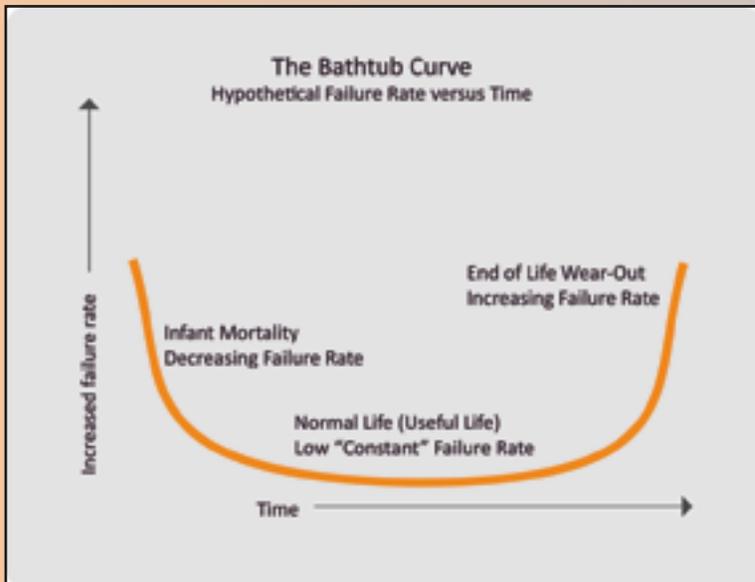
The relation between Reliability and MTBF is as indicated below:

Availability, in this context, is the degree to which the system is operational, and accessible when required for use. It is defined by the system reliability as well as the repair or recovery time when a failure occurs.

Many telecom systems have at least 10 years of expected life, but during this time they will certainly experience failures. The figure of merit in this case is how short the recovery time is. This will apply to most ground based satellite transmission systems, where time off the air is strictly related to loss of revenue.

The Availability formula is therefore a function of MTBF and MTTR (Mean Time To Repair), and it is presented below

Both equations above are based on the assumption that the components suffer constant failure rates during their operating lifetime. The figure below illustrates this concept.



The normal life, is the constant failure rate life, and it is the time when the system should operate in the field. This is where the quality issues related to manufacturing, design margins, operating factors, have leveled off, and the failures are constant. The initial high failure rate area, also called Infant Mortality, should be corrected by ample factory burn-in time.

The final stage, or the Wear-Out time, should be handled by proper proactive maintenance and spare part replacement programs.

For all new developments, in the absence of field data, the only way to predict MTBF is by mathematical statistical calculus.

There are many methods suggested, but the main ones used in the telecom industry are below:

## Telcordia, Previously Known As Bellcore

Offers calculation techniques for Telecom equipment, based on Mil-HDBK-217 standard, but with changes and updates to reflect measured field performance in the industry, as well as components improvements. The methodology is focused around Part Count Prediction, by assigning different failure rates to each electronic part, and on Part Stress Analysis, by assigning failure rates based on specific stress criteria (temperature, for example).

## MIL-HDBK-217

Used by the U.S. Military since 1965, but now considered to be obsolete. The reason is that the methodology is based on component data reliability only, which has greatly improved since the technology's inception. Today's reliability investigation will show that most of the failures were caused by process control, design, or misuse in the field. The component reliability database has not been updated, as is the case with Telcordia.

## Highly Accelerated Life Testing (HALT).

This method, combined with Telcordia predictions, has been widely used by Advantech Wireless on the new GaN-based family of SSPAs. This is a method used to increase the reliability of a product design by establishing how long it will take to reach the breakpoint of a product while exposed to a carefully controlled stress environment. That can include extreme high and low temperature cycling, high temperature and high voltage burn-in shock and vibration.

## 2. GaN R&D Reliability Program

When Advantech Wireless Inc. embarked in the early 2000's on an ambitious R&D development program of GaN based Solid State Power Amplifiers, little was known about reliability or failure modes of GaN components. The technology had been available since 1990 and was mostly used for military developments and research. The price per component was extremely high, but the technological potential was quite appealing.

In order to successfully deploy the new GaN generation of SSPAs, with an expected MTBF of minimum 10 years, concentrated research was dedicated to understanding the optimum operating points, the thermal behavior, linearity performance, efficiency, and the failure mechanisms. The prediction criteria was based on the Telcordia methodology (which is considered to be the most up to date), and on the HALT accelerated failure process. The MIL-HDBK-217 standard was avoided, as it was considered outdated.

Several electronic components and parts were ordered from various suppliers and compared in the lab. An extensive burn-in program, of over 1 Mil cumulated hours, was put in place in order to study component stability and failure modes, as per the HALT methodology. The accelerated failure program covered:

- » *High Speed Ambient Temperature cycling between -50 deg C to + 60 deg C*  
The purpose was to understand the device behavior under extreme temperature cycling, accelerate failures due to improper assembly techniques, determine the optimum heat transfer mechanism
- » *Burn-in at junction temperatures between +150 deg C to + 200 deg C*  
The purpose was to allow fast aging and early failure mechanisms due to high operating temperature points as defined by Telcore and HALT, as well as provide feedback to design engineers on aspects related to mechanical package and cooling system design
- » *Burn-in at high junction temperature and variable drain/gate voltages, no RF input*  
The devices were set in burn-in with drain voltages between +20 VDC to + 60 VDC, and gate voltages from -0.5 VDC to - 5 VDC. Junction temperature was set up to 250 deg C, and no RF input was applied.

- » *Burn-in at high junction temperature and variable drain/gate voltages, with RF input*  
The devices were set in burn-in with drain voltages between +20 VDC to +60 VDC, and gate voltages from -0.5 VDC to -5 VDC. Junction temperature was set up to 250 deg C, and the devices were driven in saturation with RF input.
- » Shock and vibration.

Power Amplifier assemblies were exposed to random vibration cycles, up to 20G high. The purpose was to define long term mechanical integrity of the devices, considering the intrinsic crystal structure.

The HALT accelerated breaking program highlighted failure mechanisms that were also reported in similar research studies including the European Space Agency, NASA (Air Force Research Laboratory), and IEEE publications.

At the start of this six year R&D program, the failure modes could be grouped in:

- » *Current Collapse*, which manifests as drain current decreases under specific temperature, drain voltage, RF drive levels. This phenomena could be reversible, as a function of drain voltage, or irreversible, when permanent damage occurred. The cause was studied in the scientific community and was associated to 'Electron Trapping' in the dielectric interface. Due to the high energy levels (high RF fields and high Drain Voltage), high energy electrons would get trapped into the dielectric, causing drain current decrease.
- » *Gate Leakage degradation mechanisms*. Under High Drain Voltage bias, and high RF drive levels, the peak voltage on the drain can get very high. That high voltage will cause quantum mechanical electron tunneling. The electric field at the gate edge will increase enough to cause current leakage, or electron trapping. This translates into a degradation of in DC current, low output RF power. This phenomena was not noticed on devices exposed only to burn-in/ No RF drive.
- » *Inverse Piezoelectric Effects*. High voltage bias on the gate edge under drain bias can generate inverse piezoelectric effects. These high electric fields can generate strain in the crystal structure of the GaN device. When a critical gate-drain voltage is reached, defects could develop in the crystal, which will lead to electron trapping and gate leakage current.

The main failure modes were analyzed and results compared with suppliers design targets and factory test results. Feedback was provided and a new set of design rules and improvement requests was put into place with a selected group of component manufacturers.

A new generation of GaN based components was manufactured and considerable improvement was achieved. By improving manufacturing processes, by use of special gate and drain layer materials, surface passivation, and others, meantime to failures values have reached by year 2010 incredible values of over 1 Million hours at 200 deg C junction temperature. These values show the remarkable increase compared to any other existing solid state technology.

As an example, GaAs based transistors will be permanently damaged at 175deg C junction temperature.

These major improvements in GaN component technology were also matched by a new generation of optimization and linearization circuitry, developed by Advantech Wireless, and introduced in all GaN based SSPAs manufactured since the initial product launch in early 2010.

Safe bias operating points were defined as per calculated temperature profiles. These allowed strict control of earlier reported current collapse, and gate leakage / inverse piezoelectric effects.

The Telcordia prediction calculations provided initial calculated MTBF numbers.

For this analysis, a 100 W Ku-band GaAs based SSPA, built by Advantech Wireless prior to 2011, was compared with a 100 W Ku-band built using recent GaN technology. The focus was concentrated on these critical areas:

- » RF Power module
- » Power supply module
- » Process control

These two modules of any SSPA (or TWT design) would be the ones generating 90 percent of the field failures. Any major reliability improve program, will therefore need to focus on improving these two building blocks.

### 3. RF Power Module Reliability

The immediate argument comes from the fact that GaN transistors can handle close to 10 times higher power density per surface area as opposed to GaAs

or other devices. That means higher power transistors can be built, while using less of them to achieve the 100w of Ku-band power.

The Telcordia prediction method is counting similar components (for example high power Ku-band transistors, capacitors, and so on) and assigns them to various groups. Each group has its own quality factor and a generic failure rate. The group failure rate is calculated by multiplying the number of components with the specific failure rate. The total failure rate is calculated by adding all group failure rates. All equations are based on field experiences of telecom equipment.

It is in this context obvious that by using less components, Reliability and MTBF will increase.



Figure 1. (Left) 50W Ku-band GaAs based SSPA (2006 generation), versus (Right) 50W Ku-band GaN SSPA (2010 generation)

It has been noted that the 100W Ku-band GaAs SSPA was using approximately 30 percent more active electronic components than the equivalent 100W Ku-band GaN based SSPA. Based on Telcordia calculations, we would expect from the beginning a similar 30 percent improvement over MTBF.

Telcordia also takes into account each component failure rate as function specific stress levels, in this case temperature. If the components are designed to handle higher temperature, the reliability is higher. As a rule of thumb, for each 10 deg C of increase in temperature, MTBF will decrease by 30 percent.

If GaN devices can handle now up to 25 deg C higher temperature with no degradation in performance, it is expected the final RF Power Amplifier MTBF to increase by at least 60 percent.

### 4. Power Supply Module

One major benefit of using GaN transistors in SSPA design is the fact they operate at higher voltages.

This has immediate impact on the power supply design. If, for example, we need to bias the 100W Ku-band GaAs SSPA at +12 VDC, we need to design a power supply able to generate 120 Amps. This is by no mean a trivial task, considering the small real estate available, the component ratings, and the limited cooling capabilities.

By comparison, the same power supply, when designed for GaN based SSPAs, will need to operate at +48 VDC, and , therefore, generate only 30 Amps. This will greatly benefit the power supply design and will have a major improvement in reliability.

The second major benefit of using GaN transistors, is the fact that they are much more efficient. As an example, a 100W Ku-band GaAs based SSPA, will consume at least 30 percent more energy than the equivalent GaN based design.

Higher efficiency, combined with low operating bias current, provide a major improvement in the overall reliability of the power supply module in GaN based SSPAs. (See Figure 2 on the next page.)

### 5. Process Control

Unfortunately, none of the reliability calculation standards take into account the manufacturing processes. All of them are based on component reliability.

This is why MIL-HDBK 217 so quickly became obsolete. The components reliability numbers that the standard was using had not been updated since 1965. Over the last 49 years, the reliability figures for the electronic components have largely improved. A look into today's failure mechanisms reveal that the most likely ones are caused by product design, process control, or human errors.

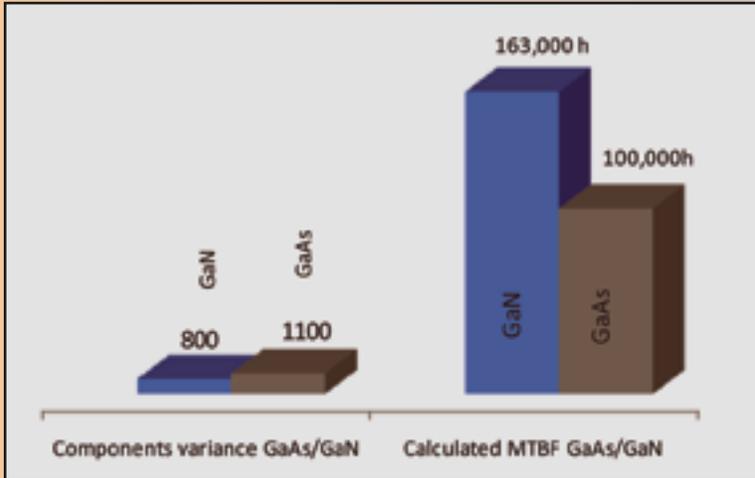


Figure 2.

100 W Ku-band component and MTBF variance GaAs (Gray) versus GaN (Blue)

This is why we believe the process control is a most important part of the design activities and any Reliability Improvement Program.

If we are looking just at the components alone, two companies building the same product, per the same bill of materials, should both have identical MTBF. This is not the case most of the time.

We have all witnessed, so many times, great products with perfect reliability and quality falling apart when production is relocated. What is changing in most of these cases are the manufacturing processes, while the bill of materials remains the same.

At Advantech Wireless, process control is part of all design objectives. Identifying the design limits and risks requires extensive product aging through combinations of stress factors. This is always required in order to move the product life out of infant mortality range.

For the GaN product line, several key process controls can be identified below:

- » 96 hours burn-in on all active devices at specific high temperature and voltage settings
- » 96 hours burn-in on power supply at specific high temperature and current ratings
- » 24 hours temperature cycling on all printed circuit boards
- » Unique proprietary techniques in assembling the GaN components, which allows much better heat dissipation.
- » 24 hours environmental testing of the final product, in thermal chamber, from extreme cold to high temperature
- » 96 hours additional active burn-in for final product at high temperature

These severe (and expensive) aging and screening processes provide an overall remarkable increase in real-life, field measured, MTBF.

For the purpose of this calculus, a population of 500 units deployed in the field were analyzed over the last four years.

A 3.8 percent failure rate per year was identified and recorded.

Considering the MTBF as the inverse of the failure rate, the field MTBF number for this sample population was:

$$\text{Field MTBF} = 1/0.038 = 26.3 \text{ years} = 230,388 \text{ hours}$$

**Conclusion**

By controlling all failure mechanisms, by working closely with strategic GaN components manufacturers, and by achieving deep levels of understanding of GaN internal physics, Advantech Wireless engineers have developed a new generation of SSPAs with unmatched electrical performance and high reliability.

Statistical reliability calculation based on existing standards have shown for the GaN-based SSPA a remarkable 65 percent increase in MTBF as compared to the similar GaAs based SSPA product. These calculations are in line with expectations, based on components reliability, number of components used, and electrical efficiency.

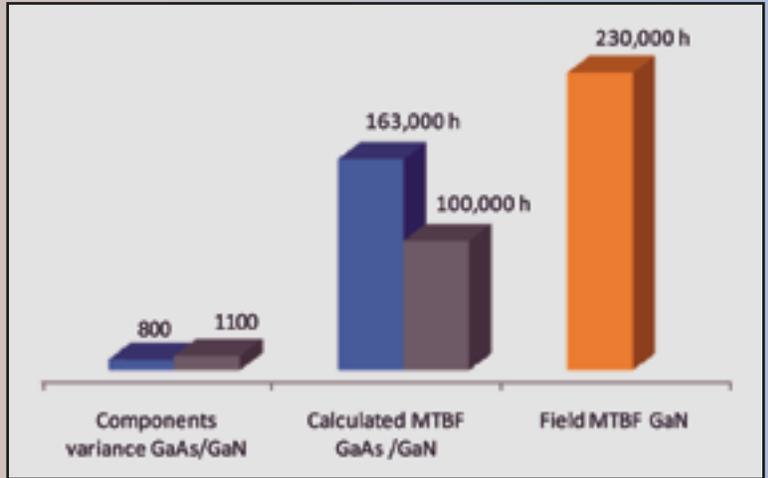


Figure 3.

100W Ku-band GaAs versus GaN, MTBF, field MTBF

When combined with strictly controlled manufacturing processes, tailored on the specific failure mechanisms identified on GaN devices, the field MTBF is even higher, exceeding an impressive 130 percent improvement over the equivalent GaAs based product. With the new SapphireBlu™ Series of high power SSPAs now able to reach up to 6 KW in RF power, the Advantech Wireless line of GaN based SSPAs is well positioned to meet the most stringent environmental and the most demanding work conditions.

To learn more about Advantech Wireless, please go to <http://www.advantechwireless.com/>

**About the author**

Cristi Damian is the Vice President, Business Development, at Advantech Wireless. He joined Advantech Wireless in 1995 where he held various leading positions in Operations, Manufacturing, Sales, Engineering and Customer Support. Prior to Advantech Wireless, he acquired experience as a hardware engineer in various high-tech companies. Mr. Damian holds a Master's degree in Electrical Engineering from Concordia University.



Advantech Wireless' 3kW Ku-band system GaN-Based SapphireBlu Series



# Growth In Small Satellites Raises Questions Regarding Smallsat Fleets

By Victor Gardner, Small Satellite Project Manager, Kratos Defense & Security Solutions

**S**mall satellites (smallsats) offer a unique combination of scaled down size, costs, and time to deploy. But what of the other components that make up the smallsat mission? Can command control (and ground segment management) be delivered with the same cost advantages that make smallsats so attractive in the first place, without compromised functionality?

Some of the most exciting and creative efforts in the space industry are coming from the burgeoning area of small satellites. Categorized as micro-satellites (micros), nanosatellites (nanos), CubeSats—even “phonesats” that can be little more than a guided cell phone launched into space—smallsats are inspiring big changes in the way we think about the affordability of space and communications missions. More than just the on orbit hardware, smallsat manufacturing and launch costs are orders of magnitude lower than traditional satellites and they are reinventing the scale, economics, schedules, and business cases underlying satellite missions.

However, if smallsats allow such scaled-down cost efficiencies, they also demand a scaling up in numbers. For many of the applications envisioned—and the financial returns required by the entrepreneurs and VCs behind them—a single smallsat probably isn’t a viable model. One smallsat simply cannot deliver the communications, remote sensing, and weather data that a fleet of smallsats could well distribute.

For a traditional Low Earth Orbit (LEO) mission, using a fleet of smallsats for remote sensing increases the revisit rate over a specific area of the Earth—the more smallsats in the fleet, the quicker the target area is imaged and the more timely is the data.

Likewise, the same approach can be taken for high resolution weather data. Again, the bigger the fleet of smallsats, the more timely the data. For communications, a fleet of smallsats can be used to provide coverage over Polar Regions and disadvantaged areas, such as mountainous terrain or cities.

## 1-To-1 Versus 1-To-Many

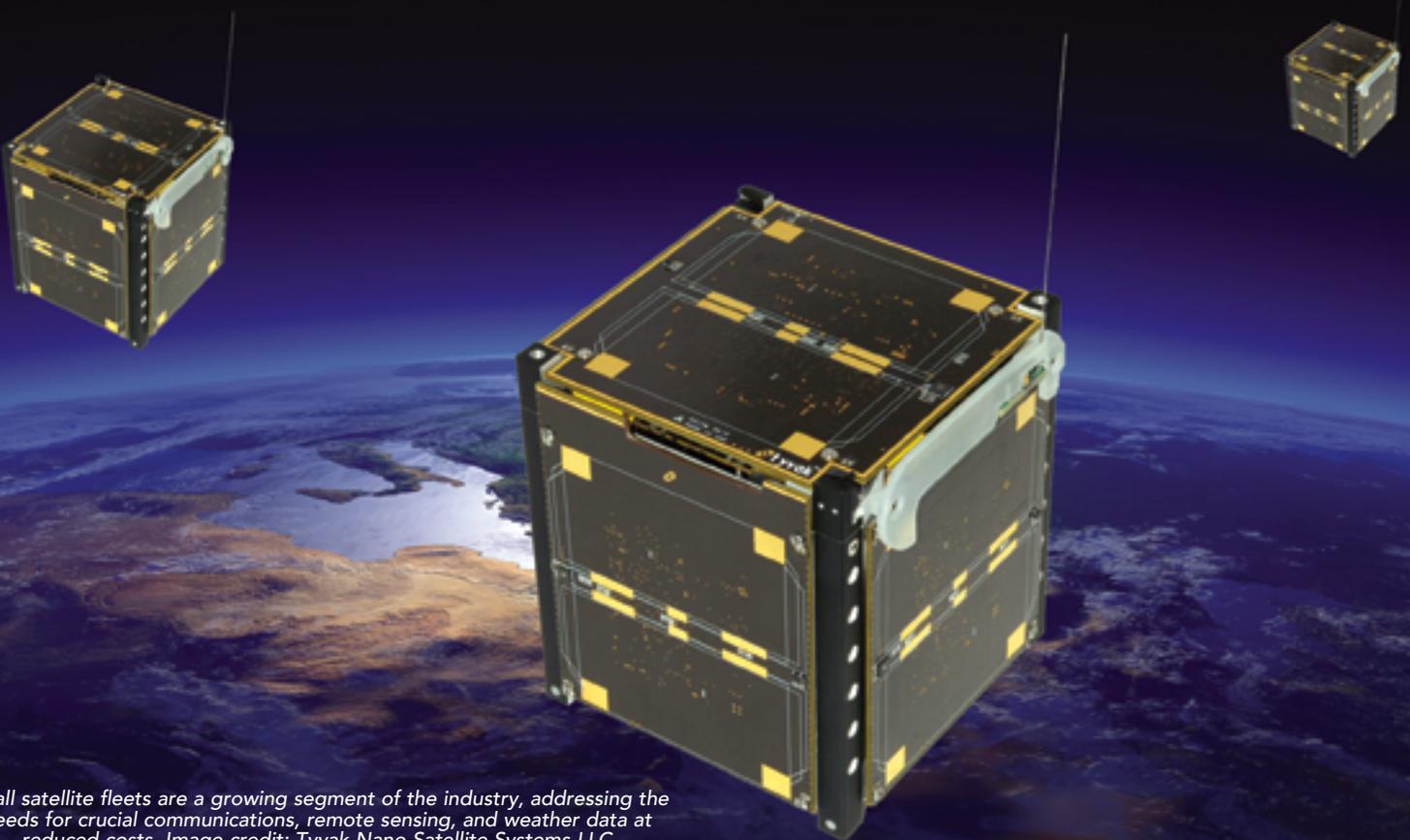
Many of the innovative smallsats garnering attention have relied on homegrown command and control systems. However, as smallsats gain popularity and new applications are envisioned, additional missions are being planned that involve larger fleets.

Planet Labs, Skybox Imaging, and Nanosatifi have all announced plans to launch smallsat fleets for commercially available imagery and weather data, with all three companies already having placed smallsats on orbit. Planet Labs even had 28 CubeSats on the International Space Station that were launched earlier this year to complete their fleet. Additionally, NASA, DARPA, and SMDC are just a few of the U.S. Government agencies who have plans for smallsat fleets, with NASA planning the launch of its Edison Demonstration of Smallsat Networks (EDSN) fleet of eight CubeSats.

With the number of smallsats scaling up, so does mission complexity. From a C2 perspective, smallsats start to resemble their larger cousins when it comes to functionality and reliability. They require ground architectures that can support the centralized management of multiple smallsats.

Planning and executing contracts for an individual smallsat is one thing, but when a fleet grows to 8, 12, or even 24 satellites in number, the scheduling and coordination of resources used by each smallsat is not a trivial task. This applies to activities and tasks to be performed by each smallsat payload as well as the coordination of ground antennas and equipment used by each smallsat.

A fleet of 24 CubeSats sharing five ground antennas, for example, requires a significant amount of coordination among the fleet to deconflict use of each antenna. This deconfliction as well as additional functionality, such as prioritization and constraint checking, should be provided by a central scheduler, enabling “hands-off” scheduling of activities after the initial setup and definitions. If the



Small satellite fleets are a growing segment of the industry, addressing the needs for crucial communications, remote sensing, and weather data at reduced costs. Image credit: Tyvak Nano-Satellite Systems LLC

mission demands smooth, continuous operations, expect the smallsat ground architecture to accommodate a contact scheduling capability so you can minimize any risk of violating operational and ground system constraints.

### Automation

Whether multiple operators are needed, or if just a single individual can handle the job, is often a matter that is determined by automation. No slight to us humans, but the more personnel and manual intervention required to operate the system, the greater the potential for risk and errors.

When contact activities can be planned ahead of time and then executed autonomously throughout the day, the ground system can greatly streamline fleet-wide operations. For example, during the contact scheduling process, the scheduler (whether human or software-based) must identify tasks for each smallsat and assign the associated procedures for each. Automation can execute each real-time contact, alerting operators only if there is a problem, freeing them up to spend time on valuable activities such as data collection (which is the purpose of the fleet, after all).

Akin to having too many cooks in the kitchen, automating contacts across the constellation can reduce or eliminate the errors that occur with (too many) humans in the loop. And automation across a fleet is more complex than it is for a single satellite.

### Constellation Awareness

Do you prefer one screen showing ten feeds, or ten screens showing one each? The answer is obvious, but this illustrates why situational or constellation awareness is important when managing the fleet. As ground equipment status and telemetry arrives in real-time, this data should be displayed to provide a common operating picture. This increases efficiency by limiting the manning required of a smallsat ground system and maintaining a reduced operational footprint.

An operator using a single Graphical User Interface (GUI) to view real-time constellation status, telemetry, and commanding, can make (or avoid) decisions

that have a ripple effect across the fleet. Aggregating that data into a single view also makes it easy to quickly drill down from a top-level common operating picture to more detailed information screens when needed. Even better, if the user interface is available through a web browser, geographically dispersed teams can operate from the same playbook at the same time.

### Scalability

Hopefully, the smallsat data will prove itself to be so valuable that more smallsats will be launched and added to the fleet. In that case, will the ground architecture accommodate the addition of the new satellites? Or, will it potentially disrupt operations or require significant software development or upgrades?

A ground system that can scale and grow along with the fleet growth—even with different smallsats—will eliminate separately stovepiped fleet management operations, which is the antithesis of having a common operational picture (see above). Using modular plug-and-play appliances for each smallsat or block of smallsats, and connecting such appliance to a common management hub, is one way of allowing this scalability.

Another method is to simply add a new, unique identifier into the ground system architecture and the reuse common telemetry screens, command procedures, and space vehicle databases from smallsats that are already present in the constellation. Or, a combination of the two may be the best answer. In each scenario, efficiency is achieved with commonality, and if each smallsat looks and behaves like the next, some of the complexity in managing a constellation of unique space vehicles is reduced.

### Venture Capitalization Assistance

These requisites are common to the smallsat community as well as to their larger cousins. Let's not forget that one of the most important considerations when it comes to the benefit of smallsats is that the build will not break the bank. If one of the biggest motives of smallsats is the dramatically lower costs to build and launch them, then the ground system itself shouldn't be disproportionately expensive. The system should be just as cost effective so that you can capitalize on these profitable ventures.

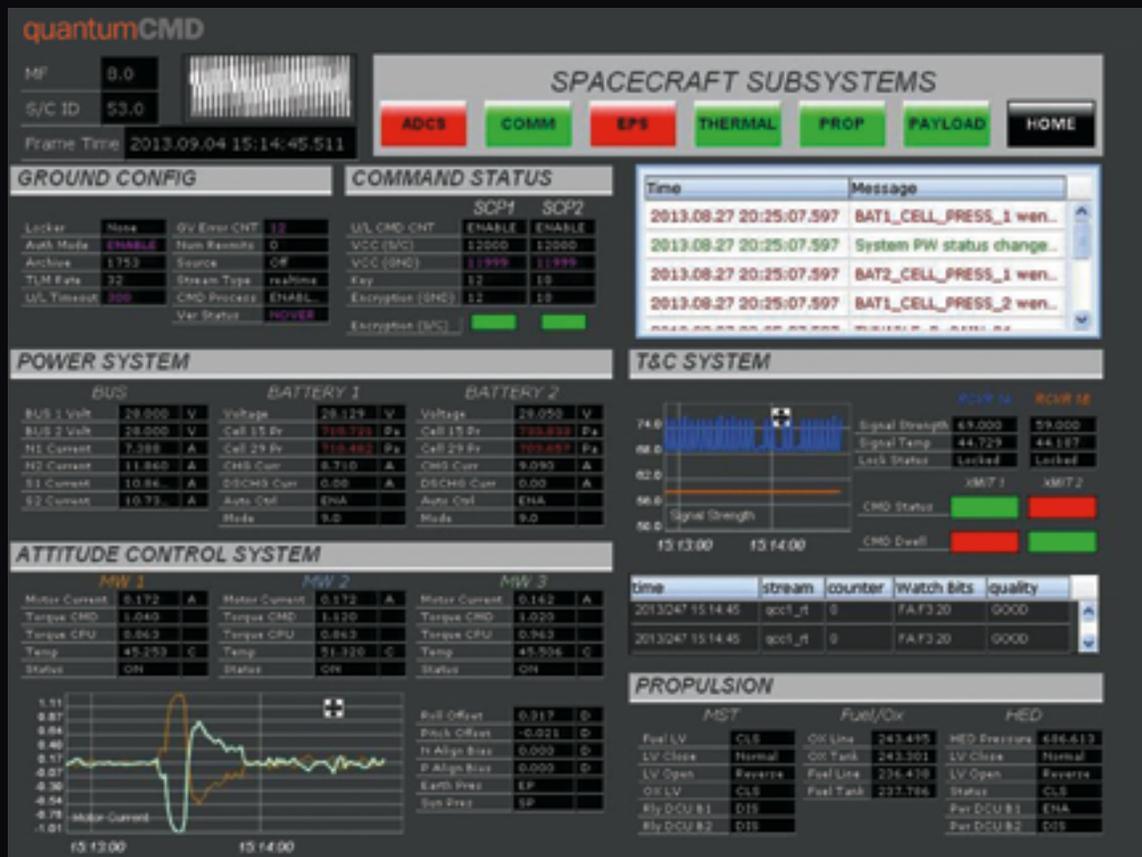
That said, going 'cheap' and cutting corners isn't a winning strategy in itself, not when you consider how much is at stake, whether the expenditure is for a

fleet or a single CubeSat. Instead, lowering the upfront and the total cost of ownership of smallsat fleet C2 systems through the use of automation and consolidated constellation awareness provides a starting point for cost objectives to be met.

For more information please visit <http://www.KratosDefense.com/quantumCMD>

**About the author**  
Victor Gardner is the Small Satellite Project Manager for Kratos Defense & Security Solutions, a division of Kratos Defense.

The author may be contacted at [victor.gardner@kratosdefense.com](mailto:victor.gardner@kratosdefense.com).



Data-rich dashboards give users spacecraft and ground status, with drill-down ability into each subsystem and ground component for further fidelity, whether for a single smallsat or entire fleet control.

# A Closer Look @ Targeting Smallsat C2

Most notably through its EPOCH IPS® fleet management system, Kratos has been the leading figure in satellite command and control (C2) for more than 20 years.

Smallsatellites have been around for about as long, but their recent explosive growth led the company's engineers to take a hard look at what makes smallsat C2 different. It turned out that many of the answers lay less with the satellites themselves than with the business of the missions—specifically the need for a lower cost, accessible, pre-integrated solution that could support the budgets, schedules and team structures that separate smallsat missions from the larger versions.

Newly released, quantumCMD™ is the first commercial-off-the-shelf C2 product targeting smallsats and fleets of smallsats. Central among the engineers' goals was designing a solution that would deliver the robust functionality, reliability and security expected in traditional missions, packaged to fit smallsatellite budgets.

## Reducing Customizations... and Customization Costs

The scope and complexity of traditional satellite missions makes integration and unique mission customizations essential to their success, but they are also key cost drivers. quantumCMD relies upon industry standards such as XML Telemetry and Command Exchange (XTCE) to streamline integration, reduce cost and dramatically shrink the time to operation of a full-fledged C2 system.

A standardized command and telemetry database ingest format increases the efficiency of system set up, as well as consolidating the ingest of ground equipment variables and directives. In addition, standardized ground equipment interfaces allow quantumCMD to operate "plug-and-play" with the rest of the ground system, with set up reduced to a few steps.

## Total Turnkey Operations

quantumCMD is a self-contained, portable appliance architected to address the core command, telemetry, trending and ground monitoring and control (M&C) needs common to most of today's smallsat missions. A built in web server supports the HTML5 web interface for users to share a common operational picture across networks. There is no client software to install or maintain, and drag-and-drop features allows non-programmers to create custom dashboards that include graphs, charts, widgets, and video feeds.

## Full Automation + Fleet Support Capabilities

As smallsat missions are covered by different, often dynamic CONOPS, quantumCMD supplies a wide range of automation capabilities to support scenarios ranging from full manual operations up to total "lights out" missions. Simplified scripting allows users with no programming experience to automate functions such as system pre- and post-contact ground system configuration, telemetry measure and checks, sending commands and ground equipment directives. As missions grow, quantumCMD is scalable to support simple or complex scenarios, from a single CubeSat to full fleet.

For more information on solutions that deliver the functionality and reliability expected in traditional missions, designed and packaged for smallsat operations and budgets, visit: [www.KratosDefense.com/quantumCMD](http://www.KratosDefense.com/quantumCMD)



## Everything Needed, All In One Box

quantumCMD is a self-contained, pre-integrated, portable appliance designed from the bottom up to meet the specific technical, mission, schedule and budget of small satellite operations. Architected to support the core command, telemetry, trending and ground M&C needs common to small sat missions, out of the box functionality includes:

- Frame or Packet Decommuration
- Point Context Check
- Engineering Unit Conversion
- Measurand Limit Check and Alarming
- Point and Track File Generation
- Ground Device Monitor and Control
- Command Generation
- Command Formatting
- Command Authority Check
- Transmission & Tracking
- Verification
- Logging & Messaging
- Procedure Scripting
- Display Building
- Real-Time User Interface
- Ops Automation
- Plotting and Trending
- Raw Telemetry and Processed File Retrieval
- Mission Data File Generation

These match the requirements of most small sat missions, and quantumCMD can also serve as the core of a more complex system for advanced mission C2 needs.



# Dubai's CABSAT Turns 20

By Andrew Pert, Show Director, CABSAT

**A**s the leading professional content management event in the Middle East, Africa and South Asia (MEASA), CABSAT has well-established roots as a conduit for facilitating and sustaining the industry's regional growth.

With profit revenues from mobile penetration rates among the world's highest, the rapidly increasing deployment of satellites, plus the tremendous growth of Free-to-Air (FTA) TV channels and huge investments in locally-produced media content, MEASA is viewed as a major growth territory for international production houses.

For two decades, CABSAT has opened a door for international players to access the region. The event has provided global heavyweights with a dedicated platform to drive technical innovations and explore business opportunities in a regional media and broadcasting market projected to be worth more than US \$ 2 billion by 2015, according to the International Association of Broadcast Manufacturers (IABM).

As our landmark 20th showcase prepares to roll-out at Dubai World Trade Centre from March 11th to the 13th, we've upped our own ante and inked a strategic alliance with the USA's National Association of Broadcasters Show (NAB Show). The accord will see the world's two biggest industry show brands in their field collaborate on a world-class content creation, management and delivery conference program titled: 'Transforming Broadcasting in the Always Connected Digital World'.

The program will cover the latest trends, technologies and innovations in the global broadcasting and media market and we're particularly excited about leveraging NAB Show's unparalleled State-side network of industry-shapers, which helps deliver everyone at the show the age-old adage of the exhibitions industry: Bang for buck.

The two-day conference agenda will focus primarily on practical opportunities and next generation technology advances in an industry where leading international broadcasters and content providers are seeking customized solutions to capture—and subsequently monetize—global audiences which are 'plugged in' to an increasingly diverse array of connected digital devices and smart phones.

In all, we're looking at 20 hours of rich conference content—from daily keynote speeches, state-of-the-art industry reports and technical programs, to panel discussions focusing on the latest trends and developments shaping global and regional markets.

We're anticipating more than 200 professionals and decision-makers representing the MENA region's leading content creators, managers and distributors of entertainment and news content will convene for the conference. Why? Simple: The industry is facing up to a global transition to digital broadcasting and striving to leverage developments affecting every aspect of the digital media and entertainment landscapes.



*The Dubai, UAE, skyline at night.*





The CABSAT 2013 show floor. Photo courtesy of DWTC.

The challenge, as said previously, is creating potential avenues to monetize multi-platform services. Our 16 keynote and interactive sessions will be led by global and regional experts who are armed with solutions and answers on how to implement and drive forward winning multi-platform, multi-screen digital entertainment and news content strategies. Attendees will learn from global and regional operators on how to best deliver immersive IPTV, video, mobile, online and interactive entertainment experiences that accelerate the adoption of new media platforms across Middle East, Africa and South East Asia.

Headline topics will include: 'Challenge & Opportunities with New Media,' 'Taking on the 4K Challenge,' 'The Convergence of Telecommunications and Entertainment,' 'Impact of Multiplatform Content Delivery in Live Sports Production,' 'Data Storage and Analytics,' 'Maximizing Your Viewership and Commercial Return With Video,' and 'Shifting Revenue in a Big Data World.'

Some of the biggest names in the business are taking part, including Sam Nicholson, CEO, Stargate Studios—the keynote speaker on day two—and a top-tier line-up of influential international industry figureheads including Sanjay Raina, General Manager, FOX International Channels; Carlos Salim Tibi, Founder & CEO, ICFLIX; Raffaele Anecchino, Executive VP for VIACOM International; Cliff Nelson, CEO, My-HD; Chris O'Hearn, General Manager, Emirates Media Measurement Company; David Butorac, CEO, OSN; David Hanson, Director of Digital, OSN; Nick Grande, Managing Director, Channel Sculptor; Dennis Lehtinen, Head of Pay TV, Abu Dhabi Media; Atul Phadnis, CEO, WhatsOn Group; Sumo Dutta, Country Head - Middle East, Africa & Pakistan, STAR Group; Jeff Youssef, Associate Partner, Oliver Wyman & Representative from Dubai Film and TV Commission; Paul Baker, Executive Director, Intaj twofour54; Mark Sanger, editor of the Oscar-nominated Hollywood hit, Gravity, discussing post-production techniques with Avid; Michele Munson, CEO Aspera presenting a special case study on Netflix, and additional representatives from Pksel, Google, VIACOM, the UK's Channel 4, Grass Valley, CNBC and other leading regional and International broadcasters.

Paying conference delegates will also exclusively receive a "State of the Industry Report" delivered by the conference's official Knowledge Partner, Frost & Sullivan, a document which will give great insights into the region's burgeoning 'TV-Everywhere' market.



The CABSAT show floor. Photo courtesy of DWTC.



Ultimately, we believe the partnership with NAB Show brings us tremendous value. Vivality, it also dually achieves and enhances CABSAT's wider modus operandi: To provide context for major international content management providers who are eyeing opportunities to accelerate the future development of MEASA's content management markets, and to deliver the greatest return on investment for our global exhibiting communities by increasing their engagement with MEASA's major industry players. It makes sense and we can't wait to get started.

Elsewhere, the CABSAT GFV Summit will focus on a key issue facing the Middle Eastern and North African satellite communications and broadcasting environment—interference.

A subject of growing concern to the satellite industry and its customers worldwide, interference is an ever increasing problem across the MENA region. The satellite industry, together with its customers, as well as global and international agencies, is exploring creative collaborations to address challenges and identify and develop solutions.

The two-day Summit will feature sessions examining the current state-of-play with a comprehensive profile of identified problems, evaluating potential solutions and setting-out a blue-print for where we go next in the MENA region and around the world to defeat interference.

The satellite side of the show continues to be a strong performer and we've secured a stellar line-up of world-class regional and international exhibitors for this year: Al Yahsat, Arabsat, Es'hailsat, Eutelsat, Gulfsat, HarrisCaprock, Intelsat, O3b, Noorsat, and SES.

CABSAT will also feature a range of additional new features, technology demonstrations, knowledge exchange platforms and themed exhibiting zones—such as the Content Delivery Hub and the Content & Studio Hub—in 2014.

With 20 of the region's most innovative providers exhibiting from turnkey pods, the Content Delivery Hub is a big draw for us this year. The area will feature an open-air presentation theatre for live demonstrations that will examine Over The Top (OTT) technologies. This is a hot topic and CABSAT, once again, is leading the regional discussion and pushing the global envelope.

Additionally, the Content and Studio Hub—providing live-feeds, alerts, blogs, social media updates and onsite interviews—will be streamed throughout the show via CABSAT TV.

The successful CABSAT Global Meetings Program, sponsored by O3b, is an exclusive platform for exhibitors and pre-registered visitors and has returned to this year's event. The program, which includes access to an online matchmaking tool, personal assistance from CABSAT's in-house business team, and three pre-scheduled meetings with potential partners, puts show attendees right in front of a targeted, senior community of MEASA's leading content management buyers, partners and suppliers. This program is a proven success and offers tremendous insights into revenue generation.

There's also a new networking concept this year called CABSAT Connect. This invitation-only event will occur at one of Dubai's most famous hotels—the Jumeirah Beach Hotel—and will witness 400 industry decision-makers at C-Level and Director Level discussing industry news against the iconic backdrop of the opulent Burj Al Arab.

In all, CABSAT 2014 is expecting to welcome visitors from 110 countries, with more than 900 exhibitors in attendance, for three days of what promises to be the greatest CABSAT outing to date. We believe we have all aspects of the broader media and satellite spheres covered including dedicated exhibitors representing numerous market segments: Acquisition & Production; Pro / Broadcast Audio; Management Systems; Post-Production; Content and Communication; Distribution and Delivery; Satellite and Communications and, all-new—Connected Devices.

For more information, or to register for CABSAT 2014, visit <http://www.cabsat.com/Content/CABSAT-Registration>



# Why VSAT Auto-Commissioning Systems Are Needed

By Alvaro Sanchez, Sales + Marketing Manager, Integrasys



**T**oday, more than one million households access the Internet via broadband satellite. A new satellite generation with 10 times more capacity will catch three million users in the coming years.

This is the situation in the United States and similar conditions are resident in other regions of the world such as South America and Central Africa. This technology represents a revolution similar to that of the satellite TV Direct-To-Home (DTH) reach in the 90s. This implies a massive deployment scenario with no precedents as to the challenging economic and technical issues that must be confronted. Integrasys has developed the appropriate tool that helps to make this technical breakthrough possible.

## Traditional VSAT Installation Methods

VSAT terminal installation can be a time consuming procedure. One must align the antenna, adjust the feed's polarization and set the modem transmit power, among other procedures. Often, the installer is dependent on Network Operations Center (NOC) operations' staff that use NOC instruments to remotely drive installer's line-up actions via a phone conversation. The nature of this procedure, with no possibility for the installer to check the uplink signal status in real time after the install, makes it nearly impossible to achieve optimal performance and minimize interference.

## The Satmotion Pocket Line-Up method

The Satmotion system is a software-based tool that allows VSAT installers to autonomously visualize and measure their uplink test signal—normally a clean carrier—in the field with no need to coordinate with NOC personnel. Uplink signal measurements are taken at the NOC site with a commodity spectrum analyzer and a controlling software server. The installer gets measurements from the outbound of the target satellite through the same VSAT that is commissioned.

The received information is displayed on a software client using a computer device of the installer's choice, such as a laptop, tablet or Smartphone. High-rate traces of different flavors of the uplinked signal as received at the NOC (nominal, cross-polar, adjacent satellite interference) are sent back to the installer in order for fine alignment of the antenna/feed orientation to be completed. Additionally, the transmit power setting can be programmed without a NOC's support, thereby achieving the VSAT optimal performance.

This system is based on a Carrier Monitoring System, which allows the reception of the hub's spectrum analyzer measurements in the field without a cellphone connection, just with a satellite link. This capability allows for a full auto-commissioning process without calling to the NOC for support; all the measurements and preventions of any interference are automatically controlled by the hub operations.

Satellite network operators struggle to serve the increasing bandwidth demand with VSAT installers carrying professional instrumentation equipment to the customer sites, while supported by staff at the NOC. In these situations, the alignment of a small dish with the satellite, usually in challenging locations and in adverse weather conditions, can be time-intensive and expensive.

The Satmotion system automates control center support and allows the satellite connection to be established with a Smartphone app or computer software at the customer's site. This auto-commissioning system is reliable, easy-to-use and opens the door for accurate installation by the end customer.

With this unique system, the installer has a ground reference for the initial pointing, maps of the location with target elevation and azimuth information, and a line to the satellite. When the antenna is pointed correctly, the modem provides the Signal to Noise (SNR) value, reading from the downstream carrier, ensuring the installer has pointed the antenna to the correct satellite.

The app displays the measurements performed at the hub to enable the installer to transmit a clean carrier (CW), measuring the power and interference generated by the VSAT in real time. In order to minimize the Cross-Pol and Adjacent Satellite Interference, it rotates the orthomode and moves the antenna. When these interferences are minimized, the app measures the BUC compression point. As a final step, all installations are followed with a log file containing all of the recorded values during the process for power, XPOL, ASI, and many more.

## The Benefits

- No more calls to the NOC
- No more Cross Pol (XPOL) interference
- Minimizing Adjacent Satellite Interference (ASI)
- Reduces human factor errors
- Most accurate measurements available in the field
- No more telephone connections required



- No more expensive Spectrum Analyzer in the field required
- Allows for simultaneous installers in different locations
- Maximum CW carrier power, automatic BUC compression point calculation
- Frequency fixed by the hub
- App control
- Optimal performance



Field VSAT installer using Satmotion Pocket app.  
Photo courtesy of Integrasys.

### Cost Efficiency

Auto-commissioning systems significantly reduce the installation costs. Integrasys completed a study which explains how—for 5,000 VSAT deployments during one year—Satmotion Pocket reduced the cost by 2.8 million euros in the developed countries and 3.2 million euros in developing countries, based on a PWC study for the European Space Agency (ESA). These savings define this system as an economical remote commissioning method.

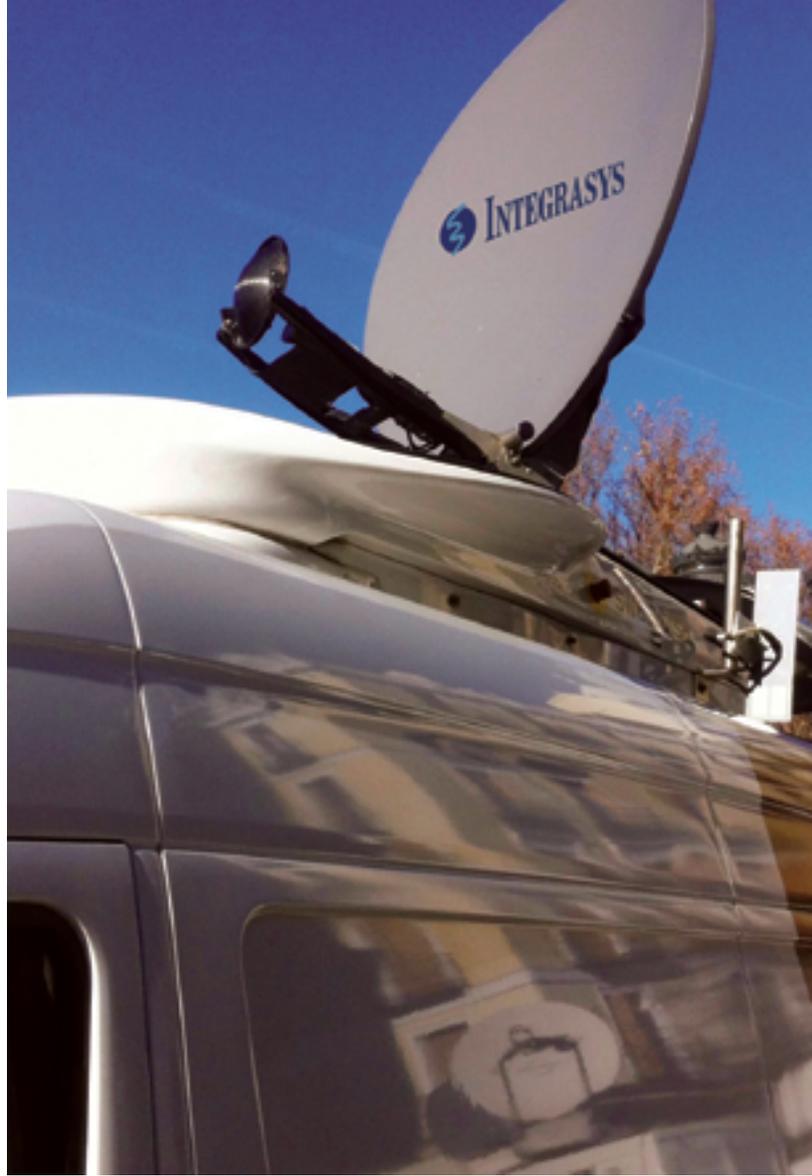
### Simplifying Broadcaster Lineups

With large-scale televised sporting events, the satellite industry is confronted with the issue of millions of antenna line ups per day; this can require additional man hours and cause confusion with the line up demand. Integrasys developed Satmotion SNG that simplifies these line ups and provides the broadcaster with the hub measurements in order to speed up this process.

This system provides the most accurate co pol, cross pol, and ASI information in real time directly to the broadcaster's Smartphone, on the specific booking frequency assigned by the Satellite Operator, measured at the NOC and sent by cellphone connection.



Satmotion app with maps on a Samsung cell phone.



This app allows the broadcaster to call and talk at the same time, so it could be used for auto-commissioning or to help the broadcaster minimize interference. The technology can also reduce the line up booking bottlenecks at the NOC, minimizing the time on each call.

### Who Uses Auto-Commissioning Systems

Satmotion Pocket is used by satellite operator NOCs, satellite service providers and VSAT equipment manufacturers with huge success.

One example is iDirect, a world leader in Satellite IP communications. This software and hardware equipment manufacturer has been testing Satmotion Pocket since early 2013. With iDirect remotes now compatible with Satmotion Pocket, iDirect customers are able to automate the remote commissioning process with the most powerful VSAT line up technology and ensure accuracy. It also minimizes cross pol (XPOL) and Adjacent Satellite Interference (ASI) increasing bandwidth efficiency and savings maintenance costs.

The following organizations have been also an important contributor to this advance technology success: Global VSAT Forum (GVF), satellite Interference Reduction Group (IRG) and the World Teleport Association (WTA).

For additional information, please visit the company's infosite at <http://www.integrasys-sa.com/>

### About the author

Alvaro Sanchez is the Sales and Marketing Manager at Integrasys, responsible for the International sales in the Integrasys worldwide market and US office. Alvaro is also responsible of the Satellite Product Line.

# Executive Spotlight

## Jim Clarke, Head of Global Wholesale, Telstra Global



**J**im Clarke is Head of Global Wholesale for Telstra Global, based in Hong Kong. With over 15 years of experience in the telecommunications industry, he is responsible for driving sales strategy and business development for Telstra Global's carrier wholesale team, across Asia, EMEA, Americas and Australia.

Prior to joining Telstra Global, Jim was the Sales Director for Global Sales in Telstra Wholesale, a role he held for four years. In that position, Jim was successful in expanding the business relationships of existing customers, moving into new territories, as well as bringing in new business to Telstra Wholesale.

Before joining Telstra Wholesale, Jim spent four years at WorldCom International, based in London, where he managed the international wholesale pricing team for WorldCom's EMEA business.

### SatMagazine (SM)

*Mr. Clarke, would you please tell our readers how you came to be interested in the satellite industry? What, in your background, prepared you for your company responsibilities at Telstra Global?*

#### Jim Clarke

Working for more than 15 years in the telecommunications industry has given me the opportunity to work on a wide range of areas, including satellite. Previously I worked in Telstra Wholesale where I was the Sales Director for Global Sales. In that position, I was successful in expanding business relationships with existing customers, moving into new territories, as well as bringing in new business to Telstra Wholesale. This type of work allowed me to learn the ins-and-outs of the telecommunications industry.

#### SM

*What is most important for a global SATCOM audience to consider as it relates to Telstra Global?*

#### Jim Clarke

Above all, the most important thing to consider is reliable communications, whether you are enterprise or wholesale. Telstra Global serves both wholesale (carriers, VSAT Service providers, Satellite Operators, ISPs) as well as Enterprises customers (for both Data and media applications).

Many of our enterprise customers are oil and gas, banking and government organizations, where communication is crucial. As for wholesale, our customers require reliable communications in a variety of industries, including aero, maritime and government applications. Telstra Global is able to provide all customers with dependable service by using three strategically positioned and world-class teleports.

#### SM

*Where do you see SATCOM heading? Specifically, the market segment that you address?*

#### Jim Clarke

Contrary to many beliefs, the SATCOM industry has been growing at a rapid rate, in some cases, even faster than terrestrial communications. There is constant change in technology and customer expectations and as a result the SATCOM industry continues to evolve. We will continue to see this in the next 10 years. In our experience, we have seen high growth in VSAT mobility in land, air and sea applications. There is also huge growth in media and as I mentioned, technology is always changing. For example, we are starting to see a demand for higher resolution, more specifically Ultra HDTV and 4k. We are seeing growth in Ka band application, consumer broadband, as well as in the carrier grade IPT market. SATCOM is growing as a whole and we have already seen about an 8-9 percent increase.

#### SM

*What can we expect from your company in the next four quarters?*

#### Jim Clarke

Recently, Telstra has deployed a new state of the art DTH platform as well as new MCR in Hong Kong to serve both full-time and occasional sue market. Both of these have already shown promise and will continue to grow. There is a lot planned for 2014. To start, we are increasing our media activities significantly with a combination of vast satellite as well as a global terrestrial infrastructure. We will also be launching new products and services for a variety of our customers, so be on the lookout. Overall, we are focused on expansion and will follow our customers wherever they might need service, thus extending our capabilities and coverage.

#### SM

*How did you become interested in the communications industry?*

#### Jim Clarke

I spent four years at WorldCom International, based in London, where I managed the international wholesale pricing team for WorldCom's EMEA business. From there, I pursued sales and went on to work as Sales Director for Global Sales in Telstra Wholesale for another four years. Since then, I have been working as Head of Global Wholesale for Telstra Global.

#### SM

*What sort of training should students be taking to prepare themselves for careers in this environment?*

#### Jim Clarke

The industry is multifaceted and there are endless opportunities for students. In my opinion, sales, customer service, and engineering jobs serve as great experience for this work environment. Within the engineering path are various options from solution design, to core engineering, to field engineering. The telecommunications industry has so many aspects to it, many of which are expanding or changing. Training is always available in one-way or another; it is simply up to students to take advantage of the opportunities out there.

For information regarding Telstra Global, access <http://www.telstraglobal.com/>



# Telstra Global Is Up For The “Challenge” + Signs On With An MoU

**T**elstra Global has been positioned by Gartner, Inc., as a Challenger in this year’s Magic Quadrant for Cloud-Enabled Managed Hosting, Asia/Pacific<sup>1</sup>.

The Gartner assessment, performed by the firm’s IT industry experts, evaluates providers on the completeness of their vision and their ability to execute. The aim of this Magic Quadrant is to help enterprises migrating to cloud-enabled hosting services by establishing which providers are best placed to serve the needs of Asia/Pacific’s broad market.

“Our Cloud Infrastructure provides customers with best-of-breed, end-to-end solutions that enable global businesses to consistently deploy applications across multiple locations to support transformation, productivity and growth,” said Telstra Global’s Head of Network Application and Services Portfolio, Martin Bishop. “We believe being named in the Challengers quadrant validates the capabilities and flexibility of our Cloud Infrastructure and confirms our commitment to putting customers at the center of everything we do.

“We look forward to the year ahead as we continue to innovate and execute on our product roadmap. Our goal is to further enhance our market position in the cloud-enabled managed hosting space, providing flexible and agile solutions for business expansion across Asia,” Martin said. To view the full report, visit: <http://bit.ly/asiacloudmagicquadrant>

**A**dditionally, Telstra and Telkom Indonesia signed a non binding Memorandum of Understanding (MoU) to form a new joint venture to provide network services in South East Asia.

Telstra’s Group Executive, Global Enterprise and Services, Brendon Riley, said the proposal would accelerate Telstra’s growth in Indonesia, South East Asia’s largest economy, and more broadly across the region.

Under the terms of the MoU, the proposed joint venture will be the exclusive provider of Network Applications and Services (NAS) in Indonesia for Telstra and Telkom Indonesia giving both companies the opportunity to build market share in the fast growing NAS market in the region. Mr. Riley said the proposed joint venture will leverage the strengths of both companies creating a new business to serve the Indonesian enterprise services market and build new capabilities for the market that do not exist today.

“Our plan is to provide enhanced consistency of services for companies connecting with Indonesia and operating in the region,” Mr. Riley said. “We are looking forward to partnering with Telkom Indonesia, a well respected market leader which has a large enterprise and government customer base and the broadest reach of domestic connectivity in Indonesia.

“Indonesia is a fast growing NAS market and we believe the best way to make in-roads is by partnering with a well recognized and respected local player. It also aligns to our strategy of supporting our enterprise customers around the globe. The proposed joint venture will form part of Telstra’s expansion plans for Asia, where we expect to have both Telstra entities and local market partnerships.”

Mr. Riley said the proposed joint venture would deliver enterprise and business customers with managed network and security services as well as cloud and unified communications services.

“We are looking forward to giving our enterprise customers local support allowing them to focus on their business rather than managing information technology and telecommunications as a business cost,” Mr Riley said. “We plan to focus on areas such as business continuity, business performance optimization, protection of business information and data assets and improved employee productivity.”

Telkom Indonesia’s Group Chief Strategy and Innovation Officer Pak Indra Utoyo said, “We are bringing the proven ICT NAS solutions to Indonesia to assist businesses to be more productive and competitive to support them locally and into the region. The NAS solutions and IDN networks are a powerful combination to differentiate our solutions and services in the market to support businesses in Indonesia to be more agile, productive and secure.”

Mr. Riley said Telstra continued to build momentum in its NAS portfolio.

“We completed an acquisition in O2 Networks, a leading Australian provider of network and security consulting and integration services for Australian enterprise customers. Late last year we acquired NSC, a provider of unified communications, contact center, managed network services and associated integration and consulting services,” Mr. Riley said. “We have also commenced expansion of selected NAS portfolios - Managed Network Services and Cloud - into international markets, particularly in the Asia-Pacific Region so today’s announcement is a further indication of our intentions for the region and for our NAS business.

**T**he conference provides an excellent opportunity to explore cutting-edge satellite-based applications from a holistic viewpoint. A comprehensive technical programme is complemented by high-level round-tables with heads of industry, space agencies and government institutions.

This mixture of industry, agencies and academic specialists will ensure a lively and innovative analysis of different space-based services. The range of topics being addressed includes **remote sensing, mobile telecommunication and positioning, legal and regulatory aspects, and services in support of disaster management.**

Alongside the **15 technical sessions** and poster displays, there are **4 plenary sessions** planned, featuring high-level panel discussions: These will include a session gathering heads of space-based services companies to discuss their challenging market. There is also a session dedicated to understanding and monitoring climate change, and one looking at the role of governmental agencies in the development and validation of space-based services and applications.

Don’t miss out – Registration details at [www.glac2014.org](http://www.glac2014.org)

# NSR Analysis

## Evens Or Odds—Capacity Trends In SNG/OU Markets

By Brad Grady, Senior Analyst, NSR USA



**W**ith the one-two punch of the recent Super Bowl and Winter Olympics in Sochi occupying a great deal of broadcaster attention, 2014 continues to shape up to be an upswing year for the contribution and occasional use (OU) satellite TV markets.

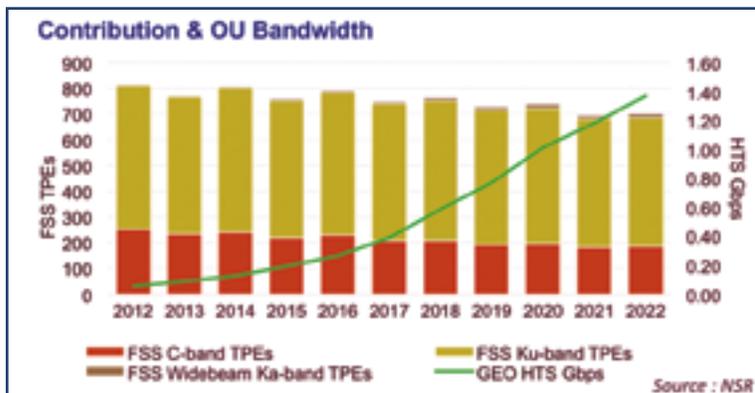
From the ongoing evolution of UltraHD 4K content, the OU market is undergoing a steady technological shift—from linear content capture to file-based workflows, from traditional H.264 to H.265/HVEC, from C-band to FSS Ka-band and GEO-HTS, and from primarily satellite-based to increasingly a hybrid satellite-terrestrial transmission model.

As the market for OU services continues to evolve, all events from high-value content such as the Super Bowl or Olympics to the reporter on the street continue to put pressure on the steady even year-odd year trend steadily exhibited within the Contribution and OU/SNG markets.

As NSR explores in its *Contribution and Occasional Use TV Markets* report, major media events typically fall on even years—World Cup, Olympics, and National Elections. It is the trend that OU/SNG markets has always exhibited an even year peak followed by an odd year valley.

However, as the deployment of fiber networks to major sporting venues continued to steadily increase, with new stadiums going so far as running fiber directly to the camera locations themselves to support the latest 4K video streams, an ongoing evolution is occurring throughout the market. Not only is the evolution a steady decline in the need for satellite-based capacity for OU/SNG, but the even-odd year trend is steadily diminishing. With more fiber deployed to more large events, and file-based workflows becoming the status-quo for live event productions, the 'peaks' from these events continue to decrease relative to the more steady-state odd year trends.

Yet, simply attributing the decline in SNG/OU even-year peaks to terrestrial solutions is not the entire story—as new compression and satellite frequencies further contribute to the overall utilization of satellite capacity for OU and SNG services. The smaller form factors, easier ground infrastructure, and IP-based network designs of FSS Ka-band Widebeam or GEO-HTS remain significant drivers away from FSS C-band or FSS Ku-bands for the lower to medium value content productions. And, with fiber eating away at the high-end production events, satellite continues to feel the pressure from all sides. All-in-all, the result is a steady smoothing out of satellite bandwidth demand, OU hourly demand, and the number of contribution feeds.



Not all is lost for SNG/OU markets though. The rise of OTT services, 'second-screen' media consumption, and the insatiable demand for video-based media by consumers continues to drive the demand for video from smaller and smaller events—a silver lining for satellite services.

Cable, DTH, and online video distributors continue to scramble for 'exclusive' access to sporting and special events across the world—into venues without widespread access to terrestrial networks—while still requiring high resolution, high-quality production.

This will be the next wave for SNG/OU growth—smaller, smarter terminals with IP-centric file-based workflows able to leverage a diverse set of satellite transmission technologies. There will always be a market for the larger FSS C-band SNG trucks, but the sweet spot for both uplinkers and satellite operators will be producing the same quality of content from smaller and smaller equipment footprints—using a combination of FSS widebeam Ka-band, GEO-HTS... and terrestrial.



*Newsline SD and HD satellite trucks can be found in The Netherlands, Belgium, Germany, France and Luxemburg at breaking news events, (long term) sports events.*

*Photo courtesy of Newsline.*

#### **About the author**

*Mr. Grady has been involved in the Satellite Communications industry since 2005, joining NSR in 2010. He is NSR's Energy market subject matter expert, and a core member of NSR's mobility research practice for both civil and government markets. He regularly provides his insights and analysis to NSR's single-client consulting practice, and is also a regular contributor to leading industry publications and forums.*

*Before joining NSR, Mr. Grady served as the Sustainable Development Projects Coordinator Intern with the Global VSAT Forum, where he worked regularly with the GVF Secretariat and the Regulatory Working Group on many of the forum's initiatives. Working with the Regulatory Working Group, Mr. Grady helped develop and*

*implement various RWG initiatives aimed at protecting satellite spectrum, increasing awareness of satellite services, and working to promote regulatory reforms across the globe.*

Information for this article was extracted from NSR's report: Contribution and Occasional Use TV Markets... report information is available at <http://www.nsr.com/research-reports/hybrid-emerging-applications/contribution-and-occasional-use-tv-markets/>

## A New Name For The Premiere, International Space Industry Event

**F**or its 30th year the Space Foundation's global space conference unveils a new name to reflect its expanding international reach. With "National" dropped from its name, the 30th Space Symposium will be held May 19-22, 2014, at The Broadmoor Hotel in Colorado Springs, Colorado, USA.

Expect even more international participation at the 30th Space Symposium than in previous years, including speakers, panelists, visiting delegations and exhibitors.

Widely known as the most significant global space industry conference for conducting business, the Space Symposium annually attracts more than 9,000 participants worldwide, including top decision makers from civil, military, commercial and academic institutions.

More than 100 top civil and military space leaders from the U.S. and abroad are slated to speak, including:

- Brig. Gen. Yves Arnaud, FAF, Commander, Joint Space Command, French Ministry of Defense
- Charles F. Bolden, Jr., NASA Administrator, USA
- Lt. Gen. James R. Clapper, USAF (Ret.), Director of National Intelligence, USA
- Matthew J. Desch, Chief Executive Officer, Iridium Communications, Inc.
- Michael C. Gass, President and Chief Executive Officer, United Launch Alliance (ULA)
- Yasushi Horikawa, Ph.D., Chairman, United Nations Committee on the Peaceful Uses of Outer Space
- Letitia A. Long, Director, National Geospatial-Intelligence Agency, USA
- Dr. Ger Nieuwpoort, Director, Netherlands Space Office
- Gen. William L. Shelton, USAF, Commander, Air Force Space Command, USA
- Deborah Westphal, Managing Director, Toffler Associates

View the current agenda at [www.SpaceSymposium.org](http://www.SpaceSymposium.org), and look for details on new additions to the Symposium for 2014, including Wednesday's Technical Track presentations and panels.

Also on Wednesday, May 21, the Space Foundation will confer its highest honor, the General James E. Hill Lifetime Space Achievement Award. This significant accolade will be presented to A. Thomas Young at a special luncheon that is co-sponsored by Lockheed Martin

Another main reason to attend the 30th Space Symposium is the dynamic Boeing Exhibit Center and Boeing Exhibit Center Pavilion, featuring more than 160 displays of the world's latest space technology, products and services.

### Space Symposium Website Available In 71 Languages

The Space Foundation web designers have created a dynamic Space Symposium website that now provides information in 71 languages. The website is responsive and adaptive for mobile and tablet devices, as well. Visit [www.SpaceSymposium.org](http://www.SpaceSymposium.org).

### Register Now For Space Symposium + Cyber 1.4

The 30th Space Symposium is preceded by a full-day cyberspace conference, Cyber 1.4 on Monday, May 19, at The Broadmoor Hotel. Congressman Lamar Smith (R-TX), chairman of the United States House Committee on Science, Space and Technology, will give the Cyber 1.4 keynote speech.

Cyber 1.4 will focus on senior leadership views on Department of Defense and industry cyber activities, with emphasis on human capital development, international dimensions and the evolving challenges posed by cyberspace. Featured speakers and panelists provide insight into cyberspace policy issues affecting industry and the government. Cyber 1.4 is also appropriate for those who are new to the cyber domain, for help in understanding current hot-button issues.

See more details, and register for both the Symposium and Cyber 1.4 at [www.SpaceSymposium.org](http://www.SpaceSymposium.org).





## Cyber 1.4 + The New Generation Space Leaders Program



# CYBER 1.4

A Space Foundation event

**S**pace and cyberspace intersect at the Space Foundation national conference **Cyber 1.4**, on Monday, May 19, 2014, at The Broadmoor Hotel in Colorado Springs, Colorado.

Cyber 1.4 focuses on senior leadership views on Department of Defense and industry cyber activities, with emphasis on hot button issues, human capital development, international dimensions and the evolving challenges posed by cyberspace. Featured speakers and panelists provide insight into cyberspace policy issues affecting industry and the government.

This full-day conference takes place immediately before the official opening of the 30th Space Symposium. For those interested in learning more about this special one-day event, here's the agenda to entice your presence.

The registration for Cyber1.4 occurs on Sunday, May 18th, from 4:00 until 7:00 p.m., simultaneously with the 30th Space Symposium registration in the foyer of Broadmoor Hall. Registration continues on Monday, May 19th, from 6:00 a.m. until 5:00 p.m., but registering earlier is better than later, as the Cyber 1.4 Breakfast takes place at 7:00 a.m. in the Rocky Mountain Foyer at Broadmoor West. The breakfast is co-sponsored by Booz | Allen | Hamilton.



The featured speaker for Cyber 1.4 is the Honorable Lamar Smith (R-TX), who is the Chairman of the Science, Space and Technology Committee in the U.S. House of Representatives. His presentation will start at 8:30 a.m. in Rocky Mountain Ballroom A & B at Broadmoor West.

Smith represents the 21st Congressional District of Texas and, as Chairman, he promotes legislation that encourages scientific discoveries, space exploration, and new technologies. In addition to having oversight over NASA, Chairman Smith's committee has been engaged on cyber security issues including holding a variety of hearings and passing out a variety of cyber-related legislation. He currently serves on the Judiciary Committee and the Homeland Security Committee. Before his election to the House of Representatives, Smith practiced law and served as a Bexar County commissioner. Smith is a graduate of Yale University and Southern Methodist University School of Law.

At 9:00 a.m., the Cyber 1.4 program starts in the same A & B Ballroom and runs until 12:00 noon or so, with Ballroom C & D the next stop for—lunch. The speakers are yet to be announced for this great opportunity for continued networking and speaker insights.

At 2:00 p.m., the program continues until 4:00 p.m. in Ballrooms A & B, with the Cyber 1.4 Reception to follow and close the event at 4:30 p.m.

To register, access <http://www.spacesymposium.org/register/register-now>

### The New Generation Space Leaders Program

During the 30th Space Symposium, the Space Foundation will help participants of this worthwhile program gain visibility and exposure to senior leaders while obtaining advice and insight on career development. The multi-dimensional New Generation Space Leaders Program features speed mentoring, workshop sessions, keynotes, Q&A sessions, interactivity, social networking, receptions and exposure for some members as part of the Space Symposium agenda.

Young space professionals should consider attending these events if they are seriously seeking to advance their careers, all the while desiring to create new contacts and gain visibility for their participation. One of the most important factors is that these are the leaders of tomorrow who will help to set the direction for the future of the space industry.

The agenda runs on Monday, May 19th, from 3:00 until 4:30 p.m. with the New Generation Leadership Exchange at the Broadmoor's Main Ballroom. The event closes with a special Networking Reception for New Generation Space Leaders and Mentors from 4:30 to 5:30 p.m. in the Pompeian Room, Broadmoor Main Mezzanine. The reception is co-sponsored by Aerojet Rocketdyne.

The program continues on Tuesday, Wednesday and Thursday with special breakfasts, panels, workshops and receptions. For a complete rundown on the event, head over to <http://www.spacesymposium.org/about/new-generation-space-leaders-program>. The sponsors include Aerojet Rocketdyne, Airbus Group, Booz | Allen | Hamilton, MOOG, Space Generation Advisory Council, Spincraft and the SI Organization and United Launch Alliance, Aviation Week, SatNews Publishers and SpaceNews are media partners..



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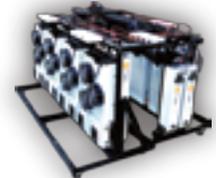
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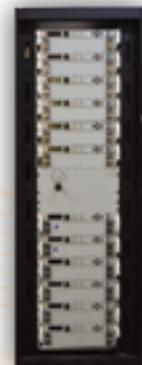
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