

Worldwide Satellite Magazine – September 2015

# SatMagazine



Europe  
SatBroadcasting™  
SATCOM Perspectives

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# SatMagazine

September 2015

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## InfoBeam

### Satellite Solutions Acquisition Brings Broadband To The Netherlands

**Satellite Solutions Worldwide Group plc (www.satellitesolutionsworldwide.com/), a global communications company specializing in rural, last-mile satellite broadband, has acquired Sat2Way SARL ('Sat2Way'), one of the largest and most respected providers of satellite broadband in France, with over 5,500 residential and business customers. Predominantly operating in France, Sat2Way also has customers in Spain, Switzerland and Belgium.**

SSW, which already has more than 1,000 customers in France, sees the territory as a key market in Europe as the French Government has incentivized the roll-out of satellite broadband as the solution for many homes and businesses, and is currently offering subsidies in many areas via their 'subvention' scheme. As a result of this acquisition, SSW

becomes the second largest satellite broadband provider in France with over 6,500 subscribers and is well positioned to target an addressable market of nearly 1 million homes in France, equating to 3 percent of French households, which have less than 2 Mbps broadband coverage\*.

Sat2Way has been acquired out of administration for €825,000 in cash for 100 percent of the share capital. For the eight months ending February 28, 2015, Sat2Way generated sales of €1.73 million (FY2014: €2.54 million) and an EBITDA loss of €0.36 million (FY2014: loss of €0.34 million) (all figures are unaudited). The acquisition is expected to be earnings enhancing for SSW within the current financial year.

CEO Andrew Walwyn said, "We are delighted to welcome Sat2Way customers and staff to SSW. This is our third acquisition in a key European market since listing on AIM in May 2015; it underpins our growth ambitions and takes our subscriber base to approximately 20,000 customers, a 65 percent increase since float.

"Following this acquisition, France is now our second biggest market after the UK, and we expect to expand further there in due course."

Established in 2008, SSW offers a broad range of satellite broadband services with customers across 31 countries. With solutions targeting B2C and B2B users, and with products developed specifically for the broadcasting/SNG, Police and Military markets, SSW's brand Europasat is a leading independent provider of satellite broadband Internet services across Europe.

Working closely with satellite owners and operators, SSW targets customers in the 'digital divide' with solutions that deliver up to 30 Mbps satellite based broadband services to almost any premises, whether residential, commercial or industrial across Europe, irrespective of location or local infrastructure.

\*Source: Point Topic data.

## HYLAS 4 Financing Now Completed

**Avanti Communications Group plc ("Avanti" — [www.avantiplc.com/](http://www.avantiplc.com/)) announces the completion of financing for its HYLAS 4 satellite, in line with the previously announced financing plan.**



Avanti has successfully placed \$125 million in Senior Secured Notes due 2019 (the "Notes") under the Company's existing indenture. The Notes will be issued at a small discount to the current trading price of Avanti's existing notes and will have a coupon of 10 percent. The investor group was led and managed by MAST Capital Management, LLC, a Boston-based investment firm. HYLAS 4 remains on-track for launch in early 2017 and will complete Avanti's coverage of EMEA. The majority of the satellite's capacity will serve high-growth markets in Africa.

The Company expects that this will consolidate its first mover advantage across EMEA, and enhance the future cash generation potential of the Group. In addition, Avanti has also simultaneously conducted an equity capital raising (the "Capital Raising"). Avanti has issued 3,592,781 new ordinary shares (the "New Ordinary Shares") of 1p each ("Ordinary Shares") at a price of 200.65p per New Ordinary Share, to raise approximately £7.2 million (\$11.3 million) (net of expenses) in order to satisfy demand from bond investors. The Capital Raising has been conducted under the Company's existing shareholder authorities to allot new Ordinary Shares for cash on a non-pre-emptive basis.

The issue price of 200.65p represents a discount of 4.0 percent to the closing middle market price of 209.00p per existing Ordinary Share on August 17, 2015, the last dealing day prior to this announcement. Application has been made to the London Stock Exchange for the New Ordinary Shares to be admitted to trading on AIM ("Admission").

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### SES Platform Services To Deliver Content To StarTimes

SES Platform Services ([www.ses-ps.com/](http://www.ses-ps.com/)), a wholly-owned subsidiary of SES S.A., announces that StarTimes, the fastest-growing digital TV operator in Africa, will distribute TV channels for their DTH subscribers across Sub-Saharan Africa via SES Platform Services' broadcast facility in Germany.



Under the new multi-year agreement, SES Platform Services will be providing signal turnaround, video processing, and uplinking services for StarTimes' SD and HD channels. StarTimes has more than 5 million DTT and DTH subscribers across 16 countries in Africa and currently provides English-language TV content to viewers across the region via the SES-5 satellite located at 5 degrees East.

"We want TV audiences in Africa to perceive StarTimes as a reliable DTH platform operator broadcasting engaging content at competitive rates to its subscribers," said StarTimes Group Chairman and President Pang Xinxing. "The new contract provides both space and ground segment services to grow their business in Sub-Saharan Africa," said Wilfried Umer, Chief Executive Officer of SES Platform Services.

### DEV Systemtechnik's Solution For Broadcasters

During IBC 2015 in Amsterdam, September 11-15, DEV Systemtechnik, a Quintech Company (Hall 1, Stand 1.B31—[www.dev-systemtechnik.com/](http://www.dev-systemtechnik.com/)), will unveil its new 8<sup>2</sup> Distributing Matrix ("Eight Squared") product, which offers outstanding flexibility in 1 RU.

With the launch of the new 8<sup>2</sup> Distributing Matrix, DEV/Quintech's Matrix product family now offers a full range of next generation RF matrix switches designed to meet a variety of sizes, from small to extremely large.

For small configuration environments such as SNG vehicles, the compact 8<sup>2</sup> Distributing Matrix offers an ideal mix of cost and performance plus unique advantages. The new 8<sup>2</sup> Matrix's optical inputs, unique redundancy options, LNB powering, full color display user interface, and dual redundant field replaceable power supplies give cable, satellite and broadcast facilities the most reliability and flexibility available on the market. The 8<sup>2</sup> is suitable for various redundancy purposes, and can be operated in autonomous mode.

The 8<sup>2</sup> is available in sizes 4x4, 4x8, 8x4 or 8x8, and easily field-upgradeable to the maximum size of 8x8, without any disruption of service. Various connector types, 50 or 75 Ohm, optical inputs, redundancy options, TRAC and field replaceable power supplies let customers equip the device to their needs. A 9th output comes as a standard feature for monitoring purposes. Additional features such as variable gain and tilt deliver optimized and linear RF signal transmission.



**The oil and gas industry is characterized by remote and inaccessible facilities where wireless communication in many cases is the only viable option for transferring M2M data ...**

*M2M Applications in the Oil and Gas Industry* is the third consecutive report analyzing the latest developments on the use of wireless M2M technologies in this worldwide vertical industry. This report provides 140 pages of unique business intelligence, including 5-year industry forecasts, expert commentary and real-life case studies to assist with business decisions.

According to a new research report from the analyst firm, Berg Insight, the number of devices featuring cellular or satellite connectivity deployed in oil and gas applications worldwide was 0.5 million at the end of 2014. Growing at a compound annual growth rate (CAGR) of 20.1 percent, this number is expected to reach 1.25 million units by 2019.

The split between cellular and satellite based M2M devices at the end of the forecast period will be 0.99 million units and 0.27 million units respectively. The oil and gas industry is characterized by remote and inaccessible facilities where wireless communication in many cases is the only viable option for transferring M2M data.

Pipeline monitoring and tank monitoring are the top two M2M applications in the midstream and downstream segments while on-shore well field equipment is the most common wireless application in the oil and gas upstream segment.

Wireless M2M solutions have become increasingly popular in oil and gas applications in the past few years.

The main drivers for adoption are safety and environmental concerns, regulatory compliance and demand for improved operational efficiency.

**[berginsight.com/](http://berginsight.com/)**



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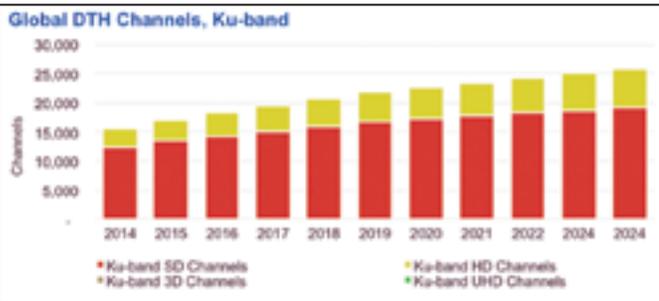
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## Analysis: Are OTT Concerns Over the Top?

By Alan Crisp, NSR Analyst

**OTT seems to be wearing on the minds of many these days. DTH and Cable TV platforms are perhaps the most threatened, given the rise of OTT video products and the potential to reduce revenues for video platforms and satellite operators alike. However NSR's latest report on the satellite video markets, *Linear TV via Satellite: DTH, OTT & IPTV, 8th Edition* finds that much of this concern is unwarranted, with a few exceptions.**

NSR forecasts that globally, DTH channels will increase to over 26,000 by 2024, representing a 67 percent increase over channel counts in 2014, with similar trends for both C-band and Ku-band video distribution. This corresponds to 438 transponders of additional DTH capacity required to handle this growth with a further 343 transponders for video distribution for Cable and IPTV headends.



The plethora of options for consuming video content has never been higher, including (but not limited to): *YouTube; Netflix, now available in 80 countries worldwide, along with similar services; Youku and iQiyi in China* OTT platforms provided by DTH and cable platforms

However, NSR found the rising OTT presence represents a growing video market pie, rather than cannibalization of revenues. Instead, cannibalization is in the form of viewing time, with consumers spending less time viewing linear content and more on OTT content. However, this doesn't correlate to cord-cutting in most instances, with the exception of the United States where a number of variables have lined up to cause subscription cancellations to occur:

- » *An existing very high pay-TV penetration rate*  
*Pay-TV is a high cost as a percentage of income for many households, whereas in many other regions, low income households have never signed up for pay-TV services*
- » *Plethora of options for OTT platforms, both free and paid*  
*A home-grown advantage for OTT, as high percentage of high quality content is produced in the U.S.*

As a consequence, NSR expects leased DTH capacity growth in North America to remain fairly soft over the next decade.

However, OTT is not a major cannibalizing factor elsewhere, where there is insufficient incentive for consumers to cancel their pay-TV subscriptions, as much higher quality local content is available for lower cost, and the lack of maturity of many OTT services and oftentimes broadband (a key to solid OTT).

Further, as economic development expands in many developing regions, large numbers of consumers are signing up for pay-TV services for the first time, boosting revenues globally. Instances of this include India, Indonesia, and Brazil, with India having overtaken the United States in 2014 for largest DTH market by total subscribers, for example. Even with OTT acting as a form of complimentary competition, there still remains significant DTH and cable growth opportunities in most regions, which appear

## InfoBeam

### This Power Is All Green

**Aerojet Rocketdyne has completed delivery of a green propellant propulsion subsystem that will be used to test a non-toxic fuel on NASA's future spacecraft, the Green Propellant Infusion Mission (GPIM).**

The subsystem was delivered to GPIM prime contractor, Ball Aerospace & Technologies Corp., for integration into the Ball-designed Configurable Platform (BCP) 100 spacecraft bus. Scheduled to launch in 2016, the GPIM will provide safer operations and higher performance on future missions. The green propellant propulsion subsystem, built by Aerojet Rocketdyne in Redmond, Washington, consists of a propellant tank and five 1-newton thrusters to carry the new non-toxic fuel, called AF-M315E. Developed by the Air Force Research Laboratory at Edwards Air Force Base, the new propellant is safer to handle and offers a 50 percent increase in density-Isp, compared to the conventional chemical propulsion systems, such as hydrazine.

AF-M315E burns hotter than hydrazine, requiring new metals to withstand the high temperatures in the thrusters aboard the propulsion system. The GPIM payload will fly aboard the BCP 100 spacecraft bus, which will provide standard payload interfaces and streamlined procedures for short lead-time and affordable access to space.

GPIM is sponsored by NASA's Space Technology Mission Directorate. Led by Ball Aerospace, the GPIM team includes Aerojet Rocketdyne; the U.S. Air Force Research Laboratory; the Air Force Space and Missile Systems Center; and three NASA field centers.

sustainable for a decade or more. For instance, the Pay-TV market in large parts of Sub-Saharan Africa remains largely unregulated, with piracy being a major issue, particularly with STBs flowing from South African DTH platforms to other parts of the continent.

Some DTH platforms have been able to capitalize on OTT content to expand their subscriber base and overall revenues, such as Sky Deutschland and Sky Italia, and this is a trend which NSR expects to become more prominent. Sky Deutschland (for example) saw their largest subscriber increase ever in terms of total number of subscribers in 2014.

And much longer term, after Internet connectivity and OTT become much more ubiquitous, there is likely to be a trend for quality over quantity for Linear TV content, including significant added capacity from the higher bitrate UltraHD format. Although OTT is perceived as a fierce threat, in reality the overall video market pie is increasing, rather than there being cannibalization of Linear TV revenues in most regions. However, this shouldn't

mean that video platforms should stay still. Rather, video platforms will need to diversify to have an OTT product and become a part of the continually expanding video market pie. 2015 is really the beginning of the growth curve for OTT, and if traditional platforms don't step up and offer their own OTT products, their dominance in the long term may be taken away by those who do.

*Alan Crisp joined NSR in 2014, following a Hong Kong based engineering role at Aurecon. Mr. Crisp is the co-author of NSR's annual M2M and IoT via Satellite and also the Direct-to-Home (DTH) Markets reports. As a member of NSR's Fixed Satellite Services (FSS) group, Mr. Crisp's areas comprise of M2M and IoT communications - including both the satellite and terrestrial M2M landscape.*

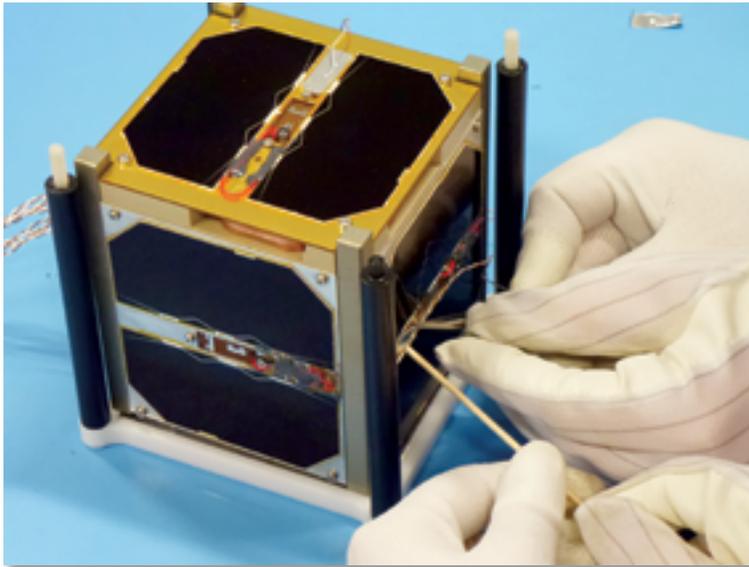
*Previous consulting experience includes forecast analysis and risk management of natural disasters in Manila, where he made recommendations to policymakers about backup and emergency telecommunication links for use in city and nationwide emergencies. He obtained a Bachelor's Degree with First Class Honours in Engineering (Civil & Structural) from the University of Adelaide, Australia. Aside from English, Alan can speak French and Chinese.*

*NSR is experienced in strategic advisory and consulting efforts regarding linear TV and OTT growth across all regions, platforms and channel types.*

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## Great Danes... Satellite Built Entirely By University Team With ESA Support



**A special event has started for approximately 30 students from Aalborg University, in Denmark, as their satellite, AAUSAT5, was launched to the International Space Station (ISS).**

Later on, AAUSAT5 will be deployed into orbit around Earth, marking the first ESA student CubeSat mission ever launched from the ISS: the pilot project of ESA's 'Fly Your Satellite from the ISS' education program.

AAUSAT5, a CubeSat satellite entirely built by a university team with ESA's support, will reach the ISS aboard the Japanese HTV-5 cargo vehicle, planned to lift off from the Tanegashima Space Center in Japan. The satellite will be accompanied by GomX-3, another ESA CubeSat, designed by Danish professionals.

There may be a possibility, to be confirmed at a later stage, that AAUSAT5 and GomX-3, both Danish satellites, are released to orbit in conjunction with the mission to the ISS of ESA astronaut Andreas Mogensen, the first Danish astronaut ever. Andreas will be on the station for 2 weeks, starting on September 2nd.

After deployment, AAUSAT5 will start its technical mission: test, in orbit, an improved version of an automated positioning system. This system is designed to track and identify ships transiting away from coastal areas and in remote areas, thereby creating potential for safer use of new shipping lanes.

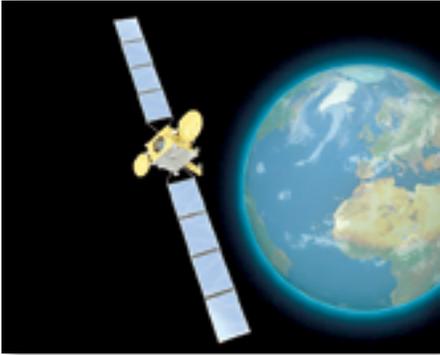
"It is by going through the whole process of setting objectives for a space mission, and then designing, building, testing, and operating a spacecraft that can achieve these objectives, that the students acquire an powerful experience in the space sector, while still completing their studies," said Piero Galeone, Head of the Tertiary Education Unit at ESA. "Our mentoring efforts are all aimed at helping the students become more competent and mature for the labor market when the time comes."

'Fly Your Satellite!', ESA's most thorough educational CubeSat initiative to date, is a program aimed at offering university student teams the opportunity to gain exemplary engineering and project management experience in designing, building, testing, launching, and operating a small satellite, a CubeSat indeed, from cradle to grave.

With AAUSAT5, the ESA Education Office is piloting the opportunity to use the International Space Station as a possible means, in addition to conventional rockets, to recurrently deploy student CubeSats into Low Earth Orbit (LEO); this would represent 'Fly Your Satellite from the ISS!', as an extension of the 'Fly Your Satellite!' program.

ESA is providing the AAUSAT5 team with the launch opportunity on board the HTV-5 launch vehicle and the deployment from the International Space Station free of charge, as well as technical and financial support for the pre-launch activities (for satellite integration and testing, and for the delivery to Houston, Texas, U.S., where the satellite has been integrated with the NanoRacks CubeSat Deployer (NRCSD).

## A Connectivity Asset From HISPASAT For Ruta BBVA 2015



Artistic rendition of the HISPASAT 1C satellite. Image is courtesy of HISPASAT.

**HISPASAT ([www.hispasat.es/](http://www.hispasat.es/)) and Bantsat are providing satellite telecommunication services for the Ruta BBVA 2015 in areas without connectivity.**

This year, the Ruta BBVA will have a Kiosco Vive Digital Móvil, operated by NEC and using HISPASAT's satellite capacity, in order to ensure connectivity. The Ruta BBVA is a journey that

combines education in values, cultural exchange, training in social enterprise and adventure. Over the course of 29 editions, more than 9,000 young people from around the world have had the opportunity to travel and discover human, geographical, social and historical aspects of other cultures.

The Ruta BBVA 2015 is starting its journey across Colombia on its thirtieth edition. Two hundred students from the Americas, Spain and Portugal will have an amazing educational experience, in addition to experiencing social commitment, within a cultural and adventure exchange framework. As they travel across Colombia, the members of the expedition will visit cities such as Aracataca, Bucaramanga, Barichara, Curití, Villa de Leyva, Tunja or Boyacá, and they will discover sites such as Tayrona National Natural Park or Chicamocha Canyon. In many of these places, the connectivity for telecommunication services is very limited, and the Ruta BBVA needs to use a satellite connection in order to access the Internet and voice and data services.

The Spanish satellite and telecommunications operator, HISPASAT, has been the technological collaborator for the Ruta BBVA for the past 12 years, providing these services in the different Latin American countries where it has traveled. In this 2015 edition, the operator will provide the Ruta with Ku-band space capacity from its satellite Hispasat 1C to make available the necessary connectivity in rural and remote areas of the country.

The Colombian company Banta will provide and manage the technical equipment needed on the ground to connect with the satellite and ensure the service works correctly. In addition, this year the members of the expedition and journalists following the Ruta will have a Kiosco Vive Digital Móvil, thanks to the Colombia's Ministry of Information and Communication Technology and NEC de Colombia.







## SatBroadcasting™: Ultra HD, The Ultimate Experience... An SES Perspective

**E**ven among the stingiest of prognosticators, Ultra HD is far ahead of schedule.

The Consumer Electronics Association (CEA) just upped its forecast of Ultra HD TV sales to surpass 4.4 million in 2015, a whopping 210 percent increase over last year<sup>1</sup>. Research firm Strategy Analytics sees a far speedier penetration rate than at first anticipated—their prediction is that nearly half of U.S. homes will own an Ultra HD TV by 2020. That is an unprecedented rise in ownership, considering just 1 percent had a 4K set in 2014<sup>2</sup>.

2015 has become the year of Ultra HD growth. Ultra HD TVs are big sellers. Programmers and content producers are creating increasingly more of the Ultra HD television episodes and feature films that consumers crave. Satellite is a pivotal element in the technology mix that has linear Ultra HD home delivery quickly approaching.

SES is keenly focused on the acceleration of Ultra HD content delivery to homes around the globe, all via a satellite fleet that continues to grow as well as unsurpassed video distribution expertise. Building on the existing carriage of 6,963 channels around the world—of which 2,100 are HD—SES has recently inked five deals to deliver Ultra HD channels across Europe that include Sky Deutschland and German shopping channel Pearl.tv.

### Breakthrough Technology/Historic Trials

Also launched are SES' own Ultra HD demonstration channels that serve Europe and North America. These demo channels allow broadcasters and cable operators, respectively, to prepare and test their networks for Ultra HD.

One such company, Cable MSO (Multiple System Operator) Armstrong, is in the early stages of the first-ever linear live Ultra HD trial in a cable system, tapping SES' camera-to-screen Ultra HD platform at the Butler, Pennsylvania, headquarters lab.

SES' Ultra HD offering, first unveiled at the NAB and INTX conferences earlier this year, combines broadcast and IP technologies in a fully managed, scalable service. The breakthrough leverages satellite's inherent broadcast advantages and the multicasting capabilities of DOCSIS 3.0, the advanced transmission standard that is already in use by Armstrong and other leading cable systems across the U.S.

A far faster rollout across cable networks will certainly occur, as there is little to no cost required for Ultra HD upgrades. This is far faster than the redeployment of cable boxes to millions of subscribers and much better than OTT offerings that are susceptible to buffering and congestion, according to Steve Corda, the Vice President of business development in North America for SES.

Corda has spearheaded SES' development of the plug-and-play ecosystem that now has 4K on the verge of linear delivery to U.S. homes four times faster than was required for HD.

"We are about nine months into the development of our turnkey Ultra HD solution. And we're on target to deliver linear Ultra HD to cable homes in a quarter of the time it took linear HD to reach subscribers," Corda said, referring to the early days of HD when the only HD content in the home was on Blu-ray. Four years were required for linear live HD to enter consumer living rooms. Ultra HD is expected to arrive in subscriber homes this fall, delivered over the SES platform.







The SNG truck broadcasting the SES Ultra HD demo into the convention center.



The SES Ultra HD demo on the show floor.

"We have a great long-term partnership with SES that enables us to innovate with satellite-delivered content solutions and provide exciting new potential offerings," said Mike Giobbi, Chief Technology Officer for Armstrong. "We look forward to testing Ultra HD on our cable system and working closely with SES on this exciting solution."

"There's always been this chicken-and-the-egg scenario with Ultra HD. When will there be enough Ultra HD TV sets in the home? When will there be enough content?" Corda said. "Well, SES has cracked the egg with an Ultra HD ecosystem that takes virtually no time or investment for cable operators to implement across their cable plant. This is the first step in making linear-live Ultra HD into cable TV households a reality. We have a historic Ultra HD trial underway with an extremely innovative tier-2 cable operator. Name-brand tier-1 operators are testing their architectures with our Ultra HD demo channels and content producers and programmers are fully engaged in our platform," Corda said, listing some of SES' most recent Ultra HD accomplishments and milestones.

There have been many postcard moments along the pathway. One of the most memorable for Corda was how the new SES Ultra HD solution impressed even the most jaded engineers at the NAB and INTX shows.

"Ultra HD is incredibly life-like, with more pixels, better pixels and faster pixels," Corda said. "When we first turned up the live system at NAB, people literally stopped in their tracks. It was the ultimate experience, the ultimate return on all our hard work," Corda recalls. SES delivered linear live Ultra HD broadcasts to a cable system at the NAB and INTX conferences.

"The 4K resolution, the dynamic range, the frame rate all came together for a quality picture that had many attendees telling us that the live feed from outside the conference floor to our Ultra HD flat screens looked like a window to the street outside. We jumped through a lot of hoops to make this happen," Corda said to a couple of cable engineers who were watching the SES NAB demo that featured a live feed of a hula hoop performer who was staged outside the Las Vegas Convention Center. Admittedly, there are more hoops to come, as SES continues to adjust and tweak the Ultra HD platform in preparation for home delivery.

### Powerful Partnerships

Creating a successful 4K Ultra HD ecosystem requires investment and innovation. SES has committed expansive investments of time and money to accelerate linear live Ultra HD. According to Corda, a significant amount of collaboration and mind share has occurred across SES as well as throughout the Ultra HD value chain to build the

required technology. "SES pioneered the exploration of 3D, and that knowledge and insight has helped us to crack the Ultra HD code," he said.

The delivery of an end-to-end Ultra HD solution also cements into place partnerships that bring together the best minds and companies that are capable of turning a lofty vision into a viable reality. Corda and SES have built strong ties with a number of leaders in the industry during the development and ongoing evolution of the Ultra HD system.

For example, SES has worked closely with Harmonic in the development of the system and the delivery of Ultra HD content during the unveiling at NAB and INTX and the Armstrong trials. Content is encoded with Harmonic's Electra X3 encoder in HEVC/H.265, a compression scheme that is 50 percent more efficient than MPEG-4/H.264. The SES demo channel is transmitting native 4K content at 10 bit color and 60 frames per second with a data rate of 20-25 Mbps. Corda expects encoded data rates to drop to around 15 Mbps in the near future.

"It's important to note that our exclusive system is completely managed end-to-end with dedicated bandwidth on the satellite and within the cable network. No one else is doing this today," Corda said. "The result is high-quality encoded content delivered to the TV in an extremely reliable method that doesn't have any of the buffering issues that OTT has due to network congestion. This is truly a premium, cinema-quality service."

### On The Horizon

Cable operators and programmers are evaluating their networks and content on SES' Ultra HD demo channels, the Armstrong trial is underway, other tests are in the works, and Corda and the SES team are readying for an extremely busy 2016. SES is planning to launch a number of full-time linear Ultra HD channels within the company's end-to-end North American system later this year, according to Corda, in preparation for Ultra HD's ramp up on the horizon.

"This will serve as a springboard into 2016 when we anticipate traditional programmers will begin launching their 4K channels," Corda said. "Then we will see a bouquet of Ultra HD channels, featuring highly compelling programming, offered in 2017. The bottom line is people want a better quality viewing experience, no matter where they are located. They're craving Ultra HD in North America, Europe, and emerging markets such as Brazil—SES has the system to bring it home."

[www.ses.com/4KUHD](http://www.ses.com/4KUHD)

<sup>1</sup>Consumer Electronics Association July 2015 US Consumer Electronics Sales and Forecast Report

<sup>2</sup>Strategy Analytics' Connected Home Devices (CHD) Report 2015



## Inmarsat To Address Comms Inadequacies In Emerging Markets



**A project that will revolutionize e-commerce and maternity services in remote communities across Nigeria and Kenya through the delivery of reliable, space-based Internet connectivity services, has completed its installation stage and is ready to be rolled out.**

Titled Digital Frontiers ([www.inmarsat.com/digital-frontiers/](http://www.inmarsat.com/digital-frontiers/)), the initiative forms part of the UK Space Agency's £32 million, two-year International Partnership Space Program, in which Inmarsat is a central partner, working alongside a group of international organizations that include Equity Bank Group and Mobile Alliance for Maternal Action (MAMA). Inmarsat was awarded funding for projects in key East and West African growth hubs, where for many, basic digital services such as a resilient data communication



infrastructure or local mapping, are not available due to a blend of economic and geographic factors.

The initial projects, in Nigeria and Kenya, will see Inmarsat enable its most advanced L-band communications satellite, Alphasat, to deliver data connectivity solutions to these sub-Saharan communities. The rationale is to demonstrate how companies can provide social or economic benefit to areas that do not currently have communication capabilities as well as evolve business models which mean more of these projects can be sustained from a commercial perspective.

Working in partnership with the Equity Bank Group, Inmarsat has provided connectivity to enable financial services, welfare and other content access to more than 200 locations in Kenya. Each site has a BGAN Internet connectivity terminal which is pre-loaded with a range of educational materials and apps covering agriculture and business among other topics.

In Nigeria, Inmarsat is partnering with MAMA to deliver maternal and child health services to 50 remote, rural communities. Called The MAMA Connect Project, the onsite system is pre-loaded with a MAMA's evidence-based, culturally-sensitive, health information. The satellite network updates the content and provides real-time connectivity for pregnant and new mothers to interact online.

Inmarsat is also working alongside a range of partners to examine the business model affordability of providing connectivity to remote locations. The idea is to identify relevant cultural and social dynamics which can help foster and sustain future connectivity programs.



# A Life Boost For TWTs... A CPI Satcom Products Perspective

By Mike Cascone, Director of Applications Engineering; John Overstreet, Vice President, Satcom Design Center; and Doug Slaton, Marketing Manager, CPI Satcom Products

**C**PI's LIFEEXTENDER is a dynamic technology that is currently the most effective method available to increase the life of traveling wave tubes (TWTs) used in satellite uplink amplifiers.

compensate for the loss of gain and beam current in the TWT that has naturally occurred over time. Under this method, depletion of the cathode's barium occurs at the same rate as it does in a TWT that has no technology for extending TWT life. While the anode voltage adjustment makes use of barium that would otherwise go unused at the end of the TWT's life, thereby maintaining TWT performance for a short period of time, LIFEEXTENDER optimizes barium evaporation over the entire life of the TWT, extending typical tube life well past the lifetimes of other HPA components, and reducing the probability for needing even one replacement TWT over the typical life of the amplifier.

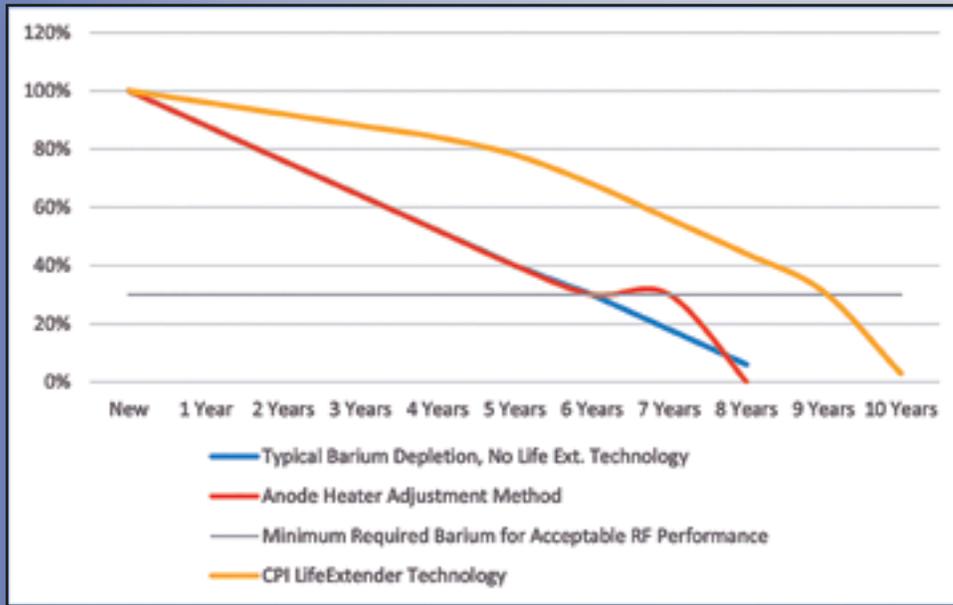


Figure 1. Typical barium depletion curves for TWTs using LIFEEXTENDER technology, the anode voltage adjustment method, with no TWT life extending technology.

Figure 1 to the left shows a graph depicting the typical reduction of barium in a TWT over time. Figure 2 shows how the cathode emission curve changes over time, and also reveals how anode voltage adjustment affects the emission curve. Each curve in the diagram represents a snapshot in time of the same emission curve for a single TWT.

This patented technology is the only method in which the life of the TWT is actually extended by preserving the active coating on the cathode surface.

Every TWT reaches end-of-life when its cathode barium reserve is exhausted. Barium is an element that, when heated within the TWT, helps provide the necessary electrons for the radio frequency (RF) amplification process. However, with CPI's LIFEEXTENDER, the cathode heater voltage is now adjusted over time to optimize the rate of barium depletion, thereby maximizing the life of the cathode and resulting in up to 50 percent longer TWT life.

Until now, technologies focusing on extending tube life have never concentrated on preserving barium, the active element on the cathode. However with LIFEEXTENDER, the cathode heater voltage is adjusted over time to minimize the rate of barium depletion, thereby maximizing the life of the cathode and resulting in up to 50 percent longer TWT life.

LIFEEXTENDER is a much more effective method of extending TWT life than the most common alternative, which is to adjust the TWT anode voltage. With the anode voltage adjustment method, the cathode heater voltage is fixed at the time of manufacture and does not change over time, just as in amplifiers with no life extending technology. Instead, the anode voltage is ramped up near the end of TWT life to

compensate for the loss of gain and beam current in the TWT that has naturally occurred over time. Under this method, depletion of the cathode's barium occurs at the same rate as it does in a TWT that has no technology for extending TWT life. While the anode voltage adjustment makes use of barium that would otherwise go unused at the end of the TWT's life, thereby maintaining TWT performance for a short period of time, LIFEEXTENDER optimizes barium evaporation over the entire life of the TWT, extending typical tube life well past the lifetimes of other HPA components, and reducing the probability for needing even one replacement TWT over the typical life of the amplifier.

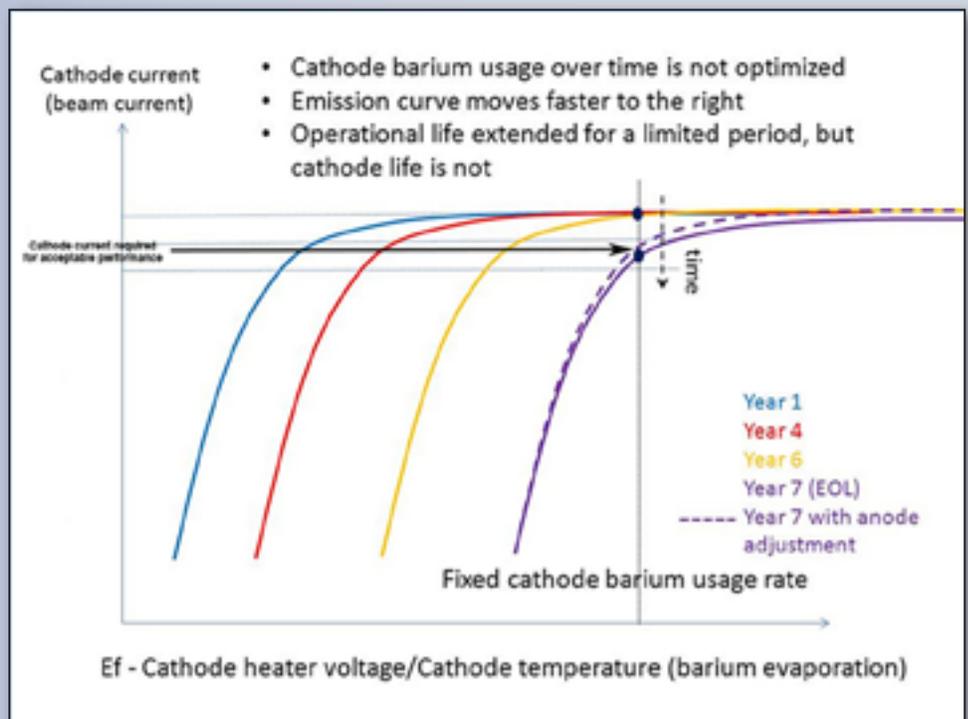


Figure 2. Emission Curves and Anode Voltage Adjustment Effects.



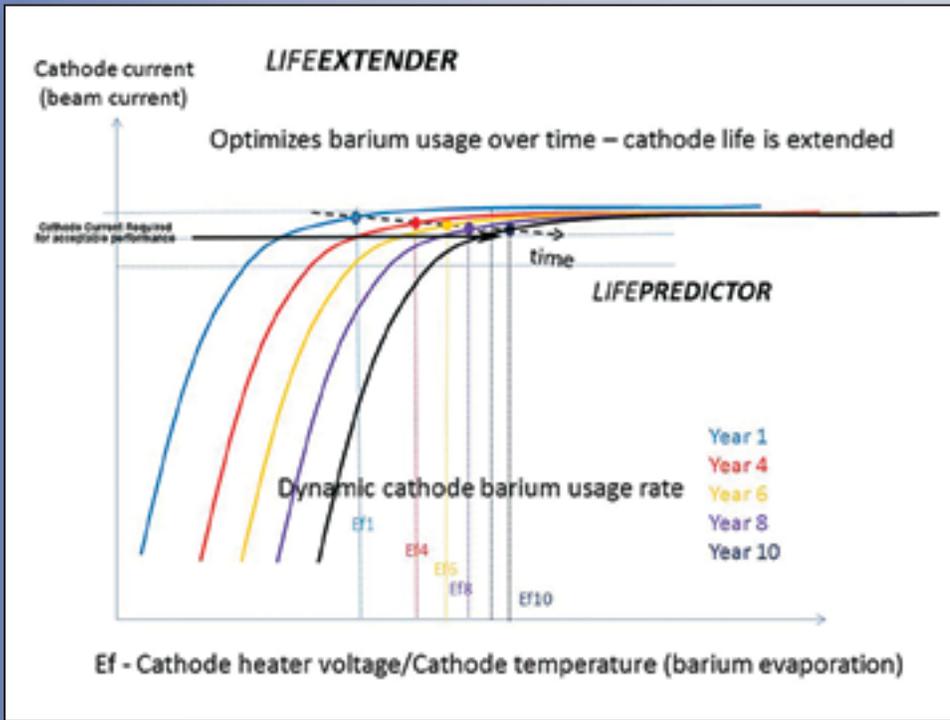


Figure 3. Emission Curves and LIFEEXTENDER Effects.

Figure 3 shows how maintaining a cooler cathode from the beginning of TWT life can save barium, while still provide enough available electrons to sustain the required beam current. Increasing the heater voltage setting higher than the optimal point (i.e., the inflection point shown in the Figure 3) will do little to improve the beam current. Conversely, lowering the heater voltage setting from the optimal point will not provide a sufficient temperature to produce enough available electrons.

moves as does the heater voltage level. By analyzing the heater voltage setting and how much additional voltage adjustment capacity is available, a prediction of remaining TWT life is made.

This LIFEEXTENDER information is readily available through the HPA's M&C and/or GUI interfaces, allowing the user to better plan for maintenance.

[www.cpii.com/satcom](http://www.cpii.com/satcom)



Figure 4. LIFEEXTENDER/LIFEPREDICTOR GUI screen. The remaining TWT life is shown in the lower left hand box.



# The Future Of VSAT Is Multi-Service... A Newtec Perspective

By Kevin McCarthy, Vice President of Market Development, Newtec

**T**he global VSAT market has traditionally consisted of specialized service providers, each focused on specific vertical markets and regions.

Until now, specialization and customer intimacy have been the key differentiators for most vendors. However, as the industry consolidates and bandwidth demand skyrockets, economies of scale will become the primary competitive advantage. In addition, with the advent of High Throughput Satellites (HTS), satellite operators will be compelled to start offering managed services (in Mbps) across multiple spot beams and vertical markets.



Gone are the days where a satellite platform will be used for one purpose.

## Key Characteristics Of A Multiservice Platform

Supporting a wide range of applications, while maximizing economies of scale, requires a flexible, efficient and scalable multi-service VSAT platform, with five key characteristics; see the image below...



Newtec's unique Newtec Dialog® multi-service platform offers these key enablers and supports an unparalleled range of applications.

Everything from Business to Consumer (B2C) to high-end cellular backhaul and mobility can be supported on this single platform.



A multi-service platform supports multiple markets in a single platform.

## Modem Types

The key to success is to offer a range of modems that meet diverse technical requirements and price points. At Newtec, we provide:

- For the **lower-end**, the Newtec MDM2000 line of modems (like the Newtec MDM2200 IP Satellite Modem) provides a cost-effective B2C solution, based on the robust MF-TDMA technology. MF-TDMA is optimized for bursty traffic and can scale to hundreds of thousands of terminals.
- For the **mid-range** enterprise market, the MDM3000 series of modems, coupled with Newtec's patented Mx-DMA™ return technology (Cross Dimensional Multiple Access), provides the perfect balance of cost and performance. Mx-DMA assigns dedicated SCPC carriers to each terminal but adjusts the symbol rate, frequency, MODCOD and transmit power every second (for every terminal) in response to variable bandwidth demand and changing radio frequency conditions. This unique approach delivers the efficiency of SCPC with the dynamic bandwidth allocation



capabilities of MF-TDMA. The MDM3000 series can also operate in MF-TDMA or SCPC modes, further increasing its versatility.

- For several years, we have offered our MDM6000 series to the **high-speed** and point-to-point backbone market, supporting speeds up to 425Mbps (duplex) and MODCODs up to 256APSK. The MDM6000 was the first modem on the market to support the new DVB-S2X standard. It incorporates Newtec's Bandwidth Cancellation (BWC) technology that allows two carriers to be transmitted in an overlay fashion, providing record-breaking spectral efficiencies.



### **Something New Is Coming**

In order to address the high-end backhaul and mobility markets, Newtec is developing next-generation Newtec Dialog<sup>®</sup> modems that will offer industry-leading performance and efficiency. Supporting the latest DVB-S2X waveform, wideband carriers and unprecedented throughput, Newtec Dialog<sup>®</sup> will maximize the capabilities of upcoming HTS satellites.

From a commercial perspective, a flexible licensing model and a modular hub architecture is key, as such a model enables service providers and satellite operators to start small and "pay-as-they grow." With a simple upgrade path, Newtec customers can add outbound carriers, return technologies and throughput capabilities to efficiently address new opportunities and markets.

The VSAT industry is undergoing a radical transformation, from both a commercial and technical perspective. The next generation of service providers will be required to address an unprecedented range of applications while driving massive economies of scale. Having the right multi-service platform will be the key to success in this new VSAT paradigm.

### **The future of VSAT is multi-service!**

[www.newtec.eu](http://www.newtec.eu)

*Kevin McCarthy serves as Newtec's Vice President of Market Development, specializing in mobile satellite communications. McCarthy has been in the satellite industry for over 15 years. He holds a Bachelors degree from the Johns Hopkins University, a Master's degree in Computer Information Systems from the University of Miami, and a Master's degree in Finance from the Florida International University.*

*Prior to joining Newtec, McCarthy worked for MTN Satellite Communications, where he served in various roles, including Senior Vice President of Network Engineering and, most recently, COO. McCarthy started his career at Norwegian Cruise Line, as a network engineer.*

## Rural Schools In South Africa + Italy Linked Together Via ESA + SES Techcom Services Program



**Teachers and students from rural schools in South Africa and Italy are benefiting from an ESA-supported project that enriches education through SATCOMs.**

The Sway4edu2 system brings rural schools online via SATCOMS. The setup provides access to

eLearning for teachers and students, media content and other online monitoring tools and information. It is funded by ESA's Advanced Research in Telecommunications Systems program and Openet Technologies. A launch event on 17 June 2015 connected Tricarico primary school in the Basilicata region of Italy with the Babati Primary School in the Mpumalanga region of South Africa.

Twelve schools with 6,500 students in the Mpumalanga region of South Africa and the 60-pupil Comprehensive School of Tricarico-Calciano in the Basilicata region of Italy faced similar disadvantages of having no Internet capability: few resources and limited access to information.

Sway4edu2, Satellite Way for Education, is improving this. ESA's Advanced Research in Telecommunications Systems program and Openet Technologies in partnership with Luxembourg's satellite broadband operator SES Techcom Services are working together to close the digital divide.

Each school was equipped with satellite terminals, solar panels and batteries where needed, laptops, tablets, a projector with screen, and loudspeakers. The setup provides Internet connectivity and access to eLearning for teachers and students, media content and other online monitoring tools and information.

Satellite terminals provide Internet connectivity, with solar panels and batteries where needed, laptops, tablets, a projector with screen, and loudspeakers as part of the Sway4edu2 installation funded by ESA's Advanced Research in Telecommunications Systems program and Openet Technologies. The setup brings rural schools online.

The Singita Community Development foundation in South Africa is supervising the installation of the equipment, the provision of raw material for the online courses, and in collaboration with the Department of Education, the mentoring and training of 200 teachers in the effective use of the system.



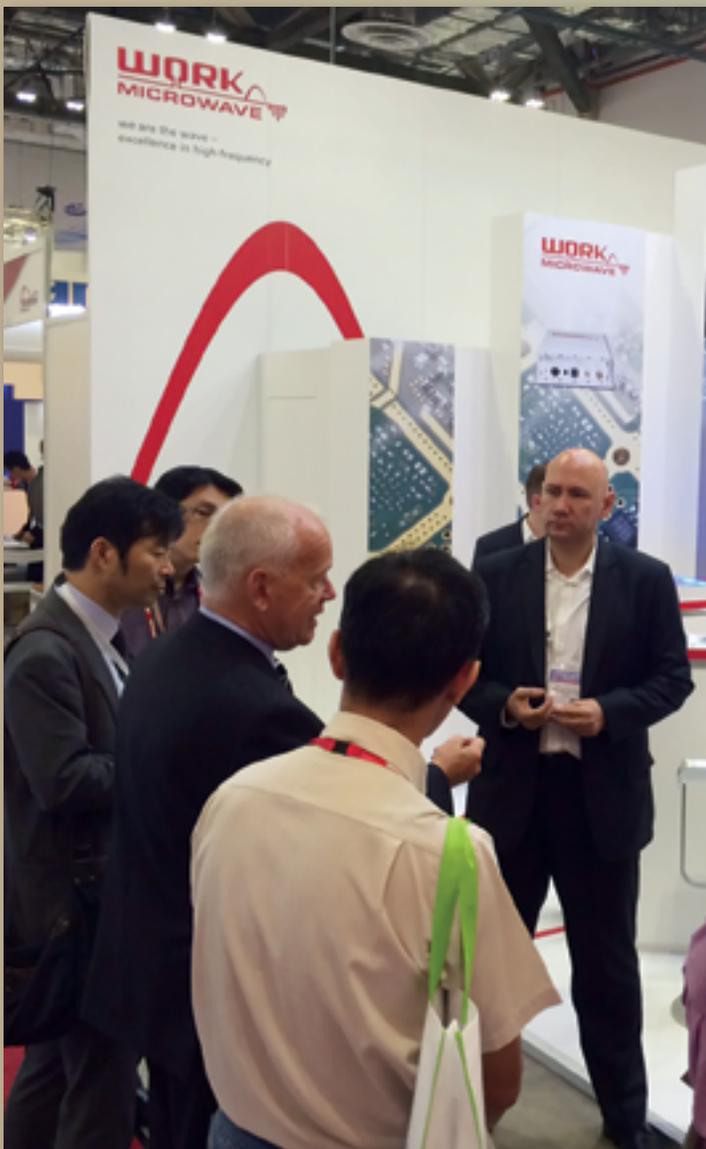
# Why The IRG Is Not Taking Their Tour To IBC2015

By Martin Coleman, Executive Director, the Satellite Interference Reduction Group (IRG)

**A**s many of you may already know, last year we instigated the now infamous Carrier ID (CID) tour which takes visitors to various exhibitions around a trade exhibition's show floor to experience the process of CID, from transmission, through detection, to resolution.

I, for one, have been extremely pleased with the results of these tours, as they generated a great deal of interest in interference reduction at every show we have visited and managed to really get the message across to a broader demographic.

Generally speaking, we attempt to conduct the tour in order, although sometimes the show floor didn't allow that to occur without taking a rather rambling route. On the tour, the first element we would talk about is transmission, followed by visits to encoder manufacturers, such as those exhibiting at IBC, including Comtech, Newtec, Harmonic, Work Microwave and others. We then discuss how CID is detected, with SAT Corporation



Martin Coleman offering information at a participating company's booth during an IRG tour at CommunicAsia2015.



and Siemens Convergence Creators as examples of this technology. The tour culminates with the satellite operators who describe how they use these tools to resolve interference when such occurs.

At CABSAT and CommunicAsia, these tours were particularly well-received, with fairly large tours winding their way around the show floor. However, IBC and the satellite-specific shows did not see anywhere near the same number of participants.

I'm certain this is in partially due to the culture here in Western Europe as well as in the U.S.—attendees at these shows don't like to follow a tour—they seem to appreciate knowing where we the IRG is going and then make their own way around the show. What is true is that at these shows, even if the tour wasn't that popular, the people who did respond to our invitation were highly receptive to what we, the IRG, and the companies had to offer on the tour and what all had to say about interference and the solutions available (as well as yet to come).

With this in mind, this year, we won't be touring IBC—what we will be doing is to bring our English cream tea to the show, but with a twist. There will be more information to follow regarding this surprise.

The message of the tour remains truly important, and this year's CommunicAsia saw an expansion beyond CID to demonstrate other technologies that are aimed at reducing interference. Therefore, here is my guide to who you should consider visiting at IBC2015 if you would like to understand how to reduce interference. Hopefully, we will see many of you making your own interference tour. However, if you would still like to have an IRG-led tour, or simply want to talk about these technologies, then please email [press@satirg.org](mailto:press@satirg.org) and we will make certain such happens for you.

## CID—Transmission

Obtaining the correct CID information included at transmission is clearly an important part of the puzzle. Over the past couple of years, more and more modulators and encoders have been launched that possess CID capability—in fact, so much so that finding one without CID is rather difficult. This makes CID information transmission easier to implement for operators and users. If you are replacing equipment, Ensure your equipment replacement units have CID capability and make certain you and your colleagues know how to enable the technology, as it is often set as "off" by default. If you are heading to IBC, visit these stands to learn more:

*Comtech EF Data — 1.F80*

*Harmonic — 1.B20*

*Newtec — 1.A49*

*Work Microwave — 4.A77*

To review the full list of available products with CID, please visit the IRG website at [satirg.org/resources/cid-ready-products/](http://satirg.org/resources/cid-ready-products/)

## CID—Detection

Once CID information has been transmitted, the operators need to be able to detect it. For users, being able to detect CID means they can also verify your CID is present and is displaying the correct information—something which could prove crucial for spotting errors. There are a number of companies exhibiting at IBC which can help you with that and help you understand the process of CID detection, such as:

*SAT Corporation by Kratos—1.A01*

*Siemens Convergence Creators—4.A30*

## **CID—Resolution**

The resolution portion of this technology is handled directly by the satellite operators. If, as a satellite operator, you are not yet ready for this inclusion, or if you would like to understand how such is handled, visit one of the many satellite operator members who are exhibiting at IBC, such as:

*ArabSat* — 1.B38

*Es'hailSat* — 4.B74

*Eutelsat* — 1.A59

*Hispasat* — 1.A50

*Inmarsat* — 2.B19

*Intelsat* — 1.D59

*SES* — 1.B51

*Telenor* — 2.B19

*Turksat* — 1.C71

## **VSAT Tools**

The other important area of discussion is that of VSAT interference. As we have previously cited many times, VSAT is the cause of the largest proportion of interference issues and is a real problem for the industry. This is, in part, due to unmanned systems that often operate in remote locations with the additional challenge that many times these systems are often operated by untrained personnel, whether such involvement is for the installation of the systems or their operation. Fortunately, innovation is responsible for numerous emerging systems right now and a number of significant tools are being launched. Please visit us at IBC2015 if you would like to solve your VSAT interference issues.

## **New Technology**

Additionally, new, exciting and innovative technology solutions are now able to directly mitigate or even eliminate interference. These products are now available and are making a substantial difference. For more information on this technology, contact [press@satirg.org](mailto:press@satirg.org) to obtain the details as well as to receive invitations to visit manufacturers of these specific products who will be present at IBC2015.

## **Training**

Of course, training is extremely important to stop interference. Our EUI advisory committee has helped to create a customized training and certification program for broadcasters. This program is offered through the Global VSAT Forum (GVF). For more information, please visit the GVF stand at **6.B05**. In addition, visit the International Association of Broadcasting Manufacturers (IABM) at stand **8.F51a** to find out about the training courses they have to offer, as well.

Finally, we at IRG (stand **4.A61**) will be at IBC talking to Members and others about how we can continue to reduce interference. We have meeting facilities that may be booked as well as access to refreshments and the Internet for IRG Members. If you would like to book time with us at IBC2015, to learn more about interference, or to engage your own personalized tour, please get in touch with us via [press@satirg.org](mailto:press@satirg.org).

*Martin Coleman is Executive Director, the Satellite Interference Reduction Group (IRG). Martin is responsible for spearheading a number of significant initiatives and is committed to introducing new technology and processes to mitigate all types of satellite interference: VSAT TDMA Systems, BIG Data; a reference guide to Interference; sorting out those Difficult Cases including new standards and processes within the Geolocation industry; assisting the ITU in dealing with Harmful Interference; and implementing Carrier ID (CID). Martin regularly addresses the industry on the subject of satellite interference, at global industry events, on an individual basis, and at IRG-led conferences and webinars.*

## Serious Contracts Signed By ESA + Airbus Safran

**The European Space Agency (ESA) and Airbus Safran Launchers have signed a 2.4 billion euros contract covering the development of the Ariane 6 launcher in its two versions, Ariane 62 and 64.**

This contract includes, notably, a firm commitment of some 680 million euros for initial development activities (phases A & B) up to the Preliminary Design Review scheduled for mid-2016.

Beyond the contract signed today the total amount for the development of the launcher will be approximately €3 billion, including boosters to be shared by Ariane and Vega, as well as 400 million euros of industrial investment.

“The contract, signed within a matter of months of the historic decision taken by representatives of the ESA member states during the Ministerial Conference on December 2, 2014 in Luxembourg to build a latest generation European launcher, will see industry taking on the leading role in its design and



marketing,” said Alain Charneau, CEO of Airbus Safran Launchers.

“Both our and our European industrial partners’ commitment is a sign of our determination to provide our customers, whether they be institutional or commercial, with a launcher that is as reliable as ever while being increasingly competitive and adapted to the rapidly evolving space market.

“I would once again like to thank the European Space Agency and the national agencies, in particular the CNES, the DLR and ASI, for their support and trust.”

The Airbus Safran Launchers teams will now finalize the design of the two versions of the Ariane 6 launcher and the accompanying industrialization process as part of a new industrial structure established within Europe to improve efficiency.

Image is an *artistic rendition of the Ariane 6 configuration using four boosters (A64).*



# Ground Stations Face Squeeze Of Hybrid Networks & Rising Customer Expectations

By Phill Howard, Director of Solution Architecture, Kratos Defense & Security Solutions

**H**ave you read about the latest broadcast disruption? Probably not. Equipment failures in ground stations typically don't make the news such as the latest headlines about HTS or smallsat constellations, but that doesn't mean they are any less important—or without drama.

Let's not forget that after the rockets are launched and satellites deployed, the essential role of ground stations then kicks in. Straddling RF and IP, digital skyways and terrestrial info-highways, today's ground stations face new challenges to deliver services through hybrid, interconnected global networks. No longer residing in its RF silo, ground stations today look more like data centers, with tens or hundreds of overlapping networks and a proliferating mix of RF and IP equipment.

Yet, despite the technology convergence, ground station operations are struggling to keep pace from a process and a people standpoint. Some staff are monitoring RF interference; others network performance; while others interface on customer service issues.

When service disruptions occur, a scramble ensues to isolate the problem and unravel which customer services and SLAs are being affected. With numerous alerts, but too little visibility, the lowest priority service or SLA may be treated like the highest priority. All while the SLA clock ticks, penalties mount and customer frustration grows.

Satellite operators won't find much sympathy from customers, whose only concern is that their broadband, video or voice service is delivered shipboard, in-flight or at a remote site with little to no downtime. That is the value proposition, after all.

Ground station operators are at an inflection point where they face a widening gap between their current concept of operations and the demands of delivering high-availability services through a complex hybrid network environment. This article looks at how ground station operations can leverage advances in automation, big data intelligence, predictive analytics, and SLA management to efficiently deliver high Quality of Service (QoS) for the near 100 percent uptime expectations in an always-on world.

## The New Model

No longer a simple RF hand-off, or 'fire up and forget' service for a carrier, customers are looking to buy services in different ways. That may be a slice of a beam, a data pipe, and deeper integration into their operations. This is a merging of satellite and terrestrial environments with more of an IP type business model and IT service arrangement applied. Yet, ground station tools and systems weren't designed for those environments.

With far more things to break and fail in a mixed RF-IP environment, unraveling the cause and effect of service disruptions can be similar to playing a three level chessboard. The jack of all trades RF engineer, who managed hardware and could troubleshoot pure-play satellite operations, has grown into a balkanized division of labor, with engineering, networks, and customer service teams. Before a modem, server or antenna control unit can be repaired or replaced, the impact on the customer must be gauged. The information to make those associations, spread around,

requires teams to dig through what are often thousands of spreadsheet items and diagrams, translating and reconciling information in an iterative time-consuming cycle.



## Automation

If teleport operations are a mix of people, processes and technology, a concept of operations defined as 'service quality management' (SQM) is a leap ahead to unify them. In this more mature model, automation does the heavy lifting. All of the operational data from hundreds or thousands of individual IP and RF components are gathered into a virtual model or graphic representation of the end-to-end services to customers.

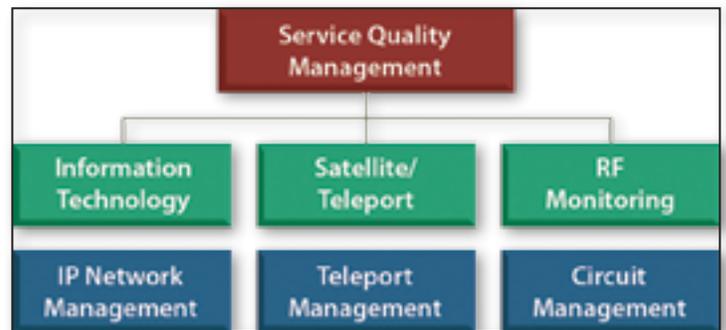


Figure 1. Uniting and reconciling satellite and terrestrial operations with an SQM approach.

SQM fuses together and standardizes all device and metric information into a unified dashboard, including data from monitor and control, network management, element management, and carrier monitoring systems.

A major reason these systems haven't fully converged is because the types of data each monitors is different, as are the protocols, instrumentation, and terminology. Satellite managers, for example, rely on EIRP, Eb/No and BER as key performance indicators, while terrestrial network managers rely on latency and packet loss. Yet all five factors directly affect QoS and bandwidth usage and need to be managed together. SQM unites this so the data center group and the RF team can manage services that traverse both technologies. This also centralizes the management of hybrid and distributed networks in the NOC, uniting what can be silo'd operations of each teleport with its own systems.

## Big Data Intelligence

With a single converged view of satellite and terrestrial networks, no longer do staff hit a dead end because their tools only monitor a segment of the network. Big data analytics correlate all key information—equipment names, locations, network links, carrier monitoring and other performance metrics—into a single management layer.

Operators can instantly see the associations between all of the equipment, services, and SLAs in a unified dashboard. Rather than reacting to a series of alerts from racks of indistinguishable equipment, staff gain visibility into each component that makes up the service chain. They can drill down into device issues for quick root cause identification, while also understanding the impact



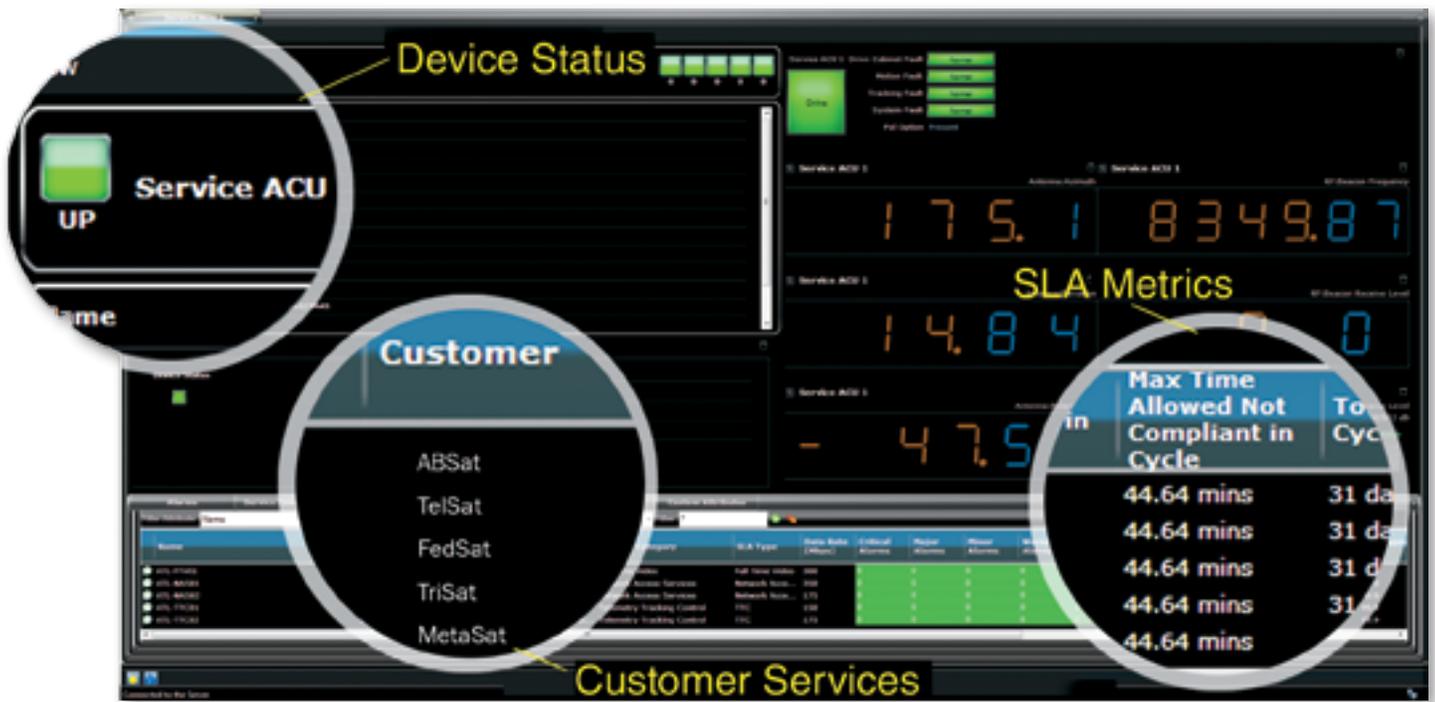


Figure 2. Displaying the status of a device with its associated customer services and SLA metrics.

on customer SLAs, whether from a failed modem, performance decay of a high power amplifier, bandwidth saturation, or a drop in carrier power levels.

Is the modem supporting one or 15 customers? Which critical SLAs are being affected, and when do penalties or charge-backs start to kick in, and how much? Having that insight readily available in the runtime system is immensely powerful. With those correlations, staff can make smarter decisions, such as whether to default to a full switchover of traffic to a redundant path, which can be more costly and disruptive, or to isolate and bypass the culprit device, replacing it at the next authorized service window. Even for routine maintenance and repair, staff will know exactly which customer services will be affected before potentially setting off a further cascade of problems or outages.

This accelerates issue response and remediation at the very time when service quality expectations are ratcheting up. Shaped in part by consumer experience with smartphones and always-on broadband at home and work, Service Level Agreements (SLAs) that were once less formalized are becoming more codified and more stringent, reflecting demands of the new normal—99.999+ uptime.

### Predictive Analytics

Speaking of problem resolution, better yet, rather than waiting on alarms for what's broken, the predictive analytics in service quality management can be applied to equipment to answer 'when will this device fail,' notifying operators beforehand. These predictive analytics can detect a range of common issues that affect satellite operations such as increasing power levels of high performance amplifiers indicating a possible rain fade event, beam voltage fluctuations highlighting an impending transmitter problem, rising temperatures on low noise amplifiers signaling near-term failure, or server memory utilization pointing to a capacity or performance issue before a crash.

Traditional management systems only provide a real-time alarm for equipment performance, not a future prediction of failure. With a service quality management approach, operators can be alerted well in advance of

a device failure, so they can anticipate or have a spare in place to minimize service impacts and SLA penalties.

### SLA Management

Like a cross section cut-away of a garden, SQM reveals grains of sand on bottom (devices) percolating up to a root system of networks, with the emerging flower on top as the customer service. Just as every 'flower' may not need the same watering or TLC, neither do all services and SLAs require the same immediacy of attention. With limited resources, staff can now prioritize and manage services by the most important criteria, whether the most stringent or punitive SLAs or critical services.

Picture multiple services having an outage at the same time, such as a high-speed Internet for a deep sea oil platform, video conferencing service for an office, and a long distance learning application for a university. Now that they are able to view the compliance status and the cost of customer outage credits, operators can clearly see that the video conferencing service has the most significant penalty associated with a violation, making it the highest priority issue for resolution, with the long distance learning application and the Internet service tiered second and third.

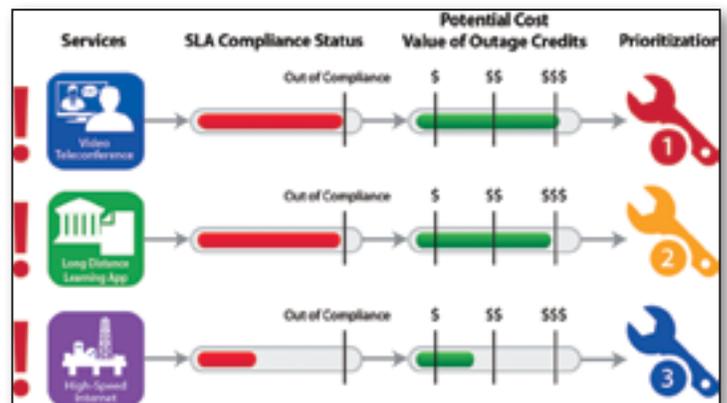


Figure 3. Prioritizing service issues based on SLA compliance and cost of penalties.

Understandably, ground station operators proficient in RF may be less so when it comes to these advanced principles of service management. By adopting these concepts and capabilities, they can mature their IT operations in step with the "Gartner Maturity Model." This outlines how IT operations can progress from Chaotic and Reactive management (ad hoc, non-centralized alert and event monitoring) to Proactive (predict, prevent and manage availability), up to Service (SLA-service views) and to ultimately Value, which links IT processes to business impact.

At a time when disruptive tech giants and startups are entering the space industry, and satellite and terrestrial service providers are looking more alike in the race to build global end-to-end services, SQM gives operators a competitive advantage to efficiently manage high availability service over a combination of satellite, fiber, wireless or microwave networks and infrastructure. Customers will look to align themselves with and choose ground station partners they can trust to outsource more of the complexity, who can provide a single-point of accountability for end-to-end service delivery, and add continuous improvement cycles to realize the network's full revenue potential.

#### **Future Proofing—Scaling Up**

In the face of game-changing new satellite technologies that are bringing exponentially more throughput and bandwidth, ground station operators will want to re-examine their concept of operations, adopting approaches that can scale to the volume, variety and velocity of these mixed network and device environments. By taking advantage of service quality management and its use of automation, big data visualization, predictive analytics, and

SLA management, ground station operators can evolve their expertise to better deliver QoS with less manual processes.

### ***Here's An SQM Solution That Meets The Demands Of An Always On World***

**As customer expectations continue to rise along with the expansion of hybrid networks, ground stations are looking for technologies that help them keep pace with the growth. NeuralStar SQM ([www.KratosNetworks.com/SQM](http://www.KratosNetworks.com/SQM)) is the first end-to-end enterprise software product for satellite and terrestrial service management.**

**With NeuralStar SQM operators are able to manage customer services, SLAs and the supporting devices across the globe and view the status of every service using real-time intelligence and analytics. Service providers are able to quickly assess which customers are affected by a degradation or outage of even a single device anywhere in the network. NeuralStar SQM enables operators to advance their ground station operations to improve quality of service and customer satisfaction, maintain and grow revenue and optimize satellite and terrestrial operations.**

*Phill Howard has more than 21 years of experience in satellite and infrastructure management for military and commercial systems. He has diverse hands-on engineering experience as a subject matter expert spanning RF/satellite communications, spectrum management, software development, management and control systems, complex and large hybrid enterprise systems. Over his career, Phill has helped provide solutions to some of the industry's largest and most complex systems.*

# High Altitude Communication Solutions with SKYWAN... An ND SatCom Perspective

By Volker Jarsch, Director, SATCOM Solutions, ND SatCom

**C**ommunications networks that must operate at high-altitude in mountainous regions have always been a challenge to install.

Low temperatures, storms, power outages or even low atmospheric pressure can impact upon the availability and reliability of the equipment in use. However, what if you have an application scenario that demands that the high altitude-based communication system operates flawlessly at all times?

ND SatCom offers a solution that has proven complete accuracy under such harsh environmental conditions. Satellite network solutions that are based on the company's SKYWAN modems with integrated IP-routing were implemented in many remote and inaccessible parts of the world and reveal a track record of reliability and high availability.

ND SatCom's SKYWAN, unlike other SATCOM networks, provides ad-hoc and on demand connectivity in one single hop via the satellite, directly between those sites which need to communicate at that moment. The connectivity is automatically established without manual or network management intervention, and is based on the dialing number of a phone call or the address of IP data packets.

The network's satellite capacity is automatically assigned by the system, considering the Quality of Service (QoS) required for the respective type of traffic, and the data volume. This allows for phone calls transmissions with minimum latency as well as voluminous files, or even real-time data, such as video, being handled.



The communication is blocking-free, so many parties at various sites can communicate with one another at any time. A SKYWAN network is private and requires no terrestrial routes between the sites and users. The network is a compact and user friendly system that supports thousands of daily users to communicate securely, effectively and quickly via satellite.

## A Case Study

The Qinghai-Tibet Railway is the world's highest railway. More than 960 km (80 percent) of the total 1,142 km of the Golmud-Lhasa section runs at an altitude of more than 4,000 meters (13,123 feet).





The Tanggula station at 5,068 meters above sea level is the highest situated railway station in the world. The passenger connection to and from the Tibet Autonomous Region to China is managed by 361 high altitude passenger carriages that are equipped with special, enriched oxygen and UV-protection systems.

The railway track was placed into service in July of 2006 and is a crucially important means of transportation for people as well as their goods in this remote region. The government of China considers this railroad to be on the greatest feats in modern Chinese history.

Within the Golmud to Lhasa section of the line there are 45 stations, 38 of them unstaffed, all fully monitored by the control center in Xining. The railway passes through regions of permafrost as well as areas that are prone to earthquakes.

The Chinese authorities saw the need of establishing an emergency communications network to ensure safe railway operations under a worst case scenario. Due to a lack of terrestrial infrastructure, the system had to be satellite-based and had to ensure the greatest availability possible.

The challenge was to find a solution that would comply with extreme weather conditions. In particular, the low atmospheric pressure at 4,000 to 5,000 meters above sea level was a key requirement. The project was awarded to ND SatCom.

In 2007, the SKYWAN network was deployed as the backup and emergency communications network along the Qinghai - Tibet Railway. The network consists of transportable "FlyAway" stations as well as a fixed 3.7 meter gateway station. This gives the railway authority the option of establishing a FlyAway station at any point along the railway line to supply the control center with up to date information (voice, video and data) about current local conditions. That, in turn, ensures that decisions made on the safe passage of the trains can be based on real-time data—an element that has an impact on the people who rely on the railway for moving in and out of the region as well as the greater economic impact on the transfer of goods into the area.

## Benefits

A satellite communications network located in such harsh environments may often be exposed to natural interferences at some sites, e.g., heavy snowfall, power failures or storms that may impact station operations. In such cases, a SKYWAN network has several built-in features that prevent a complete network outage: The network control functionality can be diversified over two geographically dispersed stations that require no terrestrial connection between them. In the case that one becomes inoperable, the other can immediately take over network control. The user communications via the other sites continue without interruption. An additional advantage for the network operator is that the network control station is lightweight and quite compact: The unit fits into a small, 19-inch rack. This allows for the easy deployment of a completely new network in any area, at any time.

User communications are only transmitted via the stations to which the users are directly connected. Those stations are connected in a single-hop via the satellite and require no other terrestrial infrastructure or routes.

This means that a failure of terrestrial routes has no influence on safe and reliable communication between the user's sites.

When used as a backup network, the built-in IP-router monitors the availability of the primary link and automatically switches over to the secondary link, e.g., via satellite when a terrestrial link becomes unavailable.

The operational experience of such highly available networks and their features, combine to achieve the utmost Quality of Experience making SKYWAN an ideal choice as well as for managing communications under extremely demanding circumstances.

*Volker Jarsch works as Director Satcom Solutions for ND SatCom. His tasks include the development of concepts for synergies between customer applications and their systems and the features of ND SatCom's portfolio of SKYWAN and integrated terminals. His experience builds on numerous customer projects in the field of governmental applications and enterprise communications which were realized by ND SatCom in the past years.*



*Image of train travel on the Lhasa-Shigatse extension of the Qinghai-Tibet Railway.*



## Canadian Government To Receive Free Access To TerraSAR-X + TanDEM-X Imagery

**Airbus Defence and Space has signed an agreement with the Canada Centre for Mapping and Earth Observation (CCMEO) providing Canadian governmental and institutional data users free access to TerraSAR-X and TanDEM-X satellite imagery for pre-operational use.**

A delegation from the Northwest Territories (NWT) of Canada led by the Honorable Robert R. McLeod, Premier of NWT, along with senior officials from the Government of Canada recently visited Airbus Defence and Space in Ottobrunn, Germany. On this occasion, the long-lasting relation between Airbus Defence and Space and the Government of Canada was reinforced by the signature of this agreement.

The main goal of the agreement is to support current efforts of Canadian agencies working on the development of operational monitoring concepts that exploit the benefits of using Canada's C-Band radar mission together with the German



*Artistic rendition of the TerraSAR-x and TanDEM-x satellites.*

X-Band satellites for maritime surveillance, disaster management and environmental monitoring. Additionally the free data provision will support study purposes and capacity building through professional training and education.

The TerraSAR-X and TanDEM-X radar satellite missions were established in 2007 and 2010 respectively as a Public-Private Partnership between the German Space Agency (DLR) and the Geo-Intelligence Program Line of Airbus Defence and Space. Since the launch, the missions benefited from Canada's Inuvik Satellite Station Facility (ISSF), which, thanks to its location above the Arctic Circle, provides access to most of the satellite's orbits in a timely manner.

The new Mackenzie-Valley-Fiber-Link currently under development for Inuvik will be providing further shortened access time to data as well as Near-Real-Time monitoring for large parts of Northern Canada in support of maritime surveillance and natural disaster monitoring.

## RUAG Space + United Launch Alliance Strengthen Their Composites Biz



### **United Launch Alliance (ULA) and RUAG intend to further strengthen their cooperation.**

To this end, the two companies announced a new strategic partnership in which RUAG will establish a U.S. composites production capability located directly within ULA's Decatur factory.

RUAG already delivers carbon fiber structures for ULA's Atlas launchers—the payload fairing for the larger Atlas V-500 launcher as well as the interstage adapter for the smaller Atlas V-400.

RUAG currently produces these structures in Switzerland at its Zurich and Emmen locations. Starting in 2018, the structures are to be produced in Decatur, where RUAG will also manufacture other carbon fiber structures for the new Vulcan launcher.

RUAG will continue to manufacture the payload fairings for the European Ariane and Vega rockets in Switzerland.

United Launch Alliance (ULA) is a joint venture between Lockheed Martin and Boeing. ULA builds the Atlas and Delta launch vehicles, which have already been used for some 1,300 satellite missions. Customers include NASA and the U.S. Air Force, the U.S. Department of Defense and the U.S. National Reconnaissance Office.

"ULA and RUAG have been working together successfully in the Atlas program for more than a decade. Now we can build on this collaboration with the new Vulcan launcher and the new production site in the U.S.," said Peter Guggenbach, CEO of RUAG Space.

Tory Bruno, ULA's president and CEO, said, "As ULA looks to the future, we will transform the future of space launch by making space more affordable and accessible, while continuing to deliver on ULA's unparalleled reliability and precision."

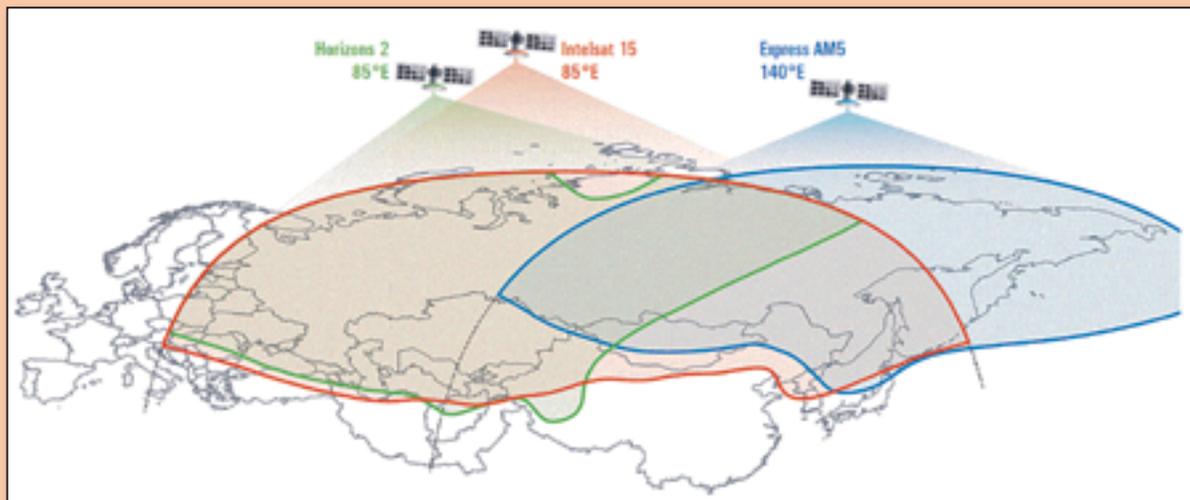
# Ten Years At The Top... An Orion Express Perspective

By Kirill Makhnovskiy, General Director of LLC Orion Express

**In 2015, this Russian federal satellite service provider celebrates a tenth anniversary of service.**

The company has numerous achievements that they are proud about, from developing and creating the largest and most unique satellite based TV service and media platform in Russia with more than 300 channels, to the fastest growing content provider in the market. During 2015, Orion Express attained fourth place in the Top-5 list of the pay-TV operators.

Orion Express' pay-TV package is notable for content balance and affordability. The company created six of the broadcast TV channels, with three of these channels reserved for important social projects. The company has been a notable presence within the Russian satellite television market since 2005. Two key business directions are currently in development. They are the provisioning of satellite television services to subscribers using the company's own brand name—Telekarta—with focus on B2C and B2B consumers.



## B2C

The delivery of Direct-To-Home (DTH) services started in 2010, following the launch of the Telekarta satellite-television project. As of today, Orion Express is the only Russian operator that serves 100 percent of the Russian territory and CIS-states. Orion Express broadcasts via the following satellites: Intelsat 15 (85 degrees east), Horizons 2 (85 degrees east), and Express-AM5 (140 degrees east).

According to analyst reports, Orion Express has acquired approximately 7 percent of the pay-TV markets. Growth of the subscriber base continues on the increase. During the first half of 2015, the number of subscribers grew at 5 percent, while the common pay-TV market growth was estimated at 3 percent. At the close of the half-year period, the number of Orion Express subscribers was 2.7 million.

Effective marketing policies, attractive prices for both the content delivery to customers as well as the necessary on-premises equipment, and a finely tuned balance of the TV packages themselves ensure ongoing, successful, business growth for Orion Express. In the standard-packages offerings of Telekarta, customers may select from more than 200 TV-channels that represent the most popular content genres. These offerings

include the products of leading Russian and foreign major suppliers, such as Viacom, Viasat, Stream, CTC Media and many others.

## B2B

In the field of B2B solutions, Orion Express has long-term professional experience in this market segment and offers a unique, full-service platform for broadcasters and TV channels that include: licensing, content localization for Russia, uplink, satellite capacity services, cable operators' distribution, and playout.

Today, Orion Express is a leading media platform within Russia and CIS. Western and Russian programmers, such as Discovery, Eurosport, Sony, Viasat, Viacom, CTC Media and others have selected Orion Express as their media platform for this region of the world. These partnerships give broadcasters undeniable advantages. First, the platform is built on Horizons 2, Intelsat 15 and Express AM5 spacecrafts that provide unique coverage

of Russia, including Siberia and the Far East, as well as CIS and East Europe. Secondly, a stable satellite signal with optimal technical support is a constant provision. Third, two satellites are always ready in case a hot backup system is required.

More than 350 cable TV and IPTV providers in Russia and CIS (including Rostelecom, MTS, ER-telecom, Ufanet, Vimpelcom, and so on) are receiving channels directly from the Orion Express

satellite platform. More than 20 TV channels are provided for distribution to local cable providers, whose market penetration exceeds 10 million subscribers, collectively, within cable and IPTV networks in all regions of Russia and CIS. Orion Express is also a key media partner with Intelsat in Russia and CIS.

*Kirill Makhnovskiy was the chief specialist within the regulation authority's work department with Moscow Cell Communications from 2004 to 2006. This was followed by a position as a chief Sky Link. From July 2007 to June 2008, Kirill was the deputy general director in the company TelecomInfoProekt, which was then followed by a position as the deputy director for state and regulation authorities with Telecom Express. In 2011, Kirill was named the director of Orion Express and, then, in October 2014, he was appointed the general director of LLC Orion Express.*





# Opening The Door To Commercial, On-Orbit Satellite Servicing

By Michael Kaplan, Principal Consultant, Kaplan Astronautics

**E**ver since the dawn of the space age, satellite operators have been constrained in their approaches to the space business.

While technological developments have enabled improved capabilities and lower costs, in many respects the space business has, pretty much, stayed the same. Operators are offered little, if any, business flexibility to deal with change. Here are two examples that illustrate this point.

An operator has a satellite developed, launched and operates the craft until the fuel supply is exhausted. Once a geostationary satellite nears the point of operating fuel exhaustion, retirement is in order by moving to a "graveyard" orbit—even if the satellite continues to operate and is capable of serving revenue-providing customers. Wouldn't it be terrific if there existed the means to provide this still valuable asset additional service life to enable a greater return on the operator's investment?

Satellite providers continue to face the reality that, on occasion, their highly valuable satellite asset is not delivered into proper orbit. Wouldn't it be great if there existed the means to move this still valuable asset into the proper orbit to avoid filing an insurance claim or writing off the satellite as a total loss?

These are but two examples of the simplest type of satellite on-orbit servicing capability that could be provided by an orbital space tug to:

- *Extend the life of a still viable satellite*
- *Transport the satellite to the originally intended orbit*
- *Even transport the satellite to a new orbit to provide additional services, in the eventuality the operator's business plans change*

There are three barriers to a viable commercial, on-orbit servicing business, as described next.

**Institutional**—Conservative approaches to fleet management encourages all stakeholders to source a new satellite, rather than to evaluate servicing capabilities. A new industry stakeholder can drive the motivation to pursue satellite-servicing business successfully.

**Architectural**—The simplest and most basic type of satellite servicing includes life extension and de-orbiting as they both require the simplest form of satellite servicing robotics technology: rendezvous and docking. This is the lowest risk, lowest cost and fastest path to providing commercially viable satellite servicing business, especially given the conservative nature of the space business. This approach also offers a positive return on investment within the shortest possible time.

**Financial**—The more up front capital required to go to market, the more difficult the raising of necessary capital can become. The small satellite architectural approach minimizes the amount of "go to market" funding required.

Until recently, only a few national space agencies had the technology and capabilities with which to address these crucially needed services. Thanks to two main factors—the decrease in launch costs and the increase in capability by today's small satellites—a privately owned start-up company, Effective Space Solutions (ESS) has now opened the door to the satellite servicing business.

The company's business approach is to meet current unmet needs in the marketplace using affordable, existing technologies. This has driven ESS to build an orbital space tug around a highly capable, low-cost small satellite bus that is compatible with an ESPA ring payload adapter.



Both of these architectural features enable ESS to minimize recurring and non-recurring costs, enabling the company to offer services at affordable price points. Additionally, as the space tug approach is centered on using existing, flight proven technology, this business thrust promises to be of low risk and highly reliable, as well.

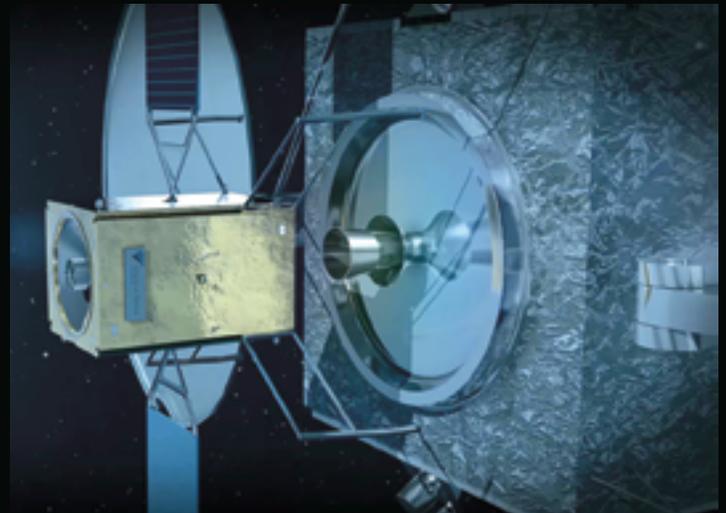
Based on a comprehensive market survey, ESS positioned their initial product to offer life extension and de-orbiting services to increase the profitability for commercial geostationary satellite operators. Communication satellite operators can obtain additional tens-of-millions of U.S. dollars annually with life-extension and de-orbiting services on each satellite, due to the early decommissioning of otherwise healthy, operational satellites. ESS expects dozens of potential commercial customers for this service over the next 10 years.

Having developed a robust architectural approach and the support of a leading venture capital fund, ESS will soon announce an established industrial partner that will be responsible for the spacecraft manufacturing. This contract will cement confidence into place for customers that the services being offered will be affordable and reliable.

ESS plans to launch and operate a fleet of spacecraft to meet current and near-term customer needs. In the long-term, ESS envisions offering ever more sophisticated on-orbit services to customers using sophisticated robotics technologies.

[www.effective-space.com/](http://www.effective-space.com/)

*Michael Kaplan, the Principal Consultant at Kaplan Astronautics ([www.kaplanastronautics.com](http://www.kaplanastronautics.com)), has more than 30 years of leadership experience in spacecraft programs at NASA Headquarters, Ball Aerospace and The Boeing Company. He is a consultant for Effective Space Solutions.*





## The First Image Of Earth Is Served Up By MSG-4's SEVIRI



**On August 10, the Spinning Enhanced Visible and Infrared Imager (SEVIRI) instrument on MSG-4 captured its first image of Earth.**

This demonstrates that Europe's latest geostationary weather satellite, launched on July 15, is performing

well and is on its way to becoming fully operational when needed after six months of commissioning. The European Space Agency (ESA) was responsible for the initial operations after launch (the so-called launch and early orbit phase) of MSG-4 and handed over the satellite to EUMETSAT on July 26.

The first image is a joint achievement by ESA, EUMETSAT, and the European space industry. For its mandatory programs, EUMETSAT relies on ESA for the development of new satellites and procuring the recurrent satellites like MSG-4.

The MSG satellite's main payload is the optical imaging radiometer, the so-called Spinning Enhanced Visible and Infrared Imager (SEVIRI).

With its 12 spectral channels, SEVIRI will provide 20 times more information than the current Meteosat satellites, offering new and, in some cases, unique capabilities for cloud imaging and tracking, fog detection, measurement of the Earth-surface and cloud-top temperatures, tracking of ozone patterns,

as well as many other improved measurements. The SEVIRI instrument has been manufactured by European industry under the leadership of Astrium SAS in Toulouse, France.

SEVIRI is a 50 cm-diameter aperture, line-by-line scanning radiometer, which provides image data in four Visible and Near-InfraRed (VNIR) channels and eight InfraRed (IR) channels. A key feature of this imaging instrument is its continuous imaging of the Earth in 12 spectral channels with a baseline repeat cycle of 15 min. The imaging sampling distance is 3 km at the sub-satellite point for standard channels, and down to 1 km for the High Resolution Visible (HRV) channel.

The SEVIRI instrument is composed of a Telescope and Scan Assembly (TSA), a Focal Plane and Cooler Assembly (FPCA), and an Electronic Unit Assembly (EUA). The EUA consists of three electronics boxes located on the satellite main platform, namely the FCU, the DE, consisting of the MDU and the Preamplifier.



## Executive Spotlight: Don Osborne, President, Information Systems Group, MDA

**M**r. Osborne was appointed Group Vice President and General Manager of MDA in January of 2014. His initial appointment to the company occurred in May of 2009, when he was named President, Satellite Systems, which covered the Montreal and UK operations.

He was then appointed President, Satellite Systems and Advanced Technologies, which incorporates the communications subsystems business in Montreal as well as MDA's robotics business in Brampton, Ontario. Prior to this appointment, he held the position of President, Advantech Networks, a provider of Satellite and Wireless Solutions for the Telecommunications and Broadband markets from 2006 to 2009.

Mr. Osborne started his career with Spar Aerospace in 1983 as a Mechanical Design Engineer. Since joining the management team in 1989, he held positions of increasing responsibility: Manager of Manufacturing Engineering, Director of Engineering, Program Manager, Vice President Sales and Marketing and Senior Vice President and General Manager.

Mr. Osborne holds both a Bachelor in Mechanical Engineering and a Masters in Business Administration, both from McGill University, Montreal, Canada.

### SatMagazine (SM)

Mr. Osborne, would you please provide us with some history and background on MDA?

### Don Osborne

MDA is a global communications and information company providing operational solutions to commercial and government organizations worldwide. We focus on two principal markets, Communications, and Surveillance and Intelligence.

Through our subsidiary SSL, MDA has become a world-class supplier of communication satellites, complementing our established system engineering business in this market segment, with over 50 years heritage of performance and reliability. MDA is also the world's largest independent commercial supplier of spaceborne communication satellite antennas across C-, Ku-, Ka-, L-, and UHF bands.

In the Surveillance and Intelligence market, MDA supports a broad range of government and commercial activities in the areas of national security, environmental monitoring, space robotics, natural resources and agriculture providing end-to-end



RADARSAT-2 imaging of Vancouver Harbor, British Columbia, Canada.  
Image is courtesy of MDA.

solutions to monitor and manage changes and activities worldwide. MDA supports other markets with advanced technology in the areas of complex information systems, terrestrial robotics, aviation systems and services, and unmanned aerial vehicle services.

We've grown from a company incorporated in 1969 in Vancouver, B.C., Canada, with two employees targeting the emerging remote sensing industry, to a global company recognized as a leader in communications and information, with revenues of more than \$2 billion and over 4,800 employees, operating from 11 locations in the United States, Canada, and across the globe.



### SM

One of MDA's well-known satellites is RADARSAT-2, which is now seven years into its mission. Would you provide us with an update on the health of the mission and your expectations for the future operations?

### Don Osborne

While RADARSAT-2 has recently passed the seven year milestone of its mission, the current evaluation of the mission's operational parameters show that the satellite is in excellent health and can be expected to continue to deliver high-quality, reliable SAR imagery for years to come. To evaluate the overall health of the mission, we can look at a number of parameters, such as the amount of fuel on board, the health of the spacecraft's components and the overall experience of the satellite operator.

One of the key operational factors for a satellite is the amount of fuel that is available for routine operations. Over the life of a satellite, orbital maneuvers are required to keep the satellite in its very precise orbit and to avoid collisions with debris that could harm the spacecraft. At launch, RADARSAT-2 used about five percent of its fuel for launch adjustments to achieve the correct orbit. Standard operations for the past seven years have resulted in the use of about three percent of the fuel reserves, which leaves more than 90 percent of the original fuel still on board. RADARSAT-2 could operate for another 30 years and still have sufficient reserves to gracefully de-orbit the spacecraft.

To operate in the harsh environment of space, RADARSAT-2 was designed with redundant systems to ensure that the satellite can continue to function, even if a primary system is damaged during launch, or during operations. Seven years into its mission, RADARSAT-2 is exceptionally healthy.

Of the all the major systems on RADARSAT-2, most are still running on their primary components. Only two systems have experienced issues where the backup components have been engaged, and neither of these systems impacts the imaging ability or quality of the satellite. There are also three non-imaging systems that have experienced only minor performance degradation. The level of spacecraft health on RADARSAT-2 at this stage of the mission has exceeded expectations.





*Artistic rendition of the RADARSAT-2 satellite.  
Image is courtesy of MDA.*

The experience that MDA brings to the RADARSAT-2 mission as the satellite's designer and operator forecasts a long operational life for RADARSAT-2. MDA is a pioneer in space-based SAR and has designed, built and operated some of the most successful Earth Observation missions. Through the development of the RADARSAT Program, starting with RADARSAT-1 in the early 90s, MDA has developed significant experience that applies directly to the operation of RADARSAT-2, and those lessons learned will contribute to RADARSAT-2 having a long life ahead of it.

**SM**

*People can easily understand optical data, thanks to exposure through Google Earth and other consumer-focused platforms. SAR is more technical and harder for even GIS professionals to understand. What are some of the unique benefits of SAR information that make it a valuable tool for people to consider adding to a portfolio of solutions?*

**Don Osborne**

SAR provides some unique capabilities that other remote sensing technologies just cannot provide and delivers unique benefits that make it a valuable addition to the GIS professionals' toolkit.

Potentially the most significant benefit is the reliability of imaging that SAR provides. SAR is an active sensing technology, meaning that the SAR satellite provides its own source of illumination of the Earth's surface. Optical satellites are passive, in that they rely on the sun's light for imaging. This means that optical satellites are weather-dependant.

SAR satellites, on the other hand, are weather and atmosphere independent, which means they can image through clouds, rain, smoke, darkness or other atmospheric conditions. This ensures that any day of the year, subject to addressing the sometimes competing demands of multiple customers, RADARSAT-2 will acquire the imagery our customers need.

One of the unique applications of SAR satellites is InSAR, or Interferometric synthetic aperture radar. InSAR is a radar technique that uses two or more SAR images to generate maps of surface deformation using differences in the phase of the waves returning to the satellite. Because of the highly precise nature of the SAR instrument on the satellite, RADARSAT-2 is able to measure changes in the height of the Earth's surface at a millimeter scale. InSAR-based solutions provide significant benefits for a number of MDA's customers in the Oil and Gas, Mining, Urban Infrastructure and Disaster Management sectors.

**SM**

*RADARSAT-2 has some unique EO capabilities. What applications does RADARSAT-2 provide the most value for, and are there any new applications that you would like to tell us about?*

**Don Osborne**

MDA is a market leader in the operational delivery of time-sensitive, business process-specific, geospatial information across a wide range of markets. MDA focuses on customers that need near real-time data, and we have built our reputation around delivering on these customers' expectations. While we have a large number of applications that leverage the strengths of RADARSAT-2, there are a few that are worth talking about at this juncture.

One is oil spill and seep detection—the current oil price climate has put significant pressure on offshore oil and gas exploration and production budgets. Remote sensing using radar satellites is a proven and reliable tool for the monitoring of broad offshore areas and for over a decade, oil spills have been identified and tracked using these tools. Space-based monitoring is a highly cost effective, non-intrusive, and safe approach to imaging areas well beyond the visual range of platform or aerial reconnaissance. In addition to providing critical information about an oil spill (size, location, extents, trajectory), space-based radar imagery collected globally both onshore and offshore provides valuable historical information.

For instance, offshore imagery archives are routinely used to identify the location and patterns of natural seepage in offshore basins. Natural seeps are used as an indicator for the presence of hydrocarbon reserves. The identification of natural oil seeps is routinely used as a cost- and risk-reduction method for high cost deep-water offshore exploration. Space-based radar archives covering over 20 years provide an excellent basis for determining the absence/presence, patterns, recurring frequency of offshore natural seeps. This historical archive is also used to establish an environmental baseline during early evaluation and production to help discriminate between naturally occurring oil and accidental oil releases.

Another application is for forest monitoring—climate change is a hot topic right now, and how deforestation, particularly in the tropics, is tied closely to this issue. Monitoring the state of a forest has always been a challenge. They cover large areas, are often located in places that are difficult to access, and they are frequently in areas that are normally cloud covered.

MDA's forest monitoring solutions allow us to leverage the all-weather acquisition capability of SAR, and a unique broad area, high-resolution beam mode on RADARSAT-2. The Extra-Fine mode allows us to image at 5m resolution over an area of 125 km x 25 km per scene. This allows us to efficiently image over large areas, at a resolution that can detect logging. Coupled with our automated change detection capability we can help the authorities responsible for protecting forests to move from a reactive to a proactive approach.

Then there is MDA BlueHawk, which provides an unclassified, multi-sensor maritime domain awareness picture to maritime security organizations worldwide. Fusing space-based radar, AIS vessel tracking and other maritime information, MDA BlueHawk monitors vast maritime regions, rapidly detecting potential threats as far from shore as possible. MDA BlueHawk leverages RADARSAT-2's ability to collect huge amounts of imagery over the maritime domain. No other sensor can provide the operational support to provide near real-time monitoring of country-wide EEZs.

Editor's note... A MDA Geospatial Services Overview video is available for access at:

**<https://www.youtube.com/watch?v=Jt8XbRQEmSw>**

**SM**

*Could you highlight the unique capabilities the RADARSAT-2 program provides in the maritime surveillance sector?*

**Don Osborne**

RADARSAT-2 was designed to monitor Canada's vast maritime domain, providing the Government of Canada with critical intelligence. The satellite is the best sensor for maritime domain awareness, and provides some unique benefits:



Offered is the broadest coverage, as RADARSAT-2 was designed to support maritime monitoring. Our ship detection modes can collect swaths up to 525 km wide, which is significantly larger than any other commercial SAR sensor.

Also to be considered is the satellite's highest collection capacity. In addition to being able to collect large areas, RADARSAT-2 also has the greatest collection capacity of any commercial SAR mission. RADARSAT-2's SAR on-time coupled with our global network of reception stations means that RADARSAT-2 can collect more imagery than any other commercial SAR provider.

Unique ship detection modes are incorporated into RADARSAT-2, which has dedicated ship detection modes that are tuned to improve ship detection capabilities. Our operations team has more experience with maritime monitoring than any other SAR provider, and our focus on near real-time delivery means that customers can receive time critical ship detection information within minutes of downlink.

### **SM**

*A similar question, but this time for the military, agency and government side of the industry?*

### **Don Osborne**

RADARSAT-2 has supported a large array of military and government users since the launch of the mission. While supporting maritime activities has been a significant component of the mission, RADARSAT-2 is also well suited to other military and civil applications.

When looking at flexibility, RADARSAT-2 has more than 20 different beam modes on the satellite. That happens to be the greatest choice in the number of beam modes offered by any SAR mission. Such flexibility means that, with RADARSAT-2, a customer will always be able to find a beam mode that will provide the optimal combination of coverage, resolution and polarization for a particular application.

One key mode, Spotlight, provides imagery at a nominal resolution of 1m. At this scale, detection and observation of much smaller targets of interest are possible. Detailed information obtained at this resolution has utility across a broad spectrum of civilian and military applications.

SAR data from RADARSAT-2 can be used to accomplish high resolution, automated change detection, which has many military and civil government applications. By comparing two or more scenes from the satellite, we can use automated or semi-automated process to identify change that occurs between the collections, irrespective of the weather conditions. When coupled with analysis from MDA's experienced image analysts, RADARSAT-2 can be a key element of any intelligence operation.

### **SM**

*MDA offers both RADARSAT-2 information as well as products and services based on the information from the satellite. How have you seen the market for satellite information evolve, and how do you expect that the market will continue to grow?*

### **Don Osborne**

In our market, we see two distinct trends developing. First, the services we offer are being increasingly defined by the specific customer problems we solve rather than the characteristics of the source of data.

Second, the use of embedded spatial information is becoming increasing prevalent as an aid to decision making across all aspects of society. Both of these trends drive adoption of information services by a much largely user base than that using imagery. As such, we continue to expect the market for satellite information services to continue to grow at a pace that will outstrip the growth from imagery and data products alone.



*Artistic rendition of MDA's RADARSAT Constellation Mission. Image is courtesy of MDA.*

### **SM**

*RADARSAT Constellation Mission (RCM) will launch in 2018—how will this meet the growing needs of the markets? What satellites will comprise the RCM and what coverage will this constellation provide?*

### **Don Osborne**

The RADARSAT Constellation Mission (RCM), being developed for the Canadian Space Agency, is the continuation of the radar program in Canada that began with the launch of the synthetic aperture radar satellite, RADARSAT-1, in 1995, followed by RADARSAT-2 in 2007.

The next-generation space radar mission (RCM) is a baseline of three ~1400 kg spacecraft, scalable to six or more to provide fast revisit, very high collection capacity, and frequent coverage—12 day repeat cycle per satellite, and a constellation repeat period of four days.

The current industry demand is for repeat persistence and RCM is expected to meet that need with daily coverage over most of the Earth. RCM also includes rapid satellite tasking as well as rapid data and information distribution to end users, plus multi-polarization capabilities for broad information content. RCM also includes simultaneous AIS and space radar data for effective maritime security.

The main RCM data application areas will be maritime surveillance, which includes ice, oil, wind, and ship monitoring; ecosystem monitoring for forestry, agriculture, wetlands, coastal changes and permafrost; and disaster management: mitigation, warning, response, and recovery.

[www.mdacorporation.com/](http://www.mdacorporation.com/)

MDA's Twitter account:

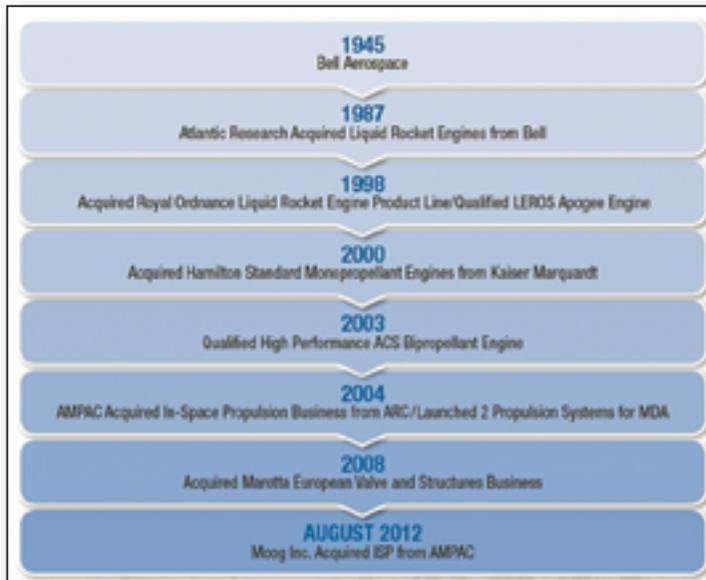
**@MDA\_Geospatial**



# When Performance Truly Matters... A Moog Historical Perspective

By Christopher Loghry, Space Systems Engineer, Moog, Inc.

**M**oog In-Space Propulsion (Moog-ISP) has been supporting the space industry since the 1950s and the company has a rich history in many critical propulsion components and systems.



Moog In-Space Propulsion (ISP) History.

## Moog In-Space Propulsion (ISP) History

Moog ISP's history is drawn from several propulsion businesses, both in the U.S. and Europe, with the origin being the Bell Aircraft Corporation. Bell specialized in aircraft that supported the war efforts in the 1940s. After the war, Bell engaged in advanced experimental projects that included the Bell X-1 that first broke the sound barrier in 1947 and then the follow-on Bell X-2. Bell developed the 16,000 lb. Agena rocket engine which was implemented into the Agena upper stage that was used on Thor, Atlas, and Titan launch vehicles. There were 365 launches between 1959 and 1987 and, to this day, Agena is one of the most reliable rocket engines ever built.

From 1965 to 1978, Bell built more than 1,000 Propulsion System Rocket Engine (PSRE) units as part of the Minuteman III program. The Attitude Control Engines (ACE) developed for this program later became the 5 lb. RCS engines that have been a spacecraft industry workhorse, with more than 2,000 engines delivered and flown. Many spacecraft providers continue to rely on these engines, primarily for geosynchronous spacecraft station-keeping.

## Minuteman III Propulsion System Rocket Engine (PSRE)

In 1987, the Atlantic Research Corporation (ARC) acquired the liquid rocket engine business from Bell, which also included the facilities outside of Niagara Falls, New York. With the acquisition of the Royal Ordnance Westcott facility based in Aylesbury, UK, the monopropellant engines from Kaiser Marquardt, and the internal development of a high efficiency line of Reaction Control System (RCS) engines, ARC expanded its market footprint to cover most spacecraft propulsion applications.

In 2004, the American Pacific Company (AMPAC) acquired the ARC liquid propulsion products to complement their support of the solid propulsion business. AMPAC-ISP began actively pursuing complete propulsion systems, including the Fermi/GLAST program that launched in 2008 and the Landsat Data Continuity Mission (LDCM) or



Minuteman III Propulsion System Rocket Engine (PSRE).

Landsat-8 system that was launched in 2013. In addition to unique single spacecraft systems, AMPAC delivered 18 propulsion systems for the ORBCOMM Generation 2 (OG2) constellation and is currently sending completed propulsion systems for the European Galileo Full Operational Capability (FOC) Constellation, with the first of these spacecraft launched in 2014 (six OG2 and two Galileo spacecraft). The on-board propulsion system was used to place the first two Galileo spacecraft into a usable orbit after the spacecraft were injected into the incorrect orbit by the launch vehicle.

During the same period, Moog, located just 35 miles away in East Aurora, New York, was primarily supporting spacecraft propulsion systems with fluid control components in addition to many propulsion manifolds and complete subsystems. Moog's fluid control expertise was used in many complicated subsystems including support of spacecraft using electric propulsion for programs such as Dawn and Deep Space-1.

In 2012 and 2011, Moog acquired AMPAC-ISP and Bradford Engineering in the Netherlands, respectively. Bradford Engineering provided several propulsion systems for programs such as SWARM as well as many of the electric propulsion feed systems and components used on European spacecraft. With these acquisitions and existing capabilities, Moog can support complete spacecraft propulsion systems and critical subsystems for almost all in-space propulsion applications.

Moog currently operates two facilities that have hot fire capabilities to test rocket engines, big and small. The Niagara Falls, New York, facility is primarily used for production programs—every rocket engine Moog builds is tested with real propellant in a vacuum chamber that simulates space. This includes engines with thrust as small



as 1N for RCS applications and as large as 635N for main engine applications, often interplanetary (LEROS engines). The LEROS line of high thrust engines are used on many commercial and military spacecraft.

One of Moog's 635N engines was used by the MESSENGER spacecraft that recently ended its mission by crashing into the planet Mercury (on purpose, of course). Another Moog engine will be used by the Juno spacecraft to insert itself into Jupiter's orbit in 2016. The Westcott facility provides production program for U.S. and European customers and has been heavily involved in new engine advances. Engineers are currently developing and testing the next generation high thrust engine for ESA's interplanetary spacecraft programs. Moog is also supporting the testing of various "green propellants" in both facilities.

Moog is assessing how propulsion can be integrated with other areas of the company. In 2013, Moog acquired Broad Reach Engineering (BRE), which provides complete Integrated Avionics Units (IAUs), including Command and Data Handling (C&DH) and Electrical Power System (EPS) capabilities in addition to a range of specialized payload electronics. The avionics and propulsion capabilities, coupled with other key components like the EELV Secondary Payload Adapter (ESPA), are being leveraged into developing a family of Orbital Maneuvering Vehicles (OMVs).

This family of OMVs can be used in a wide variety of mission applications from supporting small spacecraft deployment (including Cubesats), hosted payload applications, carrier/tug vehicles, and motherships for applications in Earth orbit and beyond. In many cases, a combination of these missions can be integrated into a single platform to provide flexible options for space access and operation.

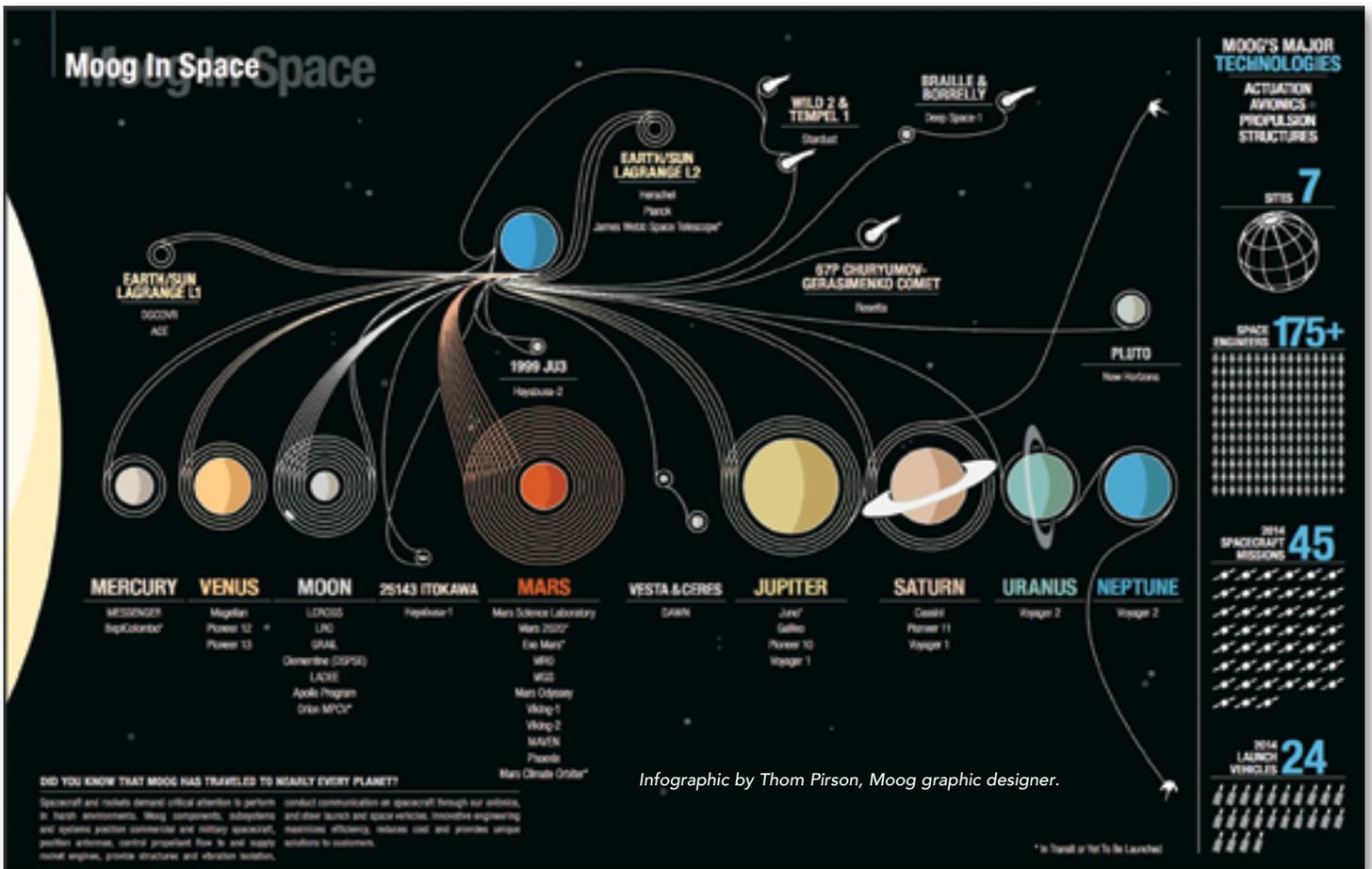


Orbital Maneuvering Vehicles (OMVs).

Moog is proud to support the global in-space propulsion industry and continues to develop and support products and technologies that are key to the space industry where performance really matters.

[www.moog.com/space](http://www.moog.com/space)

*Christopher Lohry is Space Systems Engineer who supports Moog's Space Sector with his background in spacecraft propulsion. He joined Moog in 2012 as part of the AMPAC In-Space Propulsion (ISP) acquisition. He backs the ISP business in addition to the larger space business divisions. He currently works in the Space Access and Integrated Systems business unit in an engineering role supporting propulsion, launch vehicle and spacecraft missions.*





# RF Matrix Switches in Satellite Ground Segment— New Developments and Their Benefits

By James Rapach, RF Design Engineer, Quintech Electronics and Communications, Inc.

**R**F Matrix Switches provide flexibility for Earth station operators to route signals in a large Earth station facility, teleport, cable headends, DTH (Direct-To-Home) and NOC's (Network Operating Centers).

This article reveals how RF Matrix Switches are commonly used in satellite facilities. Also discussed is the evolution of these key subsystems from legacy systems to the next-generation RF switches, which offer increased functionality as well as operational and economic benefits.

RF Matrix switches are often a critical core part of the infrastructure in Earth station facilities and are commonly used in multi-channel facilities for downlinking and uplinking signal management within the Earth station or teleport. An RF Matrix is a switch that routes Radio Frequency (RF) signals between inputs and outputs. Popular applications requiring RF matrices are satellite communications, broadcasting, military and government communication systems.

Although the term RF often refers to the Earth-to-space / space-to-Earth frequencies (e.g., C-, Ku-, Ka-band) in the satellite ground systems context, in the frame of reference of RF Matrix Switches, this typically refers to handling input/output switching and routing of signals at L-band (950 to 2150 MHz), Broadband (50 to 1000 MHz) and IF-Band (50 to 200 MHz).

Commonly, there are two primary RF switch matrices used in satellite facilities: Fan Out (Distributing) switches, which route an input to any number of outputs, and the Fan In (Combining), which take any number of inputs and routes them to a single output.

Matrices may be Symmetrical, *i.e.*, having an equal number of inputs as outputs (such as 8x8, 32x32, 128x128, 2048x2048), or Asymmetrical, *i.e.*, having an unequal number of input/output ports (such as 16x32, 48x96 or 128x256).

## Applications

### RF Signal Management in a NOC

RF Matrices are typically used to manage and route satellite signals within an NOC. The matrix provides a remote controlled, automated method to seamlessly route and switch downlink and/or uplink signals. A typical example: A major sports broadcaster in Los Angeles uses a Matrix Switch to route live, incoming satellite feeds within its facility to modems and/or receivers for sportscasts.

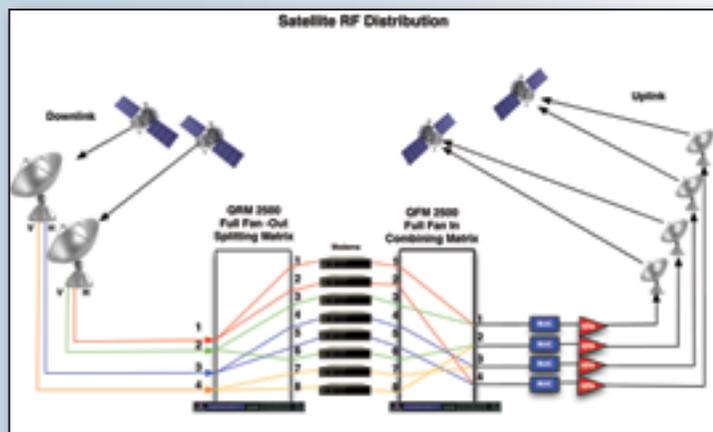


Figure 1.

RF Matrix switches give Earth station operators the flexibility to route signals between different downlink and uplink chains involving other ground equipment, as depicted in the example in Figure 1, first column, bottom. An RF Matrix gives the NOC the ability to:

- Automatically switch inputs and outputs without patching or moving cables
- Reliably split and combine signals with no signal loss
- Redundantly power LNBS in an antenna farm
- Provide backup switching for 1+1 and N+1 redundancy and scheduled maintenance
- Automatically record the signal level of the satellite feeds

### Signal Monitoring

Another common application is for service provider Signal Monitoring. Assuring customers that satellite signals are on-air and meeting specifications is critical to providers of quality of service.

RF Matrix switches are used as part of the on-air monitoring system that allows an Earth station operator to monitor and measure signals, such as downlink and uplink signals as well as return signals for compliance with expected parameters. A spectrum analyzer connected to a Matrix Switch can be configured to be time-shared within a facility, rather than dedicating the spectrum analyzer to a single input, which would be costly. The signal analysis device can be set up to continuously poll different inputs on the switch in order to monitor and record signal parameters across many RF signals.

Using an RF Matrix switch, a satellite facility can also save on equipment and resources by re-using the same satellite receivers by switching feeds between alternate antennas, or pools of receivers. Similarly, redundant units can be switched in case one unit fails or experiences a signal error, all done automatically or manually using a web GUI control or remote NMS.

### Redundancy

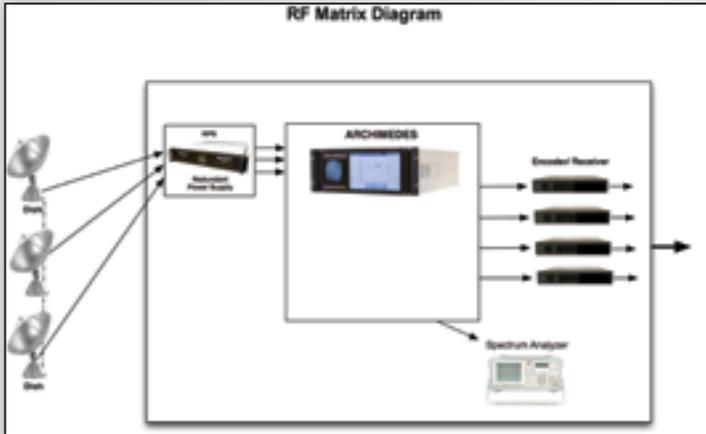
A state of the art RF Matrix Switch, such as those manufactured by Quintech Electronics & Communications, Inc., can reconfigure signal paths in milliseconds and be configured to provide automatic signal path redundancy, so that an Earth station maintains optimal signal performance. If signals fall below a pre-set threshold, the switch can be made to a pre-configured backup input/output.

For example, if an input signal drops below a certain RF level, it would switch to a backup port. This can be pre-configured for 1:1 redundancy or 1:N, depending on the requirements. This means a facility can possess a variety of redundancy options and a high degree of flexibility, with easy operation.

In the case of Quintech, the company offers Q-ROUTE™ and Q-SENSE™ technology. This provides maximum reliability with signal path redundancy and auto re-route capabilities. Q-ROUTE™ provides internal signal path redundancy by automatically re-routing around a failed signal path. Q-SENSE™ provides external signal path redundancy by the automatic routing of back-up input signals.

RF matrices can also power LNBS. For example, the DEV Systemtechnik ARCHIMEDES RF Matrix Switch has an LNB power option. Each RF input port can deliver LNB power and select the polarity and the band of the LNB.

In addition the matrix provides an integrated TV receiver displaying a selected channel of the received satellite signal via the full HD multi-touch display. Optical inputs, unique redundancy options for inputs, outputs, controller and power supply add flexibility and functionality. The example in *Figure 2* demonstrates multiple antennae being monitored using a single spectrum analyzer attached to an RF Matrix Switch.



*Figure 2. Signal Monitoring*

The alternative to using such an automated switch would be manual patch panel connections—not an effective way to operate in most facilities with multiple signals and services. Manual patch panel switching can introduce cable patch panel “fatigue,” risk of electrical shorts, or danger of physical configuration errors. Changing physical connections may require a technician as well as the removal of floor or ceiling panels to change cabling and other labor related expenses. The use of a Matrix Switch eliminates the needs for these considerations.

### **DTH / Cable Head End RF Signal Management**

A common application of large configuration (e.g., 100+ ports) RF Matrix Switches is in DTH broadcast centers and cable TV headends with large dish farms. Companies such as a DIRECTV, DISH Network, or similar satellite broadcasters around the world, may be downlinking and uplinking hundreds of signals on scores of transponders. All of these signals must be monitored and managed on a 24/7 basis.

An RF Matrix allows the operator to ensure that their signals are on-air. The DTH broadcast center (or headend) uses a large configuration L-band RF matrix switch to route and connect the transponder monitoring equipment and channel receivers so the headend can receive, switch, and monitor channels coming in from multiple transponders, satellites, and terrestrial sources.

Government monitoring and Intelligence agencies whose mission includes monitoring large numbers of satellite and broadcast signals, can also leverage the efficiencies of large-configuration RF Matrices in a similar fashion.

### **Teleport Services**

RF Matrices are not just beneficial in Broadcast /DTH facilities with hundreds of signals. Medium, or small-configurations can also be critical in a teleport or facility providing Data, VSAT, IP, and satellite mobile backhaul services. Two examples include...

- *Multiple satellite feeds routing to multiple receivers or modems*
- *Input level monitoring to detect loss of signal conditions*
- *Automatic redundancy to connect back-up signal on primary feed loss*

*Figure 3* on the next page depicts the example of a common teleport application for RF Matrices. In the example, on the uplink side, a Fan In matrix (in this case, the

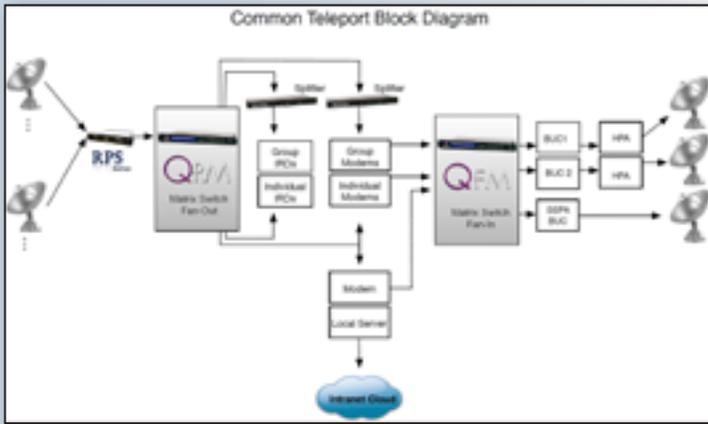


Figure 3. Teleport Block Diagram

Quintech QFM allows the teleport to send many narrow data signals and combine them to a single transponder, for SCPC (Single Channel Per Carrier) applications.

An individual Modem, or Group of Modems/Modulators, can be combined and routed on selected outputs to specific Block Upconverters and sent to specific uplinks via the Block Upconverter to HPA transmit chain. The RF Matrix can route individual SCPC modem signals to a designated satellite transponder, or uplink path.

By using the RF Matrix (in this case, the Quintech QFM), the operator can easily select which modems to combine on an uplink. Downstream signal paths to IP infrastructure, IP terminal equipment, or video encoding equipment, can be easily switched between primary and backup redundancy uplink chains via remote and automated control.

On the Downlink, carriers coming into a QRF Fan Out Matrix can take the inputs from the L-band antenna cable and fan them out to the different IRDs, or demodulators/modems. If an Earth station operation is frequently re-allocating services, carriers, and connecting different terminals to different uplink channels, an RF Matrix lets operators mix and match input/output paths seamlessly, either automatically, or under operator control.

#### High Throughput Satellite (HTS) Ka Band System Gateways

HTS gateway Earth stations may require the ability to route and switch RF signals between diverse uplink and downlink device chains within a spot beam or polarity, depending on the architecture and traffic requirements. RF Matrix switches can be used to automatically control L-band signals routing between HTS RF signal chains and ground connections.

#### Outside Broadcast/Mobile/Satellite News Gathering Systems (SNG)

Smaller Matrix Switches are also used in live production, SNG and maritime environments. For example, sports outside broadcast (OB) mobile uplink vehicles may need to send multiple outgoing content to satellites and may need to monitor the return signal, creating a SNG need for a smaller Matrix Switch.

An example of such a switch, is the DEV Systemtechnik 82 (Eight-Squared) L-Band Matrix Switch, to be introduced at the 2015 IBC Convention. SNG friendly features, such as LNB powering, flexible inputs and outputs, optical inputs, unique redundancy options, LNB powering, full color display user interface, and dual redundant field replaceable power supplies, provide the most reliability and flexibility available in its class. The 1RU 82 is also suitable for various redundancy purposes and can be operated in autonomous mode.

#### Technology Evolution: Expanding Functions, Reducing Overhead

Older, large-configuration, legacy RF matrix switching systems require miles of coaxial cable and thousands of watts of power to operate. They can be quite labor-intensive



Figure 4. Example of a rack unit matrix for Mobile / SNG.

for satellite ground facilities to install and to maintain them. Older generation RF matrices are unable to seamlessly integrate with modern Network Management Systems (NMS), IT infrastructure and terrestrial fiber systems.

The evolution of RF matrix switches over the last 20 years has led to some game-changing reductions in energy use, form factor and performance. Quintech's next-generation L-Band Matrix Switch, the XTREME 256, (a 128x128 scalable L-Band symmetrical/asymmetrical) Matrix Switch meets this challenge.

For example, the switch offers greater than six-fold (6.5X) reduction in electrical power consumption, while saving more than 3.5 miles (5.6 km) of RF cable runs per comparable system. The system greatly increases broadcast and teleport facilities' operational capabilities, while vastly reducing power requirements, cabling and rack unit footprint. The business case for replacing older, large-configuration legacy RF matrix switching systems with this nexgen system can provide a high return on investment (ROI).

Another example of this kind of improvement is the company's nexgen matrix for mid-sized systems, ARCHIMEDES, which also sets a new performance benchmark in the size and price for L-band matrices, allows from 16x16 up to 64x64 in symmetric or asymmetric configurations in only 4 RU, while consuming 75 percent less power than competing products.

#### Expansion By Reduction

In today's environment, organizations continue to face ever-increasing demands for bandwidth, content distribution and data processing. At most facilities, pressure to manage operating expenses and the demand to increase energy efficiency has never been more important.

Nexgen RF Matrix Switches—such as Quintech's XTREME 256—offer an exciting opportunity for the satellite industry to refresh legacy L-band matrices and greatly increase operational capabilities, all the while vastly reducing power requirements, cabling and rack unit footprints. For new ground facility builds, for example, to serve High Throughput Satellite (HTS), where requirements can exist to switch between multiple RF paths, new RF matrices can also provide similar efficiencies.

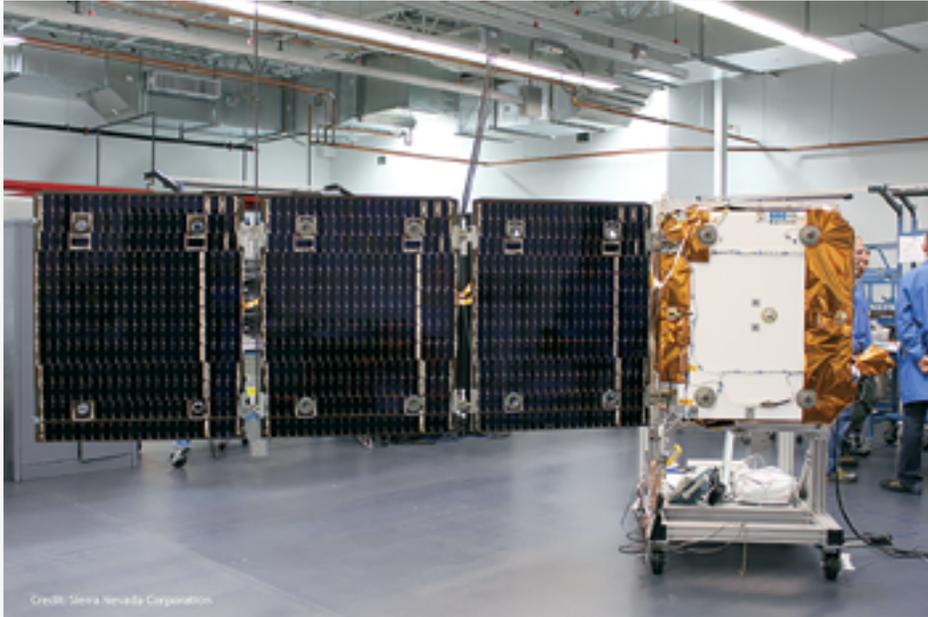
Similar efficiencies for new RF matrices also exist for new High Throughput Satellite (HTS) ground facility builds, where requirements to switch between multiple RF paths can occur.

[www.quintechelectronics.com](http://www.quintechelectronics.com)

James Rapach is an RF Design Engineer and received his BSEE from the University of Pittsburgh.

Quintech Electronics and Communications, Inc. is a leading manufacturer of RF signal management communications equipment. Quintech designs and manufactures RF matrix switches, RF-over-fiber, routers, redundancy switches, relay switches, splitters, combiners, amplifiers, frequency converters and DC powering products.

## Solar Array Design, Test + Production Capability Expands At Sierra Nevada Corporation



*The SNC OG2 satellite with deployed solar array. Photo courtesy of SNC.*

**Sierra Nevada Corporation's (SNC) Space Systems continues to expand its Space Technologies product line, by growing its capability in solar array design, production and verification, which includes a broad portfolio of flight-proven mechanisms, components and complex subsystems.**

As announced in late 2014, SNC was awarded a contract to develop and build a next-generation science and technology demonstration satellite known as STPSat-5 for the Department of Defense's (DOD) Space Test Program.

In addition to being the prime contractor for the satellite, SNC is also designing, manufacturing and testing the solar arrays and positioning mechanisms that will provide power to the satellite upon orbit insertion.

SNC will provide a complete turnkey system to be integrated into the STPSat-5 satellite that will include the solar array wings, hinges, hold-down mechanisms, solar array drive and integrated slip ring, allowing for 360 degrees of continuous rotation, maximizing available power to the spacecraft.

This turnkey power system builds on SNC's successful heritage and years of experience in manufacturing individual components that includes over 45,000 hours of combined on-orbit performance of six 600-Watt solar arrays as a part of the ORBCOMM Generation 2 (OG2) constellation.

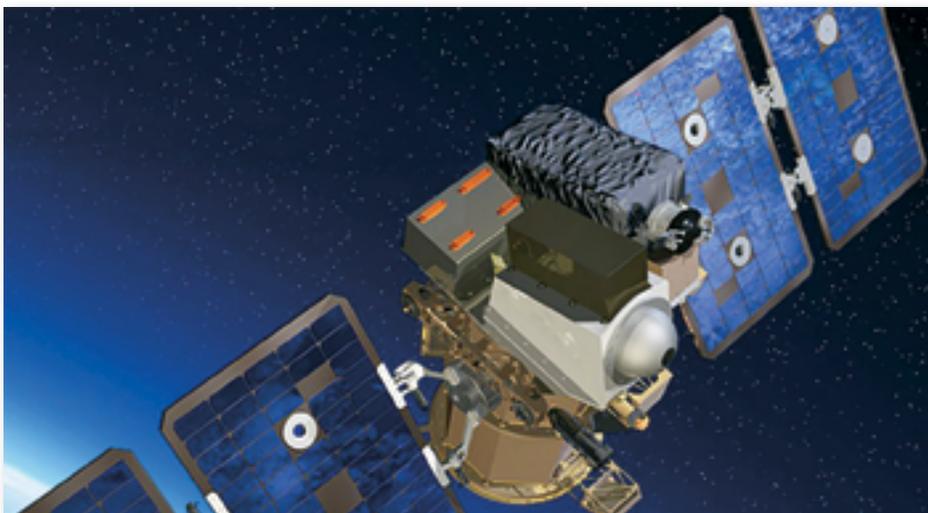
SNC's Space Systems, based in Louisville, Colorado, houses state-of-the-art test facilities, including the recently commissioned Large Area Pulsed Solar Simulator (LAPSS) used to verify solar array performance. This large-scale testing zone simulates the sun to obtain accurate electrical performance measurements of solar panels up to 3.5 m<sup>2</sup>.

"With the addition of this instrument, SNC can provide fully-optimized turnkey solutions for solar arrays," said John Roth, vice president of business development for SNC's Space Systems.

"We improve efficiency and reduce risk by designing a system that integrates with the satellite from the start, and then we validate that with system level performance verification, rather than individual component testing. These efficiencies provide overall cost savings which we pass on directly to the customer."

The Louisville facility also houses thermal vacuum chambers, a radio frequency anechoic chamber, vibration table, shock table and dimensional inspection lab, among other satellite test and production equipment. In SNC's Space Systems 25-plus-year history, it has provided thousands of components on hundreds of missions.

[www.sncorp.com/](http://www.sncorp.com/)



*Artistic rendition of STPSat-5. Image courtesy of SNC.*

# Satellite Is Vital For A Unified, Global, e-Health System... An SES Techcom Services Perspective

By Gerhard Bethscheider, Managing Director of SES Techcom Services

**P**roviding people with convenient access to public services through the Internet has long been a goal of operators and vendors alike.

In the health sector, Information and Communication Technologies (ICT) became a prerequisite for ensuring quality control in medical care and improving the efficiency of work processes and data management in hospitals and clinics. In addition, health IT is increasingly used to teach health professionals and to optimize and monitor national health programs.

Living up to this challenge in rural or remote areas, however, where connectivity may be poor or even non-existent, is a battle that eHealth vendors and operators will admit is difficult as well as increasingly important, including for the management of acute disease outbreaks, as recently experienced in West Africa. The emergence of satellite Internet is a significant step in removing these obstacles. As long as there is a base satellite installed to receive signals, fast Internet access can be provided wherever required, no matter how rural or remote the location. This is particularly useful in the delivery of humanitarian aid and resources to areas in need.

SES Techcom Services uses satellite technology to create SATMED; a multi-layer eHealth platform that addresses many of the challenges faced by operators and vendors and is changing the face of eHealth as well as health in general in remote areas.

## A Conflicted Market

In terms of assessing the current market and potential for the effective delivery of eHealth services, four major barriers challenge the use of Health IT applications: The costs of secure data management and the purchase and maintenance of software, poor user-friendliness, difficult interoperability between IT solutions, and limited availability in remote areas. In these remote areas, where there is a significant lack of trained health professionals, simplicity and ease-of-use are of paramount importance. Furthermore, multiple applications from a variety of organizations are coming to market, all with different data formats, which means the interfaces required for interoperability are often not provided. This lack of standards, and more importantly shared standards, presents large problems for doctors who wish to access shared medical records and data for patient care across multiple applications.

Thanks to innovative cloud technology, though, communications between medical facilities can be vastly improved, potentially providing one single point of access for a global, unified system. While communications standards may still be developing, the cloud provides a roaming service which is vital to mobile health services. This is because different applications can be integrated into one common platform and accessed via a single login.

## Enter Satellite + SATMED

Without question, the introduction of satellite technology has changed the landscape of the eHealth market both in terms of scale and delivery. While the advent of ICT services within the health market may have brought significant changes to local environments, remote access has brought the potential for information to be transmitted anywhere across the world, even in extremely remote or mountainous regions. In developing nations, satellite connectivity is vital. SATMED is often the only solution where terrestrial access may be limited, or poor quality, and one that can provide a fast connection over a vast coverage area.

SES Techcom Services' SATMED uses satellite Internet connectivity to address the fundamental issues that currently exist in the sharing of medical information.



As a multilayer eHealth platform, which is already making significant strides in medical advancement in developing nations such as Sierra Leone, SATMED provides medical professionals with vital applications and tools for day-to-day tasks. Supported by Luxembourg's government, with input from medical health professionals, SATMED forms part of the disaster recovery platform <http://emergency.lu/> to provide worldwide coverage and humanitarian aid in times of need.

Using satellite technology and the cloud, the multi-layer platform overcomes the barriers of poor connectivity, cost of deployment and lack of interoperability between applications. By integrating multiple applications into a single platform, information can be shared and transmitted quickly and easily. This brings significant advances to health care professionals, including doctors and nurses as well as health managers, health IT personnel and epidemiologists.

For example, in Serabu Community Hospital, Sierra Leone, SATMED has been used as a communications tool between regional doctors and off-site German doctors who seek to share medical expertise. Powering the exchange of knowledge and proving the system's worth as database as well as a communications platform, SATMED can also record and analyze individual patient data and document disease in public health.

Furthermore, the SATMED platform can be used for medical training. In West Africa, SATMED will be used to help improve conditions for the delivery of babies at Benin Maternity Hospital. Training will be delivered online across Africa, enabling midwives and health workers in training to have their performance monitored and evaluated. The end result will be improved healthcare systems at a local, regional and national scale.

## A Connected Future

Satellite technology has already increased the proportion of the world that is connected. If this new-found connectivity can be used to share medical information, vast improvements in health services and, therefore, quality of life, will also be achieved. With SATMED bringing the potential to realize the adoption of eHealth systems across all manner of medical facilities, whether that be hospitals, medical universities, or national/international health programs, medical professionals can now free themselves from the shackles of poor connectivity. In addition, with the SATMED platform, eHealth becomes affordable and more user-friendly for all.

In order for this bright future to reach its full potential, the task now is to have more eHealth applications developed, for professionals and facilities to sign on for SATMED and to further enhance satellite technology to increase global communications coverage. When these elements are all in place, reaching the ultimate goal of a global unified health system is but a matter of time.

*Gerhard Bethscheider has more than 30 years of experience in the domain of Satellite and Ground Segment Engineering. His experience extends to the fields of Research & Development, System Engineering and Management. He joined SES in 1990 as Manager of the "Earth Station Engineering" section. Since January 2008, Gerhard has held the role of Managing Director of SES Techcom Services, which commercializes satellite solutions and services to an international customer base.*

## Indigenous Peruvian Tribes In The Andes Gain Connectivity



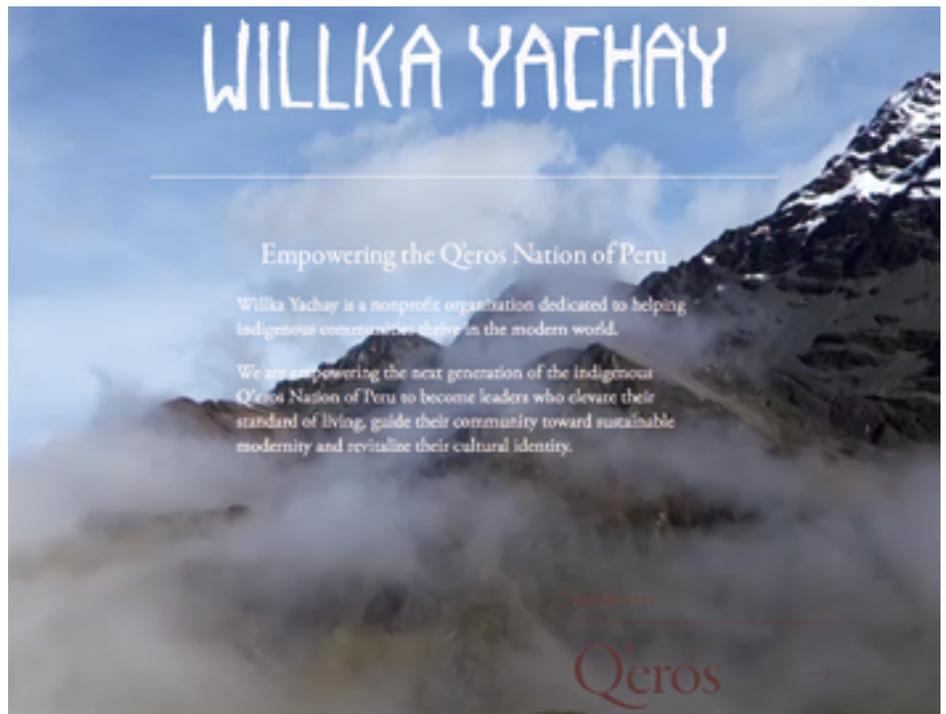
**Improving quality of life for people living in remote regions around the world is a key mandate for NewCom International.**

The company has been able to provide Internet access and global connectivity to the indigenous Q'eros Nation tribe living high up in the Andes of Peru.

Working in partnership with Kidnected World, an NGO that provides online creative tools to connect young people globally as a catalyst for greater humanity, NewCom donated a year's worth of satellite-based Internet access to a school serving the village of Qocha Moqo, which involved trekking a satellite dish up steep mountain trails to an elevation of more than 16,000 feet.

Now, after living completely cut off from the rest of the world, students and their families have a way to connect and engage with people across the globe.

They also have the ability to learn about other cultures and world events, share their cultural traditions and access the endless educational materials the Internet provides.



"Our students and their parents are very happy to be connected to the world in this digital age," said Hannah Rae Porst, director for Willka Yachay, a Peru-based NGO that built and oversees the school for the village. "There were many happy dances and lots of hugging when the satellite dish was installed."

Porst, whose organization is dedicated to helping indigenous communities thrive in the modern world, says the Internet connectivity—powered by solar energy—has been life changing for everyone involved.

Thanks to the Internet and creative tools provided, she says students have been able to connect with other students and indigenous tribes around the world and share their cultural knowledge and way of life. After school, says Porst, the computer and Internet are open to anyone who wishes to use it—benefiting all forty families in the village.

She adds that the Internet connectivity has also made a huge difference in the lives of the teachers—not just in terms of the educational content they can share with students, but in terms of their own quality of life.

"We have incredibly dedicated teachers in Q'eros," added Porst. "They come from as far away as 22 hours of travel and live and teach in the remote villages for three weeks straight and then have one week off. There is no telephone signal in Q'eros. However, now, for the first time ever, our teachers can communicate with their families while here."

[www.newcominternational.com/](http://www.newcominternational.com/)  
[www.willkayachay.org/](http://www.willkayachay.org/)  
[www.thewonderment.com/](http://www.thewonderment.com/)

# Ka-Band Broadband Relishes Medium Earth Orbit... An AvL Technologies Perspective

By Chick Reutter, Sales Director, AvL Technologies

**F**or many years, Ka-band has been considered the future of satellite communications.

Ka-band provides incredible bandwidth, costs less to use than traditional Ku-band and is available today, with much greater availability in the near future. The capabilities of Ka-band satellite communications are already opening entirely new markets for enterprises and telecommunications companies worldwide.

Though Ka-band usage was initially slow on the uptake, that was largely because there has been a lack of wide availability in the Ka-band ground segment, even though numerous Ka-band satellites are in orbit. Uptake has also been hampered by Ku-band's availability and reliability—many commercial users are happy with their present Ku-band services and see no need to invest in new equipment to move over to Ka-band.

Interestingly, these are the same arguments faced by Ku-band when it supplanted C-band many years ago. That the SATCOM industry was able to seize the Ku-band opportunity by developing and deploying new generations of high power satellites and new antenna, RF and modem technologies is a good indicator for the future success of Ka-band SATCOM services.

Though Ka-band operation requires higher-quality terminals with more precise positioning than Ku-band, the investment in upgraded terminals is balanced with Ka-band's lower cost per bit for the service and a long-term, lower total cost of ownership. Commercial SATCOM users who try Ka-band are quickly hooked.

NASCAR teams are using Ka-band to monitor real-time car performance during races, and broadcasters are using it for broadcasting in true HD, both applications that require large amounts of bandwidth.

Military and government users have learned that with Ka-band, they can transmit orders-of-magnitude more data than they could with traditional Ku-band.

Additionally, oil and gas companies are tracking performance data for widespread exploration and drilling operations using Ka-band satellites. Plus, many Direct-To-Home (DTH) service providers are now using Ka-band service for HD downlinks.

As Ka-band usage gains ground, a new transformative technology is entering the market—communications via O3b Networks' Medium Earth Orbit (MEO) satellites. O3b's present constellation of 12 satellites (with more on the way) is flying at an orbital height of 8,062 km. above Earth and covering an area between 45 degrees North and 45

degrees South of the equator (with limited coverage up to 62 degrees North and South).

Due to these satellites flying so much closer to Earth than Geostationary Orbit (GEO) satellites, the O3b system provides greatly reduced latency (round trip delay) that approaches the responsiveness of terrestrial fiber networks, all while providing the wide area coverage implicit in SATCOM technology. O3b rightly describes their connectivity as "Fiber Speed, Satellite Reach."

O3b's relatively low (MEO) orbit presents a challenge to the system's ground stations: Each of the satellites is transmitting signals to, and receiving signals from, a particular Earth station only for short periods of time—from 20 minutes to an hour per satellite, depending on the Earth station's latitude.

This creates a challenge for Earth station antennas tracking the MEO satellites in orbit. The solution to this problem is to provide the Earth station with antennas working in tandem pairs. One antenna tracks a satellite across the active portion of its orbit, while the other antenna remains ready for the handover and begins tracking the next satellite when that one becomes "visible." Working together, the two antennas provide constant, consistent connectivity and no user data is lost.

On the ground and at sea, these antenna terminals will operate 24 hours per day, 365 days per year. A great deal of development and engineering was required to provide fixed, transportable and maritime terminals that could balance O3b's always-on, ultra wideband digital traffic and gateway operations with a solution that is robust, affordable and can be used in any environment.

O3b partnered with AvL Technologies on the transportable antenna family. AvL transportable antennas are available with reflector sizes 0.85m, 1.0m, 1.2m, 1.8m, 2.0m and 2.4m, and are packed in ruggedized cases. The design is such that an O3b site can be established and become operational in two hours or less by relatively untrained personnel.

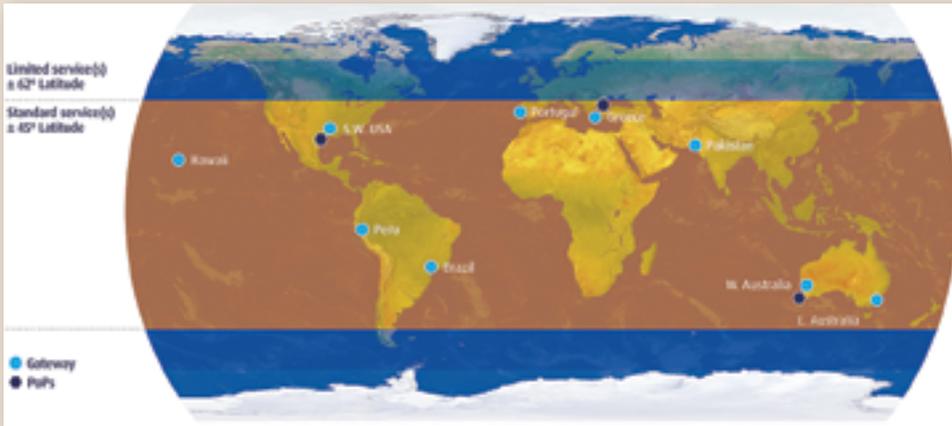
"The design of these antennas requires specific know-how and precision because the O3b satellites are moving across the orbital arc, the antennas must acquire and follow the satellites, and the antennas must be transportable," said Mike Proffitt, president of AvL Technologies. "AvL transportable antennas were selected by O3b because of the high quality and durability of our products, and because of AvL's engineering expertise in designing and manufacturing antennas."

AvL's MEO tracking antennas have come to the market quickly. The 0.85m antenna is now in the final approval stage and will soon be in production. The 2.4m antenna terminal will follow quickly and be available later in 2015. Both antennas assemble and disassemble quickly, and pack into rugged cases for easy transport to any location. Once assembled, any of AvL's transportable MEO tracking antennas are quickly operational.

O3b's MEO constellation provides incredible bandwidth—again, "fiber speed with satellite reach"—as a single O3b beam can supply an entire community with 1.6 Gbps of low latency service. The O3b network is unique in that its use of multiple satellites



A tandem pair of 85 cm antennas.  
Photo is courtesy of AvL Technologies.



*POP + Gateway coverage for O3b's constellation.*

in MEO and Ka-band frequencies will allow for extremely wideband digital traffic with minimal latency, effectively doing away with the delay inherent in traditional satellite communications.

The opportunities for MEO satellite communications seem unlimited. With Ka-band service costing less per bit than traditional Ku-band service, and the opportunity to use a 1.6 Gbps spot beam, military and government agencies can now transfer far more data to and from UAVs, remote sites and post-disaster operations.

network such as O3b, satellites are now providing HD video, 4G LTE, cloud services and other bandwidth-intensive and latency-sensitive applications, to places where fiber cables aren't practical. Simply put, they provide fiber speed, with satellite reach.

Oil and gas companies are recognizing the potential for continual monitoring of equipment performance and field operations, and broadcasters are recognizing the ability to broadcast in true HD and 4K/8K—as well as how economical the service is for true HD distribution. O3b's service can also provide enough data transfer capability to extend it to an entire "floating city" such as an aircraft carrier or cruise ship.

Satellite communications have long been lauded for their ability to bring connectivity to challenging locations as well as their extreme reliability. However, with the progression into Ka-band services, especially when combined with the fiber-like latency over a MEO

# SatBroadcasting™: Next Generation Spectrum Monitoring

By Roger Franklin, CEO, Crystal

**S**atellite transmissions, especially those involved in broadcasting, are increasingly dispersed and dynamic—changing consumer behavior has created demands for compelling content available anytime and anywhere.

Broadcasters are juggling several different versions of their content to support local markets and multiplatform delivery. The need to monitor spectrum and quickly react to problems is of growing importance.

## The Changing Broadcaster Landscape

A radical shift is impacting the way content is consumed. Consumers expect the content they want, where they want it, and broadcasters are under increasing pressure to deliver content to multiple platforms in order to stay competitive. As programs' nets are cast wider, the need for local variations and regional advertising creates new challenges and opportunities for broadcasters. The type of programs watched has changed—viewers want news now, sports live and up close from far-flung corners of the globe, and entertainment tailored to their individual preferences.

## Responding To Issues

There are many reasons why issues can, and will, occur. As an uplinker, you don't want the first indication of a problem to be a phone call from a disgruntled advertiser whose advertisement did not appear at the scheduled time—such difficulties can often be traced to human error or equipment failure.

One of the biggest challenges is that equipment malfunctions can go unnoticed for long periods of time. If the malfunctioning piece of equipment is normally offline because of its use only as backup device, notice of this problem can take even longer to realize. Other factors out of your control, such as weather, can have a huge impact on all types of systems. The effect of weather is easily overlooked at unmanned sites in particular and is especially problematic for broadcasters with multiple sites. Remaining aware of changing weather conditions, such as a rise in temperature, humidity, or heavy rain is always challenging.

## Monitoring

The only way to react quickly and find solutions to issues as they arise is to ensure continual system monitoring. Some diagnostic monitoring systems are extremely expensive, so at times uplinkers will have only one system that must be relocated

and reconnected only after they are alerted to a problem. This results in a failure to spot errors until they have already impacted an operation. An error in one part of the chain may filter through and cause further, and often bigger, issues downstream. The number, type, and monitoring requirements for each site will be unique. Relying on software-based decisions means you can cover a multitude of 'what if' cases.

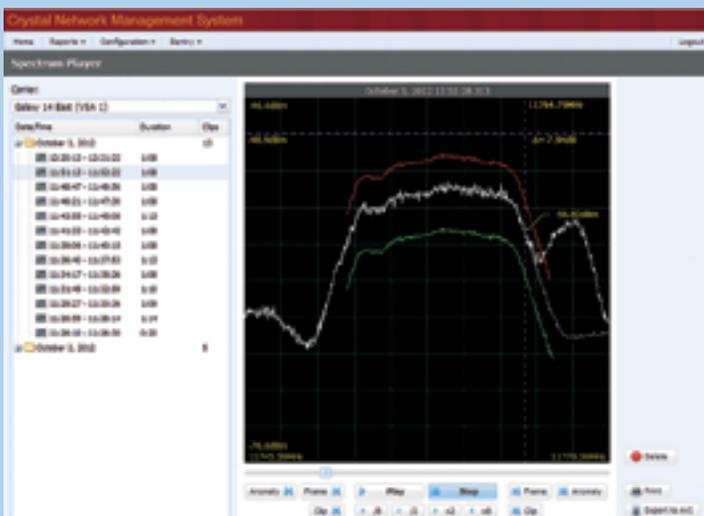


By monitoring multiple spectrum segments simultaneously, you can compare their profiles against one, or more, user defined limits. Recording and archiving sequential spectrum 'snapshots' in a continuous manner is also important, so that lessons can be learned from previous episodes. Effective monitoring allows relatively complex switching rules to be implemented in the case where equipment failures call for switching online redundant transmission chains or disabling transmissions altogether. Responding to issues automatically, even when there isn't a connection between the primary and secondary site, is the key advantage of a modern monitoring system.

If spectrum is continuously monitored, errors can be spotted, and solved, as soon as they occur. In the world of broadcast, this means you can sort these issues out before they have a negative impact on your transmissions and keep your content flowing to your viewers.

*"My primary role is to make sure the Crystal team has what they need so they can properly service our customers. I also focus on methods and solutions that enable our customers to increase the efficiency of resiliency of their video and data networks. I rely on customer observations and communications, as well as the Crystal sales and implementation teams, to understand where operational issues exist and then lead a collaborative group to design solutions."*

*"I also stay involved with the development team to ensure that the solutions Crystal builds satisfy the needs of our customers. In addition to my day-to-day duties at Crystal, I serve as a member of the board of directors for the World Teleport Association and participate in some of their sub-committees. I also stay involved with some video standards groups of the Society of Cable Telecommunications Engineers (SCTE) and the Interference Reduction Group (IRG)."*—Roger Franklin



## HISPASAT Getting Good With Goonhilly

**HISPASAT has reached an agreement with British teleport owners Goonhilly Earth Station (GES) Ltd. to provide television distribution services throughout Europe.**

A transponder from the Hispasat 1E satellite will provide the capacity contracted over the next three years, which will be transmitted by means of one of the teleport antennas. The entire process chain of transmission has been set up and will be provided by GES. Through this agreement, both companies are introducing an attractive commercial offer to the market, which is aimed at achieving maximum flexibility so that the television channels can avoid the traditional barriers they come across, both in terms of cost and time scale, when they want to distribute their channels.

The addition of services from Goonhilly adds to the teleports that already offer a shared solution on HISPASAT 30° West digital platforms. With these solutions, HISPASAT offers great flexibility to audiovisual content producers seeking to transmit their signals, either directly to the user (DTH) or indirectly by transporting TV channels to cable head-ends. In addition, this enables transmissions in both DVB-S format and DVB-S2 –ensuring not only optimized power transmission, but also bandwidth consumption.

Goonhilly was commissioned in 1962 and received the first transatlantic images broadcast over Telstar. It also broadcast numerous historic events to Europe including the first lunar landings. Currently, Goonhilly is open to commercial services and is fully operational as teleport for satellite communications.

Steve Jones, Commercial Director at GES, said, "As part of our ongoing investment in our site's capabilities we are delighted to offer the broadcast uplink market an alternative, attractive route to market. Working alongside HISPASAT, with our collective experience and knowledge, we aim to make it easier

for channels to get their content to their customers."

HISPASAT Chief Commercial Officer Ignacio Sanchis also voiced his approval for this agreement and said, "which enables us to widen our offer in Europe and provide television operators with adaptable and scalable solutions for every situation."



# The Art Of Going Global... An ETL Systems Perspective

By Andrew Bond, Sales Director, ETL Systems

**W**ith the launches of new HTS (High Throughput Satellites) and global demand for pay-TV services, the use of reliable satellite signal handling is more than essential.

As a result of this crucial need, ETL Systems, a global designer and manufacturer of RF distribution equipment, is building their international distribution network with leading SATCOM integrators to meet this increasing growth.

Andrew Bond, ETL's Sales Director, said, "Working closely with system integrators enables ETL to consult better with customers to provide support when designing the best RF distribution solution for their teleports. As ETL exports to 97 countries, having worldwide partners representing our RF products in the market plays a vital role in helping us to achieve export success. Our partners recognize our ability to provide innovative, custom-made solutions through the work of our in-house RF and test engineers. Because of this knowledge, broadcasters and satellite operators are continuing to perceive ETL as the best choice for reliable RF management and distribution equipment around the globe."

ETL's worldwide partners are selected based on their knowledge of the satellite communications market and an appreciation of the design and application of ETL's products. They are supported by the expertise of ETL's engineering team in order to offer tailored solutions for even the most demanding of RF projects. Successful projects that ETL have recently worked on in conjunction with European partners include:

## **IPTV equipment upgraded for a Belgium broadcaster**

ETL Systems' partnership with DigiNet in Belgium, a major provider of technical solutions and professional equipment for the broadcast and telecom markets, helped ETL to win a competitive tender to upgrade an IPTV headend for a Belgian telecommunications giant.

The project, which upgraded existing RF signal distribution equipment at the teleport, included ETL systems 64x64 L-band Vortex Matrices, offering features such as 'plug and go' installation, web browser control and hot-swap of all active components.

ETL Systems replaced its own legacy equipment which has been operating efficiently for over 10 years. The upgrade also added extra downlink capacity, reduced rack space and power required and allowed the broadcaster to balance signal strength to reduce crosstalk.



ETL Systems' StingRay Series RF over Fiber.



## **L-band Matrix for a Greek satellite operator**

ETL's Spanish partner, NTi Soluciones, assisted Hellas Sat in selecting an L-band switch matrix / router for their DTH satellite station platform in Greece. Hellas Sat is one of the leading DTH service providers, broadcasting more than 200 TV and radio channels in the Mediterranean region.

ETL's Enigma L-band matrix router was selected because of its reduced single points of failure design and this product has helped the Greek national satellite operator to improve switching reliability for communications and video services to households, specifically in Greece and Cyprus.

NTi has also recently helped to supply an ETL ultra compact, L-band 16x16 Victor switch matrix to Overon in Spain, who provide broadcast services for content distribution services all around the world.

## **German broadcaster expands matrix system**

Hessischer Rundfunk, the German public broadcaster, worked with ETL's experienced German distributor, Tellink, to upgrade their existing Enigma matrix system and expand their RF routing capabilities as new satellite feeds have been added to their Frankfurt teleport.

The Enigma design allows single inputs or outputs to be added to the switch as satellite teleports grow.

## **Matrix and RF over Fiber for a German defense equipment supplier**

A German supplier of defence technology and security equipment, also worked with our partner, Tellink, to use ETL's upgraded 16x32 Valiant Matrices and the StingRay RF over Fiber system to operate as part of an internal test system.

## **@ IBC2015**

ETL Systems ([www.etlsystems.com/](http://www.etlsystems.com/)) is exhibiting at the IBC 2015 exhibition in Amsterdam in September. Ian Hilditch, CEO and Andrew Bond, Sales Director, will be part of the team of 10 ETL staff at this major event to demonstrate the range of new products as well as to highlight ETL's quarter of a century of in-house experience in designing award-winning RF equipment. The company is recognized internationally for its innovation and professional service, with 67 percent of ETL's 2015 customers composed of repeat business.

*Andrew Bond's specialty is centered on the sales and marketing of technical communications products, with a focus on developing international brands and sales networks. He joined the ETL team in June of 2005 to support the company's expansion into new global markets, with the company since then experiencing sales growth of approximately 20 percent per year.*

## RSC Energia + RSCC Sign Advanced Comms + Satellite Broadcasting Agreement



**Vladimir Solntsev, Energia President, and Yuri Prokhorov, RSCC Director-General, have signed an agreement to cooperate in the field of developing advanced communications and broadcasting satellite systems.**

Working together, the two companies intend to use more efficiently the resources they have in order to design such systems.

The plan is (i) to develop jointly the technical requirements regarding prospective systems of satellite-supported communications and broadcasting, including those for RSCC, (ii) to assess feasibility of applying new requirements to future communications and broadcasting satellites using the R&D and production potential of Russian space industry, and also (iii) draft proposals regarding the use of prospective domestic satellite launch systems.

Among those contributing to the development of new spacecraft will be Energia specialists who have attended training programs at Airbus D&S under the Express-series project.

"I am convinced that our joint efforts will make it possible to expedite implementation of state-of-the-art processes and standards to ensure appropriate quality and reliability of satellite-supported communications services.

"Our cooperation will serve the objective of further development of Russia's infrastructure of satellite communications and broadcasting", said Energia President, Vladimir Solntsev, following the signing ceremony.

For his part, Yuri Prokhorov, RSCC Director-General, said, "The agreement we have signed is called upon to spur implementation of the 2016-1025 program to develop the domestic orbital constellation of civilian communications and broadcasting satellites involving Russia's leading space industry enterprises

that have the requisite knowhow and unique competencies in the area of space hardware."

[www.rsc.ru/](http://www.rsc.ru/)

# Advancing Maritime Intelligence With Real-Time Satellite AIS

By Nicole Schill, Marketing Communications Manager, exactEarth

**C**urrently, the remote Arctic region's ice levels are slowly recovering after all-time low levels during the summer months.

This reduction in the ice levels allows for an increase in the number of ships that are able to transit through these relatively untouched waters. The ice retreat means Arctic research and exploration will ramp up as nations start to unearth the resources that lie beneath this frigid area of the world.

Just as ships in the Arctic maneuver around the melting ice caps, off the coast of Australia in the beautiful turquoise waters of the Great Barrier Reef, massive tanker ships travel dangerously close to this pristine wonder of the world. In fact, ships everywhere across the globe are dancing around similar environmentally safe zones known as Marine Protected Areas (MPAs), carefully traveling out of harm's way so as not to disturb the marine life that call these areas their home.

Across the poles and everywhere in between, exactEarth's eyes are on our oceans. Knowing the who, what and where of shipping activity is precisely their business. exactEarth owns and operates a constellation of seven, Low Earth Orbiting (LEO) satellites.

The company is able to detect the transmitting signals from more than 165,000 active vessels across the oceans. Every ship over a certain gross tonnage is required to be fitted with an AIS (Automatic Identification System) transponder that emits messages containing information, such as the ship's position, course and speed. exactEarth is able to then take those messages, almost 8 million of them each day, and decode them into actionable data for users. Competent maritime authorities around the world have been loyal to the exactEarth data service, exactAIS®, since the company was launched in 2009.

Starting with just a single satellite back then, exactEarth is now able to provide complete global coverage with their current exactView constellation—but the company is not stopping there—with two planned launches in the fall of 2015, exactEarth will add an equatorial satellite to the mix to significantly lower the current global revisit times of the satellite constellation.

Constellation expansion was the major driving force behind exactEarth's recent announcement of a new partnership with Harris Corporation, as they will be the first to market a real-time (RT) satellite AIS constellation. The new exactView RT, powered by

Harris, will leverage the real-time connectivity of 58-hosted payloads on the Iridium NEXT constellation.



At full deployment, the exactAIS service will be using a combined constellation of 70 satellites, providing a new level of satellite AIS (S-AIS) data service for real-time global ship tracking. exactView RT powered by Harris will offer customers data latency and global revisit times of less than one minute. This will allow truly unsurpassed global ship tracking and maritime information solutions.

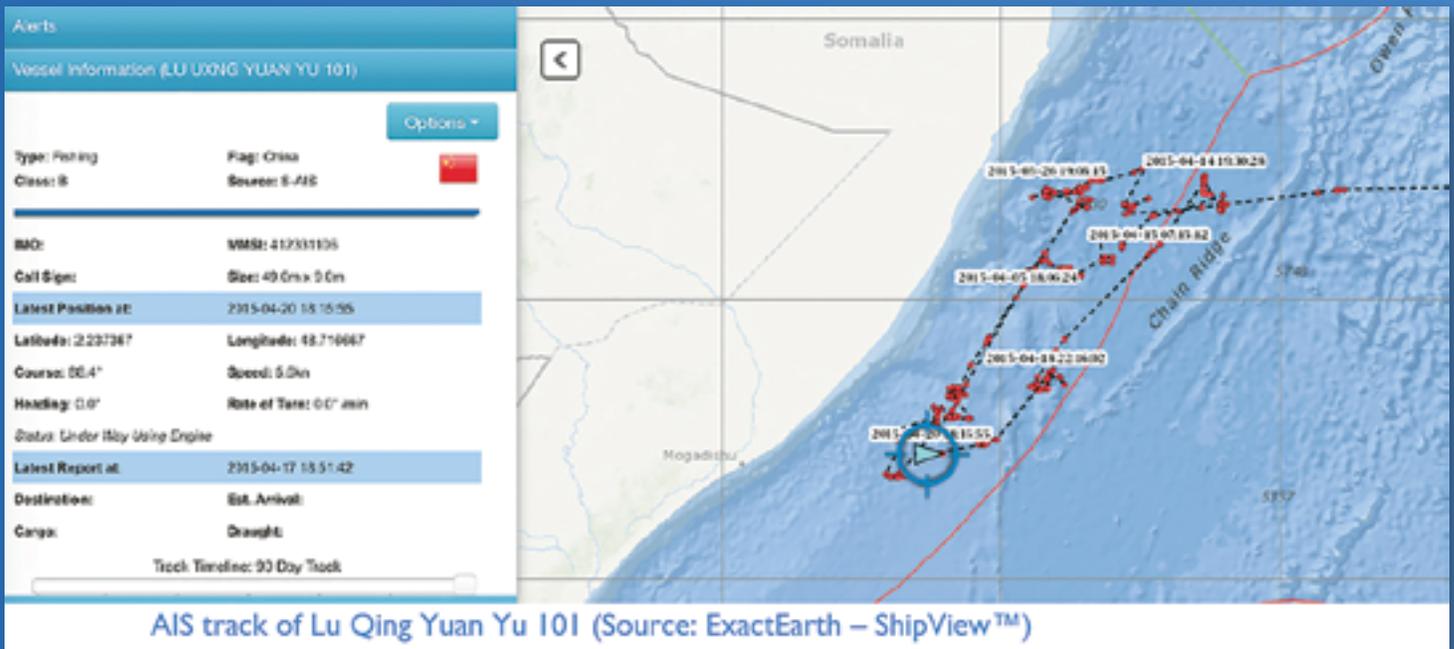
"As the recognized satellite AIS industry leader, the Harris announcement further strengthens our commitment to provide best-in-class maritime intelligence solutions to our customers worldwide," said Peter Mabson, President of exactEarth. "We are thrilled to be able to offer the shortest revisit times and lowest latency for developing true maritime domain awareness. This partnership with Harris will allow us to significantly expand the range of advanced value-added services and information solutions that we can bring to the global maritime market."

The next generation S-AIS constellation uses exactEarth's proven and patented AIS spectrum de-collision algorithms to make sense of those millions of AIS messages received, as well as the reconfigurable Harris AppSTAR™ payload platform. The ability to reprogram the payloads from the ground is a real boon for the team at exactEarth as they now can support multiple onboard applications to adapt to the ever-changing maritime industry.

By hitching a ride on the Iridium NEXT constellation, exactEarth will now have access to the entire maritime VHF band as well as new and future digital modes and services. This opens the door to an entire host of other VHF-based vessel data services, such as container tracking and monitoring, emissions and fuel usage data, fish catch data, as well as the collection and supply of weather and navigation data.

With AppSTAR's reprogrammability built into the processing elements, on-orbit reconfigurations and repurposing is easily accomplished via software uploads. This provides complete operational flexibility, enabling exactView RT to adapt to changing VHF missions and/or mission parameters. With extra processing capability built into the space payload, Harris and exactEarth have room to expand the capability of the exactView RT system towards new and changing signals, missions and uses.





To date, exactEarth has seen their data used by authorities for building credible maritime domain awareness (MDA) in a whole host of operational activities. In an ever-changing environment where there is a vital need for the persistent monitoring of human activity to forecast defence challenges, S-AIS has become a very powerful tool in the delivery of MDA to a variety of maritime and geo-intelligence users.

S-AIS is evolving in the context of Activity Based Intelligence (ABI) as a crucial aid to effective decision-making and proactive response to ensure national defense and security, as evidenced with data being easily correlated with other information sources, such as a Radar or Electronic Support Measures (ESM) signature. The ability to readily know the who, what and when of any transiting vessel is a critical piece of intelligence. S-AIS provides that knowledge for any area of interest and has been

a benefit for maritime operations, whether it's monitoring protected areas, better mapping, policing marine pollution or combating illegal fishing.

Fisheries now play an important role in improving food security and supporting economic development, provided that fisheries management is effective in curbing illegal fishing. In March of 2015, exactEarth provided data to the Federal Ministry of Fisheries and Marine Resources in Somalia as the nation looks to build the infrastructure necessary to combat the rampant illegal fishing taking place in their waters. In order to build their case for fishery management resources, the Ministry compiled many examples of illegal fishing activities within the EEZ using exactAIS data.

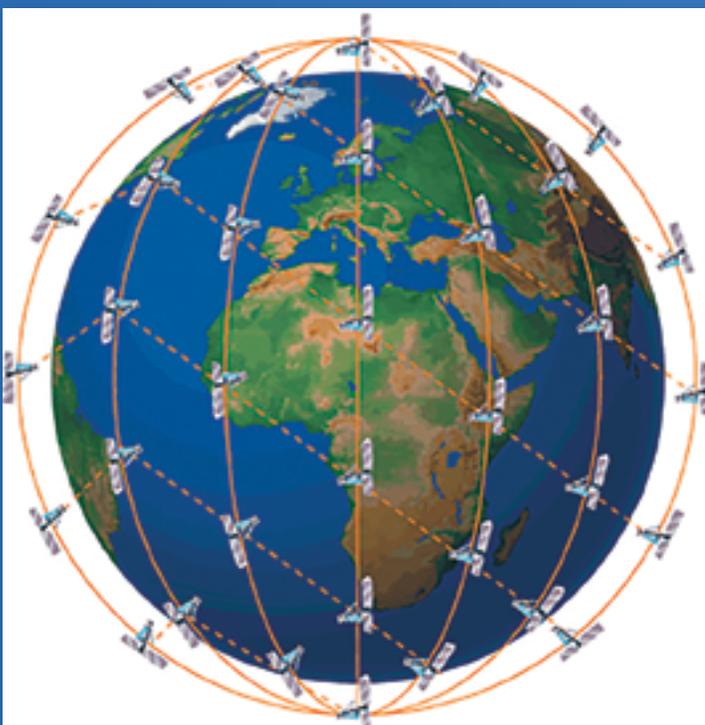
With the addition of real-time data, authorities can expect to have an even bigger leg up in the daily execution of maritime operational activities. Considering that behavioral modeling can now be performed in real-time, dark target analysis is significantly enhanced as authorities can instantaneously see any deviation in a vessel's traffic pattern.

That same immediacy can be applied to catching illegal fishing in its tracks or spotting a ship breaching an environmentally sensitive zone. The real-time data provides authorities with the actionable information they need to not only identify suspect ship behaviors but enough time to act on that information.

Search and rescue operation require a quick response and this is where the new, real-time data can be a matter of life or death. Now, coordinators will know immediately when and where a ship is in distress to allow for more efficient use of resources such as patrol craft since the rescue area is pinpointed. Proactive rescue responses will be a reality as authorities monitoring ships traversing through stormy weather conditions can be immediately notified at any sign of trouble.

exactEarth continues to see businesses and organizations rely on global satellite AIS data in so many different activities, and with real-time data now a reality, exactEarth customers around the world can expect to make drastic improvements to their maritime safety, security, and use of marine assets.

*Nicole Schill is a marketing communications professional with over five years of experience in both technical writing and content marketing strategy. Nicole is the Marketing Communications Manager at exactEarth, a published freelance journalist and holds a B.A. from the University of Toronto.*



Iridium NEXT constellation's global coverage.

# Evolving Products For Better Space... A Space Data Association Viewpoint

By John Mackey, Senior Vice President, Network Operations, Inmarsat

**I am one of the Executive Directors of the Space Data Association (SDA) and part of my role is to head up the Product Evolution Working Group, which is aimed at determining what products and services we need to be offering the industry to improve the space environment.**

As you may well have read, we recently issued a call for participation in this group. The remit of Space Data Association (SDA) is about increasing safety of flight and reducing problems, such as satellite interference.

Essentially, our organization wishes to act as a valuable resource for satellite operators and related stakeholders to provide the most useful services. In order to do this, we need to understand what the concerns are and what services and products are needed of offset those challenges.

To be truly effective, the SDA needs to engage with both the existing membership as well as the remainder of the satellite community. Toward the end of July, we had our first meeting via webex for this group, with participants from within the membership and external interested parties. The element that struck me the most was that, in reality, everyone is pretty much in the same boat with similar demands and needs. Conjunction Analysis (CA) remains high on the list of priorities. Using operator-provided ephemeris and maneuvers means that our data is really accurate, however it has to be a priority to gather more members and thus more data, to make that even better.

The other area that met with resounding agreement was the need to integrate SDA data with Joint Space Operations Center (JSpOC) data. As mentioned in a column written a few months ago by my colleague, Erika Rosetto, we have, for some time, been discussing how to improve collaboration between SDA and JSpOC.

Last August, SDA signed an agreement with the United States Department of Defense (DoD) to participate in the DoD's Space Situational Awareness Data Sharing Program, the first such agreement with a non-satellite operator. In the near future, we should be able to provide an even better space safety service for the satellite community. Of course, Radio Frequency Interference (RFI) is still an area of concern for many satellite operators. We are continuing to improve the Carrier ID database and are working on a geolocation solution sets tool to automatically analyze all geolocation solution set possibilities and rank-order them within the Space Data Center (SDC). As well as this effort, we are investigating other ways to even more effectively support the RFI environment.

The other topic that came up was that of space weather. This is not an area we have done much with previously and this is a course that is difficult to respond to—however, with some operators starting to look into this area, it could be worth investigating what weather data is already being collated and how that could help the international satellite community as a whole.

As the Product Evolution Group continues to progress, I certainly hope we can work with the entire satellite community to solve the issues we are all facing in the space environment. If anyone wishes to get involved, they can get in touch with [press@space-data.org](mailto:press@space-data.org) for additional information.



## What Is The SDA?

The Space Data Association (SDA) is a formal, non-profit association of civil, commercial and military spacecraft operators that supports the controlled, reliable and efficient sharing of data that is critical to the safety and integrity of satellite operations. Founded in 2009 by major satellite operators, Inmarsat, Intelsat, and SES, the SDA offers:

- *Direct support for operations*
- *An operational data exchange to help ensure the safety of operations*
- *Technical support to help secure the integrity of operations*
- *Shared costs that optimize your participation and reduce individual costs*

The space environment, in all orbital regimes (LEO, MEO and GEO), is becoming increasingly congested, and operators must effectively coordinate and manage their flight operations to minimize the risk of collisions. Formally exchanging accurate orbital position data can assure the preservation of the space environment for all operators. Prior to the formation of the SDA, data exchange only happened on an ad-hoc and informal basis for close approach coordination.

Other CA services rely on radars or telescopes to collect observations without the active cooperation of the satellite operator and do not incorporate advance maneuver plans, producing inaccurate results that do not best predict the satellite's orbit. Use of this data for CA leads to false alarms or, even worse, missed alarms. SDA's use of operator-provided ephemeris and maneuvers provides the most accurate conjunction analysis and the most trustworthy close approach warnings. Therefore, it is naturally important for SDA to be an independent, third party association, enabling operators to share their orbital data in a secure and controlled manner. The SDA provides mission assurance functions to help operators minimize the risks with their satellite operations. Its computing systems provide automated tools and processes to assist satellite operators with their flight operations and quality of service.

The Space Data Center (SDC) is the processing center of the SDA, designed to reduce the risks of on-orbit collisions and radio frequency interference. Analytical Graphics Inc (AGI) works with SDA as Technical Advisor and has developed and operates the Space Data Center. To ensure reliable and secure operation, the SDC has geographically-separated redundancy, high-level data security and encryption, and best practice information assurance. SDA and AGI are today continuing to work together to enhance the services provided by the SDA to its members.

## Who Can Join The SDA?

The SDA currently counts approximately 30 participants from across the globe with good membership growth seen this year. It is open to:

- *All satellite operators, in all orbital regimes. This includes commercial, civil and military operators. Currently, the SDA has members representing all these types of operators, with satellites in LEO and GEO regimes*
- *Entities providing services to the space industry such as launch providers*
- *Other entities having an interest in the safe exploitation of space*

Learn more and join the SDA today at [www.space-data.org/sda/](http://www.space-data.org/sda/)



# SatBroadcasting™: SNG Simplification... An AVIWEST Perspective

By Erwan Gasc, CEO, AVIWEST

**T**oday's consumers have insatiable appetites for high-quality video on a wide range of devices.

The challenge for broadcasters is that difficulty in anticipating what the viewer's circumstances will be like when a breaking news story or live event is being covered. In particular, some environments have no Internet connection or poor 3G/4G cellular wireless network connections—satellite networks then become an absolute necessity. In other instances, broadcasters may wish to use satellite networks but require additional bandwidth. The advantage of using satellite for live newsgathering is guaranteed bandwidth in environments such as demonstrations and sports events, where 3G/4G networks may have become over-saturated.

To deliver superior-quality coverage of breaking news and live events with speed and agility, broadcasters need portable, cost-effective, and reliable video solutions that can be used at any location around the world. This article explores three ways that AVIWEST, a global provider of video contribution systems, simplifies satellite-based newsgathering for international, national, and regional TV channels; video content operators; and news agencies through its DMNG PRO video uplink system.

## Sophisticated Signal Transmission Technology

The DMNG PRO features multiple cellular connections, a built-in Wi-Fi modem, and best-in-class H.264 video encoders, providing broadcasters with an advanced 3G/4G, Wi-Fi, and satellite video uplink family for newsgathering applications.

Using the DMNG PRO, broadcasters can easily and cost-effectively deliver live SD or HD video via satellite. By bonding together multiple Ka-band or BGAN satellite links, the DMNG PRO gives broadcasters a larger conduit to spread their video content, making it possible to support high-end applications such as streaming at a high frame per second over satellite.

With the DMNG PRO system, broadcasters also have the flexibility to deliver video over Ka-band while using cellular links as a back-up or complementary connection. Under this scenario, broadcasters can start streaming live news or event coverage over cellular connections while driving to a location and then switch over to the Ka-band once the satellite dish is set up. This method of bonding ensures transmission reliability when the performance of the Ka-band decreases, especially in cases of bad weather conditions or due to a decrease in bandwidth because of a congested network.

## BGAN Terminal Support

Under certain circumstances, cellular wireless network conditions may be poor or nonexistent. The DMNG PRO180 has broadcasters covered in these environments. Full compatibility with a variety of major portable satellite uplink solutions, such as Inmarsat BGAN, Thuraya, and the Ka-band, is supported.



**A SatMagazine Conversation with  
AVIWEST CEO, Erwan Gasc**

## SatMagazine (SM)

*What drew you into the field of digital mobile newsgathering in the first place?*

### Erwan Gasc

Before founding AVIWEST, I worked in the professional video industry for Tandberg Television (now Ericsson) and Thales Broadcast & Multimedia (now Thomson Video Networks).

The advent of 3G+ technology and its deployment within French cellular networks made me and the other founders of AVIWEST rethink standard video contribution practices and consider the advantages of using cellular networks versus traditional contribution networks. That led us to develop the world's first hardware-based digital mobile news gathering platform, which—at the time—was quite challenging.

## SM

*In your role as CEO at AVIWEST, what are your main job responsibilities?*

### Erwan Gasc

As CEO at AVIWEST, I'm involved in all key decision making, from finance to human resources and product strategy. The strength of AVIWEST is based on the innovativeness of our technical solutions and the performance of our products, assuring high satisfaction for customers. Thus, I would say the most critical decisions I make are related to development strategies.

I make it a goal to listen to our customers, watch the evolution of technology, aggregate the ideas raised by our team, and envision future customer needs. These are what define our vision and drive product developments.

## SM

*How do AVIWEST systems improve broadcasters' ability to capture and deliver live events and news coverage?*

### Erwan Gasc

Unlike traditional systems that rely on a single managed or unmanaged network, our live video contribution platform enables broadcasters to capture and broadcast live HD or SD video over multiple networks, including bonded 3G/4G cellular wireless, Wi-Fi, Ethernet, and satellite. By providing broadcasters with the capability to bond together multiple IP networks, the DMNG system ensures the delivery of live transmissions even in the midst of unpredictable cellular network conditions.

At IBC2015, we will introduce the DMNG HE4000, a new HEVC 4K contribution video encoder that allows broadcasters to deliver crystal-clear 4K content at low bit rates to meet the growing consumer demand for higher quality video content.

We'll also be showcasing a new grid view for the DMNG Manager server application at IBC2015. This feature simplifies system resource allocation by helping operators to easily route the video streams to one or multiple receivers or CDNs, with simple drag and drop.

Recently, AVIWEST formed partnerships with Hughes Network Systems, LLC (HUGHES), and Cobham SATCOM, two of the world's leading providers of broadband satellite networks and services, to improve delivery of video signals over Inmarsat's BGAN mobile satellite network. Thanks to these collaborations, the DMNG PRO now comes integrated with Cobham's EXPLORER 710 and Hughes 9211-HDR BGAN satellite terminals. When used during satellite transmission, the antennas enable the DMNG PRO to compress video content according to the available satellite bit rate to ensure superior video quality.

Through the BGAN terminal, users can connect to Inmarsat's HDR service at streaming broadband speeds of more than 650 Kbps to quickly transmit video and other critical data for broadcasting and other IP-based industry applications. The DMNG PRO system has two Ethernet ports that allows broadcasters to easily bond two BGAN terminals together and achieve streaming rates over 1 Mbps. Plus, deploying and using the solution is quick and easy. The DMNG PRO automatically configures the antenna once a connection has been established via Ethernet, speeding up remote newsgathering. As an added bonus, the DMNG PRO and Cobham/Hughes BGAN terminals are small enough to be carried in a backpack, making it simple to deploy and use anywhere in the world covered by Inmarsat's satellite network.

### **Optimal Design For In-the-Field Use**

When broadcasters are chasing a live news story or sporting event, they need satellite newsgathering equipment that is easy to carry and use. AVIWEST's DMNG PRO is based on a compact, lightweight, and portable design that is perfect for in-the-field use. Weighing about 1 kg, the pocket-sized system is extremely portable. Broadcasters can purchase less equipment and the unit may be moved around as needed. That lowers capital and operational costs.

Flexibility is another cornerstone of the DMNG PRO, which can be easily connected to any professional camera (e.g., SD/HD SDI, analog [BNC] and HDMI) and mounted via V-Mount, Gold Mount, or PAG plates. By providing broadcasters with a video uplink system that is easy to transport, the DMNG PRO speeds up newsgathering operations.

Designed to automatically detect real-time network capabilities, the DMNG PRO is simple to use. Through a user-friendly and intuitive touch-screen interface, the DMNG PRO allows any on-the-go media professional to easily configure and operate the system as well as communicate with the studio through the IFB return channel. The units can also be controlled by the receiver (DMNG Studio), the Management System (DMNG Manager), the DMNG Remote smartphone application, or any device connected to the unit through the network.

### **The SNG Solution That Makes Good Sense**

When it comes to satellite-based newsgathering equipment, broadcasters need reliability, portability, and flexibility. Through its sophisticated transmission technology, BGAN terminal integration, and lightweight, portable design, AVIWEST's DMNG PRO system is the perfect solution for delivering high-quality live news and events coverage in the most affordable manner possible.

[www.aviwest.com/](http://www.aviwest.com/)

*AVIWEST's video hybrid contribution solutions are distributed in the United States by VidOvation.*

*Erwan Gasc is the CEO of AVIWEST, and through his leadership and strategic vision, he has helped position the company as a leading provider of video contribution uplink systems for live streaming over bonded 3G/4G cellular networks. Mr. Gasc has extensive managerial and sales experience working in the global broadcast industry for leading technology companies.*

*Prior to AVIWEST, he was the key account manager for France and North and West Africa at Tandberg Television. He was also the area sales manager for France, Southern Europe, and the Middle East at Thales Broadcast & Multimedia. Mr. Gasc holds a masters degree in telecommunications and signal processing from the Université de Rennes in France.*

These are just a few of the ways that AVIWEST improves upon broadcasters' ability to deliver breaking news and live events coverage. There will also be other enhancements introduced at the show, such as an IP Bridge functionality for the DMNG PRO video uplink system and DMNG Studio. We invite attendees to stop by stand **2.A29** to learn more.

### **SM**

*What are the key requirements a broadcaster should look for in a digital mobile newsgathering system?*

### **Erwan Gasc**

Breaking news can happen anywhere in the world, making it challenging for broadcasters to predict the remote environment they'll be, the availability of networks, and whether it is conducive to sending live video. Broadcasters should choose a versatile solution that supports the widest range of contribution networks, such as bonded 3G/4G, Wi-Fi, Ethernet, and satellite.

Power consumption, portability, size, and weight are also important parameters to take into account. In addition to the technical requirements, partnering with a technology provider that offers support from a local supplier anywhere in the world is an essential advantage.

### **SM**

*What are the current industry trends and how do they impact your company's latest development in digital mobile newsgathering equipment?*

### **Erwan Gasc**

Our broadcast customers are requesting technologies that will maximize operational efficiency, improve video quality, and lower costs. Some of the current technology trends we are looking at to achieve this are cloud and HEVC.

Our cloud-based solution for delivering breaking news and events coverage offers broadcasters increased flexibility, scalability, and control. Broadcasters like using the cloud because it significantly reduces their CAPEX and OPEX, while enabling the delivery of high-quality live and on-demand video content. For broadcasters looking to provide viewers with superior quality video content on a growing number of devices, we've introduced HEVC encoding technology.

### **SM**

*How do you envision the future of digital mobile news gathering?*

### **Erwan Gasc**

Viewer generated content is increasingly being used by news channels, and I think that trend will continue. Thanks to the proliferation of smartphones, cloud-based contribution platforms, and 4G networks, anyone can shoot live video with good quality.



# What Would Occur If All Of Our Satellites Were... Suddenly Destroyed?

By George Dvorsky, Contributing Editor, *io9*, Chairman of the Board, Institute for Ethics and Emerging Technologies

**S**ince their inception 60 years ago, satellites have gone on to become an indispensable component of our modern high-tech civilization. But because they're reliable and practically invisible, we take their existence for granted—here's what would happen if all our satellites suddenly just disappeared.

The idea that all the satellites—or at least good portion of them—could be rendered inoperable is not as outlandish as such might seem at first. There are at least three plausible scenarios wherein this could occur.

As portrayed in the soon-to-be-released science fiction thriller *Ghost Fleet: A Novel of the Next World War*, satellites could be deliberately knocked out of action by warring nations. In this book, set in the near future, authors P. W. Singer and August Cole describe a war in which the Chinese military use anti-satellite (ASAT) satellites to direct high-energy weapons at sensitive U.S. targets. Dozens of satellites are rendered useless before the action on the ground even gets started.

There are other space war scenarios to consider. Jeff Kueter, the President of the George C. Marshall Institute—a Virginia-based think tank focusing on scientific issues and public policy—says that combatants could physically attack satellites from ground stations, jam com links, release pellet cloud attacks, deploy high-altitude weather monitoring rockets, or detonate high-altitude nuclear devices.

Alternately, our satellites could get wiped out by a massive solar storm. A so-called Carrington Event—like the one that happened in 1859—would wreak tremendous havoc to a modern civilization like ours. As *Universe Today's* Fraser Cain explains, a sufficiently powerful geomagnetic storm would overload power grids on Earth and fry all of our devices in orbit.

"When a blast of particles sweeps past the Earth, it carries an enormous electric charge," Cain tells *io9*. "When satellites are close to the Earth, they're mostly protected by the planet's geomagnetic field, but the satellites in higher orbits, especially geosynchronous orbit aren't so lucky. The entire satellite can get charged during the storm, and then the excess electrical charge can go into satellite components and burn them out."

Cain says the several hundred geosynchronous satellites orbiting the Earth right now are vulnerable, including the GPS network that orbits at about 20,000 km (12,430 miles).

Lastly, there's the Kessler Syndrome to consider. This scenario was portrayed in the 2013 film *Gravity*. In the movie, a Russian missile strike on a defunct satellite inadvertently causes a cascading chain reaction that formed an ever-growing cloud of orbiting space debris. Anything in the cloud's wake—including satellites, space stations, and astronauts—gets annihilated. Disturbingly, the Kessler Syndrome is a very real possibility, and the likelihood of it happening is steadily increasing as more stuff gets thrown into space.

Given these grim prospects, it's fair to ask what might happen to our civilization if any of these things happened. At the risk of gross understatement, the complete loss of our satellite fleet would instigate a tremendous disruption to our current mode of technological existence—disruptions that would be experienced in the short, medium, and long term, and across multiple domains.

## Compromised Communications

Almost immediately we'd notice a dramatic reduction in our ability to communicate, share information, and conduct transactions.





A 1986 DIA illustration of an anti-satellite system attacking a target (DIA/public domain).

"If our communications satellites are lost, then bandwidth is also lost," Jonathan McDowell told io9. He's an astrophysicist and Chandra Observatory scientist who works out of the Harvard-Smithsonian Center for Astrophysics.

McDowell says that, with telecommunication satellites wiped out, the burden of telecommunications would fall upon undersea cables and ground-based communication systems. But while many forms of communication would disappear in an instant, others would remain. All international calls and data traffic would have to be re-routed, placing tremendous pressure on terrestrial and undersea lines. Oversaturation would stretch the capacity of these systems to the limit, preventing many calls from going through. Hundreds of millions of Internet connections would vanish, or be severely overloaded. A similar number of cell phones would be rendered useless. In remote areas, people dependent on satellite for television, Internet, and radio would lose practically all service.



Lockheed-Martin's GPS-III-AHI satellite.

"Indeed, a lot of television would suddenly disappear," says McDowell. "A sizable portion of TV comes from cable whose companies relay programming from satellites to their hubs." It's important to note that we actually have a precedent for a dramatic—albeit brief—disruption in com-sat capability. Back in 1998, there was a day in which a single satellite failed and all the world's pagers stopped working.

### Get Out Your Paper Maps

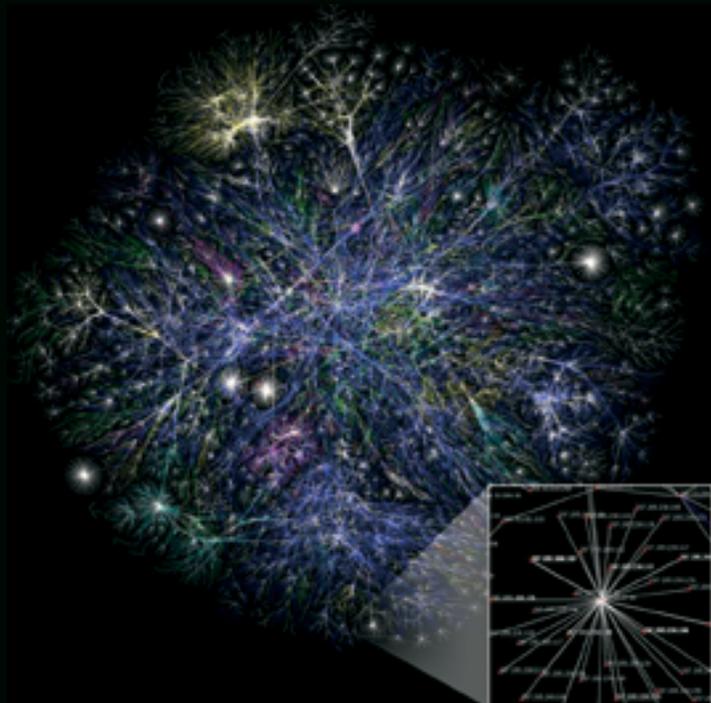
We would also lose the Global Positioning System. In the years since its inception, GPS has become ubiquitous, and a surprising number of systems have become reliant on it. "Apart from the fact that everyone has forgotten to navigate without GPS in their cars, many airplanes use GPS as well," said McDowell.

Though backup systems exist, airlines use GPS to chart the most fuel-efficient and expeditious routes. Without GPS and telecommunication satellites, aircraft controllers would have tremendous difficulty communicating with and routing airplanes. Airlines would have to fall back to legacy systems and procedures. Given the sheer volume of airline traffic today, accidents would be all but guaranteed. Other affected navigation systems would include those aboard cargo vessels, supply-chain management systems, and transportation hubs driven by GPS.

But GPS does more than just provide positioning—it also provides for timing. Ground-based atomic clocks can perform the same function, but GPS is increasingly being used to distribute the universal time standard via satellites. Within hours of a terminated service, any distributing networks requiring tight synchronization would start to suffer from "clock drift," leading to serious performance issues and outright service outages. Such disruptions could affect everything from the power grid through to the financial sector.

In the report, "A Day Without Space: Economic and National Security Ramifications," Ed Morris, the Executive Director of the Office of Space Commerce at the Department of Commerce, writes, "If you think it is hard to get work done when your Internet connection goes out at the office, imagine losing that plus your cell phone, TV, radio, ATM access, credit cards, and possibly even your electricity. [...]"

"Wireless services, especially those built to CDMA standard, would fail to hand off calls from one cell to the next, leading to dropped connections. Computer networks would experience slowdowns as data is pushed through finite pipelines at reduced bit rates. The same would be true for major networks for communication and entertainment, since they are all IP-based today and require ultra-precise timing to ensure digital traffic reaches its destination.



A visualization from the Opte Project showing the various routes through a portion of the Internet (Opte/cc).

The lack of effective sync would hit especially hard in banking, where the timing of transactions needs to be recorded. Credit card payments and bank accounts would likely freeze, as billions of dollars could be sucked away from businesses. A financial crash is not out of the question.”

### **The Loss Of Military Capability**

The sudden loss of satellite capability would have a profound effect on the military. The Marshall Institute puts it this way, “Space is a critical enabler to all U.S. warfare domains,” including intelligence, navigation, communications, weather prediction, and warfare.

McDowell describes satellite capability as the “backbone” of the U.S. military.

As 21st century warfare expert Peter W. Singer from New America Foundation tells io9 (io9.com/), “He who controls the heavens will control what happens in the battles of Earth.”

Singer summarized the military consequences of losing satellites in an email. “Today there are some 1,100 active satellites, which act as the nervous system of not just our economy, but also our military. Everything from communications to GPS to intelligence all depend on it. Potential foes have noticed, which is why Russia and China have recently begun testing a new generation of anti-satellite weapons, which in turn has sparked the U.S. military to recently budget \$5 billion for various space warfare systems.”

What would happen if we lost access to space? Well, the battles would, as one U.S. military officer put it, take us back to the “pre-digital age.” Our drones, our missiles, even our ground units wouldn’t be able to operate the way we plan. All our assumptions of 21st century high tech war would have to be rewritten. We might have a new generation of stealthy battleships... but the loss of space would mean naval battles would, in many ways, be like the game of Battleship where the two sides would struggle to even find one another.

Moreover, and as McDowell explained to io9, the loss of satellite capability would have a profound effect on arms control capabilities. Space systems can monitor compliance; without them, we’d be running blind.

“The overarching consideration is that you wouldn’t really know what’s going on,” says McDowell. “Satellites provide for both global and local views of what’s happening. We would be less connected, less informed—and with considerably degraded situational awareness.”

### **Compromised Weather Prediction + Climate Science**

One great capability satellites have provided for us is to improve our ability to forecast weather. Predicting a slight chance of cloudiness is all well and good, but some areas, such as India, Pakistan, and Bangladesh, are dependent on satellite systems to predict potentially hazardous monsoons. In the U.S., the NOAA has estimated that, during a typical hurricane season, weather satellites save as much as \$3 billion in lives and property damage.

There’s also the effect on science to consider. Much of what we know about climate change comes from satellites.

As McDowell explained, the first couple of weeks without satellites wouldn’t make much of a difference. However, over a ten-year span, the lack of satellites would preclude our ability to understand and monitor such things as the ozone layer, carbon dioxide levels, and the distribution of polar ice. Ground-based and balloon-driven systems would help, but much of the data we’re currently tracking would suddenly become much spottier.

“We’re quite dependent on satellites for a global view of what’s happening on our planet—and at a time when we really need to know what’s happening,” said McDowell. Without satellites, we also wouldn’t be able to monitor space weather, such as incoming space storms.

### **Time To Recover**

With all of the satellites gone, governmental and private interests would work feverishly to restore space-based capabilities. Depending on the nature of the satellite-destroying event, such could take decades or more to get ourselves back to current operational standards. It would take a particularly long time to recover from a Carrington Event, which would zap many ground-based electronic systems as well. The U.S. military is already thinking along these lines, which is why it’s working on the ability to quickly send up emergency assets, such as small satellites parked in Low Earth Orbit (LEO). CubeSats are increasingly favored, as an easy-to-launch, affordable, and effective solution—albeit, a short-term one.

The U.S. Operationally Responsive State Office is currently working on the concept of emergency replenishment and the ability to “rapidly deploy capabilities that are good enough to satisfy warfighter needs across the entire spectrum of operations, from peacetime through conflict.”As for getting full-sized, geostationary satellites back into orbit, that would prove to be a greater challenge. It can take years to build a new satellite, which typically requires a big, costly rocket to get it into space.

Lastly, if a Kessler Syndrome wipes out the satellites, that would present an entirely different recovery scenario. According to McDowell, it would take a minimum of 11 years for LEO to clear itself of the debris cloud; any objects below 500 km (310 miles) would eventually fall back to Earth. Thus, we would only be able to start re-seeding LEO in a little over a decade following a Kessler event.

Unfortunately, the area above 600 km (372 miles) would remain out of touch for a practically indefinite period of time; objects orbiting at that height tend to stay there for a long, long time. We’d probably lose this band for good—unless we manually removed the debris field, using clean-up satellites or other techniques.

Worth noting is that a single Kessler event could hit the LEO zone or the GEO zone (geosynchronous orbit) but realistically not both; LEO debris could never reach GEO, and vice versa—although a spent rocket in GTO (geosynchronous transfer orbit) or SSTO (supersynchronous transfer orbit) passes through or near both zones and could potentially affect either of them. The spent rockets in GTO do not stay too close to the GEO arc for long due to orbital perturbations, which means a GEO Kessler event is unlikely to be triggered by one of them.

We should probably take the prospect of a Kessler Syndrome more seriously and be aware of what could happen if we’re no longer able to use these spaces.

Canadian futurist, science writer, and ethicist George Dvorsky has written and spoken extensively about the impacts of cutting-edge science and technology—particularly as they pertain to the improvement of human performance and experience. George is a contributing editor at io9 where he writes about science, culture, and futurism.

A founding member of the Institute for Ethics and Emerging Technologies, he is Chair of the Board and is the founder and program director for its Rights of Non-Human Persons program. In addition, George is the co-founder and president of the Toronto Transhumanist Association and has served on the Board of Directors for Humanity+ for two terms. George’s work has been featured in such publications as The Guardian, the BBC, CBC, Forbes, the New York Times, Slate, Radio Free Europe, and al-Jazeera. He is also an avid CrossFitter, an ancestral health enthusiast, and an accomplished music performer, composer, and recording engineer.

#### **Editor’s note:**

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## SatBroadcasting™: Discovery's Love For 4K (UHDTV)

By Chris Forrester, Senior Contributor

**F**actual broadcaster Discovery Networks is planning for 4K, otherwise known as UHDTV.

J.B. (Jean-Briac) Perrette, the president of Discovery Networks International, was asked where Discovery stands on 4K (and perhaps even 8K)—and the answer was the company is firmly backing the new technology.

"Discovery's short answer is that we have always reflected what our viewers and fans want, which is—sometimes—more like the 'bleeding edge' of technology. We were the first in pay-TV, the first in HD, even the first in 3D, although we don't talk so much about that technology today. That evolution is part of us. Now we all know that some of these experiments didn't quite turn out the way we had expected, but this is part of that experience. Some things don't end up being for mass market consumption. So, my short answer is that we are going to be doing more and more in 4K. We think this is important for us, the brand, the company, and the archive."

J.B. added that sport is also important in 4K. Discovery now controls Eurosport and, with it, the European TV rights to the Olympic Games through 2024 (the UK and France have rights for 2016 and 2020). Eurosport paid 1.3 billion euros for those rights.

"On the sports side, we see a growing shift towards IP distribution. However, for sport and the brand you are going to see, that will keep us busy with 4K, and probably 8K, and then whatever comes after that. We lead in what we do, and it all goes back to that evolution I mentioned. I certainly see higher quality video images playing an increasing role in the years ahead."

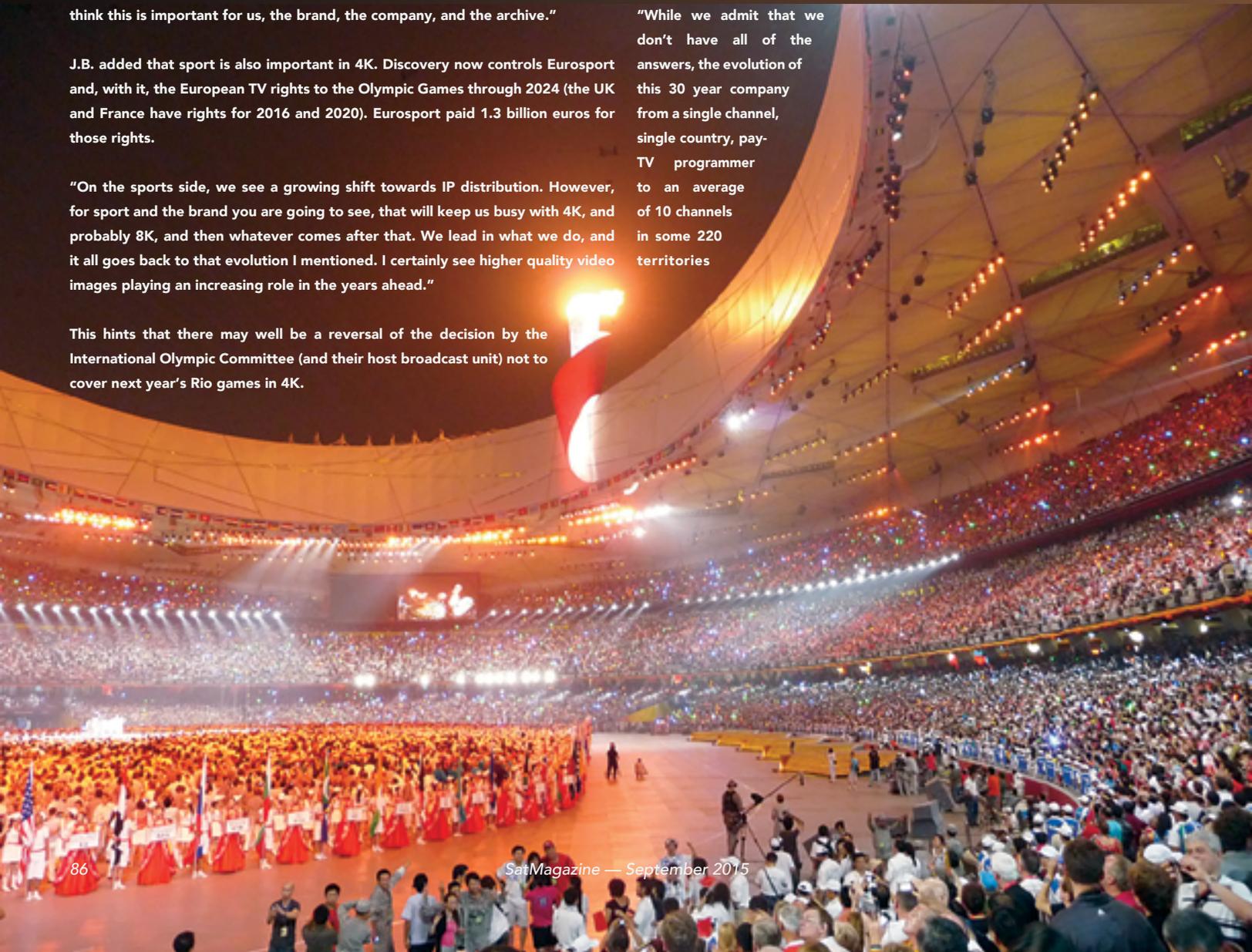
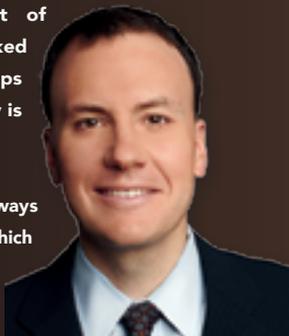
This hints that there may well be a reversal of the decision by the International Olympic Committee (and their host broadcast unit) not to cover next year's Rio games in 4K.

Perrette has been in post since January of 2014 and has driven the European division dramatically forward during that period, which culminated in Eurosport's move to cover the Olympics. He has continued the expansion that followed the acquisition of SBS's Nordic channels (acquired from ProSieben/Sat-1). A clue as to its sports expansion plans was clear when Perrette appointed the former Co-CEO of sports rights specialists MP & Silva Group, Peter Hutton, to the company.

Indeed, Discovery is very much on a roll, with the International division contributing more than 50 percent of the profits to the parent company last year. This will grow, J.B. said.

"We're in a period of enormous consumer and technological change in the media business. Discovery as a company is in an equally exciting and important transformation of our business that reflects these changes. We totally embrace these changes.

"While we admit that we don't have all of the answers, the evolution of this 30 year company from a single channel, single country, pay-TV programmer to an average of 10 channels in some 220 territories





**Discovery's headquarters building during the Shark Week broadcasts.**

around the world is amazing. And then having moved into multi-genre programming, including fiction, kids, and now sports, as well as moving from pay-TV exclusive, to pay-TV plus FTA, as well as including OTT, shows that the evolution continues—we are ready for more.”

Discovery has certainly grown, from that single channel founded by John Hendricks (with a little help from the USA's cable players, including John Malone) to the behemoth of today. While the BBC manages its small portfolio of channels with some 20,000 staff, Discovery's global pay-role is barely 7000.

“My predecessors in this chair, including John Hendricks and our leader David Zaslov, our Board and international management and the teams we have in place, with some 7,000 people working directly for the company—they are the one's responsible for the company's success and for the transformation that's taking place. They all deliver a lot of credit for getting us where we are today. But our flagship brand—the core channel is never forgotten. What we are doing today is very faithful to the core brand which is to try and be curious and embrace what we don't know and to try and figure out for all our benefits how we shape the world ahead. That curiosity drives us, and runs through our veins.”

Asked whether paying one billion dollars for sports would impact on Discovery's documentary and factual investments, Perrette was unequivocal: “Absolutely not. The simplest and cleanest answer is ‘no’. We look at moving into sport in the opposite way. The opportunity now, especially because of the access to the Olympic archive, is to tell stories. We can look at the thousands of hours of material available and gathered over the years. We'll be putting more work into telling these legacy stories that go far beyond the usual two-and-a-half weeks of the Olympics themselves that occur every four years—we'll have much more Olympic programming in the full broadcast calendar. And, as these world-class athletes are competing in major events outside of the Olympic Games themselves, we will have more locations and opportunities throughout the year to amplify and tell their stories.

“We have the content story and we are spending more time with the International Olympic Committee (IOC) discussing this and will continue to do so in the months and years to come. Then there's carriage of the IOC's Olympic Channel, which is part of the agenda for 2020. How they intend to take the channel idea forward is an important question for them, but it isn't geared for linear carriage and is more of an online proposition. However, there are ways of collaborating on the story telling and how we all pull out those wonderful nuggets, the rich parts of the story, that's what we want to help with.

“Let's put aside genres for a moment and look at that common DNA. From Day One, when this company started our absolute prime focus, we have been able to find great characters and marvelous, factual stories. We have always tried to tell those stories

in the most authentic way possible. Think of how we have diversified over the years, especially to programming for kids—by the way, we operate the Number One kids' channel in Latin America. We have evolved to telling those stories in broader-based entertainment platforms, such as SBS, and broader still into what is arguably the most dramatic non-fiction content that exists—sports. When you look at that sort of evolution, it is not quite as dramatic or as radical a shift as you might think. This is a true evolution and we want to stay rooted in the way we started: great stories, great characters, and stories that we can tell on a global basis.”

J.B. said sport was also good for stories—“Sport has great stories. The speed at which someone might run 100 meters, or makes a great ski jump, are unbelievably impressive and become so much more engaging due to the way TV tells the story not only of the achievement, but also what is behind that success. How the barefoot athlete trained in Kenya or Ethiopia and what we think we can do with unique stories such as those is how to inspire viewers in our kids channel. We try to emote with the person who trained in their bare feet, or couldn't afford proper shoes, or who trained in truly challenging circumstances. That storyline is why we watch and why we become so very involved in the drama of the moment and why we can become as emotional as the competitor when we watch such events.”

**The Expansion Drive Is Far From Over**

“We are a big company, with enormous global scale, but we like to think small. We are truly local in many, many of our markets around the world. In some markets, we have a modest share of viewership—in some places, just a single digit share—but we are there and can, therefore, only grow. We have staff in most of these markets and each and every one of them is tasked with looking and understanding that market and coming back to us if and when they note an opportunity. We are about growing our audience, on TV across all its forms, online, on mobile, on all platforms. This is a hugely exciting opportunity for us. As to specific regions, in July we hired a new leader for our Asian business as we think we can do a lot more in that part of the world. The same is true of Latin America, parts of Europe and Africa.”

Discovery is famous for its global ‘special’, where satellite links the planet for an hour or two of shared experience. It might be an underwater feature, or something with Cleopatra in its title, or more recently, Nik Wallenda's hair-raising 2013 stroll across the Grand Canyon. Discovery carried that exciting event live, and then handled the follow-up, also live, when he walked between two Chicago skyscrapers. Perrette said we'll see much more.

“In a world of growing platforms, and more and more options for viewer's leisure viewing time, such fragment the audience and then the need for ‘event’ television becomes quite important. Such is much more than the regular linear stream and we have been able to create these valuable moments.

“There is still something special about a global event on Discovery and what changes that event onto a massive scale, all well worth the investment. These events are unique to us and really important in gaining not just a large audience, but also new viewers for Discovery. These major events work for our marketers to present a platform and a place to obtain timely exposure to the product and our output. They are important for our distributors. Big event TV is increasing and is yet another reason why the sports genre is so interesting.”

*Senior Contributor Chris Forrester is a well-known broadcast 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. He also files for Advanced-Television.com. In November of 1998, Chris 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.*

# Eliminating the Need to Pause—SOTM Antennas... A C-COM Satellite Systems Perspective

By Drew Klein, Director, International Business Development, C-COM Satellite Systems

**A**s technology continues to improve by leaps and bounds in almost every sub-sector, at times, in the satellite business, improvements seem to come at a snail's pace.

The traditional SOTP (SATCOM-on-the-Pause) land-based antenna market has remained, for all intents and purposes, a stagnant product hindered by the laws of physics, with slow improvements being made to the technology, and little cost reduction available to the end user. Ku-band and C-band products continue as reliable, if not bulky, solutions for most vertical markets.

To the layman it might not be fully appreciated that an auto-deploy antenna can find a satellite 22,000 miles away, lock onto it in a few minutes with just the push of a button, and begin transmitting and receiving data with only a 600ms lag. This truly is a remarkable feat – but what have you done for us lately?

With total global bandwidth consumption doubling almost every 2 years, the thirst for faster, quicker and cheaper solutions in our industry are always being sought. The push for improved mobility, as well, remains a key issue for manufacturers, integrators and users alike. People who travel via plane, train, automobile or boat expect connectivity wherever they go.

Big changes have begun in earnest and, like most technologies, are taking some time to gain global acceptance. Ka-band and the emergence of High Throughput Satellites (HTS) are moving into the mainstream in the satellite world. In 2012, ViaSat gave us ViaSat 1: the highest capacity satellite ever launched, with 10 times the throughput of any previous Ka-band satellite, and thus pioneering the next generation of satellite capacity.

A few weeks later, Hughes launched Jupiter-1, another enormous pipe in the sky. Many other satellite operators and service providers are breaking the mold as well, from Intelsat's EPIC, O3B's ambitious constellation and Inmarsat's Global Xpress eventual worldwide coverage.

Even more interesting is the notion that satellite technology is moving out of the shadows and into the forefront of the communications dialogue with respect to quenching the thirst of the bandwidth starved global community. Facebook, Google, One Web and others are all angling with impressive projects. Big names like Richard Branson, Bill Gates, Greg Wyler and Elon Musk are now involved. Things are changing, and perhaps finally, changing more quickly than they have in the past.

The relatively recent acceptance of Ka-band SOTP land-based products into markets in North America, Europe and MENA has begun a small tide shift. Smaller antennas, lower cost bandwidth, lower power requirements, and a significant increase in bits per dollar has been the biggest improvement in the hardware side of this market in over a decade. While Asia, LATAM, Australia and parts of Africa still have yet to see complete coverage in Ka, it's generally accepted that the natural progression is towards more Ka-band solutions which will eat away at some of the Ku and C-band markets.

Similarly, the evolution of mobile antenna systems from 'on-the-pause' to 'on-the-move' is progressing. While SOTM antennas have been around for quite some time, specifically in the maritime business and in the growing aeronautical market, there is no specific advancement to replace all SOTP products with SOTM for land based SATCOM. It's simply not cost effective and the technology isn't ready at this point.



But it's only natural that the antenna business should progress from a technology that works only while stationary to one that works during any kind of movement.

C-COM Satellite Systems Inc. is a global leader and pioneer in the SOTP auto-acquire antenna business and is one of the first mobile antenna manufacturers in the world. Currently, the iNetVu® brand has been deployed in over 100 countries and there are over 7,000 transportable antennas in the field being used as vehicle mount, flyaway or fixed motorized. The company was also the first designer and manufacturer to have both driveaway and flyaway solutions approved for use on Ka-band services from ViaSat, Eutelsat, Avanti and Yahsat. The development towards a SOTM solution was inevitable and C-COM is pursuing several options for its 'in-motion' antennas.

C-COM has been working with ViaSat in adapting their successful aeronautical antenna into an affordable terrestrial solution for trains, buses, and other land-based vehicles. The Ka-band antenna, which will be unveiled at IBC in Amsterdam in September 2015, will operate and be certified first on ViaSat's Exede service in the US and later on Eutelsat KA-SAT service in Europe. Shortly thereafter, C-COM will integrate the antenna to work on all emerging Ka-band services worldwide. Full production is expected to begin in mid-2016.

"Our reseller network was surveyed for their ideal Ka-band in motion product," said Leslie Klein, President & CEO of C-COM. "Based on their feedback, and at the intersection of science and economics, we arrived at a product design which we believe will meet and exceed most of their requested requirements. The antenna system will be the first low-cost, Ka-band, land-based, in-motion commercial product developed to capture a number of vertical markets looking for a high performance," Klein continued.

The iNetVu® inMotion Antenna will provide affordable broadband connectivity via Satellite to all mobile ground platforms. Rugged, low profile (sub 33cm), and with look angles from 20-90 degrees, the flat-panel antenna will have operation wind loading of 350km/hr, which will make it usable on even the highest speed trains and in the most exhaustive terrains. With data rates up to 20Mbps of download and 6Mbps of uplink and at a price tag unseen in the market today by any approved system, the inMotion product will stand alone in the today's available SOTM offerings.

As SOTM has been slow to implement in the commercial world, we need to ask why that is. Part of the answer lies in the technology, but just as important, the cost of the bandwidth has been prohibitive.

"Most SOTM systems make use of spread spectrum bandwidth which spreads the power required over a wider bandwidth to reduce the carrier's spectral density," said Paul Seguin, Sr. Technical Advisor for C-COM Satellite Systems. "This reduces the effective interference created by the motion, impacting the transmitter's ability to remain pointed precisely at the satellite."

As the actual bandwidth required to support a given speed of data has been more than the actual amount required, based on the spreading of the frequency, the cost of SOTM has historically been much higher than a SOTP system for the same speed and volume. This higher monthly cost has been an impediment for a lot of people and has curtailed the move to SOTM.



"The new technology that C-COM will deliver will eliminate the spread spectrum issue and should allow a user to connect using standard fixed or SOTP bandwidth," continued Seguin. "This is exceptionally good news as it should mean that having connectivity on the move could be as economical as SOTP bandwidth."

In parallel with the ViaSat project, a much more ambitious project is underway. C-COM and the University of Waterloo are developing a hybrid mechanical and electronic beam steering antenna which will include C-COM's patented phase shifter technology.

"C-COM is exploring several antennas technologies in its quest for developing a low-cost, low profile high performance land mobile SOTM Ka terminal," said Bilal Awada, CTO for C-COM. "The Phased-Array antenna technology currently in development has been focusing on the antenna sub-arrays. These modules will be used as the building blocks for a complete SOTM antenna platform," Awada continued.

The new antenna technology will allow for a less complex design, will consume less power, reduce noise level, and will be less costly than any phased array system ever designed. The result is expected to be a considerably smaller antenna which will be even lighter and more low profile than the earlier version.

The proof of concept for this unique phased array antenna is expected by the end of 2015, with full production expected in 2017. This will be timely so as to coincide with the significant number of upcoming HTS launches; 1.34 TBps of capacity is expected to be available by 2020 from these new satellites and satellite operators will be looking for novel antenna designs to capitalize on the bandwidth that's available.

*Drew Klein oversees the sales and marketing departments at C-COM responsible for the promotion of the iNetVu mobile antenna. Drew directs global sales via our existing worldwide dealer network and reaches new resellers who wish to support and integrate the iNetVu brand. After graduating from the University of Waterloo in 2000 with a Bachelor of Honours Science (Biology), Drew worked for nearly 10 years in the financial markets in California running his own commodity brokerage firm.*

# The Big Cover Up: Staying Snow + Ice Free... A W.B. Walton Enterprises Perspective

By David Walton, Product Development and Director of Snow Shield Operations, W. B. Walton Enterprise, Inc.

**E**arth station antenna covers are designed to prevent snow and ice buildup that can degrade satellite signals.

Antenna cover products range from consumer-grade “passive” covers that repel snow from residential antennas and Direct-to-Home (DTH) dishes, to professional-grade systems designed to assure continuous CATV head-end, broadcast, teleports, and enterprise class satellite signal uptime and revenue streams. This article discusses considerations for selecting effective systems for commercial facilities.

When snow or ice accumulates on a satellite dish and antenna feedhorn, signal loss can be caused. One way to prevent such an occurrence is to install a de-icing system.

However, so-called anti-icing, or de-icing solutions, can range in performance and features from passive antenna covers (least costly but with de-icing limitations), to fully automated, professional, de-icing systems (highest reliability and uptime assurance).

## Cable Head-End Efficiency

For sites such as cable head ends, TV stations and teleports, where signal uptime is essential, a professional grade de-icing system, with automated sensing and de-icing, superior RF performance, and energy-efficient operation will provide advantages in terms of reliability, as well as operational ease-of-use.

A case in point is the Plainfield, New Jersey, media center of Comcast Cable, the largest cable TV provider in the U.S., which employs Walton De-Ice’s Snow Shield Covers with Ice Quake Systems (See Figure 1). The Snow Shield Cover is designed for antennas that range in size from 0.6 to 6.3-meters in diameter.

The Snow Shield consists of coated material, which is virtually invisible to RF, stretched over the satellite antenna. Snow Shield covers can be used as a passive, or actively heated solution using electric or gas heaters. Walton De-Ice’s Ice Quake enhances the performance of the Snow Shield antenna cover by vibrating the fabric cover—this action prevents snow and ice accumulation that degrade signals.

According to Allen Pillar, Head-End Manager at the company’s Media Center, “The Snow Shield and Ice Quake systems are working great. I am

saving lots of over time and have peace of mind that I don’t have guys out working in the middle of the night.” The facility houses 12 antennas, ranging in size from 3.8 to 5.0 meters, which are protected by the Snow Shield antenna covers made from Tedlar® material.

## RF Signal Transparency

In recent years, the deployment of MPEG-4/DVB-S2 format signals to U.S. cable systems makes for tighter satellite link margins above required signal thresholds, or less “headroom” before a weakly received signal goes off air. In this environment, grimy and poor quality antenna covers can degrade MPEG-4/DVB-S2 signals more severely than traditional modulation and signal formats. Antenna covers made of poorer quality material can accumulate dirt, grime, and mildew affecting a cable head-end, or broadcast signal (For example, See Figure 2).



Figure 2. Degraded antenna cover.

## Requirements + Considerations

Some issues to consider in selecting the right antenna cover solution for satellite facilities include:

- What revenue and 24/7 services run on the antenna?
- What type, size, and model of antenna will be protected?
- Can you afford to take the antenna out of service in warm weather months for maintenance?
- Can you afford to lose signal every time it rains?
- Can you afford to take the antenna out of service every 3-5 years to replace a worn out, grimy and tattered cover? For professional facilities, managers should compare the costs and downtime of having to replace your antenna cover several times over a 10-year period with the price and performance advantages of a system that offers longer services life.



Figure 1. Snow Shield Covers at COMCAST Cable, Media Center, Plainfield New Jersey.



- Will you be able to sweep snow off your antennas during a midnight snowstorm? Or would you rather have an automated system perform that task for you?

### Passive Versus Active Covers:

#### Hot Air De-Icing vs. Pad Heating

Passive antenna covers can be combined with heating systems to ensure effective de-icing, making them “Active.” The “Electric Pad De-Icing Systems” used by the major antenna manufacturer’s during the 1970s C-band era became all but obsolete with the advent of Ku-band antennas during the early 80s.

The pad technology would only heat the antenna reflector and not the reflector’s back structure. This caused movement in the alignment of the reflective surface which, in turn, causes attenuation in the signal and a loss of gain. This loss in performance was not acceptable for the antenna manufacturers or their customers, thus the Hot-Air De-Icing system became the accepted solution for evenly heating both the antenna reflector and reflector’s back structure.

Issues to consider in selecting a heating system with an antenna cover include:

- Does the system comply with local safety, electrical and environmental standards, e.g., CE standards, etc.
- Is it made of metal or fiber? (Some heaters only work on metal dishes)
- Do you have an adequate power source at or near the dish location?
- Gas heating: some hot-air heating products can use either natural gas or liquid propane. Which is most cost-effective for you?
- Do you want one that you turn on when needed or one with an automatic control?
- Can you afford to lose your signals in a snow or ice storm?
- Do major antenna manufacturers resell the product as an option with their own systems? For example, Walton Hot-Air De-Icing Systems, Snow Shield antenna covers, both passive and heated, Ice Quake Systems are the only such systems resold and installed by the major satellite Earth station antenna manufacturers.

### Comparing Features

#### Cover Fabric Properties

Some manufacturer’s antenna covers can accumulate dirt and grime, which degrade RF performance. They can also absorb moisture, further degrading signals. As a result, these products need to be replaced every few years.

Another issue is some products need to be removed during warmer weather to increase their useful life, according to manufacturers suggestions. Walton De-Ice’s Snow Shield architectural fabric with either a Kynar® or Tedlar® coating provides the advantage of many years of service without the need to remove the Snow Shield Covers during warmer months.

Another problem with consumer grade and poor quality covers is, even when they are brand new, they do not quickly shed rain. This can cause a water sheeting effect, and the result is, again, loss of signal. A hydrophobic antenna cover solution, such as the Walton Snow Shield, sheds water quickly, avoiding the kind of signal attenuation that a non-hydrophobic material can create.

Less well-designed systems may also need to be removed in order to add active heating to de-ice an antenna. In contrast, it is possible to upgrade the passive Snow Shield antenna covers by adding an electric heater or gas heater or Ice Quake System, either at the time of initial installation, or at a later date without having to remove the Snow Shield from an antenna. (See Figure 3.)



Figure 3. – Ability to upgrade to heating without downtime is a consideration.

#### Upgrade Issues

Walton De Ice has a patent on the company’s unique offering of a combined antenna cover and active heating, due to a number of technology patents in this technology area. Walton’s Snow Shield can be upgraded to add an electric heater, gas heater or Ice Quake System, either at the time of purchase, or at a later date without having to remove the antenna cover and causing downtime.

#### Antenna Cover Innovations

Walton De-Ice has also developed a successful new solution called the Ice Quake system, which shakes and vibrates snow off the antenna cover to prevent snow and ice buildup. By eliminating the need for high power conduit, trenching, and electrical switch gears, costs are saved when compared to conventional electrically heated, anti-ice systems.

With dramatic (e.g., up to 100-fold energy savings versus competing anti-ice systems), Walton covers have been successfully deployed around the world in a variety of Earth stations, cable TV head-ends, and broadcast facilities—these include such companies as Comcast Cable, Fox TV and satellite and broadcast facilities, as well as the U.S., French, Canadian and Belgium Department of Defense.

#### Installation—Mounting

Most residential satellite dish covers slip over the front of the satellite dish face and are secured at the back of the dish by a variety of methods, typically strings, cords, or straps. Commercial-grade solutions, capable of working on antennas, for example up to 6.2 meters or larger, can employ other methods, such as stainless steel mounting.

A disadvantage with the use of cords or rope to secure the cover to an antenna is they can tear and create bare and uneven edges, subject to tearing (See Figure 4 on the next page).





Figure 4. Rope mounted covers can cause tearing.

A professional system with Trim Lok stainless steel mounting hardware can prevent tearing (See Figure 5).



Figure 5. Trim Lok mounting prevents tearing of an antenna cover.

#### Heat Tape

Antenna cover products from some manufacturers attempt to use heat tape to transfer heating from a heat cable to the antenna reflector and to also hold the heat cable in place in order to defeat snow and ice. This kind of anti-icing systems can be quite cumbersome to install during cold or wet days, due to the lack of adhesion by the tape to the back of the reflector. (See Figure 6 in the next column). Adhering tape to older antenna reflectors that have become "chalky" can also be a difficult task to complete.

There are some claims in the antenna cover business arena of the low-end products being 95 percent effective at eliminating snow and ice related problems on satellite antennas, and at a cost of about 10 percent of a full



Figure 6. Heat tape partially heats a reflector. Customer later installed the Walton electric system for top performance.

de-icing system. However, commercial site experiences tell quite a different story. For example, some anti-icing systems are designed for installation on only one-third to one-half of the antenna reflector. Therefore, they tend to only melt the snow or ice on that portion (one-third or one-half) of the reflector.

Figure 7 reflects an example of such a 1.2 meter antenna with a half-reflector Ant-Icing system's performance during a snowstorm. In this example, only 35 watts per square foot of power are used for heating. In this case, the VSAT antenna is off the air due to the wet snow accumulation.



Figure 7. Anti-icing system using heat tape.

After the snowstorm was over, the antenna's half reflector Ant-Icing system was only able to melt the snow and ice off of the lower half of the dish. In this example, (See Figure 8), the antenna is still off the air, even after the snowstorm ended.



Figure 8. Heat Tape Anti-Icing example: Off Air.

Earth station managers using these kinds of pad systems have also found that the lack of insulation behind the heat cable can allow most of the heat intended for the reflector to be lost due to just a slight breeze.

In contrast to this example of one manufacturer's 35-Watt heater failing to de-ice a 1.2-meter antenna, a Walton Ice Quake can de-ice a 4.5 meter antenna with only 150 watts of power and a 2.4 meter antenna with only 50 watts of power.



Figure 9. Insulation applied with metal clips.

Don Smith, Sales Manager of Capella Telecommunications, an antenna de-icing system distributor, and leading Canadian integrator and stocking distributor of quality professional satellite equipment, knows the effects of snow and ice on unprotected satellite Earth station antennas.

"We have many systems installed here in Canada that have been in service for a number of years with no outages," he said of the Walton De-Ice products.

#### **Insulation Kits**

Some manufacturer's insulation kits can be cumbersome to install during inclement weather conditions. Many pieces are required on some antennas for installation using required adhesives and metal clips to hold the individual pieces in place (See example in Figure 9 – Metal Clip Installation)

#### **Protecting Your Signals**

Several specialized manufacturers of antenna snow and ice-protection systems advertise their products around the world. Advertising pitches often imply these are simple "commodity" items, in an attempt to attract first-time buyers.

However, for a professional operation, selecting the correct or "wrong" antenna cover solution can have a significant positive or negative impact on an antenna's operation. The old saying, "you get what you pay for," applies to de-icing systems. Protecting satellite signals and services, and ensuring maximum uptime at the lowest cost-of-ownership, is certainly the understandable goal for most professional facilities.

#### **[de-ice.com/](http://de-ice.com/)**

*David Walton is in charge of Product Development, and Director of Snow Shield Operations at W. B. Walton Enterprise, Inc. With over 30 years of industry experience, he has been integral to the successful development and expansion of Walton De-Ice products and innovative technologies. Walton De-ice ([www.de-ice.com](http://www.de-ice.com)) designs and manufactures the broadest line of De-Ice equipment available for satellite Earth station antennas. From its original hot air (Plenum) design which mounts behind antennas from 3.2 to 32 meters, to its Snow Shield, Rain Quake, and Ice Quake, Walton De-Ice systems for 0.6 to 6.3 meter antennas, Walton De-Ice delivers the most innovative and effective solutions to help protect critical satellite networks from degradation and outages due to weather.*



# SatBroadcasting™: An Optimized Approach To Localized TV Content An Amagi Perspective

By Baskar Subramanian, Co-Founder, Amagi

**T**oday's TV networks are under immense pressure. They are competing for viewer eyeballs with a growing number of OTT providers, such as Netflix and Amazon. Their expansion into new territories and the need to differentiate their offered content is crucial for their business expansion.

However, as TV networks continue their global expansion, a major issue they must face is how to localize content across multiple countries or regions in order to match viewer preferences, as well as the need to abide by complex broadcasting regulations and content licenses as well as monetize regional markets by attracting local advertisers.

The traditional approach to regionalizing content involves setting up a completely new satellite feed, or an opt-out fiber feed for each country. There are several problems with this strategy.

First, the ROI (return on investment) is often insignificant or negative. Secondly, this method for managing region-specific content creates scalability issues and slows down operations. Finally, traditional ad insertion/content insertion solutions are designed to be managed by the operator/affiliate. This means that the TV networks have little to no control over content insertions. TV networks need a better way to deliver regionalized content.

This article explains why it is important for TV networks to deliver regionalized content and how this process has been optimized with smart IRD technology.

## Reasons For Delivering Regionalized Content

Most leading entertainment networks in the world today, such as HBO, Comedy Central, and ESPN, have invested heavily in dedicated feeds for different regions. The HBO Asian and Indian feeds, for example, carry significantly different content as compared to their U.S.-based, ad-free counterpart. There are several reasons a TV network would want to start delivering localized content.

**Regulatory Compliance:** For starters, there are different censorship mechanisms in India versus the United States. In many multicultural nations, there are restrictions about the type of advertisements that can be shown. For instance, some countries do not allow television networks to carry tobacco and alcohol commercials. In Singapore, channels are prohibited from airing religious content, while in Europe, TV networks cannot run advertisements for e-cigarettes, pending the establishment of a comprehensive legal framework (according to a European Platform for Regulatory Authorities report).

**Local Ad insertion:** Beyond allowing TV networks to comply with broadcasting regulations, TV networks are looking to deliver local ad-spots to monetize their content. Using content insertion platforms, TV networks can deliver targeted advertisements to audiences, increasing viewer satisfaction and their revenue streams.

**Rights compliance:** Delivering regionalized content is also a way to address licensing issues. For example, if a channel does not have the rights to universally broadcast a movie, they can insert different programming during the time the movie is set to air in affected regions. This helps TV networks avoid having dead air, which can lead to major losses in terms of reputation, subscription, audience loyalty, and even ad revenue.

**Increasing viewer affinity:** Another major reason that TV networks are looking to regionalize content is to match viewers' preferences. Whether it is introducing local content or airing content more suitable for local tastes, TV networks consistently look for ways to make their content more relevant for local audiences. Some TV networks may only need to deliver a few hours a day of localized content. In this case, it wouldn't make sense to invest in a completely new satellite feed, from an ROI standpoint.

## An Optimized Approach to Content Regionalization

How can global TV networks deliver local content without having to set up a new satellite feed in each region? Signaled content replacement triggers have become an effective solution for regionalizing content. Commonly used triggers within the industry include SCTE (Society of Cable Telecommunications Engineers) and DTMF (Dual-tone multi-frequency signaling). These triggers usually deal with audio signals, so the audience impact is minimal.

There are limitations with using a content replacement system that relies upon DTMF and SCTE triggers. As a result, TV networks may need to deploy additional devices to store and replace content.

Key issues with existing platforms included no control over local content insertions, missed cue-tones, integration with scheduling/broadcast systems, manual errors/misses, inability to dynamically alter break schedules/ads, inability to micro-replace an ad within a break, and the incapacity to centrally and remotely manage all content/ad insertions across distributed affiliate end points. More often, a TV network's best answer is to start a completely new satellite feed, which may not provide a ROI.

A new solution that has recently emerged enables TV networks to deliver regionalized content without using separate satellite feeds and without any compromise in audiovisual quality or control. Through smart IRD technology that allows satellite receivers to store local content and replace it with specific triggers, TV networks can create a new feed without requiring an investment in completely new satellite bandwidth.

Using smart IRD technology, such as Amagi STORM, local content can be received, decrypted, stored, and replaced and transmitted via existing satellite bandwidth as data, or through an IP-based infrastructure, dramatically reducing TV networks' capital and operating expenses.



Amagi's STORM regionalization platform.



Amagi's STORM regionalization platform features a unique watermark-based workflow that enables the transmission of triggered content over the cloud, in addition to the trickle bandwidth available on an existing satellite feed. This watermark technology is at the core of a localization solution recently deployed by the Sundance Channel Global.

Using Amagi STORM, the channel could deliver a few hours of local content to audiences in Brazil, satisfying viewer preferences in the region in terms of language and content type. This is just one real-world example of how advanced cloud technologies are enabling global TV networks to address viewer preferences in various regions around the world at a fraction of the cost compared with traditional satellite and fiber-based delivery models.

### **IRD's Momentum**

Given that the need for regionalization is expected to grow exponentially in the next decade or so, the time has arrived for TV networks to develop a solid technology strategy for delivering localized content. Launching a separate satellite feed has proven to be too expensive, and traditional content replacement systems relying on DTMF and SCTE triggers have limitations, making them an unwise choice.

Featuring zero signal-loss along with secure, user-friendly UI structures, smart IRD solutions for content signaling and replacement are gaining momentum among TV networks. Through an innovative watermark-based content replacement trigger framework and a cloud-based infrastructure, smart IRD technology is changing the way brands approach targeted advertising.

This exciting technology enables TV networks to comply with local regulations and adhere to content licensing obligations in a way that is much more efficient and cost-effective than ever before.

**[www.amagi.com/](http://www.amagi.com/)**

*Baskar Subramanian is one of the founders of Amagi, the leader in cloud-based broadcast infrastructure and targeted advertising. A natural entrepreneur and innovator at heart, he was previously involved in the creation of Impulsesoft Technologies, a group that pioneered the delivery of Bluetooth-based audio solutions. He can be contacted at [baskar@amagi.com](mailto:baskar@amagi.com)*



# What Occurs When Your Primary Network Fails?

By Roland Hamouche, Sales Engineer—Satellite, M2M Connectivity

**R**eal-time connectivity is becoming increasingly critical to the functioning of certain applications, and more specifically, mobile applications.

Whether a mobile asset travels outside of cellular reception, or during natural disasters, a secondary communication route completely independent of the terrestrial infrastructure is required to ensure that the data traffic flows back to the main servers.

A number of dual-mode communication terminals that deliver connectivity to assets transitioning in and out of cellular range already exist in today's market. These terminals are used for emergency services, where constant connectivity and visibility of the asset are essential, such as with transport vehicles or maritime vessels. Any downtime means the loss of connectivity as well as a risk to people's lives.

In a sparsely inhabited country such as Australia, only populated areas have cellular coverage—these areas form only 10 percent of the total land space. Therefore, at least one secondary communication system is required in a large majority of the country where cellular coverage is weak or completely absent.

The same concept applies to the sea, where vessels operating in close proximity to the shore are usually within the range of cellular coverage. However, as these vessels sail deeper into the sea, the coverage is lost. Land or sea, mobile assets require some form of connection to transmit data back to a data center. This data may be in the form of a simple position report that contains the coordinates of latitude and longitude, job acknowledgments or even duress information.

Simultaneously, the data center might need to send information to the asset in the field, such as data for job dispatching, hazard notifications and rerouting. When transporting dangerous or hazardous material, real-time monitoring is necessary so that tracking is maintained at all times.

The same applies when crossing the borders of different countries, as the asset can still be connected to multiple terrestrial networks—this requires

more than national roaming capabilities and becomes global roaming. However, the current definition of global roaming does not take into consideration the areas where mobile connectivity is absent, which remains a major limitation. In such areas, the satellite network can be used to fill the gaps between different cellular networks and achieve what can be classified as "real global roaming."



**However, using the failover mechanism could have its own risks.**

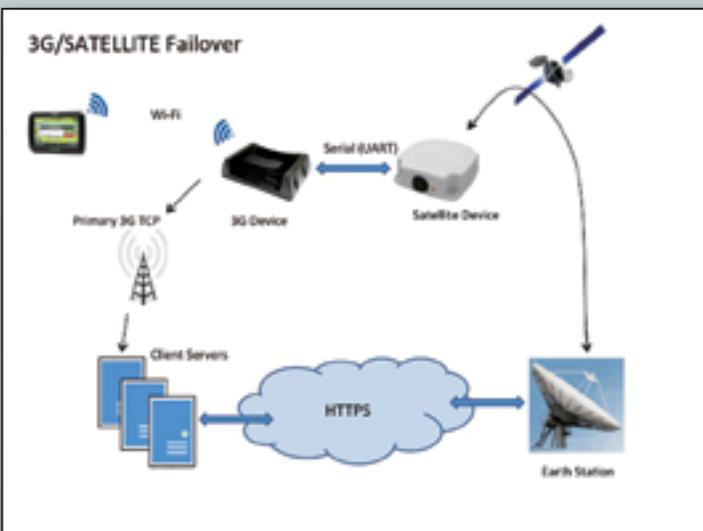
Least-cost routing is a simple but complicated practice that identifies the most cost-effective pathway to route data traffic. In the absence of terrestrial connectivity, the selection of the correct conditions to switch between networks is absolutely crucial. This allows all, or part, of the traffic to be selectively forwarded onto the satellite path, which can be an expensive method of communication if such is not well monitored. With satellite connectivity, application prioritization is vital to apply to traffic control to ensure only critical data is sent over satellite to avoid shocking bills. Such bills can also be avoided with a reliable reversion to cellular when it becomes available again.

At M2M Connectivity, the company has found that, for specific applications, several variants have to be taken into consideration to deliver an efficient and reliable least-cost routing mechanism—engineers have developed several algorithms to customize the failover system to suit the specific needs of the application as requested by the client. In these cases, thorough monitoring is applied to the data transmitted through the more expensive route, in this instance, the satellite. In addition, this allows the correct decisions to be made as to when to optimally switch between different available networks.

In a number of applications, more than two networks may be required (i.e., radio communications). This further complicates the application, an off-the-shelf solution would be difficult to find. In such cases, M2M Connectivity's customization becomes a "must," due to the many advantages offered. These include the ability to choose the precise technology, the appropriate networks, the proper hardware and the intelligence to drive the application.

All are heading toward a constantly connected world where information should be accessible at any time and at any location without data delay or loss. This is why the failover application is of immense importance. Due to the advantages of combining different technologies and networks, the asset is able to remain connected—everywhere and at all times.

*Roland is a Sales Engineer at M2M Connectivity who specializes in satellite technology and products. He provides developers and customers with technical support and application development. Roland has extensive knowledge of many satellite products, one-way and duplex data transmission through to IP connectivity for remote M2M solutions. As a specialist satellite engineer, Roland's knowledge and experience of the Inmarsat, Iridium and Globalstar Simplex networks extends to the products designed for these networks and how they are best utilized to achieve the desired outcomes in M2M applications.*





# Changes Ahead To Continue Business Growth + Success... A Spacecom Perspective

By Jacob Keret, Senior Vice President Sales—Europe, North America and ME—Spacecom

**2015 has been an excellent year for Spacecom. The company reached several corporate goals in terms of business development, technological advances, and milestones, both in funding and construction of our upcoming satellite: AMOS-6.**

Europe continues to drive our business, primarily in Central and Eastern Europe, and reaching all of Europe with pan-European beams on the AMOS-6 satellite is our next goal.

The past year was filled with the signing of new, as well as extension agreements, with existing clients. As an emerging global satellite provider (Europe, Africa, Asia and the Middle East), broadcast, broadband, data and telecom is experiencing true business growth for the company. Whereas a majority of Spacecom's clients are broadcast related, there is a notable expansion in the broadband and telecom sides of the business.

Positive numbers are being generated this year—\$110 million in revenue, with an excellent geographic spread, with ongoing development to ensure that Europe, Asia and Africa will continue to contribute heavily to company growth. In 2014, the recorded EBITDA was more than \$70 million. During the first quarter of 2015, the company's revenues gained \$27 million and the order backlog rose to more than \$700 million.

At IBC 2015, one fact will be quite evident—the AMOS brand is becoming far more well-known around the globe: Central and Eastern Europe, all of Africa, the Middle East and Asia, as well as China, Russia and Southeast Asia. A dedicated team of sales, technical, engineering and strategic planning professionals are diligently working to ensure Spacecom's reputation for excellence is maintained far into the future.

Highly focused efforts for the company rest on the molding of the AMOS brand's future and on the upcoming launch and start of services from the AMOS-6 satellite in early 2016. To be co-located at the 4 degrees West orbital position with AMOS-3, and where it will replace AMOS-2, AMOS-6 will be larger than both of those named satellites combined.



Spacecom's AMOS-6 satellite during the build process.  
Photo is courtesy of Spacecom.



The new satellite will incorporate advanced technologies, such as High Throughput Ka-band spot beams that will enable improved, broadband, Internet access. The satellite's HTS beams will blanket Europe as well as large swaths of Africa, in addition to Ku-band technologies.

AMOS-6's 39 Ku-band segments and 24 Ka-band beams will provide a wide array of services. With cross-beam and cross-services capabilities, the satellite will serve an important role as a communications carrier between Europe, the Middle East and Africa.

Fitted with numerous new technologies that include electronic propulsion capabilities to save on weight and cost, and HTS capacity and an appealing Mbps cost, the new satellite will open additional markets, including those in Western Europe, and Ka-band spot-beams for broadband access.

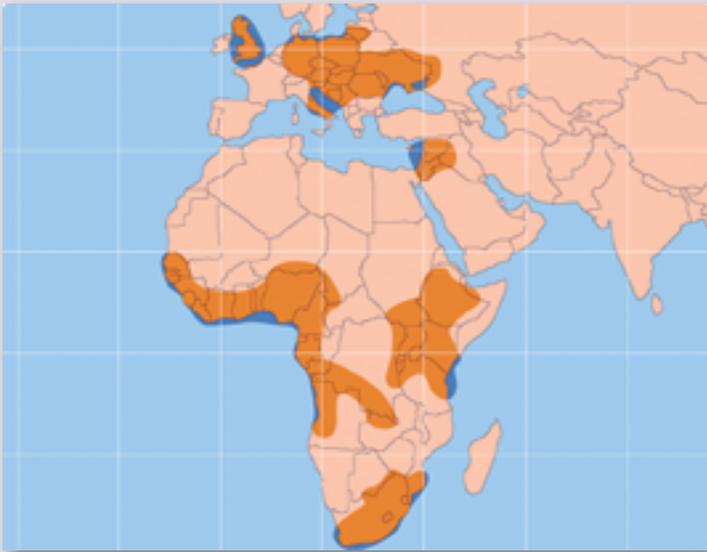
AMOS-6 will also make an impact in other areas, as well. The satellite can provide dual-play with UltraHD content to specific markets; 3G and 4G backhaul to smaller sites to enhance low ARPU; IP trunking; Oil & Gas platforms; and Government services, among others. This will be the case not only in parts of Europe, but also in Africa, as well as the Middle East. Spacecom's goal for the satellite fleet is to enable clients to provide customers with superior services to increase their own business profitability.

In pursuing the Western European market, the company determined that our existing CEE clients are ready to expand into Western Europe and that broadcasters and telecom providers in this region are particularly keen to add CEE to their business. These are exciting European business prospects and a solid core of order backlogs awaits AMOS-6 to initiate operations, and bring full capacity online.

In Europe, as well as in other regions, Spacecom is preparing for the change that Ultra HD (UHD) will bring to the broadcast market segments. UHD will be similar to the roll-outs of HD broadcast when that technology first debuted. During the last decade, HD was considered a breakthrough technology because of massively improved picture quality as well as a dramatic increase in large screen television sales. HD's success benefited many companies and the move to UHDTV will likely parallel the HD conversion as this new technology and economics of scale advance into the marketplace.

Whereas today HD is considered a 'basic' product in all pay-TV packages, a majority of today's digital receivers do not support UHD reception. Therefore, for UHD to become more accepted, manufacturers will need to ramp up production and DTH operators will need to make those important large scale strategic decisions to move in that direction.

Communications satellites are the best method by which to quickly launch and deploy quality UHDTV broadcasts on a large scale. The Spacecom fleet is ready for the UHDTV eventuality and, though such might require a number of years to become fully market mature, this change is coming.



Spacecom's AMOS-6 Ka-band spot beams coverage.

Spacecom's excellent solution connects the cellular network and satellite to a central hub hybrid platform on one side and a hybrid terminal at the customer's location. This technology enables new implementations for service providers and operators who can then maintain service in far flung regions as well as in urban areas, which results in more and more hours of use by customers.

As Spacecom moves toward the future with AMOS-7 and AMOS-8, the focus is on the best methods to create the follow-up set of next generation satellites. There are a number of organic growth options as well as a cultivation of ideas from the outside via joint ventures, partnerships and other accords.

Spacecom's long term goal is to build additional business in high demand markets. Going forward has never been more exciting and the opportunities for the company are boundless.

[www.amos-spacecom.com/](http://www.amos-spacecom.com/)

*Jacob Keret brings to his position more than 20 years of global business and management experience in the aerospace and telecommunications arena. Jacob served for six years as vice president of marketing and sales at Starling Advanced Communications, an innovator in satellite communication systems. Prior to that, Jacob co-founded Spacecom Satellite Communication Services, a service provider for AMOS satellites. In his role as vice president of marketing and sales at Spacecom, he led a team that generated several dozen million U.S. dollars in sales within a few years and helped build the company into a leader in several European markets.*

*During his nine years of service at Spacecom, Jacob was personally responsible for the successful AMOS 1, 2 and 3 satellite project businesses. Previously, he held the position of marketing manager in the MBT Division, Space Directorate of Israel Aircraft Industries (IAI). Earlier, as a space systems engineer in the same division, he was responsible for satellite trajectory planning and performance analysis.*

Another additional growing business brings together satellite and cellular technologies. Spacecom has created a Satellite-Cellular hybrid solution to drive new business. This hybrid solution offers affordable broadband Internet to users who require excellent service at a cost-effective price. Users can take advantage of satellite for downloading data while relying on cellular or other terrestrial data networks for Internet upload requests and data offload.

# Managing Media Networks In A Hybrid World... A Skyline Communications Perspective

By Steven Soenens, Product Marketing Director, Skyline Communications

**In order to be successful, broadcasters and service providers require velocity, scalability and cost structures that unify the various media workflows that cross technology and vendor boundaries of satellite, fiber and cloud infrastructures.**

## Thee Key Industry Trends

The broadcast and media service provider industry is going through a number of transitions. Customers are more demanding than ever before, technology is evolving at a rapid pace and there is increasing pressure to run businesses far more efficiently.

Network Management Systems (NMS) and Operational Support Systems (OSS) are instrumental in delivering the customer experience at the correct cost, turning end-to-end NMS/OSS into a highly strategic asset for any media company, broadcaster, satellite operator and service provider.

### Trend 1: Businesses + Value Chains Are Changing

The broadcast and service provider landscape is changing quickly. Consumers expect content to be available at any screen in any location and they want the choice to consume the experience at their own convenience. Live content is still king—consumers want the option to watch, interact via social media and even generate their own content in real time. Time is of the essence. Advertisers drive broadcasters and service providers to adapt to the evolving consumption behavior.



The industry responds well to the needs of the consumer and the advertising industry. Broadcasters and service providers deploy new services to retain customers in an ever-increasingly competitive environment. 4K UHD TV, multi-screen, OTT, TSTV, network DVR, targeted ads, social media embedded with traditional video—these are just a few examples of new experiences offered to consumers. The wealth of new services reduces churn, at least as long as there is good content that is always available.



The rapid growth of new services and products places high pressure on the operational and capital expenditures of media companies. The costs are high as well as the risk, as not all new services are equally well adopted by consumers.

As a result, companies that are just starting get to use new hardware and software solutions and are also able to explore new business and operational



models. xAAS and VNO models are selected to reduce risk and cost and such models, in turn, enable new businesses to incubate. These new business models create a new dimension of operating services and infrastructure.

Today's media networks continuously converge and evolve. Multiple technologies from different brands co-exist, each having their own strengths. The challenge is to have all technologies work together in one orchestrated manner.

**Trend 2: Efficiency Is Of The Essence**

An efficient network is a network that supports end-to-end unified media workflows, regardless of which network technology is used and regardless of the brand of equipment.

Software and hardware from multiple vendors need to interoperate, acting as one converged network, supporting MPEG-2, H.264 and HEVC, live and file media, linear and non-linear exchanges, satellite, fiber SDH, MPLS, traditional processing and cloud virtual functions. Furthermore, the highest degree of efficiency is reached if multiple applications share the same infrastructure: contribution, exchange, distribution and OTT, data, video, audio, voice, interactive applications, advertising, etc. In such a dynamically shared network, managing resources must be embedded in a company's day-to-day activities. No longer accepted are network idle time and resource under-utilization.

Going one step further, new cloud resource management paradigms arise, such as overbooking, last minute capacity extensions, taking the best of what is on hand, and so on. Indeed, the media industry adopts experiences from the IT industry: all-IP networking over any medium, generic CPU-based media transcoding and processing using Virtualized Media Functions (VMF) in the cloud, increased use of file formats and file exchanges driven by cost-effective storage and overnight transfers.

**Trend 3: Vendors Offer API's Instead Of NMS/OSS**

As most are aware, technology is rapidly evolving. This means there is a growing need to reduce complexity in an ever more dynamic and complex environment. While in the past, technology providers sold EMS/NMS systems capable of managing their entire ecosystem as part of their product portfolio, today, the focus on those products is often reduced and scaled down to uniquely managing their own brands of equipment.



Vendors offer APIs, thereby freeing up resources to develop their core technology rather than NMS/OSS, as the latter is most often not part of the core product strategy. Fortunately, open and documented APIs offer additional advantages: the ability to manage all devices, subsystems, services, and SLAs from one single view, following one set of operational processes, and using one set of unified workflows across the company. As such, operators recognize the value of using a using a technology independent, multi-vendor NMS/OSS that is highly configurable to their needs and to the way they operate the network and services.

**NMS/OSS Strategic Assets**

Today's media infrastructure is an aggregate of many different technologies, interoperating using standard interfaces (ASI, SDI, ETH and others), transmission protocols (IP, UDP, RTP, SMPTE2020 and others), compression formats (JPEG2000, MPEG-2, H.264, HEVC and so on) and file formats and containers (MXF, and more). Exchanging media using open-standard interfaces works well in practice.

But even if video and data can seamlessly be exchanged across a variety of technologies supplied by different vendors, network and video processing segments are still often operated in isolation, thereby not unleashing the true potential of running a complete infrastructure as one single, shared entity. What is needed to provide operators the velocity, scalability and cost structure are end-to-end media workflows that are agnostic to type of technology and brand of equipment.

Using DataMiner NMS/OSS, boundaries between media capture, video processing, transmission and storage are disappearing. The technology to enable this is based on four pillars of innovation:

First is the fact that DataMiner is the unique system that manages and controls just any resource and technology in the network : legacy devices, data centers, Virtualized Media Functions (VMF) and even bandwidth.

Second is the new robust resource booking, reservation and advanced activation that enables end-to-end workflow automation in a comprehensive manner.

Third are the unified and integrated NMS/OSS gateway functions, such as automated trouble ticket generation and real-time customer self-service portals, which simplify and unify operational processes regardless of which technology used.

Forth, and last, is that DataMiner keeps track of all historical events and learns from it (big data analytics), thereby predicting network performance and outages in a pro-active manner.

**A Perfect Fit**

DataMiner is operational at more than 500 media companies around the world. Multiple applications are supported as a result of the numerous configuration capabilities at all levels. Whether you are a broadcaster, satellite operator or service provider in the cable, telco, mobile or satellite industry, DataMiner manages your networks, your services and SLA's.

[skylinecommunications.net](http://skylinecommunications.net)

*Steven Soenens is an experienced professional in product marketing, product management and engineering of multiscreen video compression and transmission solutions for the broadcast, satellite, cable and telco industries. At present, Steven is responsible for product marketing of DataMiner with Skyline Communications.*

# SatBroadcasting™: How Can Broadcasters Prepare For The UHD Era? An SES Platform Services Perspective

By Sophie Lersch, Chief Product Officer for Services, SES Platform Services

**W**ith high image definition, a resolution four times higher than HD and a finer gradation of colors, UHD offers a viewing experience which draws the viewer into the action—securing the technology's position in the future of broadcast.

Indeed, Euroconsult research analysts expect 11,000 HD and 500 UHD TV channels to be launched by 2023. However, are broadcasters' operations equipped to deliver the large amount of data UHD requires with the quality, reliability and flexibility viewers will demand?

## Why UHD?

Ultra HD (UHD) ensures a viewing experience that is unrivaled—to date. With high image definition, a resolution four times higher than HD and a finer gradation of colors, the viewer is drawn into the action. As prices of UHD TVs are already starting to fall, this trend is here to stay. Experts expect the technology to become mainstream within 10 years.

Content providers and broadcasters are also growing more and more interested in the prospects for UHD, due to the huge leap in quality that provides the competitive differentiation necessary to attract new subscribers to their linear broadcast and cable television channels.

## Challenges For Broadcasters

For media companies looking to launch UHD services, though, there are a number of challenges to consider.

While UHD delivers ultra-powerful images, it also makes ultra-high demands on the digital workflow for production and transmission. It requires four times more bandwidth than HD, and 12 times more than SD. For example, a UHD live TV signal leaving the Satellite News Gathering (SNG) van via 4x3G is approximately 12Gbit/s. This is twice the total bandwidth that is available today on SES' Astra satellite at 19.2 degrees East.

As HD channels grow in number, broadcasters are already facing sky-high capacity demands. What will happen when the scales are tipped and 4K growth catches up and overtakes HD? All that would be required is for most large screen TVs and tablets to be 4K capable. Furthermore, for UHD in particular, intelligent and flexible handling of content workflow also plays a decisive role. The large amount of data places high demands on storage, management, encoding and delivery. Add to this the quality, reliability and flexibility that is essential when delivering UHD—and delivering UHD becomes extremely complex, as well as potentially quite costly, for broadcasters.





## **Delivering Unsurpassed Quality**

How, then, can broadcasters ensure they are delivering the quality and reliability required for UHD services and still keep OPEX and CAPEX at a minimum? Even if a broadcaster's infrastructure is designed to deliver UHD—which many aren't—launching a UHD service still requires a partner who is capable of delivering UHD services all the way from delivery of UHD content and TV signals to distribution via satellite or the Internet. Demands will be even greater for broadcasters who don't yet have such infrastructure in place.

The most efficient and cost-effective answer to this dilemma is for broadcasters to select a technical media services partner who provides the ability to launch UHD operations without the need for them to turn their infrastructure upside-down overnight. Teaming up with a content management and playout partner, such as SES Platform Services, gives broadcasters peace of mind that their content is being delivered to audiences and customers with the best possible quality.

Additionally, SES Platform Services' newly launched service, FLUID Media, offers a convenient, browser-based management of Ultra HD content and metadata. Through flexible workflows, customers can efficiently deliver content to their customers, partners and platforms.

## **Satellite + Beyond**

Satellite is the ideal infrastructure to deliver the Ultra HD experience, offering a high degree of coverage to the largest number of viewers possible. As a subsidiary of satellite operator SES, SES Platform Services naturally broadcasts UHD content via satellite.

Today, however, as consumers become used to having access to content on any device, and at a time convenient for them, not every business model is designed to obtain the maximum coverage with linear programs. Consequently, broadcasters should make the selection of a technical media services partner—one that possesses the capabilities to deliver content to the Internet as a top priority.

At SES Platform Services, such is managed through the multi-format encoding of live signals and playout content. The latest HEVC encoders are used, with oversight of multiplexing and uplinking and even encrypted content upon request. All systems have redundant support and uninterrupted operation is guaranteed.

## **A Bright, Clear + Reliable Future**

With these technology innovations in place, broadcasters should have a bright future in offering UHD services—and without the need for huge, initial, infrastructure investment.

Broadcasters who delay adding UHD services to their portfolios could well find themselves losing out on a large share of market revenue. Furthermore, as UHD grows in popularity, they could also risk losing their existing customers.

While becoming a mass market, teaming up with a technical media services partner will assure maximum return on Ultra HD with minimal outlay.

[www.ses-ps.com/](http://www.ses-ps.com/)

## **UHD In Action**

*Europe's first live UHD channel will begin to air in September. As one of Europe's most popular shopping channels, the quality of this channel's broadcast is of utmost importance to pearl.tv ([www.pearl.de/tv/](http://www.pearl.de/tv/))—which is why this is the first live channel in Europe to start broadcasting in UHD.*

*Launching on September 3, pearl.tv's UHD channel will be broadcast via satellite and the Internet, using Astra's prime European orbital position at 19.2 degrees East.*

*SES Platform Services will ensure pearl.tv content is delivered with maximum transmission security and of the highest quality. The technical media service provider will provide the HEVC encoding of the UHD live signal as well as the uplink to the Astra satellites. Furthermore, SES Platform Services will prepare the TV signal and the Internet stream, and will also manage the Content Delivery Network (CDN) that supplies the stream.*

*Dr. Michael Sichler, Managing Director of Enstyle GmbH said, "With the launch of pearl.tv UHD, we're seeking to raise the quality of our product worlds to a whole new level. SES Platform Services GmbH is the ideal partner for the preparation and playout of our TV signal, as it provides us with top-quality UHD services and maximum transmission security."*

*This is the latest in a string of UHD projects for SES Platform Services, which has also overseen UHD tests and showcase transmissions for Sky Deutschland that included the first-ever, live broadcast of a football game in April of 2014, based on the newly introduced HEVC compression standard.*

*The live UHD broadcast of the Linkin Park concert in November of 2014, in cooperation with Samsung, was another world first—SES Platform Services encoded and uplinked the content to the satellite.*

## **What Is FLUIDMedia?**

*In addition to classic linear television, the distribution of on-demand content is becoming more and more important for broadcasters and production companies. The number of VOD (Video On Demand) platforms is growing and, with it, their technical complexity. Video is playing an increasingly important role in other sectors, too, such as publishing and the automotive industries.*

*FLUIDMedia is SES Platform Services' solution to these developments. The service allows all companies producing or distributing video content to convert their content easily and conveniently, as well as deliver that content to Internet or VOD platforms. The entire technical-operational process of VOD distribution as well as the use of Internet video for customers, from the digital supply of content and all necessary editing processes, right up to final delivery, is all simplified by SES Platform Services.*

*Additionally, users can control technical aspects, such as ingestion, various formats of transcoding, quality checks, packaging and delivery—all via a modern, browser-based interface. These steps are carried out on the basis of SES Platform Services' tried-and-tested content management infrastructure. FLUIDMedia also allows for the convenient management and customization of metadata for individual platforms, including information about license periods, images, trailers and brief descriptions.*

*Media assets can be accessed from the user's own PC—or any other device—and from several workstations, all simultaneously. Such allows colleagues to collaborate easily and seamlessly. For example, an editor in Munich can contact a colleague in Hamburg to request a specific section of a video in the SES Platform Services digital archive and, just a short while later, the Munich editor will receive that requested section and can continue working on the project.*



## Arianespace Chalks Up Successful Mission Number 81—EUTELSAT 8 West B + Intelsat 34 Lift Off



**Arianespace successfully launched their fourth Ariane 5 flight in 2015 and seventh launch overall this year—performing a heavy-lift mission today for Eutelsat and Intelsat, two key customers for the past 30 years.**

Lifting off from the Spaceport in French Guiana, Arianespace's workhorse vehicle deployed EUTELSAT 8 West B and Intelsat 34 into geostationary transfer orbit, delivering a total payload performance estimated at 9,922 kg., which included the two satellites and Ariane 5's dual-payload deployment system.

Arianespace Chairman and CEO Stéphane Israël recognized all of the key players in this latest operational success, including the French CNES space agency, the European Space Agency and the on-site teams at the Spaceport; along with Ariane 5 prime contractor Airbus Safran Launchers and Arianespace's own teams. He said Arianespace remains on target to best its own record of calendar-year launches, with 12 total flights on tap for 2015.

"My thanks to European industry, which—under the leadership of Airbus Safran Launchers [ASL]—produces such a reliable launcher," Israël stated. "Today with Ariane 5, and tomorrow with Ariane 6... Arianespace will work hand-in-hand with its number one shareholder, ASL."

The numbers associated with today's flight, designated VA225 in Arianespace's mission numbering system, further underscored the company's role as the launch services industry leader. It marked the 67th consecutive success for Ariane 5 and the launcher's 81st mission overall; while the EUTELSAT 8 West B and Intelsat 34 satellites were the 513th and 514th payloads lofted to date by Arianespace. Flight VA225 was the 67th consecutive success for Ariane 5 and the launcher's 81st mission overall.

Arianespace's heavy-lift Ariane 5 is shown at the Spaceport's ELA-3 launch site, ready for liftoff with its dual payload of the EUTELSAT 8 West B and Intelsat 34 satellites.

EUTELSAT 8 West B was riding in the upper payload position on Ariane 5, deployed at 28 minutes into the flight. Once in service for Eutelsat, it will bring powerful new satellite broadcasting resources to the Middle East and North Africa—primarily serving direct-to-home markets from an 8 degrees West orbital slot. The 5,800-kg.-class relay spacecraft, built by Thales Alenia Space using the Spacebus platform, also is to introduce a C-band mission to this geostationary orbit position, covering the African continent and reaching to South America.

"Eutelsat 8 West B is the 30th satellite launched by Arianespace for Eutelsat in a cooperation that spans more than 30 years with our two companies," Israël explained. "We've been friends and partners with Eutelsat for 30 years, and we intend to continue! We have three satellites to launch for Eutelsat during the next two years—including the first all-electric satellite ever to be launched by Ariane 5."

Israël also noted that EUTELSAT 8 West B was the 47th Spacebus-series platform carried by Arianespace from the 143 total Thales Alenia Space-built spacecraft entrusted to missions performed by the launch services company.

During today's mission, the 3,300-kg. Intelsat 34 payload was deployed from the lower passenger position on Ariane 5, and will be utilized by Intelsat for the media distribution requirements of leading programmers for Latin America, operating from an orbital slot of 304.5 degrees East.

Produced by Space Systems Loral (SSL) using its SSL 1300 platform, Intelsat 34 also is to support advanced broadband coverage for maritime and aeronautical providers serving the North Atlantic.

Emmanuel Macron, France's Minister of Economy, Industry and Digital Affairs, visited the Ariane 5 control center as part of his presence at the Spaceport for today's Flight VA225 mission.

"Intelsat 34 is the 55th satellite launched by Arianespace for Intelsat: our cooperation also started more than 30 years ago...with the launch of Intelsat 5 F7 in October 1983 on Ariane, and will continue at the same pace with four more satellites already in our order book," Arianespace's Israël said. "Arianespace is especially proud to start deploying your next-generation EpicNG satellites next year."

Intelsat 34 was the 51st Space Systems Loral-built (SSL) satellite launched by Arianespace, and the 45th based on the manufacturer's 1300 bus—with 10 more in Arianespace's backlog, Israël added.

Following today's mission, Arianespace is maintaining its sustained launch pace, with preparations and launch vehicle components at the Spaceport for multiple upcoming missions across its family of heavy-lift Ariane 5, medium-weight Soyuz and light-lift Vega vehicles.

The company's upcoming launch is set for September 10 with Soyuz on Flight VS12, which is to orbit Europe's latest two Galileo navigation satellites. Also scheduled in September is an Ariane 5 launch with two commercial telecommunications satellites: NBN Co 1A for Australia's National Broadband Network, and ARSAT-2 for Argentinean satellite operator ARSAT.

The company's next Vega mission is planned for November with Europe's LISA Pathfinder scientific space probe, which will observe the Universe in a completely new way.

[www.arianespace.com/](http://www.arianespace.com/)

## SAIT Communications Is Being Acquired By SpeedCast International

**SpeedCast International Limited (SpeedCast—[www.speedcast.com/](http://www.speedcast.com/)) has signed a definitive agreement to acquire SAIT Communications, a fast-growing maritime communications service provider in southern Europe.**

SAIT Communications is one of the leading suppliers of L-band satellite services in the southern European maritime market, in particular Greece, which is one of the largest maritime markets in Europe, as well as Cyprus. The acquisition will bolster SpeedCast's strength in the global maritime market, enhance its services portfolio with additional offerings, and significantly expand SpeedCast's exposure to the important shipping sector.

SAIT Communications has been active in the maritime communications business for close to 10 years. The company's customer list includes most of the top Greek shipping companies and services about 2,500 ships and has rolled out Inmarsat Fleet Broadband to nearly 1,500 vessels over the past few years and has more recently started providing VSAT broadband services. The Company is based in Cyprus with employees in Cyprus and Greece.

SAIT Communications uniquely complements and extends SpeedCast's maritime business thanks to its long term customer relationships with large Greek shipping companies, a strong L-band expertise, an innovative portfolio of value-added services, and a very experienced management team that will drive the growth of SpeedCast's business globally.

With this transaction, SpeedCast acquires a strong foothold in Southern Europe, a region with continued L-band growth and ripe for accelerated VSAT services growth, in particular in Greece and Cyprus, countries that host many large ship owners and fleet managers. The combined entity will be one of the largest service providers to the maritime sector in the market today, servicing over 5000 vessels with a wide portfolio of communications and IT services, and an impressive global support network. Joining SpeedCast,

SAIT Communications will now be able to offer its maritime customers a wider portfolio of products and services, including the widest range of VSAT services in the market, and to better support its customers globally leveraging SpeedCast's network of field engineers in key ports around the world.

SAIT Communications will further expand SpeedCast's global maritime network in the strategic Greek market. The transaction is expected to close on 31 July 2015. SAIT Communications' management team will remain with the SpeedCast group.





