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***Cover Image**: Built into a Toyota Land Cruiser by Lithuanian systems integrator TVC, KTK's DSNG station features a SWE-DISH/Rockwell Collins Drive Away Antenna system, two Ericsson Voyager II multi-format integrated DSNG encoders, and two fully redundant Ericsson RX8200 advanced modular receivers. This fully operational HD live production system connects with TV studios and Outside Broadcast vehicles and is being used for live broadcasting. DSNG Vehicle Photo Credit: TVC*

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SatBroadcasting™—Is C-Band The Next "Beachfront Property?"

One of the trends I've seen over the last decade is a "winners and losers" environment when it comes to standard plan C-band satellites, especially over North America. By Mike Antonovich

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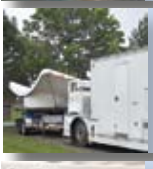

SatBroadcasting™—SNG's New Edge

A quick review of the Broadcast Industry and its use of satellite technology suggest some very interesting information. By Paul Seguin

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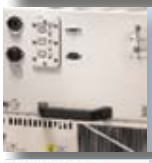

SATCOM Solutions—CPI's HPAs + BUCs

There are several primary applications for SATCOM HPAs and BUCs.

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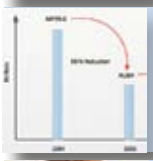

SatBroadcasting™—Reducing Satellite Transponder Bandwidth

An increased need for satellite transponder bandwidth is being driven by greater use of Full-Motion Video (FMV) gathered by Unmanned Aircraft Systems (UAS). Intelligence, Surveillance and Reconnaissance. By George Mancuso

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Executive Spotlight: Tore Morten Olsen, Astrium Services

Tore Morten Olsen has 17 years of experience in the satellite communications sector working for Telenor and Vizada.

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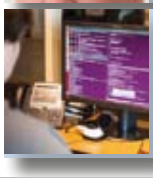

SatBroadcasting™—In Search Of Quality Monitoring

Year on year we are noting greater proliferation and diversification in the satellite market. The only thing we can be sure of is that there is constant evolution in the way satellites are being used. By Simen Frostad

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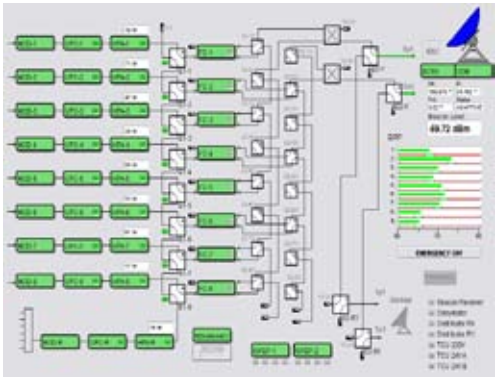

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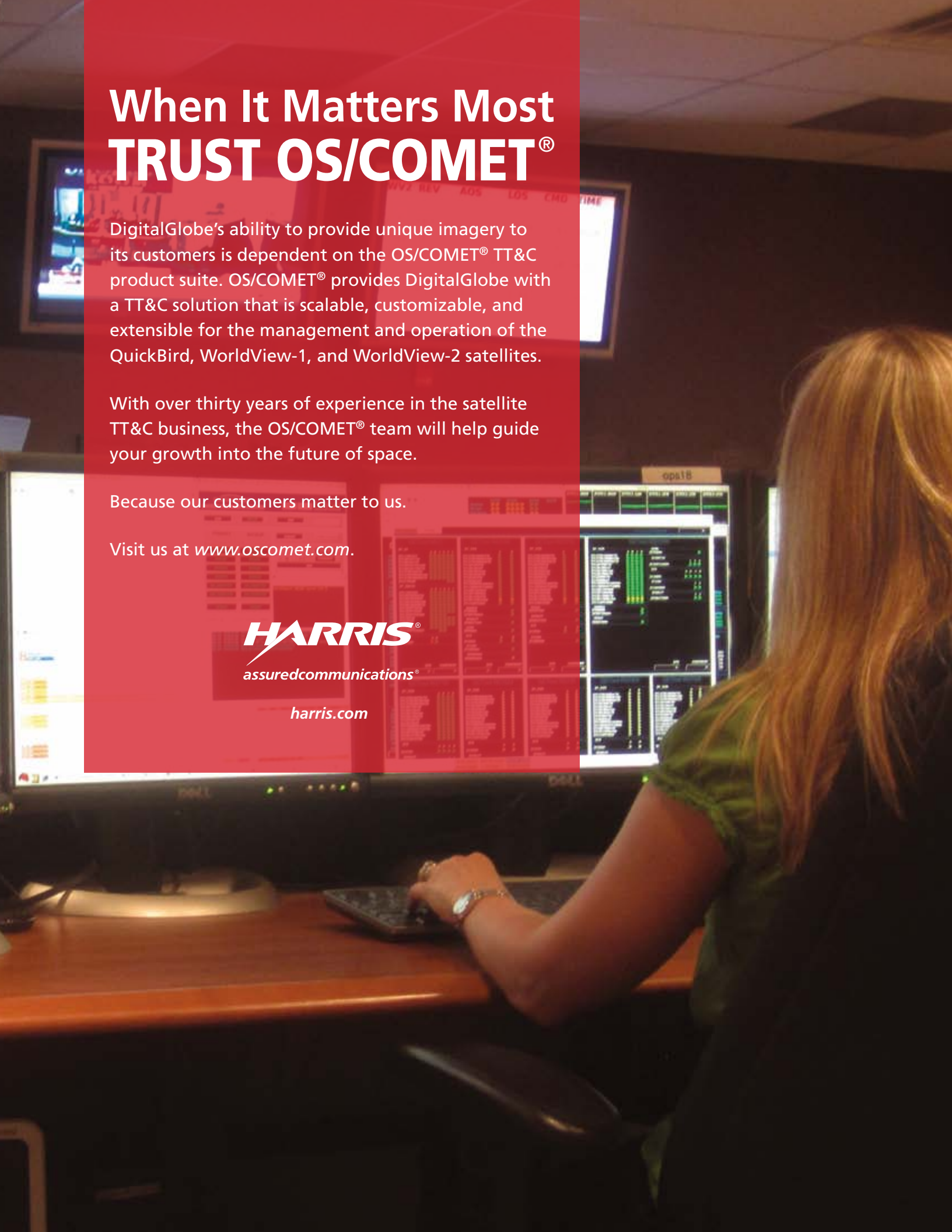

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SatBroadcasting™—Sports Broadcasting's Future Challenges

Today, consumers are faced with many ways of accessing and watching television programs. Whether via a television set, PC, mobile or tablet device, the change in habits ... By Mylan Tanzer **Page 48**

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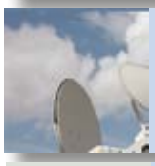
The ever-shortening design and development timeframes and budgets of modern space programs demand correct-first-time engineering. High quality, goal-focused, time and cost efficient... By Noel Brown **Page 52**

Executive Spotlight: David Ball, NewSat Limited

David Ball has 25 years of experience in the telecommunications, media and technology sectors with a significant portion of his career specializing in satellite communications. **Page 56**



SatBroadcasting™—The Four-Point Advantage

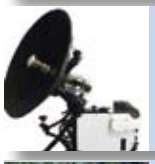
Increased flexibility, optimized remote monitoring and configuration, cost-effectiveness, and reduced concatenation make real-time IP encoding over satellite the ideal method for news and sports applications. By Richard Harvey. **Page 62**

Satellite Backhaul In Emerging Countries

The rural cellular market in emerging countries has changed significantly in the past couple of years. Newer usages and technologies have helped reshape the landscape. By Louis Dubin **Page 66**

Executive Spotlight: Dr. Aimee Chan, Norsat International

Dr. Amiee Chan has more than 15 years of experience in executive management and research and development in the telecommunications industry. **Page 68**



SatBroadcasting™—Changing SNG Forever

In recent years there has been a significant move to the production of lightweight, compact SNG systems that can be operated by a smaller news crew—usually a cameraman and a reporter—on the fly... By Lance Hiley **Page 74**

SatBroadcasting™—Protecting Broadcast Content Delivery

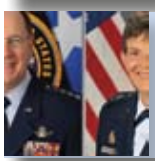
What if more than the lights went out during the Super Bowl? Imagine sitting at home and losing the audio of the broadcast and missing the ref's call... By Greg Caicedo **Page 76**

Sadtler On Careers: Good Doggie?

As a long time dog owner, I have found there is nothing more loyal than your dog who welcomes you with unconditional love when... By Bert Sadtler **Page 80**

Business TV—Watch Your Way To Knowledge

Change is constant in successful businesses—they continuously invest in new systems, sales programs and other efforts to maintain a competitive edge. By Mike Tippets **Page 82**



The Global Perspective Offered @ NSS

Each spring, the Space Foundation's National Space Symposium is offered in conjunction with a separate Space Foundation cyber conference. Cyber 1.3 is a full-day event taking place on April 8th... **Page 86**

SatBroadcasting™—Broadcasting To The Diaspora

As the world becomes a smaller place and people move from one end of the Earth to the other, broadcasters are realizing new opportunities. In the Diaspora World people may be far from... By Eran Avni **Page 88**

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SatBroadcasting™—A Submerged Challenge For DSNG

Deep underneath the QianDao Lake in Zhejiang province of China rests the thousand-year-old 'Lion City'. This ancient site was submerged half a century ago... By David Leichner

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SatBroadcasting™—Bridging The Gap

Broadcasters and payTV service providers are seeking to exploit the potential of convergence and are increasingly focusing on multiscreen delivery, enabling content to be enjoyed everywhere and on any device. By Matthew Huntington

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SatBroadcasting™—End-To-End SNG + Asset Management

For the first time in broadcasting history, the acquisition of content is no longer a major technical challenge. By Greg Dolan

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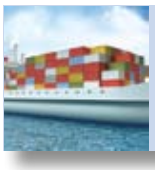

Gottlieb On Maritime—The Price Must Be Right

Word is on the street, and DPs and customers have been notified. A new, second round of Inmarsat price increases arrived on March 1st (in addition to the increases imposed by the Company last May)... By Alan Gottlieb

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Driving A Double Initiates The 2013 Launch Programs

Arianespace has successfully carried out the 54th Ariane 5 launch in a row, orbiting two telecommunications satellites: Amazonas-3 for Spanish operator Hispasat, and Azerspace/ Africasat-1a for the Azerbaijani operator Azercosmos 0JSC and the Azerbaijan Ministry of Communications and Information Technologies.

The 68th launch of Ariane 5 set a new record for weight injected into geostationary transfer orbit: the launcher on this mission carried a total payload of 10,317kg, including 9,503kg. for the two satellites, Amazonas-3 and Azerspace/ Africasat-1a. This was the first Ariane 5 launch of 2013.

Amazonas-3 is the seventh Spanish satellite launched by Arianespace. The company first launched the Hispasat 1A and 1B satellites in 1992 and 1993, respectively, followed in 2005 and 2006 by the XTAR-Eur and Spainsat satellites for Hispasat and its subsidiary Hisdesat.

Photo of Azerspace/Africasat-1a. Courtesy of Orbital Sciences.

Amazonas-2 was launched in 2009, followed by Hispasat 1E in 2010.

The Azerspace/Africasat-1a satellite is the first national satellite to be launched by Arianespace for the Azerbaijan Ministry of Communications and Information Technologies. Arianespace has already launched the first satellites for 31 operators to date.

The mission was carried out by an Ariane 5 ECA launcher from Europe's Spaceport in Kourou, French Guiana. Liftoff was on Thursday, February 7th, 2013 at 6:36 p.m. local time in Kourou (4:36 p.m. in Washington, D.C., 21:36 UT, 10:36 p.m. in Paris, and 1:36 a.m. on Friday, February 8 in Baku).

Amazonas-3 was built by Space Systems/Loral using the SSL 1300 platform and weighed 6,265kg. at launch. It has 33 Ku-, 19 C-band transponders, and 9 Ka-band spot beams.

This high-power satellite provides a wide range of telecommunications and broadband connectivity services in Europe, the Americas and North Africa. It offers a design life of 15 years. Amazonas-3 is the 43rd satellite built by Space Systems/Loral to be launched by Arianespace.

Artistic rendition of Amazonas-3. Courtesy of Space Systems/Loral.

The Azerspace/Africasat-1a satellite was built by Orbital Sciences Corporation using a Star-2 platform. Weighing 3,000kg. at launch, the satellite is equipped with 24 C- and 12 Ku-band transponders and will provide a wide range of telecommunications services for Azerbaijan, Central Asia, Europe, the Middle East and Africa. Azerspace/ Africasat-1a is the 24th satellite built by Orbital Sciences Corporation to be launched by Arianespace. **#**

Up + Away Without A Hitch

A beautiful day at mission base Space Launch Complex-3 at Vandenberg Air Force Base in California was the scene for the successful launch of the Landsat Data Continuity Mission (LDCM) Launch Readiness Review (LRR).

This was the second ULA launch of the year, the 36th Atlas V mission, and the 68th ULA launch in just over six years.

"We are privileged to work together with NASA and such a strong LDCM mission team," said Jim Sponnick, ULA vice president, Mission Operations. "This is the second NASA mission ULA has launched in just 12 days. The ability to successfully execute this launch rate is a testament to a very dedicated and skilled workforce, excellent teamwork with our NASA customer and all of our mission partners, and a one-launch-at-a-time focus that enabled both the TDRS-K launch on January 30 and today's LDCM launch, both of which delivered critical capabilities to orbit."

This mission was launched aboard an Atlas V 401 configuration vehicle, which includes a 4-meter diameter payload fairing. The Atlas booster for this mission was powered by the RD AMROSS RD-180 engine and the Centaur upper stage was powered by a single Pratt & Whitney Rocketdyne (PWR) RL10A-4 engine.

The Landsat Program provides repetitive acquisition of high resolution multispectral data of the Earth's surface on a global basis. The data from the Landsat spacecraft constitute the longest record of the Earth's continental surfaces as seen from space.

ULA's next launch is the Atlas V SBIRS GEO-2 mission for the Air Force scheduled for March 19, 2013, from Space Launch Complex-41 at Cape Canaveral Air Force Station, Florida.

ULA program management, engineering, test, and mission support functions are headquartered in Denver, Colorado. Manufacturing, assembly and integration operations are located at Decatur, Alabama, and Harlingen, Texas. Launch operations are located at Cape Canaveral AFS, Florida, and Vandenberg AFB, California. **#**

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IOV spacecraft

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AUGUST 2
Ariane 5
Intelsat 20 & HYLAS 2

JULY 5
Ariane 5
EchoStar XVII and MSG-3

MAY 15
Ariane 5
JCSAT-13 and VINASAT-2

MARCH 23
Ariane 5
Automated Transfer Vehicle (ATV)
Edoardo Amaldi

FEBRUARY 13
Vega
LARES, ALMASat-1, multiple cubesats

Launch Smart

In 2012, the workhorse Ariane 5 orbited 13 spacecraft in seven missions, including the 20-metric-ton Eduardo Amaldi Automated Transfer Vehicle, and 12 commercial telecommunications satellites. On February 13, Arianespace added a new chapter to the history of space flight with the inaugural launch of the Vega light lift vehicle at the Guiana Space Center. In total, three Soyuz missions, two at the Guiana Space Center and one at Baikonur with Starsem, lofted four satellites into orbit. With this flawless record, Arianespace has earned the confidence of its customers, who time and again have chosen to launch smart.

arianespace.com

Beefing Up The Bouquet

Spacecom, operator of the AMOS satellite fleet, and SatLink Communications have announced the addition of TV5MONDE Afrique to the AMOS-5 17 degrees East French-language broadcast bouquet.

SatLink Communications is providing a TV distribution platform on the satellite via its MCPC (Multi Channel Per Carrier).

TV5MONDE Afrique, the first international channel in the French language, is a general interest quality channel bringing knowledge and understanding of various cultures to the world. TV5MONDE Afrique enriches programming through exclusive and informative films, entertainment shows, sporting events, documentaries and productions.

The channel is well known in French-speaking countries, with a nine out of 10 recognition rate.

SatLink Communications allows broadcasters to effectively distribute video content to and out of Africa for DTH or via Cable TV, DBS, DTT, MMDS, Mobile TV and IPTV partners across the continent.

Taking advantage of SatLink's Global Satellite and Fibre Network, the service is available on the AMOS-5 Pan African C-band coverage in DVB-S and DVBS-2, and additional two Ku-Band MCPC platforms to serve Sub-Saharan countries. This gives broadcasters greater flexibility with the provisioning of services to Africa including the Uplink, Downlink, Turnaround, Playout, content management, content localization, encryption (CA) solutions and inland installations. #

Same Transponder Segment, Full Duplex Data

NovelSat has introduced Duet™ next generation software-based Echo Cancellation technology within its NS3000 Modem.

This ground breaking new feature enables NovelSat's Modem to transmit twice the amount of data over existing bandwidth, delivering data transmission rates of up to 730Mbps, and ensuring maximum spectral and cost efficiency.

Patent pending Duet™ Echo Cancellation technology, now embedded as an OTA (Over-The-Air), remotely downloadable software module in the NS3000 Modem, allows Teleports, Telcos and Cellular companies using satellite backhaul, DSNG operators and others offering data intensive applications to establish full duplex data, video and voice communication on the same transponder segment with the highest efficiency.

Duet™ revolutionizes the way DSNGs operate. By supporting bi-directional communication with the studio on the same bandwidth, Duet™ offers new capabilities that were previously considered impossible. Users with symmetrical data links can particularly benefit from the transmission of twice the amount of data without leasing additional bandwidth, and the significant cost savings that ensue. The NS3000 Modem supports all applications—from the smallest links to the world's largest pipes, a claim that no other modem can fulfill.

Of particular note is that, unlike all other existing echo cancellation technologies, NovelSat's Duet™ eliminates the mandatory need for dedicated, costly and performance-impairing hardware.

Furthermore, all processing is done in the digital domain, eliminating degradation associated with the redundant conversion of digital to analog and back.

In addition to technology that pushes performance boundaries to the limit, the NS3000 offers transparent pricing that allows unlimited configuration changes and flexible, pay-as-you-grow feature and capability additions, resulting in a compelling cost structure. #

Interoperability Pilot Tests

VT iDirect, Inc. (iDirect), a company of VT Systems, Inc. (VT Systems) has successfully completed pilot tests with ip.access Ltd. to support 3G service over ip.access' nano3G® small cell device and iDirect's Evolution® X1 Outdoor satellite remote.

The pilot simulated a live network that could support data rates of 10Mbps on the outbound channel, 1.2Mbps on the inbound channel and up to 24 simultaneous voice calls.

The tests validated that mobile operators can affordably expand 3G services into remote or new areas, delivering broadband data rates and carrier-class voice quality using small cell technology.

The pilot addressed two persistent challenges for mobile operators—how to extend voice and data services to remote areas, where traditional macro cell towers are either too costly or simply not possible to install, and how to affordably backhaul mobile traffic.

The pilot featured a nano3G small cell device from ip.access, a leading small cell solutions vendor for mobile operators around the world.

The nano3G is a low-power wireless access point that provides hot-spot-like 3G coverage in a public area, private home or business. Small cell devices are a cost-effective alternative to macro cell deployments. They offer significantly lower cost points in purchase and backhaul and can be deployed quickly, with greatly reduced need for technical expertise.

The test also featured iDirect's Evolution X1 Outdoor satellite remote, which works in tandem with small cell devices to backhaul data from remote locations to the core network.

Modern TDMA-based satellite systems deliver carrier-class, two-way, all-IP connectivity and can share bandwidth efficiently across multiple end user sites.

Further, satellite backhaul has advantages over competing technologies in being quicker and more convenient to deploy and often more economical when extending service into territories that are otherwise difficult to reach.

The proof of concept highlights the opportunity for mobile operators to cost-effectively expand 3G and even 4G connectivity to underserved areas and markets. It's a critical business opportunity as smartphone adoption and data subscription plans are growing exponentially worldwide. Cisco predicts that mobile data traffic will increase 18-fold worldwide by 2016, compared to 2011 rates. And the number of mobile connected devices will surpass 10 billion.

"This joint test is an important validation that mobile operators can leverage small cell devices and satellite backhaul to cost effectively expand 3G service into new areas. This initiative builds on more than four years of successful 2G ip.access deployments in fixed rural and mobile environments using iDirect satellite backhaul. We can now enable mobile operators to capitalize on the global surge in demand for smartphone service." Gavin Ray, VP Product and Marketing, ip.access

"Together, small cell technology and satellite communications are dramatically changing the economics of remote connectivity. Companies like ip.access are opening a gateway for mobile operators to capture millions of new subscribers and achieve significant profitable growth, while bringing high-speed connectivity to underserved populations and business markets." Richard Deasington, Director, Market Development, iDirect. #

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A Dignitary's Visit, Then Space Bound

Indo-French space cooperation is all set to soar to new heights with the scheduled launch of a satellite to study changes in the environment, to occur soon after the visit of French President Francois Hollande in New Delhi next week.

The SARAL-Altika satellite, a joint project of the space agencies of India and France, will complement the observations of the seas made by current satellites.

The Indian Space Research Organisation (ISRO) has identified a launch window between February 22 and February 25 for putting the 450kg Indo-French satellite into orbit from its spaceport at Sriharikota, official sources said.

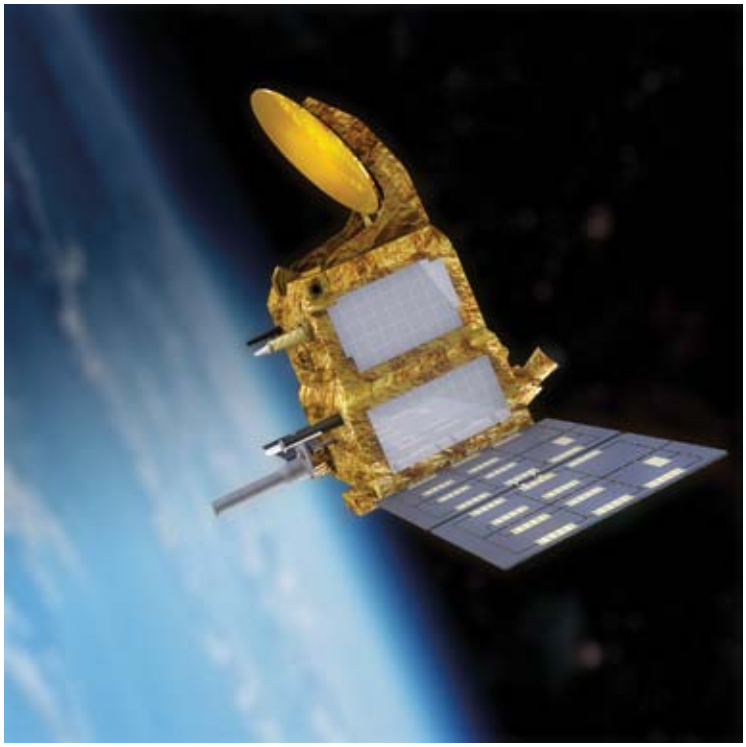
India's warhorse rocket, the Polar Satellite Launch Vehicle (PSLV), will launch the satellite into orbit.

SARAL is short for Satellite with ARgos and ALtiKa, the two main devices on it which have been provided by French space agency CNES. Besides building the spacecraft, ISRO will launch and operate it through its life.

SARAL would be one of the very few ocean-centric satellites and a vital cog in studying sea surface heights and other aspects. Earlier, the launch was scheduled for December last year but it had to be put off to complete a few tests and validations.

AltiKa is an Ka-band altimeter system, dedicated to accurate measurement of the rise in the sea levels. The satellite would be useful in studying the sea state, light rainfall climatology, mean sea level and coastal altimetry.

The satellite will also help ocean scientists gather accurate data on the rise in the sea level which could threaten the low lying and coastal areas of the country. #



SARAL-ALtika satellite. Image courtesy of CNES.

Flyaway Feedback Incorporated

Norsat International Inc. has launched the GLOBETrekker 2.0, an upgraded and more feature rich model of their popular fly-away satellite terminal.

Upgrades to the auto-acquisition terminal are the result of feedback from key military and enterprise customers, including the NATO Communications and Information Agency, with whom the Company worked to produce the DART+ line of fly-away terminals.

The re-engineered GLOBETrekker is now lighter, more field serviceable and faster to deploy while maintaining the rugged design Norsat has become known for.

Important feature additions to GLOBETrekker make the terminal easier and more intuitive to use for operators of all skill levels. The GLOBETrekker now includes a one touch user interface and maintains its easy tool-free assembly process, enabling rapid deployment in less than 15 minutes.

Auto-acquire technology is provided by Norsat's revolutionary LinkControl™ Software. Through LinkControl's sophisticated system of user configured profiles, operators can now switch satellites, equipment, or systems rapidly in the field. A USB recovery process saves a full system image, providing security, configuration storage and disaster recovery if necessary.

LinkControl's automated troubled shooting also provides visible and audible alarms to guide the technician through an intuitive resolution process.

Design improvements make the already rugged GLOBETrekker tougher and more flexible in the field. A new modular architecture, developed to enable rapid sub-assembly swapping in the field, includes a removable base unit, which allows the modem and key electronics to be integrated with the terminal or removed and positioned indoors for maximum customer flexibility.

The GLOBETrekker is multi-band capable (X-, Ku- and Ka-band), and band switching is possible in less than 10 minutes in the field. The development of quad pod legs keeps electronics well above snow, mud or running water when used in challenging environments, and automatic levelling enables rapid deployment in uneven terrain.

The addition of a sunlight readable display (greater than 1200 NITS) provides visibility even in direct sunlight.

The GLOBETrekker is undergoing Wideband Global SATCOM (WGS) certification to allow for operation on the ten satellite WGS constellation for use by U.S. and other WGS-enabled military forces. #

A Spatial First For Singapore

Singapore Technologies Electronics Limited (ST Electronics) has announced that its subsidiary, ST Electronics (Satellite Systems) Pte Ltd., has started the design and development of its first commercial remote sensing satellite.

Named TeLEOS-1, this made-in-Singapore Earth observation satellite should launch into commercial service in 2015.

ST Electronics is the electronics arm of public listed Singapore Technologies Engineering Ltd. (ST Engineering). Established in May 2011, ST Electronics (Satellite Systems) is a joint venture of ST Electronics' wholly owned subsidiary, ST Electronics (Satcom & Sensor Systems) Pte Ltd., Nanyang Technological University and DSO National Laboratories.

ST Electronics recognizes that the space industry, with its high value-add and market potential, provides commercial opportunities for its next growth frontier.

To capture these opportunities, ST Electronics, with the support of the Singapore Economic Development Board (SEDB), has committed itself into the design and manufacturing of satellites, with the vision of developing satellite technologies for the global market.

Collaborations with local and foreign research institutes, institutes of higher learning, space agencies and leading space industry players is instrumental in strengthening ST Electronics' core engineering and business competencies, and building up indigenous capabilities for the development and commercialisation of its satellite technologies.

TeLEOS-1 will be the launch platform for ST Electronics to tap into this growing business, to exploit commercial potential, and to grow the indigenous capability in the design, development and production of advanced earth observation satellites.

TeLEOS-1, weighing about 400kg., is designed and developed by ST Electronics (Satellite Systems), and its operations, marketing and sales of related services will be undertaken by ST Electronics (Satcom & Sensor Systems), a wholly owned subsidiary of ST Electronics.

TeLEOS-1 is designed to orbit around the equator, at an orbital height of about 550km, with an update rate of 90 minutes.

The satellite will provide images of 1 metre ground sampling distance from an electro-optics camera.

The satellite images can be used for disaster monitoring and management, mineral exploration, precision farming, environmental monitoring, climate change studies, agriculture resource studies and management, maritime and coastal observation, urban planning and homeland security.

In this regard, it is currently developing the first made-in-Singapore commercial satellite which will be launched soon. In addition to using its own satellite to provide imagery and value-added services to customers, ST Electronics plans to collaborate with partners to tap on their complementary satellite images to enhance the offering of high quality geospatial solutions and value-added services to the market. #

Meshing With Mozambique

PolarSat Inc. has received a multi-phase order from GECI for equipment supply and technical services for a VSATPlus®3 satellite communications network.

This network is to upgrade the air traffic control communications network within Mozambique.

This upgrade is a strategic element within Aeroportos de Mozambique master plan to improve its overall Communications, Navigations and Surveillance (CNS) systems.

The Mozambique ATC network consists of total of 11 sites with two Air Traffic Control (ATC) regional control centers all connected in a full mesh all-IP based network.

The VSAT network provides backbone connectivity for VHF voice communications relay to cover the whole continental airspace and Oceanic airspace delegated to the Beira Flight Information Region.

The airspace is divided into northern and southern regions that are controlled by their ATC control centers, located in Maputo and Beira. The VSATPlus®3 provides geographic redundancy in transporting control center traffic. In the event of a failure of one of the centers the VSATPlus®3 system automatically provides connectivity to the other ATC center.

All sites will support a complex mix of voice and data communications including hot lines, AFTN, AMHS, ADS B, Internet and general corporate internal communications.

The VSATPlus®3 family of terminals provides a full mesh, hubless network with no single point of failure and offers the greatest ease of network configuration and expansion. It supports the most demanding network applications including high quality voice, low and high-speed data, video conferencing and fax—all in a single low-cost, integrated platform. #

Lose That Latency

Fujitsu Frontech North America Inc. exhibited at VidTrans13, the Video Service Forum's annual technical conference and exposition that occurred in Los Angeles last month.

At the show, Fujitsu showcased a new firmware release that dramatically improves end-to-end latency for its IP-9610, IP-900, and IP-920 HD/SD H.264 video encoders/decoders while delivering an exceptional picture quality at reduced bit rates.

The new enhancement enables Fujitsu's H.264 video encoders/decoders to operate at less than 99 milliseconds, ensuring a seamless interaction between talent, studio, and interviewees for HD satellite newsgathering, broadcasting, and IP streaming applications. Leveraging high-performance H.264 video compression algorithms, and considered by many as the highest quality in the industry,

Fujitsu encoders/decoders enable bandwidth-efficient, real-time transmission of digital media content over IP, DVB-ASI, and RF networks.

The new ultra-low latency enhancement is available today and can easily be added to existing IP-9610, IP-900, and IP-920 H.264 video encoders/decoders, allowing users to realize the return on investment of previously purchased equipment while simultaneously adapting to new technology advancements. #

The IP-9610 encoder/decoder

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Teleport Revitalization In Africa

BringCom Inc., supplying communications technologies to Africa, and local Djibouti partners have established a new private company, Djibouti Teleport SARL, to revitalize and manage the daily operations of the Djibouti Teleport facility.

Under the agreement, BringCom becomes the managing partner of Djibouti Teleport. In addition, the partners agreed to upgrade the Djibouti Teleport with new buildings, backup power, security hardware and an iDirect hub to create a first-class teleport facility serving the African region.

Djibouti Teleport will also provide competitive international connectivity through five large-capacity undersea cable systems connected to the facility. BringCom has assigned trained teleport technicians to assist the experienced Djibouti Teleport staff in providing round-the-clock teleport services.

"This agreement is a significant extension of BringCom's capabilities to serve the requirements of customers in the Middle East and Africa," said Fabrice Langreney, President and CEO of BringCom. "This relationship will allow us to revitalize the Djibouti Teleport in a way that makes it well-suited to a great number of potential users."

Djibouti Teleport currently provides Apstar 7 Ku-band connectivity with a 7.3 meter antenna and C-band connectivity with a 16 meter antenna. Both antennas have been refurbished and upgraded with new electronics. Additional antennas and equipment are currently being installed and should be available shortly. BringCom and Djibouti Teleport will continue to add technical functionality and personnel resources to the teleport as necessary to support the requirements of their Djiboutian, African and international commercial and government customers. The Djibouti Teleport is well suited to support terrestrial, aeronautical and maritime satellite applications owing to its unique geographical location, multiple satellite look angles and international connectivity to multiple fiber optic systems, including SEMEWE3, EIG, SEACOM, and EASSY. #

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VSAT ODU

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VSATS - MODEMS - AMPLIFIERS - ANTENNAS

Big Plans For Small Sats

Skybox Imaging (Skybox), an emerging provider of timely satellite imagery and data services, has announced it is adding an imaging satellite, SkySat-2, to its fleet during 2013, via a newly available secondary launch opportunity aboard a Soyuz-Fregat.

Skybox has secured this launch opportunity by contracting with JSC Glavkosmos, a secondary payload launch provider within the Russian Federal Space Program that works on behalf of the Russian Federal Space Agency (Roscosmos).

The previously unplanned spacecraft will substantially increase Skybox's near-term imaging capacity and accelerate the availability of timely information products.

Skybox can respond to new launch opportunities such as this Soyuz launch because it is capable of building a high-resolution imaging satellite within nine months, demonstrating the company's capability to scale to a near-term, multi-satellite constellation.

Skybox provides global customers easy access to reliable and frequent high-resolution images of the Earth by designing and building microsatellites and cloud services.

By operating the world's first coordinated microsatellite constellation, Skybox aims to empower commercial and government customers to make more informed, data-driven decisions that will improve the profitability of companies and the welfare of societies around the world.

"The ability to build and launch a satellite with the capabilities of Skybox's satellites in less than a year was impossible five years ago," said Joe Rothenberg, technical advisory board chairman for Skybox and former director of Goddard Space Flight Center. "The convergence of launch opportunities, computing technologies and Skybox's Silicon Valley approach to aerospace enables the company to innovate more rapidly than other players in the industry."

The satellite will launch alongside the Meteor-M weather satellite from the Baikonur space center in Kazakhstan. It will be a copy of Skybox's first satellite, SkySat-1, which is planned for launch in 2013 aboard a Dnepr launch vehicle. #

Landing Landsat

Honeywell announced that after Honeywell Technology Solutions Inc.'s (HTSI) successful management of the Landsat program for the past 12 years, the organization was awarded a new six-year contract for the continued flight operations for Landsat 7.

Honeywell's new mission and data management processes anticipate and rectify anomalies and have saved the U.S. Geological Survey (USGS), the managing organization of the Landsat satellites, $9 million over the past 12 years.

In addition, HTSI has successfully extended the Landsat 5's original three-year mission to 29 years and kept the Landsat 7 operationally viable.

Beyond its data management processes, HTSI also deployed its innovative "Lights Out" automated operations capability that reduced Landsat 7 operations staffing from 24 hours a day to just 10 hours a day, contributing to the overall cost savings for the USGS.

Artistic rendition of the Landsat 7 satellite. Courtesy of NASA.

Under the new six-year contract, HTSI will continue to manage both the Landsat 5 and Landsat 7 satellite programs while adding new tasks such as these:

» *On-orbit flight operations and technical services for the Landsat 5 and Landsat 7 satellites*

» *Sustaining engineering for each spacecraft, helping to keep the spacecraft operationally longer*

» *Sustaining engineering for the Landsat mission control centers, helping manage their critical ground support and management functions*

HTSI will also assist the USGS with the safe decommissioning of Landsat 5 by lowering it from its orbiting altitude of 705 kilometers and mitigating risk to nearby U.S. and international Earth-observing satellites.

HTSI's flight operations team has already completed Phase 1 of the decommissioning by successfully lowering Landsat 5's orbit by 20 kilometers in two delta velocity maneuvers. #

Bringing Beidou Into The Picture

Spectracom, a business of the Orolia Group, has upgraded its capability to China's global navigation satellite system, Beidou.

The Spectracom GSG Series 5 and Series 6 GNSS simulators, released last year, are designed to be field upgradeable to simulate current and future GNSS constellations. GSG simulators are capable of outputting the frequencies, modulations and data formats of anticipated GNSS systems.

The recent release of the Beidou ICD specification has confirmed that Spectracom simulators will be able to simulate these satellites with a simple field-upgradeable firmware update.

The Series 5 single frequency simulator is fully capable of the all the signals in the L1 (GPS and GLONASS) / E1 (Galileo) / B1 (Beidou) band, including all the GLONASS FDMA satellites.

The Series 6 multi-frequency simulator is fully capable of all four bands of all the systems: L1 / E1 / B1; L2 / L2C; L5 /E5 /B2; and E6 / B3. #

The Technology + The Challenges

Espial has a new whitepaper entitled Agile IP Video Delivery: Redefining STB Software Architecture.

The white paper addresses the technology and business challenges that payTV operators face in delivering a sophisticated television experience to consumers on set-top boxes (STBs).

The whitepaper provides a detailed insight into the current state of the industry, followed by strategies to leverage recent hardware and software innovations to implement an STB software architecture capable of supporting compelling user experiences at a faster time to market, with significantly lower development costs.

Relying on a multipronged approach that utilizes recent technology advancements—including open Web standards such as HTML5—payTV operators can cost-effectively address current STB limitations and power a more dynamic user experience that includes: cloud-centric user interface delivery models, new advertising and business models, rapid application development, interactive content, and integrated Web and social applications.

An excellent resource for the payTV industry, the whitepaper is available as a free download from the Espial website at this direct link. Further details at ***www.espial.com*** #

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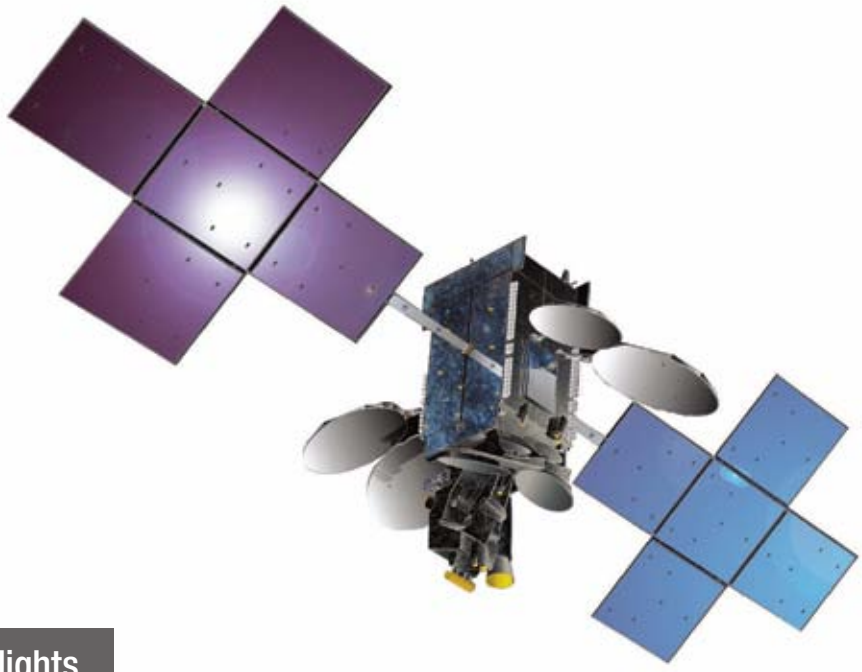

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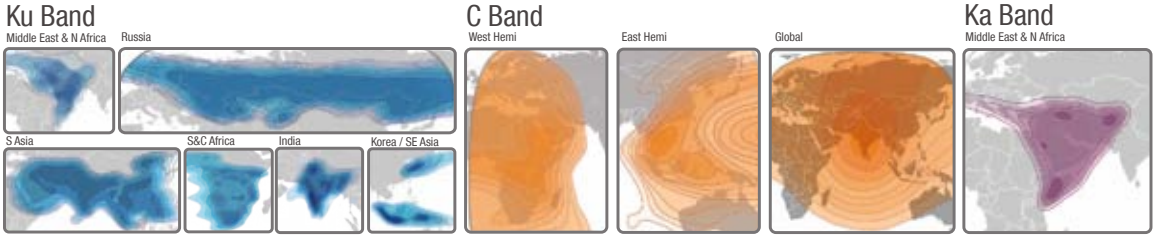

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Kepler Discovers A Tiny Planet System

NASA's Kepler mission scientists have discovered a new planetary system that is home to the smallest planet yet found around a star similar to our sun.

The planets are located in a system called Kepler-37, about 210 light-years from Earth in the constellation Lyra. The smallest planet, Kepler-37b, is slightly larger than our moon, measuring about one-third the size of Earth. It is smaller than Mercury, which made its detection a challenge.

The moon-size planet and its two companion planets were found by scientists with NASA's Kepler mission to find Earth-sized planets in or near the "habitable zone," the region in a planetary system where liquid water might exist on the surface of an orbiting planet. However, while the star in Kepler-37 may be similar to our sun, the system appears quite unlike the solar system in which we live.

The first exoplanets found to orbit a normal star were giants. As technologies have advanced, smaller and smaller planets have been found, and Kepler has shown even Earth-size exoplanets are common.

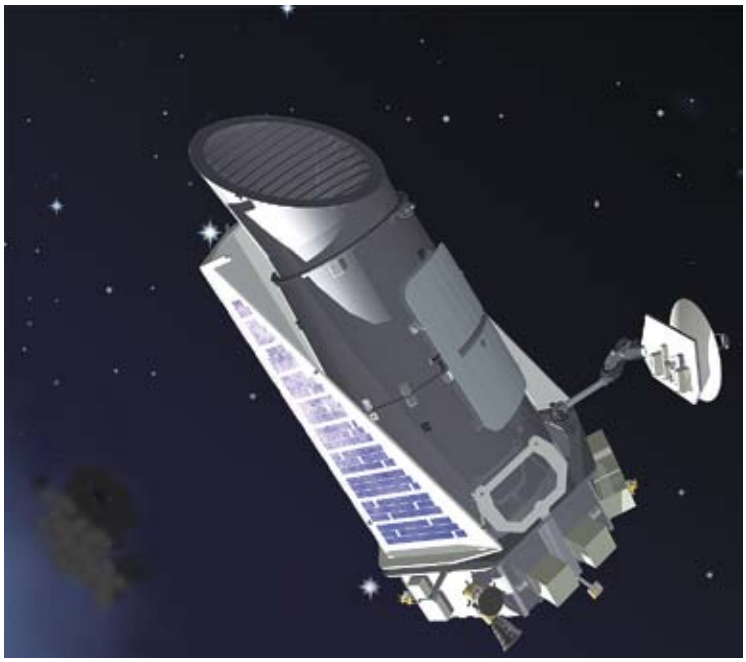
"Even Kepler can only detect such a tiny world around the brightest stars it observes," said Jack Lissauer, a planetary scientist at NASA's Ames Research Center in Moffett Field, California. "The fact we've discovered tiny Kepler-37b suggests such little planets are common, and more planetary wonders await as we continue to gather and analyze additional data."

Kepler-37's host star belongs to the same class as our sun, although it is slightly cooler and smaller. All three planets orbit the star at less than the distance Mercury is to the sun, suggesting they are very hot, inhospitable worlds. Kepler-37b orbits every 13 days at less than one-third Mercury's distance from the sun. The estimated surface temperature of this smoldering planet, at more than 800 degrees Fahrenheit (700 degrees Kelvin), would be hot enough to melt the zinc in a penny. Kepler-37c and Kepler-37d, orbit every 21 days and 40 days, respectively.

The artist's concept depicts the new planet dubbed Kepler-37b. The planet is slightly larger than our moon, measuring about one-third the size of Earth. Image credit NASA/Ames/JPL-Caltech.

Astronomers think Kepler-37b does not have an atmosphere and cannot support life as we know it. The tiny planet almost certainly is rocky in composition. Kepler-37c, the closer neighboring planet, is slightly smaller than Venus, measuring almost three-quarters the size of Earth. Kepler-37d, the farther planet, is twice the size of Earth.

"We uncovered a planet smaller than any in our solar system orbiting one of the few stars that is both bright and quiet, where signal detection was possible," said Thomas Barclay, Kepler scientist at the Bay Area Environmental Research Institute in Sonoma, Calif., and lead author of the new study published in the journal Nature. "This discovery shows close-in planets can be smaller, as well as much larger, than planets orbiting our sun."



Artistic rendition of the Kepler spacecraft

The research team used data from NASA's Kepler space telescope, which simultaneously and continuously measures the brightness of more than 150,000 stars every 30 minutes. When a planet candidate transits, or passes, in front of the star from the spacecraft's vantage point, a percentage of light from the star is blocked. This causes a dip in the brightness of the starlight that reveals the transiting planet's size relative to its star.

The size of the star must be known in order to measure the planet's size accurately. To learn more about the properties of the star Kepler-37, scientists examined sound waves generated by the boiling motion beneath the surface of the star. They probed the interior structure of Kepler-37's star just as geologists use seismic waves generated by earthquakes to probe the interior structure of Earth. The science is called asteroseismology.

The sound waves travel into the star and bring information back up to the surface. The waves cause oscillations that Kepler observes as a rapid flickering of the star's brightness. Like bells in a steeple, small stars ring at high tones while larger stars boom in lower tones. The barely discernible, high-frequency oscillations in the brightness of small stars are the most difficult to measure. This is why most objects previously subjected to asteroseismic analysis are larger than the sun.

With the very high precision of the Kepler instrument, astronomers have reached a new milestone. The star Kepler-37, with a radius just three-quarters of the sun, now is the smallest bell in the asteroseismology steeple. The radius of the star is known to 3 percent accuracy, which translates to exceptional accuracy in the planet's size.

Ames is responsible for Kepler's ground system development, mission operations, and science data analysis. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development.

Ball Aerospace & Technologies Corp. in Boulder, Colorado, developed the Kepler flight system and supports mission operations with the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder. #

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X-Band Certified

GATR Technologies has announced that its 2.4- and 1.8-meter unique inflatable satellite communication terminals are certified to operate at X-band on the Wideband Global SATCOM (WGS) network.

This certification affirms that GATR's terminals adhere to the stringent performance and operational control requirements needed to operate on the WGS network.

GATR's extreme portability, in combination with this certification, enables the warfighter to easily transport and deploy the system, as well as transmit and receive mission critical data, voice, and video faster and more securely.

Testing was completed by the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT) in support of the U.S. Marine Corp System Command.

The WGS constellation of satellites increases the communications capability of United States, Canadian, Australian, and other allied nation militaries by providing additional bandwidth capabilities for tactical command, control, communications, and computers; intelligence, surveillance, and reconnaissance (C4ISR); battle management; and combat support information.

WGS offers the ability to exchange information faster using higher data rates, and more efficiently, versus commercial satellite solutions.

"GATR's WGS certification fulfills mission requirements for a high-gain, low-weight satellite terminal that will directly benefit the warfighter," states Dr. Larry Lowe, VP of Engineering at GATR Technologies.

Lowe continued, "The portability and performance advantages of our technology are already realized by comms groups within the military and homeland security; this certification enables all DoD users to exploit these advantages."

GATR's 1.8- and 2.4-meter X-band solutions are also certified to operate on commercial X-band networks such as X-TAR and Paradigm. **#**

Antarctic Imagery, Courtesy Of Inmarsat's BGAN

A team of mountaineers on Queen Maud Land in the Antarctic used an Inmarsat BGAN terminal to relay their "epic adventure" to the world.

The six-man team were there to climb Ulvetanna, which lies at 71° 51' South, 8° 20' East, in the Orvin Fjell mountains on Queen Maud Land—an area half the size of Europe.

The mountain is known as the most technically demanding peak on the harshest continent.

With temperatures dropping as low as -35°C and with the potential for 100mph winds, it was no picnic for the team, who departed for Antarctica from South Africa on December 16th.

Led by climber Leo Houlding, the team included film director and photographer Alastair Lee who reported their BGAN Explorer 700 terminal was "working like a charm" as he used it to update blogs and send back images from the desolate icy wilderness.

Images sent included shots of the team in a beautiful blue ice cave, which took nearly six hours to carve out. Another showed the near vertical face of Ivetanna and the task ahead of them.

"The cave is amazingly sheltered and has this beautiful blue color. Combined with the hundreds of facets scored into the icy snow by a saw, and the shiny surfaces resulting from breathing and water boiling sessions inside the cave, it makes you feel like you have entered a magical crystal dungeon," said Alastair.

The team eventually conquered the summit in late January.

"Ulvetanna's fearsome North East Ridge allowed us safe passage up and down from her summit, but not without showing a few teeth," said Alastair.

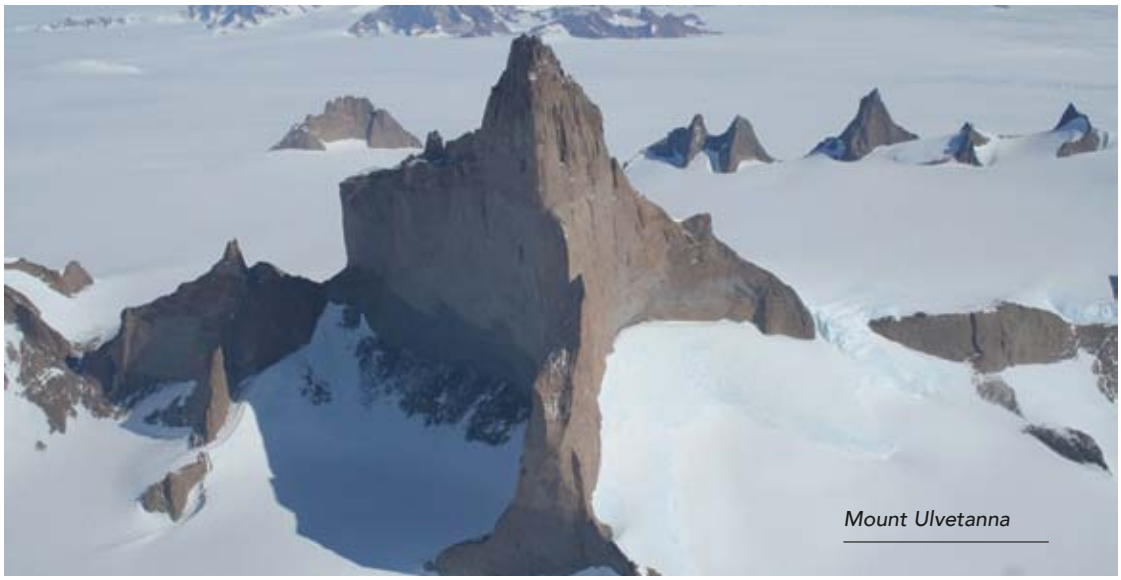
"We did it. A decade of dreaming, a year of planning, a month on the ice, and week on the wall, but we did it!"

And he praised the efficiency of the BGAN terminal they used for their marathon trip, saying: "It is a solid piece of kit and the battery life was amazing.

"We were on the ice for 35 days and only had to charge it once. We used it to upload photographs to our sponsors and keep our blogs updated—it never missed a beat."

"We also found it very easy to align with the satellite—we had a clear shot North across the ice sheet so that was no problem. I would definitely use it again if we had a similar climb."

You can read more about the team's adventure on their blog. A film of the adventure called "The Last Great Climb" is also being produced. **#**



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SSPI—2013's Honorees

The Society of Satellite Professionals International announced five new inductees for the 2013 Hall of Fame—they will be honored on March 19 during SSPI's annual Gala.

They will join more than 40 Hall of Fame members including Dr. Arthur C. Clarke, Dr. Harold Rosen, Olof Lundberg, Eddy Hartenstein, Frederic d'Allest, Sidney Topol, Takayushi Yoshida, Mary Ann Elliott, Mary Frost, Peter Jackson, and Robert Berry. The 2013 Hall of Fame Honorees include...

Romain Bausch, President and CEO of SES. Since joining SES in 1995, Romain Bausch provided the leadership that transformed SES from a regional satellite company offering direct-to-home TV distribution in Europe to a global satellite operator serving broadcasters, telcos, enterprise, and government customers. Under his leadership, SES became one of the big "consolidators" in the FSS industry, integrating among others Nordic Satellite AB, GE Americom and New Skies Satellites, and also providing significant investment and support to O3B Networks. He managed this expansion program while keeping SES on a solid financial footing, and took the company public in a successful IPO in 1998. Romain Bausch is also Vice Chairman of the Board of Directors of O3b Networks, member of the Board of the European Satellite Operators' Association (ESOA), and a Director of Luxembourg's Business Federation. In 2002, he was honored as Via Satellite's Satellite Executive of the Year.

Robert Zitter, Executive Vice-President and Chief Technology Officer, Home Box Office. Robert Zitter is responsible for HBO's technology interests worldwide, overseeing satellite-based distribution, origination, production operations and engineering. Zitter's career has included spearheading the introduction of digital compression technology, the development and launch of HBO HD and HBO On Demand and the founding of HBO's businesses in Latin America, Asia and Europe. "There are very few names that come to mind who have had as significant an impact on our industry as Bob Zitter," said HBO president and COO Eric Kessler. "His accomplishments and innovation have helped transform not just the business at HBO but the entire landscape." Zitter was inducted into The Cable Television Hall of Fame in 2006 and is a recipient of the NCTA's Vanguard Award for his leadership in science and technology. He also served on the FCC's Technology Advisory Committee and as a director of the North American Broadcasters Association.

Susan Irwin, President, Euroconsult US. Susan Irwin, one of the original founders and directors of SSPI, has more than 30 years experience researching and analyzing industry trends and developments on the use of satellite communications for voice, video and data. She is responsible for business development and management of Euroconsult's U.S. business. For 25 years, she headed her own consulting firm, Irwin Communications, contributing her expertise in satellite markets and applications to start-ups, government agencies, NGO's and private corporations worldwide. She was a pioneer of satellite distance learning, teleconferencing and business television and has been a key contributor to the commercial advancement of innovations such as DTH, digital compression and satellite broadband. Susan is widely published and a frequent speaker at conferences throughout the world. She has been Conference Chair of SATCON since its inception in 2001; Director Emeritus of the SSPI; Director Emeritus of the Arthur C. Clarke Foundation, on the Board of Governors of the Pacific Telecommunications Council, and was recently elected Vice President, International, of the American Astronautical Society.

Prof. U. R. Rao, Chairman, the Governing Council of the Physical Research Laboratory at Ahmedabad. Prof. U. R. Rao is an internationally renowned space scientist who has contributed to the development of space technology in India and its extensive application to communications and remote sensing of natural resources since starting his career in 1960. More than any other single individual, Professor Rao is responsible for the creation of India's space and satellite capabilities and their application to the nation's development. As head of the Indian Space Research Organization, Prof. Rao undertook the responsibility for the establishment of satellite technology in India in 1972. Under his guidance, beginning with the first Indian satellite 'Aryabhata' in 1975, over 20 satellites were designed, fabricated and launched. Rao also accelerated the development of rocket technology in India, resulting in the successful launch of ASLV rocket in 1992 and the operational PSLV launch vehicle. He has tirelessly promoted the use of space technology for broadcasting, education, meteorology, remote sensing and disaster warning. Rao, who has published over 360 scientific and technical papers in various journals, has received many honors and awards, including the Padma Bhushan Award, a very high civilian award of the Government of India.

Dick Tauber, VP Transmission Systems & New Technology for the CNN News Group. Dick Tauber, a former member of the SSPI Board of Directors, is the current President of the Board of Directors of the Southeast Chapter of SSPI, which he helped found in 2005. He has worked at CNN since 1981, when he joined the company as a satellite trainee. As the satellite technology leader for a global newsgathering and distribution business, he has implemented technologies and solutions that allow this organization to gather its content from any place on the planet, any time a news story unfolds. He has also been the Chair of WBU-ISOG since 1985. More recently, Dick has also served as Co-Chair of The Radio Frequency Interference - End Users Initiative (RFI - EUI), an organization that seeks to mitigate the risks of satellite interference and develop quality assurance practices that programmers and distributors require for the collection and distribution of their content. Tauber has received three Emmy Awards for his work at CNN - 1986 for his part in Turner Broadcasting System, Inc.'s Goodwill Games, in 2002 honoring CNN's coverage of the events of Sept. 11, 2001 and a Technical Emmy in 2007 for CNN's mobile, IP newsgathering system.

The Hall of Fame was introduced in 1987 to recognize the valuable contributions of the visionaries and pioneers who have made possible the age of satellite communications — individuals who have devoted their careers to the advancement of technology and to helping build the political and commercial foundations of the industry.

The Hall of Fame Ceremony will open the 2013 Gala dinner on March 19th at the Renaissance Hotel in Washington DC. Hall of Fame members are selected by a committee of industry leaders, chaired by Richard Wolf, Senior Vice President, Telecommunications & Network Origination Services for ABC Television, and past Chairman of SSPI.

#

Driving Content, Quite Literally

SIS LIVE has deployed its new 1.8m vehicle mounted antenna DriveForce®.

DriveForce delivers high bandwidth transmissions with the ability to transmit at any location including those, such as links golf courses, where exceptionally windy conditions prevail.

SIS LIVE is currently operating a new dedicated DriveForce SNG truck for Sky and has launched an additional six DriveForce vehicles to support Sky Sports News and other news and sport customers. The DriveForce system has already received tremendous feedback from operators and clients.

With increasing demand for high bandwidth HD transmissions, many existing systems use mounts developed for small aperture antennas, bolstered to take a larger reflector, thus compromising the design.

With DriveForce, SIS LIVE have adopted a 'grass roots' approach, ensuring that the mount is optimized to carry the large antenna and capable of operating in wind speeds of up to 60mph, almost double that of competing products.

The ultra-high performance carbon fibre system is fully automated, capable of very high bandwidth or dual path transmissions and incorporates SIS LIVE's award-winning differential antenna control technology to find and track any satellite within seconds.

SIS LIVE has invested heavily in accurate tooling and high quality, low tolerance manufacturing processes, ensuring optimal quality and performance of its antennas.

This significant investment has enabled the development of units that feature high levels of integration and are extremely lightweight due to the extensive use of composite materials.

Additionally, SIS LIVE has put together a working group to explore the technology and workflows required to deliver live, 4K, multi-camera event coverage from an outside broadcast unit, culminating in a field test at St. James' Park on February 2nd.

Working with major camera and equipment suppliers, SIS LIVE has conducted proof of concept tests at base using a range of cameras coupled with its latest 3G capable outside broadcast unit OB 14. All recent SIS LIVE trucks have been built to be 3G capable, designed to handle 4K and HD signals.

This has involved testing of signal flows, the use of lenses suitable for live event coverage, as well as the integration of recording technology.

Testing continued on 2nd February with a Premiership football match featuring Chelsea and Newcastle captured in full 4K using the Sony F65 camera paired with a Fujinon 75mm-400mm lens, recording to the camera's onboard 256gb flash memory cards.

Additionally, one of Psitech's 4K Vortex systems and a specialist engineer were flown over from the United States to take part in the testing. #

Successful Robotic Refueling Demo

Following six historic days of operations aboard the International Space Station, NASA's Robotic Refueling Mission, or RRM, demonstrated remotely controlled robots using current-day technology could refuel satellites not designed to be serviced.

RRM tests from January 14-25 culminated in a first-of-its-kind robotic fluid transfer, a demonstration that could be a catalyst to expanded robotic satellite-servicing capabilities and lead to a greener, more sustainable space. NASA also hopes that RRM technologies may help boost the commercial satellite-servicing industry.

"RRM gives NASA and the emerging commercial satellite servicing industry the confidence to robotically refuel, repair and maintain satellites in both near and distant orbits—well beyond the reach of where humans can go today," said Frank Cepollina, associate director of the Satellite Servicing Capabilities Office, or SSCO at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Since 2009, SSCO has aggressively advanced robotic technologies for a notional, free-flying, servicer spacecraft that could access, repair and refuel satellites in geosynchronous Earth orbit, or GEO. RRM is a critical part of this technology development campaign.

"RRM allows us to take a major step into the future—a future where humans and machines can together take on greatly expanded roles in space capability, research and exploration," Cepollina said.

Veterans of five manned servicing missions to NASA's Hubble Space Telescope, Cepollina and the SSCO team conceived the idea of RRM and saw it through its rapid 18-month development to its July 2011 launch on STS-135, the last space shuttle mission. A joint effort with the Canadian Space Agency, RRM uses the space station as test bed for the research and development of robotic satellite-servicing capabilities.

The cutting-edge technologies RRM demonstrates could extend the lives of many of the hundreds of satellites currently in GEO. These assets deliver such essential services as weather reports, cell phone communications, television broadcasts, government communications and air traffic management.

Servicing capabilities could greatly expand options for government and commercial fleet operators in the future, potentially delivering stakeholders significant savings in spacecraft replacement and launch costs.

The January RRM activities employed the teleoperated Canadian Dextre robot, four sophisticated RRM tools and the washing-machine-sized RRM module to execute an end-to-end refueling demonstration on orbit. Unlike other demos, RRM is the first to test the robotic refueling of satellite interfaces not designed to be accessed or serviced.

Robot controllers at NASA's Johnson Space Center in Houston first commanded an RRM tool—working at the end of more than 70 feet (21.34 meters) of combined Dextre and Canadarm2 robotics—to cut a pair of twisted wires each 0.02 inches in diameter, the thickness of four sheets of paper. Additional exacting tasks followed, with RRM tools cutting more wire—used to secure satellite parts during launch—and unscrewing and stowing two protective caps before finally exposing the representative fuel valve.

After the Johnson team threaded the RRM Nozzle tool with its attached hose onto the valve, operators at NASA's Marshall Space Flight Center in Huntsville, Ala., sent a precise sequence of commands to activate the RRM Fluid Transfer System. Liquid ethanol flowed from the Fluid Transfer System into the Nozzle Tool and through the attached fuel valve, ultimately pulsing back into the module's reservoir. Once the fluid transfer was complete, the Nozzle Tool used a novel technique to withdraw from the valve, leaving behind a clever "quick disconnect" fitting that would allow for a simpler and more efficient future refueling connection.

Future RRM tasks scheduled for 2013 include thermal blanket cutting, and fastener and electronic termination cap removals: all firsts of their kinds. A new round of servicing task boards, tools and activities are slated to continue its investigations through 2015.

Results of RRM operations show that current-day robotic technology can refuel the common, triple-sealed satellite fuel valves of orbiting satellites. "The RRM tools, technologies and techniques passed their tests with flying colors," said SSCO deputy project manager Benjamin Reed. "We are immensely pleased with its success and very grateful to our partner the Canadian Space Agency."

The team's excitement in completing the task was heightened by the treasury of experience and insight gained from the exercise. "Nothing compares to seeing how your hardware and procedures work in a real space environment," said Reed. "This is the beauty of being able to test new, game-changing technologies on the International Space Station."

"We were very excited to see the RRM refueling task validated the ground development work that our dedicated SSCO team performs every day," Reed said. "It is direct evidence that we are not working blindly in the proverbial vacuum, but rather that our carefully planned work at Goddard accurately simulates the real environment of space."

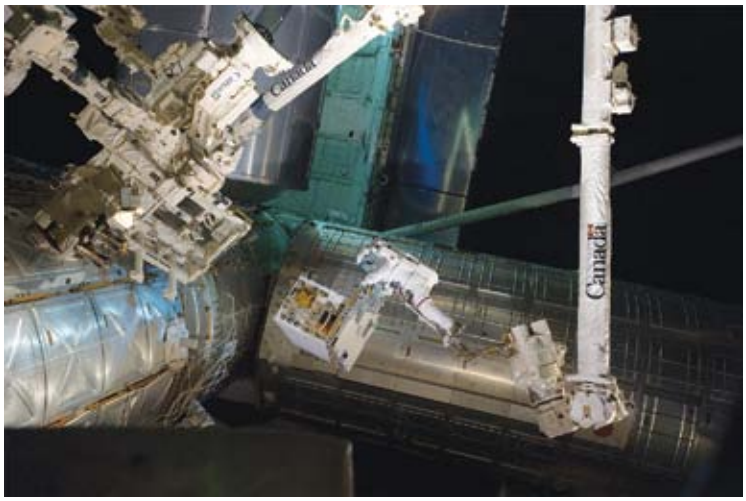
SSCO plans to present RRM results to date at the upcoming Satellite 2013 conference, as well as during space station panels and other events.

NASA continues to test capabilities for a new robotic servicing frontier. In conjunction with RRM, the SSCO team has been studying a conceptual servicing mission and building technologies to address uncharted territory. They include an autonomous rendezvous and capture system, a propellant transfer system for zero gravity and specialized algorithms to orchestrate and synchronize satellite-servicing operations.

On January 15, NASA released a Request for Information to seek input on a potential public-private partnership to effect the full utilization of NASA-developed technology through an end-to-end technology demonstration of a satellite-servicing capability for client satellites located in GEO. The conceptual Restore Mission would potentially perform servicing operations in orbit in the 2018-2023 timeframe. RRM is proving the technology to achieve such a future mission.

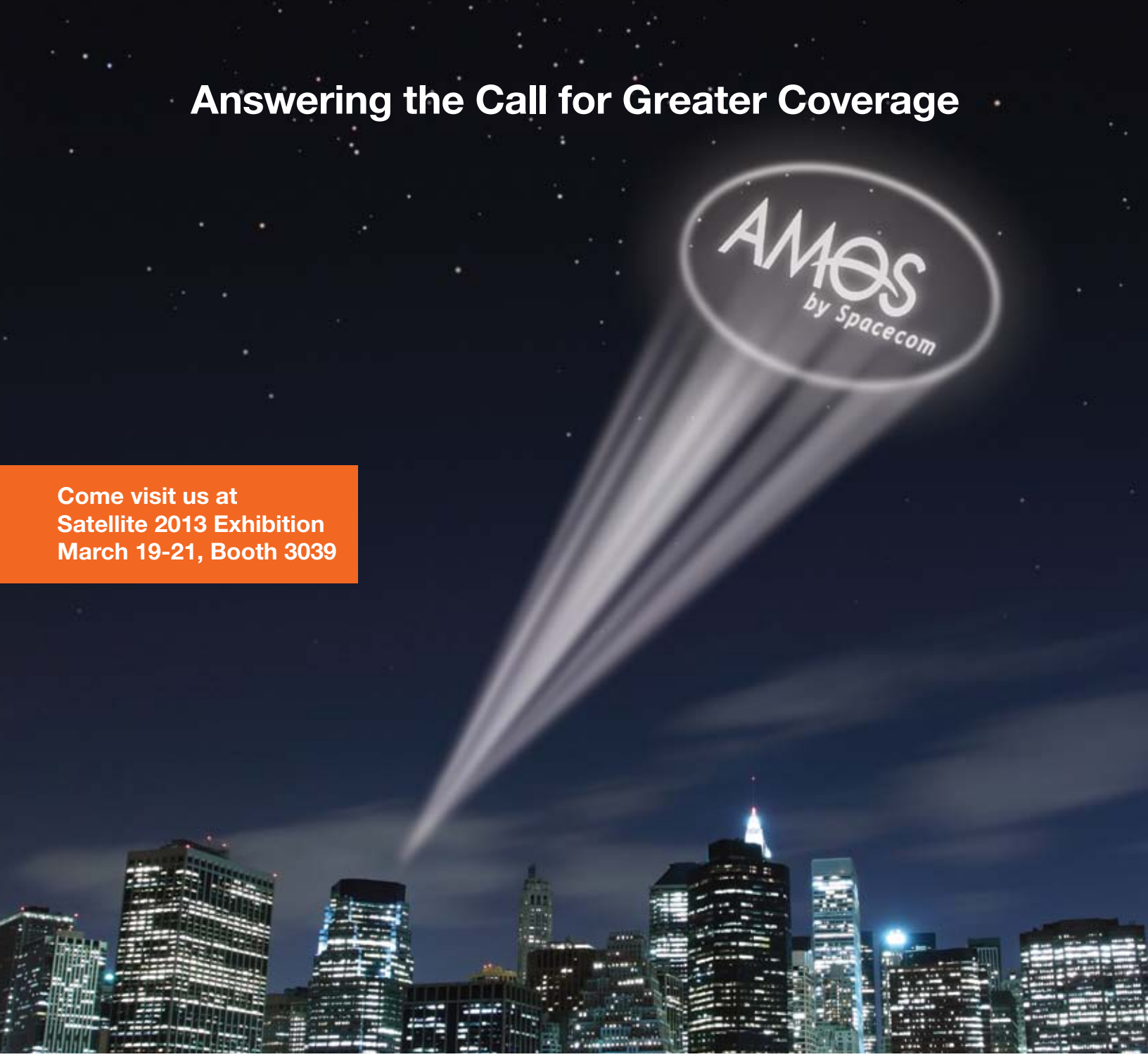
"RRM is a harbinger of the next era in satellite fleet operations," Reed said. "It disrupts the accepted paradigm that a GEO satellite must be decommissioned at the end of its propellant reserves. Nearly 50 years of common practice is challenged with the options that RRM proves and foreshadows." **#**

Story by
Adrienne Alessandro
NASA's Goddard Space Flight Center



On July 12, 2011, spacewalking astronauts Mike Fossum and Ron Garan successfully transferred the Robotic Refueling Mission module from the Atlantis shuttle cargo bay to an temporary platform on the International Space Station's Dextre robot. Image Credit NASA.

Answering the Call for Greater Coverage



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SatBroadcasting™—Is C-Band The Next "Beachfront Property?"

By Mike Antonovich, Senior Contributing Editor

One of the trends I've seen over the last decade is a "winners and losers" environment when it comes to standard plan C-band satellites, especially over North America.

By "winners" I mean those primary cable distribution satellites in both the Intelsat and the SES fleet that deliver literally hundreds of channels to thousands of cable headends that serve over a hundred million television viewers. While there are plenty of rumblings within the programmer community on the wisdom of end-of-life satellite terms on the pending satellite replenishment cycle, there is, and will remain, a compelling business case for national broadcast and cable distribution for many, many years to come. This business is safe.

However, beyond the 10 or so mainstream cable distribution satellites, life isn't so simple. There used to be a very healthy satellite distribution business for program syndication. Between digital video compression, file transfer and industry consolidation, that business is long gone. C-band contribution for major news events and sports is still robust, but very much under threat from fiber.

What that leaves are about a dozen "market challenged" C-band satellites (or C-band payloads on hybrid birds) without a clear mission and with lots of excess inventory. Over the last few years, we've seen the carriers avoid committing to replacement and, in some cases, actually move a satellite out of the domestic arc. They just haven't been able to justify a business case. They also haven't relinquished their licenses, either…

So, right over the heart of the world's richest economy sits this wonderful satellite asset, perfectly coordinated, robust from rain fade, and in this market great deals are to be had. Where are the customers?

One of the most elegant applications I know of is from my good friends at **Roberts Communications Network**, who I've had the good fortune to have served as their carrier, reseller and employee at various and sundry moments in my career. They operate more than 110 MPEG-4 video uplinks for live horse and greyhound racing, that serves their 80-channel DTH distribution platform businesses, feeding back to their racing and wagering industry clients. They long ago figured out that nothing is more reliable and manageable than lockdown C-band service for ubiquitous nationwide origination. Even today, fiber doesn't come close to the price and reliability that C-band satellite affords.

But they are the exception to the rule. Where are the rest of the takers for this capacity? The terrestrial wireless carriers here and abroad continue to poke at radio frequency "dead wood" and will end up encroaching, usurping or out-lobbying government regulators to get more precious bandwidth. The carriers can't do much without new customers and a new round of innovative applications to put this bandwidth to work.

While I'm no spell-binding, stupefying, savant or soothsayer (try saying THAT three times fast) it seems pretty clear to me that the future of C-band for the communications satellite community depends on more creative and innovative use of the inventory. C-band is either prime Malibu, California beachfront, or prime beachfront on the Salton Sea. The dictum of "use it or lose it" definitely applies. So, c'mon you clever people...get cracking!

About the author

Mike Antonovich has been recently announced as ATEME's Senior Vice President & General Manager, Americas, a worldwide leader in advanced video compression and transcoding solutions. Mike welcomes your comments and counter-points, but asks that in lieu of throwing overripe fruit and cegetables at him, you instead donate to your local food pantry.

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SatBroadcasting™—SNG's New Edge

By Paul Seguin, Application Specialist, C-COM Satellite Systems, Inc.

A quick review of the Broadcast Industry and its use of Satellite technology suggest some very interesting information. Prior to the use of satellite, video images shot on site needed to be put on tape and hand delivered to a studio for editing and broadcast. While this provides a secure delivery method, it could prove to be a very lengthy process, making the event being covered less than "current". As all agencies were in the same position, the public was used to this obscene delay, and it was considered a normal course of events (*e.g.*, during World War 1, stories were often submitted by Post).

The obvious issue with this type of delivery was the location of the event being filmed; if not sent by mail, it would have to be carried a long way before it could be reviewed, edited and broadcast over the air. A shared system was installed in certain large cities where a video tape player would be located in a building. A hardwire communication line was installed such that a story could be uploaded to the appropriate news agency for editing. These portals provided a way for agencies to upload stories quicker than it would be to transport the tape back to the studio. This advancement meant that the time between the event and the viewing could be reduces to hours, rather than days.

The thought of using a satellite to transfer data was very intriguing to the broadcast engineers of the day. If you could use a fixed antenna system to do this job, why not use a slightly smaller antenna to broadcast images captured in the field. The real problem was: how does one move a 4.8m fixed antenna around and get it setup in reasonable time to make it quicker than driving the tape back to the studio. Studios had just begun to use C-band antennas to upload stories filmed or composed locally to an office in different location. The studios would receive feeds from other affiliates and sources that they would then broadcast over the airwaves to their viewing audience.

Moving forward, a gentleman named *Dudley Freeman*, from Massachusetts, decided that there was a way to install a 4.8m antenna on a truck and drive to the required location to upload the video captured at the event. In fact, with some creative electronics, the video could be transferred live back to the studio.

Mr. *Freeman* found that by folding the edges of the 4.8m antenna and by locating the antenna at the right physical plane, it could just fit on the back of the truck without any overhang. As this was C-band, and the efficiency of the satellite was not very good, high power amplifiers (BUCs) needed to be used. It was standard to use two 600 watt (or higher) amplifiers to provide enough power, plus a redundant device should a failure occur.

These amplifiers were of the type **TWT** (*Travelling Wave Tube*) and required that the tube be allowed to warm up to temperature before the frequencies would stabilize and they became usable. The tubes in the amplifier required vast amounts of power to operate; the trucks had to be equipped with high power generators to produce the required voltage and current. It was normal for a 12.5kw generator to be installed in the truck to power the system.

These trucks were a marvel of modern broadcast electronics and typically would cost north of a half a million dollars. Due to the amount of equipment and the size of the reflector they carried, they were typically installed on a 5 ton

truck chassis, with a large box body. These trucks could be used to uplink to any satellite needed in order to transfer video and audio from any event that was newsworthy.

These early broadcasts would push an analog video and audio of *Standard Definition* (**SD**) quality that required a whole transponder for one video image. If multiple camera feeds were to be used, multiple transponders needed to be available. Obviously, the cost to use a whole transponder was quite high. Only the truly worthy news events would warrant using these live feeds.

Once the market saw the usefulness of these trucks, some smart operators began to build such vehicles with the sole purpose of renting them out to news agencies that needed to uplink a story. These users would listen for the intelligence of the day and drive their trucks to the location of the newsworthy stories. Once on site, the operators could sell their uplink services to whichever agency had sent reporters but had no satellite truck of their own. This allowed for live feeds from these events to be picked up and carried as either a breaking story or on the next scheduled news broadcast.

The use of these large antennas and C-band satellites continued until late 1990's when some operators began to build trucks to use Ku-band satellites. The Ku-band operates at a higher frequency than the C-band; so, the antenna size can be smaller, the amplifier needed to push the same amount of data could be smaller, and the transponder had more capacity. C-band was typically 36 MHz whereas KU-band is typically 27 MHz or 54 MHz, less than a whole transponder was needed to upload a story from the field. Having smaller antennas and amplifiers meant that the truck size could also be smaller. In addition, a smaller truck was more nimble getting to and from the event, and less expensive to keep on the road.

A 2.4m antenna became the choice for the new trucks being built. Ku-band, being a smaller wave than C-band, required lower transmission power, and thus, a smaller BUC was needed. Ku-band bandwidth was more expensive than C-band but more transponder space was available. That, in turn, reduced the power requirements and also the size of the required generator.

The advent of encoders/decoders/modulators brought with it the ability to reduce bandwidth requirements by being able to put more data into a smaller space. This made the delivery of stories even less expensive than previously thought possible. The demand of the television viewing audience to watch 'live' events forced broadcasters to have more trucks, pushing more live video, than ever before.

These smaller trucks equipped with smaller antennas became the 'king' for many years. Broadcasters were switching to Ku-band as the older C-band trucks were in need of replacement. A new breed of video broker sprang up as the new trucks were less expensive and much easier to maintain and operate. During the 90's, and into the new millennium, a quick look at any newsworthy event would reveal a number of broadcast trucks, both station-owned and broker-based.

As the world's demand for more and more coverage to breaking news events continued to increase, the pressure to provide the live feeds created a situation where Ku- bandwidth was becoming a scarce commodity. Without long-term contracts in place, 'occasional use' bandwidth was in limited supply in many locations across the globe. Satellite operators were reticent to leave empty transponders in their inventory to handle the rush of requests that would occur when a major event happened.

Large agencies had the availability to purchase contracts for bandwidth that they could then share amongst their various locations. Smaller operators were at a disadvantage when it came to buying bandwidth. They needed to be able to acquire the bandwidth they needed, when they needed it and not have to worry that the bigger players had taken all of the available bandwidth. Satellite operators were looking for a way to offer additional bandwidth and meet these demands.

Hughes Network Systems launched ***Spaceway 3***, a Ka-band satellite in 2007. This satellite provided 10Gbit/s of bandwidth covering the North America market, which is equivalent to approximately 8 Ku-band satellites.

In 2010, **Avanti** launched ***HYLAS 1*** over Europe and the company now offers services the Middle East, Russia and Australia. **Yahsat** has taken up the Hughes model and has rolled out Ka- offerings in the Middle East & Africa.

October 2011 marked the date of the launch of ***Viasat 1***, the company's first Ka-band satellite. The new satellite was activated in January 2012 and has a total capacity of over 140Gbit/s. This is more capacity than all the satellites currently serving North America. With its spot beam technology, these Ka satellites are capable of tremendous speed and bandwidth simultaneously.

New dedicated SNG service plans were developed to offer the market an alternative to the standard C-band and Ku-band programs. **Viasat** named their new offering ***Exede*** and has actively pursued the video media markets in North America. In the Viasat model, each spot beam is approximately 300km in size and each beam has 450Mbps of throughput. In Europe, **Eutelsat**, in partnership with Viasat, offers their ***Newspotter*** service to agencies that need 'occasional use' bandwidth.

SatBroadcasting™—SNG's New Edge (Cont.)

The Newspotter Ka service can be roughly one-third the cost of similar Ku-band service. This service is offered on a 'contracted committed volume' basis, where total volume for the year can be contracted, and the actual usage is deducted from the total. The more volume contracted, the less expensive the bandwidth. This allows smaller operators to participate and not just the larger players.

Of course, availability of all of this bandwidth is great, but if you do not have the equipment to access it, you are not benefitting from these advances. **C-COM Satellite Systems** Inc., the manufacturer of the ***iNetVu***® line of portable and mobile auto deployable satellite antenna systems, was contacted to produce a series of antennas that would operate on these new Ka-band services. As the beam for the Ka service is so much tighter than the C- or Ku-band services, the antennas are also expected to be smaller. This leaner antenna, given the strict requirements of this new service, demanded extremely accurate and exact pointing requirements.

C-COM's first Ka- product was the ***Ka-75V***. This was a unit built specifically for the Viasat Ka- offering. It was certified by Eutelsat as the first, fully approved Ka- mobile antenna system to meet their stringent requirements. It is configurable to handle all of the transceivers and modems offered by Viasat and Eutelsat.

The ***iNetVu***® ***7024*** ACU has the geo-tables built-in, allowing the operator to simply press one button and the controller sets all of the internal parameters needed to locate and lock onto the satellite. This feature works in North America and in Europe, as well.

The next offering was a ***Ka-98H*** to address the Hughes Ka- service. This product was designed specifically to support the **HNS** supplied Ka- service. This antenna system has been designed to work in North America on the Hughes Ka- offering, in Europe on the Avanti service and in the Middle East and Africa on the Yahsat service. All models of the transceiver and modem have been tested and are fully operational.

To address a request for a new **iDirect** Ka- offering, C-COM developed the ***Ka-98G***. This unit handles the iDirect Ka- as well as the Gilat Ka- service. The Ka-98G has been tested by Avanti in Europe and is in use in the U.K. and other countries.

A Viasat/Eutelsat version of the 98cm antenna, the Ka-98V has also been developed and is in full certification testing with Eutelsat at the time of this writing. This product will provide better RF performance on the fringe areas of spot beams, and offer better margin for higher bandwidths.

A *Fixed Motorized* Ka-band antenna (***iNetVu FMA-120Ka***) has been designed and tested, offering a pole mounted Ka-band antenna solution that provides enough mobility to be moved to a new satellite when needed, by program control. This unit is perfect for remote locations where sending a technician to perform a re-point is simply too expensive. By using remote access to the Controller, the operator can program the new satellite, issue the find command remotely, and the antenna will locate and lock on to the new satellite with no additional intervention required.

C-COM is developing a number of additional new products for the Ka- market place. Some are going to be released at Satellite 2013 in Washington DC, while others will be introduced at a later date.

With the roll out of new Ka-band solutions, companies deploying iNetVu antennas have begun performing their own acceptance tests. At the present time, iNetVu equipped SNG units are deployed in the USA, U.K., Germany, Belgium, Netherlands, Poland, Italy, Romania, Spain, Russia, Finland and France. Several other service providers are also in the process of completing testing of these small, extremely powerful mobile antenna systems.

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SATCOM Solutions—CPI's HPAs + BUCs

There are several primary applications for SATCOM HPAs and BUCs. These include the Internet, *Digital Satellite Newsgathering* (DSNG), mobile communications, maritime VSATs and offshore energy, *Direct-To-Home* (DTH) television and military communications (MILSATCOM).

These applications demand a wide variety of products. Indoor rack-mounted amplifiers are typically installed in a climate controlled room or shelter located some distance from the antenna. *Outdoor amplifiers* (ODUs) and high power BUCs are typically mounted at the antenna in a hub, or on the actual antenna feed. Regardless of the type of amplifier or operating environment, customers always desire products that are smaller, lighter, more efficient, and reliable.

1.25kW Ku-band SuperLiner® outdoor TWTA

Ka-Band

The emergence of Ka-band is a key element in CPI's business and the company has been at the forefront of the developing Ka-band HPA industry since introducing its first product in the 1980s. The company has been involved in a number of projects in various countries around the world that use Ka-band for both broadcast and IP applications. Today, CPI possesses the broadest and most established offering of Ka-band HPAs on the market. To address the crucial Ka-band market, CPI developed the following solutions...

1. *High power BUCs with RF output powers up to 40 Watts PSAT/20 Watts PLIN; in very small, lightweight packages*
2. *Helix TWTAs with RF output powers ranging from 120 Watts up to 500 Watts*
3. *Coupled cavity TWTAs and extended interaction KPAs with RF output power up to 1000 Watts*

More than 1,000 CPI Ka-band amplifiers have been installed and these amplifiers are relied upon in the gateways of most of the broadband, high throughput systems across the globe.

Reducing Environmental Impact

A significant step forward in TWTA technology was the creation of ***SuperLinear***® TWTAs. These take the concept of peak power amplifiers to an entirely new level of efficiency. SuperLinear TWTAs first appeared about seven years ago and have gained considerable interest and market acceptance. In many applications where they are applied, these TWTAs are more than twice as efficient as GaAs based SSPAs. They are significantly more efficient than other types of HPAs (including GaN based SSPAs), SuperLinear TWTAs are now replacing both older TWTA and SSPA systems.

Higher efficiency manifests itself by fulfilling green, carbon reduction initiatives; providing significant ongoing operational cost savings; as well as being smaller and lighter. This new range of SuperLinear TWTAs also provides *higher mean time between failures* (**MTBF**), as the amplifier's internal temperatures are lower than comparable amplifier technologies.

The SuperLinear TWTAs are designed for optimal operation at the backoff power levels that are required in order to meet standard international intermodulation specifications. This has resulted in a line of smaller, lighter, and cooler running HPAs.

Most traditional HPAs are designed to run from small signal to saturated power. However, the true usable RF power in a typical uplink application is limited by linearity requirements set by **Intelsat** and other satellite organizations. While RF power backoff of 3 to 7dB is all that is ever required, what is still required is the top-end peak power to avoid clipping of the transmitted signal. This clipping results in intermodulation products, spectral regrowth, and other non-linearities. Operating power must be limited to a maximum –3dB from the maximum peak power for low bit-error rates when transmitting signals like QPSK, QAM, CDMA, or OFDM.

When the TWT, linearizer, and HPA can be optimized to work best at the 3dB backoff point (half average power), such results in a more efficient amplifier at the true operating point. Internal TWT and amplifier temperatures are reduced, required amplifier prime power is minimized, and HPA size and weight are dramatically reduced.

A comparison of the specifications of CPI's SuperLinear 2250 W HPA against those of traditional TWTAs (non-optimized and non-linearized) and SSPAs reveals a 30 percent reduction in size, a 20 percent reduction in weight, and a 25 to 70 percent reduction in prime power. This is a rare case of 'win-win-win,' with no penalty for the extra performance. Predistortion linearizers are a highly effective option with the SuperLinear HPA and, as with traditional HPAs, are recommended for maximum carrier traffic.

Direct-To-Home (DTH) Television

While the DTH market in the U.S. and Western Europe is starting to mature, the demand for amplifiers for this market is flourishing in other parts of the world. CPI has provided

amplifiers that are used in nearly all DTH systems around the world. These systems normally transmit to dedicated transponders and compress many TV channels on each transponder. DTH systems typically uplink at Ku- or DBS-band frequencies and the amplifier needs to provide sufficient linear RF power to overcome any potential atmospheric losses such as rain fade, which can be extreme at these frequencies.

CPI's efficient and reliable ***GEN IV*** *klystron power amplifiers* (**KPAs**) are an ideal selection for many DTH service providers. The technological breakthrough for the GEN IV was the invention of the *multi-stage depressed collector* (**MSDC**) klystron in the late 1990s, developed by CPI SATCOM's sister divisions: **Microwave Power Products** (**MPP**) and **Communications & Medical Products** (**CMP**). The MSDC klystron has demonstrated MTBF in excess of 200,000 hours.

Higher power TWTAs in Ku- and DBS-bands have also recently become available to the market. This provides some options for DTH service providers in certain areas of the world where atmospheric losses are not too severe. These TWTAs are available from CPI packaged as either *indoor* (**IDU**) or *outdoor* (**ODU**) amplifiers.

ODUs can be of particular interest to service providers as the amplifier can be located at the antenna or within the antenna hub itself. This reduces the RF losses between the amplifier and the antenna feed and permits the RF power required to be less than an amplifier located some distance away in a building.

There are always other issues to consider when deciding what type of amplifier technology to use. A service provider must balance ease of service, equipment reliability, and service availability in certain environments. Today, CPI offers TWTAs with RF power up to 1.25 kW SuperLinear in Ku-band and up to 750W in DBS-band.

Mobile Applications + Solid State

Mobile communications systems are addressed by CPI's family of TWT ODUs and BUCs available in C-, X-, Ku- and Ka-bands, with quick turnaround for custom solutions. Plus, the acquisition by CPI of the **Codan** and **Locus Microwave** SATCOM business augments an already significant line of solid state products. Codan SATCOM consisted of the Codan and **Locus Microwave** product brands, both providing SATCOM amplifier solutions decades.

Military

CPI supplies a complete range of ODUs and BUCs for commercial and government/military applications. The company is familiar with **DISA** and **ARSTRAT** certifications, and has many products certified to these requirements in the customer terminals product lines. Such products need to be rugged, reliable, and able to operate in a variety of scenarios that could find operating temperatures of up to 60 degrees Celsius. Together with the former Codan SATCOM products, CPI has shipped approximately 17,000 ODUs and BUCs to various locations and environments all over the world.

Connectivity matters

Out there, reliability rules.

For satcom connectivity at sea, rely on CPI Block Upconverters to get the job done. From cruise ships to oil rigs, our BUCs are valued by maritime industry leaders for their rugged build and outstanding reliability. Whether the challenge is to provide security, safety at sea, passenger broadband communications, oil services, or to keep the crew in touch with home, CPI BUCs are ready to go. Call us today for rapid delivery, or visit our website for product listings and information.

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SatBroadcasting™—Reducing Satellite Transponder Bandwidth

By George Mancuso, President + Principal Consultant, DivSat

An increased need for satellite transponder bandwidth is being driven by greater use of *Full-Motion Video* (FMV) gathered by *Unmanned Aircraft Systems* (UAS). *Intelligence, Surveillance and Reconnaissance* (ISR) systems collecting mosaic wide area imagery are accelerating the pace at which bandwidth is required.

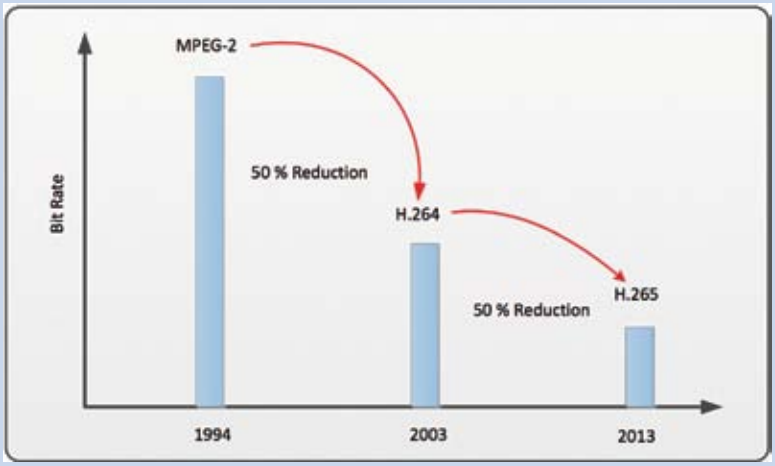
The situation is further compounded by the proliferation of *Very Small Aperture Terminals* (VSAT) requiring higher performance satellites which further worsen the scarcity of usable bandwidth. Approximately 80 percent of all data carried on the Internet is video, with estimates used by the military falling into a similar range. In short, there is an insatiable demand for video which is a prime consumer of satellite transponder bandwidth.

To a significant degree, the military has supported satellite transponder bandwidth requirements with the use of commercial satellites. Funding for commercial satellite bandwidth has been obtained through **Overseas Contingency Operation**s (**OCO**) accounts which are being considerably reduced. For reference, the 2012 OCO enacted funding for Operation and Maintenance vs. the 2013 request is 23.3 percent lower. Consequently, the Pentagon may not be able to meet their demand for commercial transponder satellite bandwidth in the future.

High Efficiency Video Codec

Enter a new *High Efficiency Video Codec* (**HEVC**) standard, otherwise known as **H.265**. The techniques defined in the standard have the ability to reduce video data rates by as much as 50 percent as compared to the most current H.264/AVC (*MPEG-4, Part 10*) standard, and as much as 75 percent opposed to the older *MPEG-2*. (*See Figure 1, below.*)

HEVC/H.265 is an open standard defined by the *ITU-T Video Coding Experts Group* (**VCEG**) and the *ISO/IEC Motion Picture Expert Group* (**MPEG**) and was ratified in January of 2013. The standard is maturing with additional capabilities being incorporated. Manufacturers are also currently demonstrating products using this codec.



The Compression Factor

Video compression (data rate reduction) is achieved by eliminating temporal and spatial redundancies. An encoded Transport Stream is used by a decoder to recreate an approximation of the original video. H.265 is an evolutionary standard which exploits similar techniques as employed in MPEG-2 and H.264 but to a more elaborate degree.

H.265 specifies decoder syntax but does define how an encoder is to generate the related Transport Stream. For this reason, not all encoders are created equal, with individual manufactures determining how to best implement the H.265 toolsets. The increase in encoding complexity requires processing power 3 to 5 times that of a H.264 encoder and lends itself to parallel computing. The H.265 encoded video is designed however to operate on handheld devices, media players, *Set Top Boxes* (**STBs**) and other types of decoders.

SATCOM Adoption

Presuming 80 percent of satellite bandwidth is composed of H.264/AVC video (legacy MPEG-2 exists), then moving to H.265/HEVC compression has the potential to result in a substantial 40 percent saving in satellite bandwidth.

Due to the dramatic impact H.265 can have on reducing transponder bandwidth, it is anticipated SATCOM will be an early adopter of H.265. Further, by use of transcoding, the existing ground receive infrastructure can be maintained while achieving the much needed bandwidth savings. Watch for initial H.265 SATCOM deployments during 2013.

About the author

George Mancuso is the President and principal consultant at DivSat a firm which specializes in Digital Video and Satcom bandwidth reduction solutions. His background includes various government projects involving the Army, Navy, Air Force and the National Laboratories. George's Satcom experience includes the development and deployment of earth stations throughout the world ranging from small aperture terminals to major 21 meter major path Earth Stations. He played a significant role in the deployment of the first practical Standard and High Definition Television encoders to enter the broadcast market and has continued involvement with advanced video codec's. For additional information regarding this article, contact ***gmancuso@divsat.com***.

Editor's Note

To learn more about satellite communications and its application and use by military, government, NG0 and first responder agencies, read MilsatMagazine each month.

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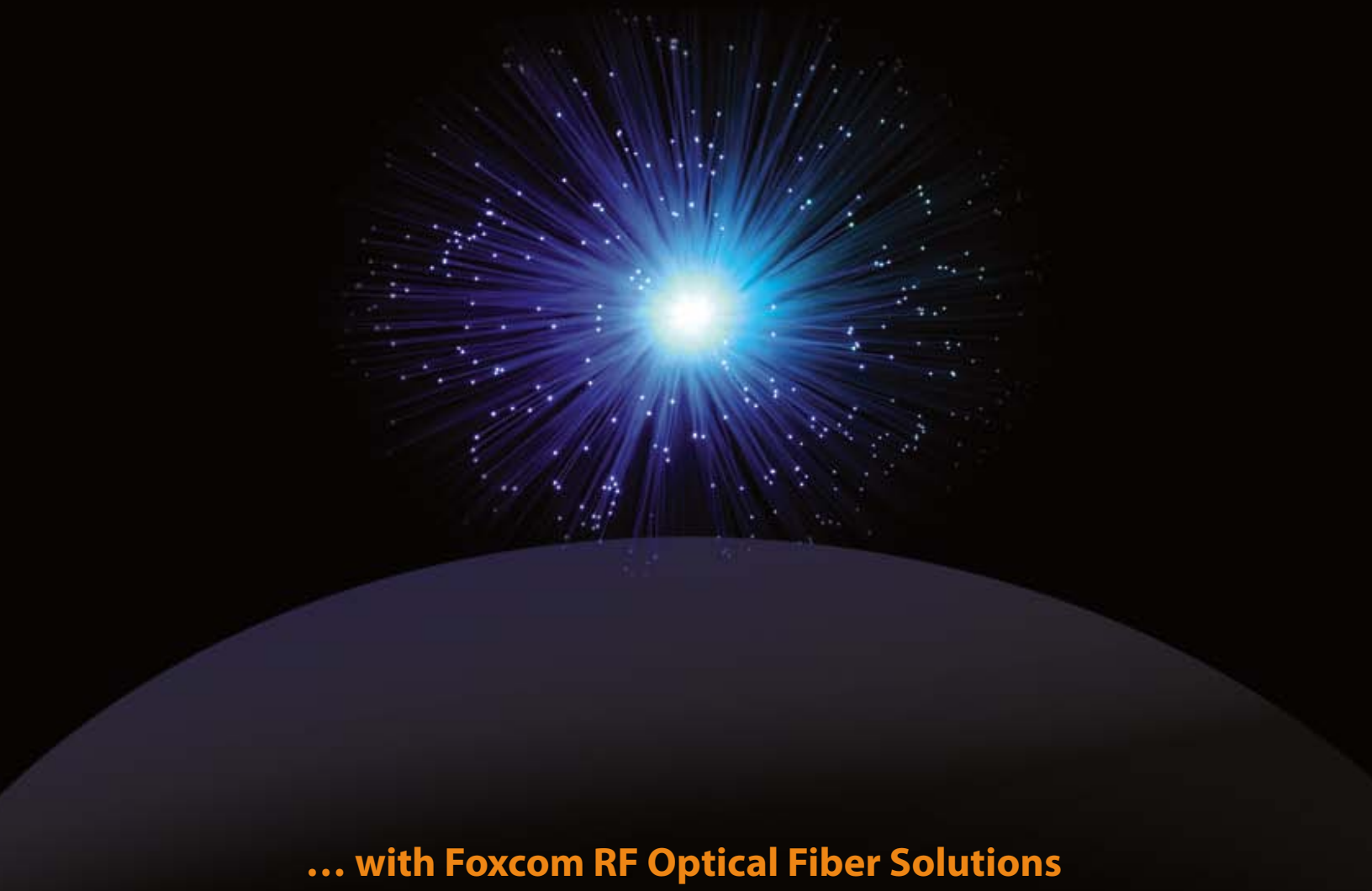

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Executive Spotlight: Tore Morten Olsen, Astrium Services

Tore Morten Olsen has 17 years of experience in the satellite communications sector working for Telenor and Vizada. He started in 1994 as a Technical Product Manager and moved into the commercial field responsible for the governmental market sector in 1997.

In 1999, he moved to Slovakia to lead the international satellite communications activities of Telenor and then returned to Norway in 2004 to head up Telenor Satellite Networks AS. Since 1999, Tore Morten has held several senior positions within the company that include CEO Telenor Slovakia spol.s.r.o, Chairman of the Board of Directors in several Telenor Satellite Networks companies, Country Manager for Telenor in Slovakia, and CEO of Telenor Satellite Networks.

Following the establishment of Vizada, Tore Morten has taken responsibility of the Maritime VSAT and Mobile Satellite Services retail activities of the company, operating under the Marlink brand. He was CEO of the Marlink Group and held numerous Board positions in the Vizada group.

After Astrium Services acquired the Vizada Group in December 2011, in September 2012 Tore Morten was appointed CEO of Astrium Services Business Communications—Maritime division, taking responsibility for both indirect and direct sales within the Maritime segment in the newly established business division.

SatMagazine
Good day, Mr. Olsen. Would you please tell our readers how you became interested in the satellite communications industry, and why Astrium Services Business Communications (Astrium Services) became your company of choice for your career?

Tore Morten Olsen
I completed a Masters degree in engineering at the **Norwegian University of Science and Technology**. Norway was one of the first countries in the world to use SATCOMs as part of its domestic telecoms infrastructure. Additionally, the state-owned telecoms company, at the time known as **Norwegian Telecom**, was at the forefront of these developments within the satellite industry.

Norway is, obviously, also a major maritime nation and, by nature, this industry is highly dependent on SATCOMs. Selecting this career path enabled me to bridge a link between maritime and satellite communications. It's a way of combining the innovativeness of telecoms with the requirements of maritime customers. Norwegian Telecom became **Telenor**, which then merged with the then **France Telecom Mobile Satellite Communications**, before the rebranding to **Vizada** in 2007. In 2012, Vizada was acquired by **Astrium** to join **Astrium Services**.

Throughout my career with this company, in its different forms, I have had some great opportunities and challenges to sink my teeth into.

SatMagazine
Is Astrium Services involved in helping youngsters become more interested in careers within our various market segments? Given the need to educate trained professionals to support companies' advanced technical needs for various projects, how can we, as an industry, encourage today's youth to consider careers in SATCOMs, as well as further courseware in middle and high school for such future employment?

Tore Morten Olsen
Today's youngsters are our future. With the innovations and development taking place in the SATCOM industry, we need to ensure that we have talented young people joining us, to challenge traditional thinking and help us to bring new ideas to market. This is a core focus for both Astrium. Some of the elements we focus on are:

- The World Space Week (organized by the UN) in October every year. Astrium engineers are particularly active during this event, meeting young pupils and students to explain the benefits of joining the satellite industry
- Partnerships with universities and engineering schools
- Human resources/recruitment initiatives with universities and schools
- Promoting the "critical mission" nature of the SATCOMs industry, particularly interesting for young engineers keen on getting involved with the armed forces, NGOs etc. This can be a very exciting environment for young recruits and a fantastic training opportunity as it requires a particularly high level of service and expertise.

SatMagazine
How has Vizada's transition to Astrium Services affected the company and their customers? Is everyone "onboard" for the changes ahead?

Tore Morten Olsen
The new Business Communications unit of Astrium Services was birthed from the acquisition by Astrium of the Vizada Group and Marlink at the close of 2011. Partners and customers benefit from this move by having access to a complete range of satellite services that cover the full range of systems (L-, C-, Ku-, Ka-band) and a scope of solutions from airtime and hardware sales to fully managed and outsourced solutions.

Following the acquisition, we now have an enhanced network infrastructure, as well as the strategic and financial backing of **EADS**, the global leader in aerospace, defense and space related services, to continuously develop new innovations and opportunities. The significant size and scale of Astrium and its resources will enable us to continue a technology-agnostic approach, with a sales strategy dedicated to providing maritime customers, such as shipping companies, oil and offshore, fishing, cruise and ferry, as well as NGOs, enterprise and energy companies, with an extensive choice of satellite systems, through indirect and direct channels.

SatMagazine
What moves are major satellite operators taking to satisfy the current thirst for broadband data communications as well as the associated market implications?

Tore Morten Olsen
What we're seeing right now when it comes to evolutions in satellite technology is a race for speed. Satellite operators, equipment manufacturers and solutions providers are all currently moving towards the same common goal: Develop an offering capable of satisfying increasing demand for data throughput.

Data speeds are currently available at around 10 Mbit/s over C- or Ku-band, depending on the service and the provider. The arrival of Ka-band is due to boost throughputs up to 50Mbit/s and beyond. The first Ka- satellite was launched mid 2012 by **Eutelsat** (and built by Astrium), and has multiplied by 70 the capacity of the Ku- satellite. **Inmarsat** will be close on their heels with the launch of their ***Global Xpress*** Ka- service this year following a satellite launch in 2013-14, with global coverage expected in 2015.

Executive Spotlight: Tore Morten Olsen (Cont.)

SatMagazine
An area of constant conversation and project analysis is that of hosted payloads, with the commercial and MAG sides of the industry seemingly willing to work together to lower the cost and shorten launch timeframes. What are your thoughts regarding HPA? Is Astrium Services involved in such projects?

Tore Morten Olsen
Hosted payloads can be an interesting model on a case-by-case basis, as long as it creates a win-win situation and improves cost efficiencies. A few examples include:

- **Anik-G1**: Astrium is not the manufacturer of this Telesat satellite, but Astrium Services will operate an X-band hosted payload for the defense and government market

- **EDRS**: The first EDRS payload will embark on the Eutelsat 9B satellite (Astrium Satellite manufactures the satellite for Eutelsat, with Astrium Services operating the EDRS Hosted payload. The European Data Relay System (EDRS) will be two telecommunication payloads in geostationary orbit which will enable broadband, bi-directional data relay Low Earth Orbit (LEO) satellites. EDRS increases the time LEO satellite can remain in communication with the ground and enables immediate broadband data transfer to the user

SatMagazine
How is Astrium Services positioning itself as a broadband communications expert, catering for shipping companies increasing need for high-speed data?

Tore Morten Olsen
Astrium Services has been at the forefront of a number of significant industry changes linked to broadband satellite during the recent years. In 2012, the company launch ***Pharostar***™, the new addition to its maritime VSAT portfolio. This latest innovation was developed with a view to make maritime VSAT easier to install and more accessible to a wider range of vessels, including medium-sized transportation, fishing and leisure boats. With data rates up to 1.5Mbps, Pharostar is based on data allowances to compliment the traditional throughput-based VSAT offering. An important development in late October saw the Pharostar coverage zone significantly extended over the *Indian Ocean Region* (**IOR**), with a further expansion due over the southern part of the Atlantic Ocean by the end of the year. Customers currently using all Astrium Services' VSAT systems will automatically be able to receive coverage in the new areas.

SatMagazine
Even with military drawdowns across the globe, the need for mobile communications continues to increase. What can Astrium Services offer in this regard?

Tore Morten Olsen
At the moment, a number of leading nations are withdrawing their troops from major conflict zones, such as Afghanistan, and this is obviously having an impact on the military's satellite communications requirements. However, we're seeing many civil organizations working to stabilize the situations in these former conflict zones. Astrium Services is one of the main partners to the United Nations' organizations in terms of SATCOMs. The enterprise entity within Astrium Services provides videoconferencing solutions for UN workers in remote areas. We continue to provide services to military elsewhere, particularly maritime services as navies make the move from a traditional secure X-band environment to C- or Ku-band.

SatMagazine
What technologies or events do you believe will carry the most significant weight during 2013 as budgets continue to weigh heavily on all sectors of the industry? How do see such projects coming to fruition?

Tore Morten Olsen
Leading satellite operators Inmarsat and Intelsat are working on major technological developments. As mentioned above, Intelsat is due to evolve its Epic service over time to offer throughputs of 100Mbit/s, and Inmarsat will launch their Global Xpress Ka- service this year or next. Regional players such as Telenor, providing Ka-band capacity, are also worth watching. What we're experiencing is an important increase in throughput per dollar—a good thing for customers—communications become more affordable and attractive to more and more people on land and in maritime environments. We'll probably have to wait until 2013-14 for many to come—several of these systems won't be launched until at least the end of this year. Astrium Services is in talks with all of these companies and we're confident that we will become a core partner for them.

SatMagazine
Over your 18 years of experience in the SATCOM environments, which projects or programs have brought you the most satisfaction?

Tore Morten Olsen
As a general rule the most satisfaction comes from meeting a customer who has a requirement you believe is difficult to meet and then finding the solution that helps them communicate. Following the Tsunami in Asia in 2006, through the relationship between the UN and the Norwegian government, we were able to mobilize people and equipment within three days of the disaster. It's during this kind of situation that you realize just how important satellite communications are to the world.

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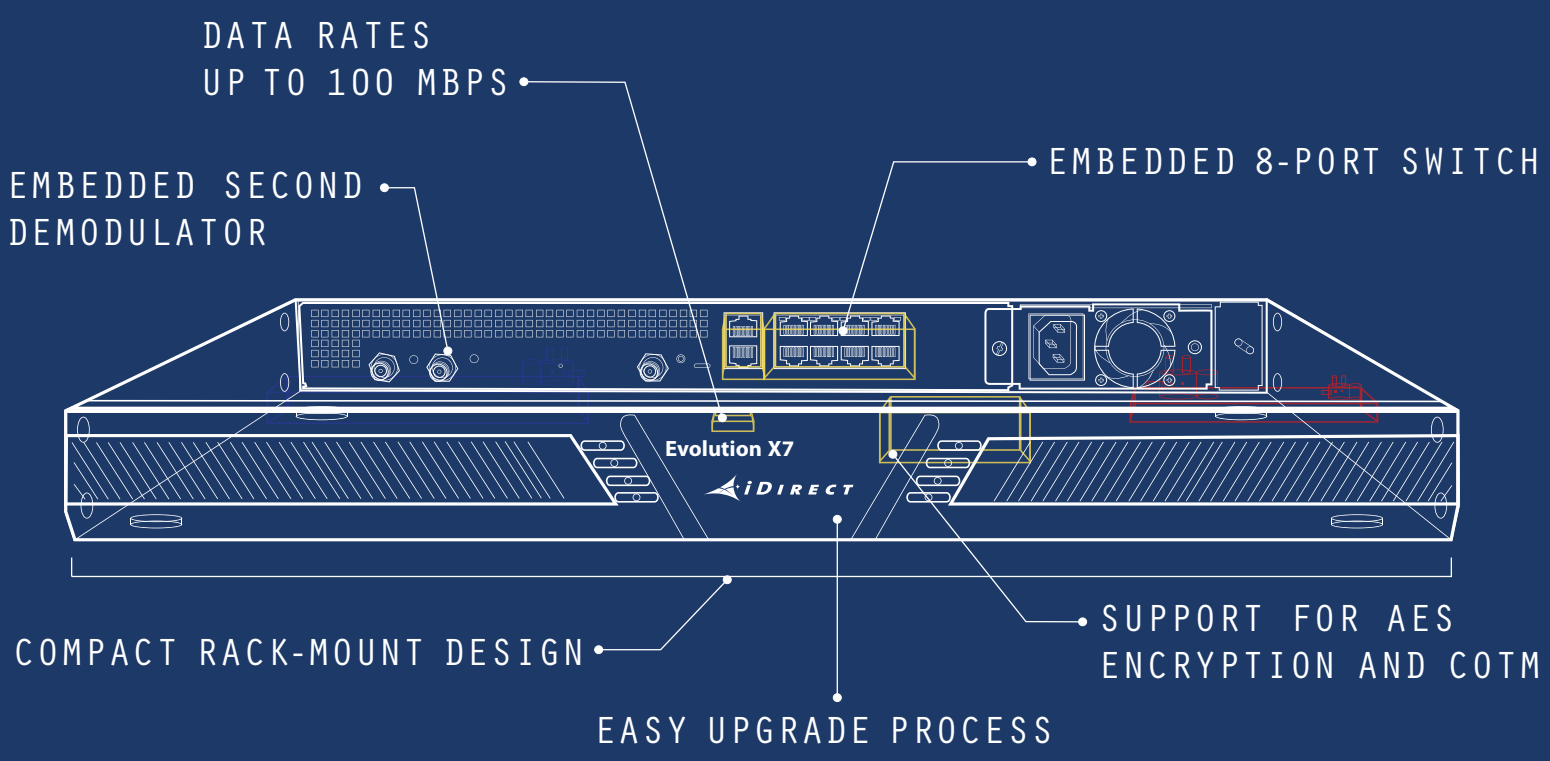

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SatBroadcasting™—In Search Of Quality Monitoring

By Simen Frostad, Chairman, Bridge Technologies

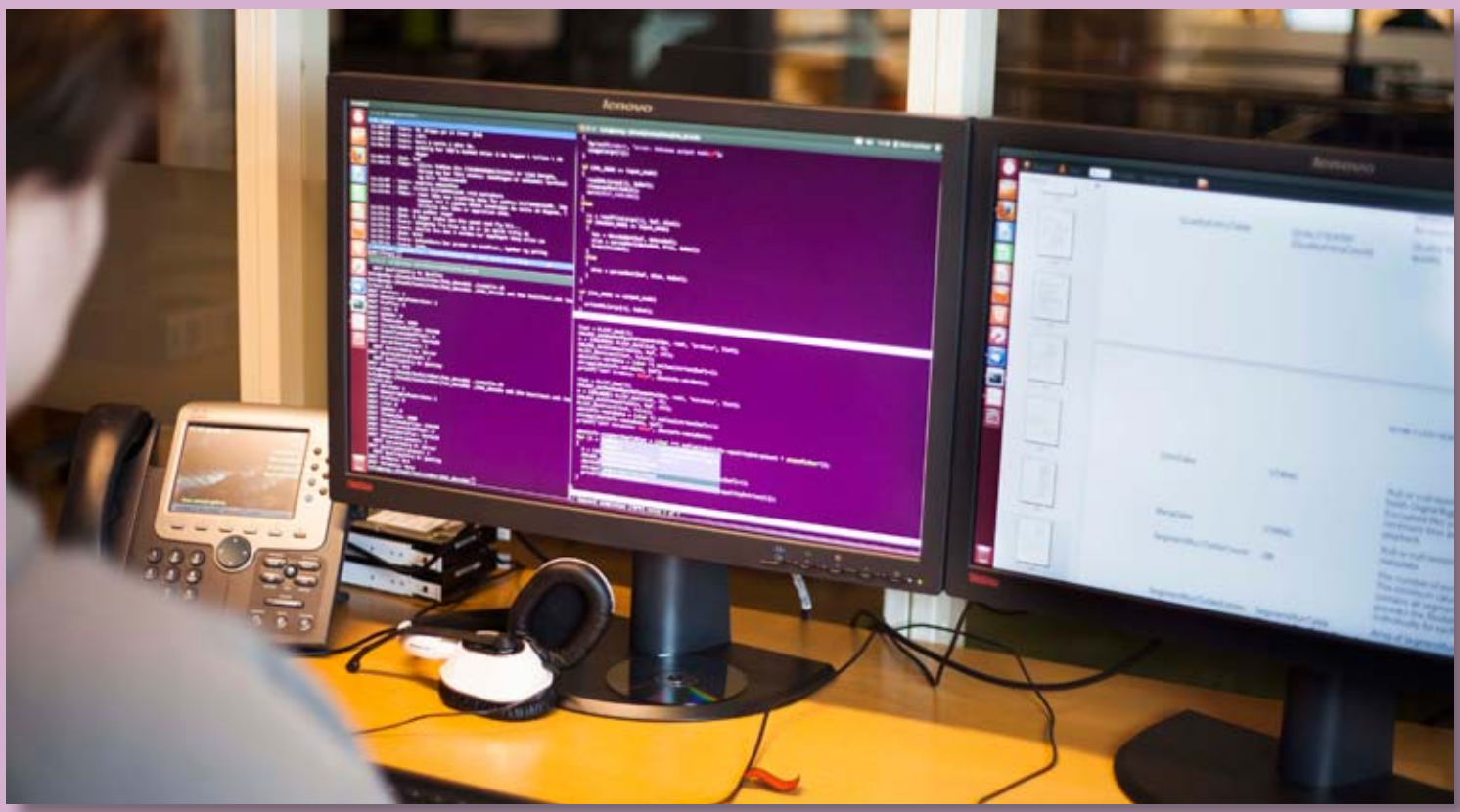
Year on year we are noting greater proliferation and diversification in the satellite market. The only thing we can be sure of is that there is constant evolution in the way satellites are being used. In addition to the 'traditional' applications—if we can talk about practices that are only a few years old as traditional—there are newer ways of using satellite capacity that reflect the massive expansion in mobility, in professional and consumer domains.

When the pace of development is so rapid, what often happens is that there is a lag between the introduction of new technologies and the support systems operators need for delivering robust commercial services in the real world. This is the situation satellite service operators find themselves in today. The tools available for monitoring satellite data are lagging behind the reality of the new wave of services. Traditional monitoring tools continue to provide some of the functionality operators need. However, there are large gaps opening up where monitoring would be quite valuable, but where the current crop of tools can't be applied.

Take, for example, the way **OB** (*outside broadcast)* mobile units have developed their exploitation of a satellite connection in recent years. Broadcasters used to use OB satellite vans for a simple uplink of the HD feed, but now, for many operators, the OB unit has become more of a mobile production center, with the satellite link being used additionally to connect the unit to the studio and the wider world. Sideband channels provide a variety of two-way data traffic links for production staff, allowing them to search for information on the net, conduct picture research, download clips from the studio, conduct VoIP and video calls, and so on. This devolved 'mobile production unit' role can be very valuable to broadcasters at major events, and as this way of using mobile units becomes more extensive, these sideband links become more and more important to the production. A failure of these channels could be as serious as a problem with the main feed.

For the mobile unit operator, there is no readily available monitoring solution that can be used on the unit to provide valuable diagnostics for these services and the main feed, leaving the potential for service interruption, and making it far harder to track down and fix any problems if they occur. What's needed is a solution that provides good RF data performance, a good ETR290 analyzer, and is compact and cost-effective.

The combination of strong RF performance and good ETR290 analytical capability in an affordable unit would make it deployable throughout the satellite transmission chain, extending serious monitoring capability outside the central headend to other locations, including the mobile uplink van. An operator's



monitoring system could therefore encompass not just the distribution, but contribution links and data services too.

Monitoring satellite input into the central headend remains a critical requirement for digital media operators: Satellite services are still used for 90 percent of all IP-based service delivery, so it's vital for operators to validate the quality of the signal they are receiving, before pushing it out to the network. The technology to monitor the quality of the feed from the satellite as it reaches the central headend is already available, but the ability to add sophisticated monitoring capability to contribution links and the increasingly important satellite data services will give far greater control over service quality and maintenance.

Under the umbrella of mobile data services we can include the rapidly expanding category of users in the marine and industrial sectors. SCADA (supervisory control and data acquisition) is becoming a key operating method for a wide range of industrial and scientific enterprises, from eco-friendly power generation to experimental climate data gathering stations. The integrity of the link and the data transmitted over it can be vital for applications like these, as can the ability to monitor remotely and link the monitoring data into an enterprise-wide system.

In the arena of satellite data services there's a proliferation of providers supplying Internet connectivity to communities that can't use a cable connection, for reasons of geographical remoteness or lack of infrastructure. Among these are not only the communities living in the deserts, jungles and island chains of the developing world, but also some parts of Europe and less densely populated areas in other regions. Satellite receivers are readily available at an affordable price for communities and individuals who need to connect this way, and the providers are often incentivized by governmental grants.

All these areas of the satellite market could benefit from the kind of end-to-end advanced monitoring capability that is available to operators delivering over a cable infrastructure. The ability to diagnose, isolate and correct errors quickly is vital when establishing and maintaining a competitive service quality in any market.

About the author

Simen K. Frostad is Chairman and co-founder of Bridge Technologies. With 22 years of industry experience Simen founded Bridge Technologies in 2004, after creating the world's first IP/MPLS contribution network for Scandinavian sports coverage. Simen had previously built the first multi-camera hard disk recording system for episodic drama production in 1998, and the first nonlinear sports editing facility during the 1994 Winter Olympics.

SatBroadcasting™—Sports Broadcasting's Future Challenges

By Mylan Tanzer, Director of Sports Services, SatLink Communications

Today, consumers are faced with many ways of accessing and watching television programs. Whether via a television set, PC, mobile or tablet device, the change in habits and the audiences' desire to watch what they like, when and where they like, is an area that has involved much discussion. These developments pose many challenges for sports broadcasters as they look to meet customer demand, stay ahead of competitors, and retain audience share. In sports, more than any other genre, new technologies are in great demand, but there is still a need for traditional delivery methods.

Making Way For OTT + Second Screen Technology

The rise of OTT and second screen technology is having a widespread affect on how media is consumed, with viewers now favoring the ability to watch television while accessing social media applications on their mobile/tablet device. This requires broadcasters to look at developing innovative ways to address this evolving market and to engage with the audience. One example of where a broadcaster has adapted is that of **Sky** and its ***SkyGo*** application, a model that broadcasters will need to emulate in order to successfully compete. By enabling audiences to access content anywhere and, significantly, on any device, it increases customer satisfaction and retention, not to mention monetization.

It is also highly likely that sports social media technologies currently being developed will, in future broadcasts, provide an additional layer, which will enhance the viewing experience for an audience that is increasingly immersed in social media, enabling them to view sports on a simple screen.

Platform Neutral Distribution

Another factor to be considered is that the sports content distribution market has changed dramatically over the past two to three years and has presented broadcasters with a distribution conundrum. The traditional linear model of content distribution has to make way for the rise in mobile and Internet-based delivery.

For example, the current method of distribution of content was, and is, managed on a territory-by-territory basis. The emergence of mobile and Internet platforms cannibalising the traditional content distribution method, and the legal and technical limitations and difficulties in preventing it, is a real threat for rightsholders. As these mediums have introduced a multitude of new players into the field that hold no geographical boundaries or limits in sharing content via the Internet, it means rightsholders are finding content being shared further than originally agreed upon, resulting in a loss of earnings.

As a result, content providers are turning the tables by adopting an "if you can't beat them, join them" approach, which is seeing digital media content rights offered on a 'platform neutral' basis. This means successful bidders routinely exploit their content distribution rights across all media platforms in their territory including television, Internet and mobile on a linear and on-demand basis. This is aimed at ensuring maximum exposure while providing partners with programming flexibility to fully exploit the properties they invest in.

Additionally, many international rightsholders, such as the Spanish ***La Liga***, the **NBA**, and the **UFC**, have launched their own globally-accessible ***YouTube Channels***, enabling them to exercise a degree of control and exploit new digital opportunities.

However, sports programming is still dictated by the linear reality of live events, the hours of which are based on local requirements—the "TV everywhere" approach of OTT is particularly significant, where viewers are increasingly active and mobile and live events take place in different time zones.

Sports Broadcasting's Future Challenges (Cont.)

Nonetheless, sports broadcasters/rightsholders, who internalize that the crucial function of programming is moving into the hands of viewers, will be the first to successfully adapt to this new reality and should reap the rewards.

The Rise Of Ultra HD

With sport content being in high demand and traditional linear delivery of live events still important, and with audiences demanding high quality imagery, it is now becoming the de facto standard that all content be delivered in HD. This ability to obtain high definition broadcasts was welcomed by sports broadcasters as a way to enhance the viewing experience. Yet, alongside the burgeoning demand for 3D, there are now calls for Ultra HD. These pose additional challenges as carriers will need to be upgraded and, while the DVB association discusses new standards, there is a cost/benefit equation that broadcasters need to factor in. For many broadcasters, budgets remain tight and they are looking to cut costs and increase efficiency—Ultra HD would be a significant infrastructure investment. Ultimately, while it is envisioned that 3D and perhaps Ultra HD will be widely adopted, this is still new technology that has not reached full market penetration and, consequently, there is no immediate requirement for change.

There is the additional consideration that these options are a huge drain on satellite bandwidth, which is already strained, and could cause problems with the quality of transmission if everyone was to view sports in 3D or Ultra HD.

Addressing Broadcasting Challenges

With audiences requiring high quality transmissions for live sports broadcasts so they don't miss a single second of the action, sports broadcasters are having to constantly rethink and evaluate how their content is viewed and distributed. Looking beyond 2012, sports broadcasters will need to adapt to find ways of incorporating new technologies into their offerings and work out how consumption models such as OTT can be adapted so they don't cannibalise traditional television distribution across the globe.

While each region has its own individual quirks and modes of operation, the common theme to unite broadcasters is the need to provide the highest possible quality broadcast in the most cost effective manner over as many platforms as possible.

About the company

SatLink Communications provides global satellite transmission services with an emphasis on Global Content Distribution for Television, Radio and Data Channels over Satellite, Fiber and IP to every corner of the world. As a leading provider of transmission solutions for Video, Audio and Data, SatLink provides an array of advanced solutions to broadcasters, Pay TV operators, Governments, satellite operators, ISP providers, large communication enterprises and Maritime as well as to other teleports.

SatLink's broadcast solutions include satellite uplink, downlink and turnaround; occasional use services for Sports, News and special events, satellite capacity on Satlink's own Digital Platforms or on any desired satellite; television production; High Definition (HD), Standard Definition (SD) and 3D transmission services; play-out facilities; IPTV; Web streaming; and Media Analysis Technologies.

SatLink's Data, Governmental and Engineering solutions include IP Transit; Hub hosting; and Hub based services with iDirect VNO solutions. In addition, the company provides solutions to the Maritime industry and satellite engineering consultancy services.

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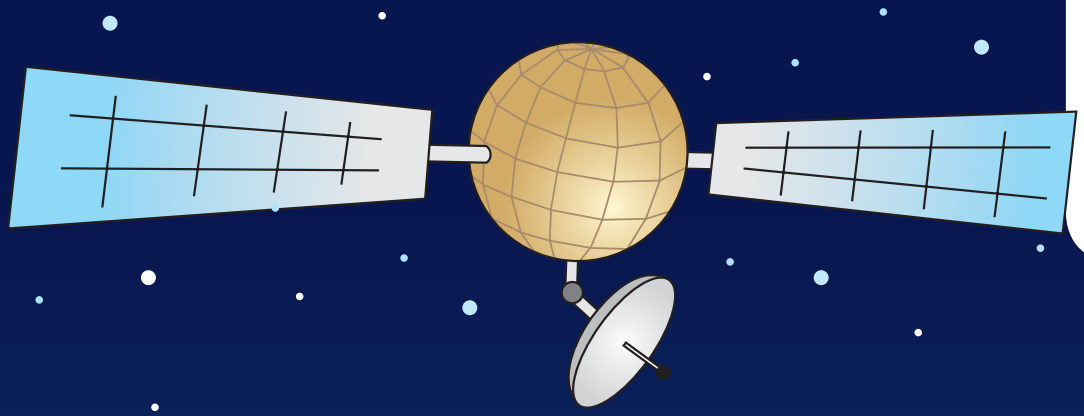

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Ensuring Satellite Reliability—Vibration Testing

By Noel Brown, Program Manager, Brüel & Kjær

The ever-shortening design and development timeframes and budgets of modern space programs demand correct-first-time engineering. High quality, goal-focused, time and cost-efficient vibration testing is critical to meeting programme milestones. RAL Space's contribution to the new James Webb Space Telescope required a new vibration test system—they selected to stay with the LDS range of shakers.

Rutherford Appleton Laboratory – RAL Space

RAL Space provides world-leading space research and technology development for customers around the world. They offer space test and ground-based facilities, design and build instruments, analyse and process data, and operate ground-station facilities, as well as leading conceptual studies for future missions.

Working with space and ground-based groups around the world, they are now the largest space science department in Europe and have been involved in more than 150 missions in recent years. These have included the groundbreaking ***SOHO*** and ***STEREO*** solar missions, the Earth Remote-Sensing missions ***ERS-1***, ***ERS-2*** and ***ENVISAT***, and solar system missions such as the ***Rosetta*** lander, the ***Cassini/Huygens*** mission to Saturn and its moon Titan. They also continue to work on ***MIRI*** (*Mid-Infrared Instrument*) for the ***James Webb Space Telescope*** (**JWST**).

James Webb Space Telescope mockup on display in Europe. Photo courtesy of EADS Astrium.

RAL Space is part of the U.K.'s **Science and Technology Facilities Council** and there are approximately 200 staff who are dedicated to supporting the programs of the Council and those of the other research councils, as well as undertaking a large number of contracts for agencies, industry and other commercial customers.

The Company is based at the **Rutherford Appleton Laboratory** (**RAL**), located at Harwell, Oxford, and at the **Chilbolton Observatory** in Hampshire, U.K. Much of its work is done in collaboration with U.K. university research groups and a range of institutes around the world. Most of these collaborations have been set up to support the **European Space Agency** and **NASA** missions, although RAL is also working on projects with other countries and organizations that include Australia, Japan, Morocco, Pakistan, Russia and the European Union.

History

RAL was formed in 1979 from a combination of two existing laboratories that had been named after the physicists *Ernest Rutherford* and *Edward Appleton*, respectively. The Rutherford Laboratory grew out of the **National Institute for Research in Nuclear Science** (**NIRNS**). The NIRNS was formed in 1957 to operate the **Rutherford High Energy Laboratory** established next to the **Atomic Energy Research Establishment** on the former RAF Harwell airfield between Chilton and Harwell.

The Appleton Laboratory side of RAL Space's history goes back 50 years, with an anniversary celebrated in 2012. **Ditton Park** in Slough was the starting location as **The Radio Research Station**, later becoming The Radio and Space Research Station and The Appleton Laboratory.

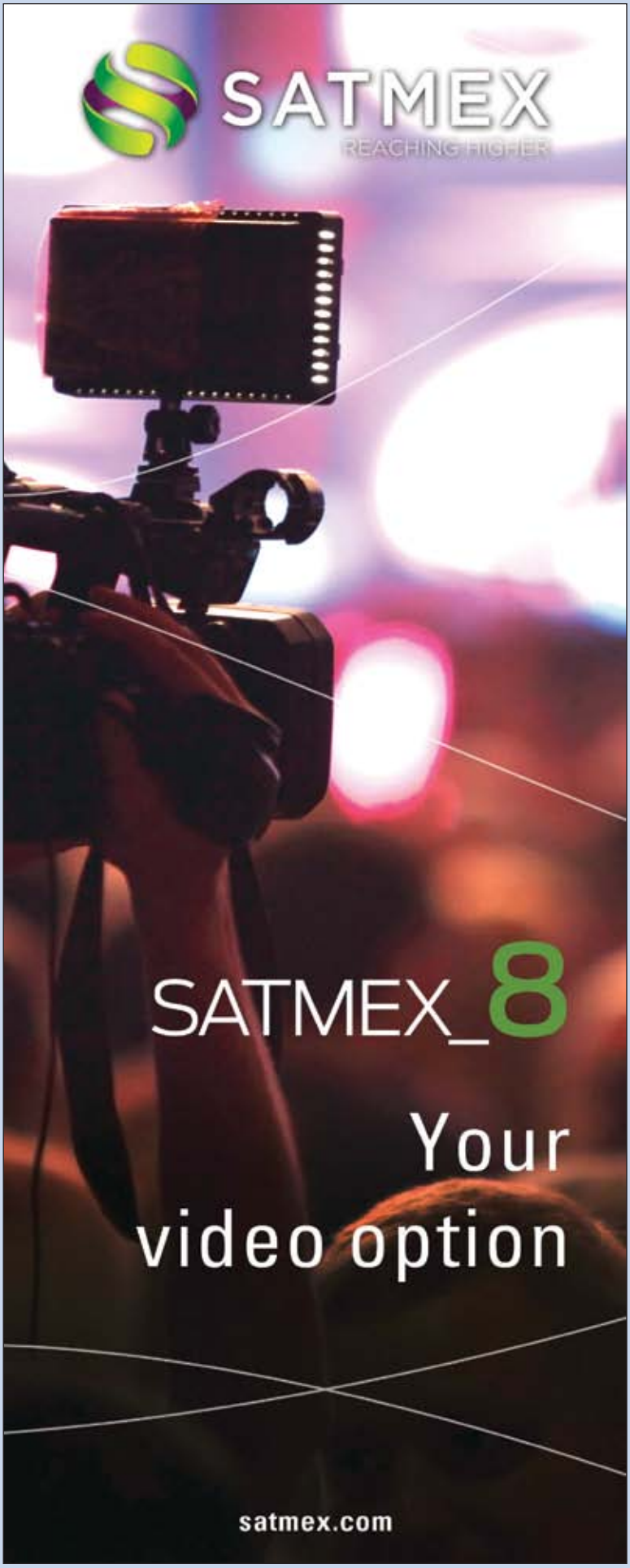
The James Webb Space Telescope (JWST) Project

JWS) is due to be launched in 2018 as the scientific successor to the venerable ***Hubble Space Telescope***. The JWST's ten-year mission is to find and study the first luminous objects, the assembly of galaxies, the birth of stars, the birth of planetary systems, and the origins of life.

JWST is a NASA project with international collaboration from the European Space Agency and the **Canadian Space Agency** and includes contributions from 15 nations. RAL Space's main involvement has been the design qualification and acceptance testing of MIRI, a mid infra-red camera and imaging spectrometer developed in Europe, which will be one of the four main instruments carried by the JWST.

Unlike the Hubble Space Telescope, the JWST will not be in low-Earth orbit, but will be parked at the "semi-stable second Lagrange point", or **L2**. This Earth–Sun L2 point is 1,500,000 kilometres (930,000 miles) from the Earth, or nearly four times farther than the Earth is from the Moon. At such a great distance, the Webb telescope will be considerably more difficult to service after launch than the Hubble telescope. From JWST's point of view, the Sun will always be behind the Earth, reducing the harsh effects of solar radiation.

JWST might appear serene, but that fragile mass of technology must endure being stowed as the six ton payload of a launch vehicle. The satellite and its components (such as MIRI) must endure the noise and subsequent vibration of the



Ensuring Satellite Reliability (Cont.)

~145dB interaction between the rocket engines and launch-pad environment, the jarring transonic climb phase, pyroshock as stages separate, turbulent boundary layer excitation, and more.

Testing Regimes

The launch forces can induce fatigue in resilient metal structures—not to mention the sensitive electrical and optical components of instruments like MIRI. Consequently, the space industry has the most demanding requirements for vibration testing anywhere in the world. Given the fact that a damaged satellite cannot easily be repaired once it has been deployed, thorough testing is of fundamental importance before the violent ride into orbit.

Protecting the multi-million euro investment in the JWST project, vibration testing establishes the make-or-break robustness of components, subsystems and ultimately the fully assembled craft. Depending on the stage of a project, different testing regimes are adopted.

To begin with, two identical versions of the test object are made, a structural model and a flight model. The first will never fly, but will instead be tested rigorously, and then the second—the flight model—will be tested just enough to qualify the assumption that it is equally resilient.

"The tests also allow verification of the satellite's mathematical model by measuring motion at 'resonant frequencies' at which elements of the satellite's structure are prone to self-vibrate once vibration is initiated.

Acceptance Tests

These are performed on the flight model in order to verify workmanship and ensure that the equipment does indeed operate satisfactorily in its final configuration and will not degrade when subjected to the vibrations encountered during launch. Naturally, this is a critical test period.

According to *Paul Eccleston*, "When you are actually testing flight hardware—the stuff that is going to go up there—then it is a little nerve-wracking. Of course you have got high confidence that everything is going to be okay, but there is always that slight nervousness, in case it is not."

Clearly, reliability of the test equipment is of paramount concern here, as causing a failure through accidental overloading of the test object is an unthinkable eventuality. This is balanced however with the high demand placed on the testing facilities, where time is of the essence. Fast setup and rigorous schedule adherence are highly important considerations.

MIRI Vibration Testing. Photo: RAL Space / STFC / Stephen Kill.

MIRI Alignment Testing. Photo: RAL Space / STFC / Stephen Kill.

Design Qualification Tests

These are usually carried out on the structural model during the development phase in order to demonstrate that the design enables the equipment to withstand the vibration level it will see during launch, plus a qualification margin. In some cases they even test objects to complete destruction.

In the words of Senior Engineer *Paul Eccleston*, "You never actually learn anything about an object unless you break it. All you would know is that you are still within its safety margins. To find out where they are you have got to deliberately break things, so occasionally that is what we will do on development models.

Vibration Testing Systems @ RAL Space

In 2010, RAL Space decided to replace their existing ***LDS V954 Vibration System*** with a more powerful and flexible one to meet its increased testing needs. Their older V954 had served them well, but with increasing payload masses and more severe tests required, RAL Space needed to improve their capabilities.

The new solution provides the increased capacity necessary for test programs going forward and is based on the ***LDS V8*** electro-dynamic shaker, with the ability to operate in horizontal or vertical orientation. An integral slip table measuring 1200 x 1200mm is coupled to the shaker as necessary, allowing large objects to be mounted securely. The slip table has nine high-pressure hydrostatic bearings arranged

MIRI Vibration Testing. Photo: RAL Space / STFC / Stephen Kill.

MIRI Vibration Testing. Photo: RAL Space / STFC / Stephen Kill.

on a 3 x 3 matrix. This configuration provides for maximum overturning restraint for devices under test with a high centre of gravity. They also have an additional, interchangeable 750 x 750mm slip plate for high acceleration testing.

The amplifier—a ***56kVA*** class 'D' switching amplifier—is forced-air cooled and incorporates an integral DC field power supply which is required for the shaker field coils. The shaker is also forced-air cooled and relies on a fixed blower device to pass air through the shaker for efficient cooling during operation.

The shaker cooling fan includes an all-weather acoustic enclosure that allows it to be located adjacent to the vibration laboratory, in order to separate the shaker cooling air from the ambient air in the laboratory. This is an important measure to maintain the integrity of the cleanroom environment and conditioned air. This is achieved with a sealed upper-air plenum and associated hoses to enable cooling air to be drawn from, and exhausted to, the atmosphere outside the laboratory. The PC used for vibration test control is loaded with a software-based remote control kit that can...

- Switch the amplifier on and off remotely
- Set the amplifier gain remotely
- Remotely monitor interlocks
- Monitor armature and field coil voltage and current

When specifying the guided load support platform, RAL Space had the MIRI in mind as well as an eye to testing larger, heavier structures in the future. This can be removed from the shaker and set aside when not required, and provides additional load support, and cross-axial and rotational restraint.

Brüel & Kjær supplied a set of bespoke fixture blocks to enable the MIRI to be attached to the vibration system without the need for complex and heavy attachment fixtures. This allows testing of the MIRI on its feet, using three mounts to keep it securely upright.

Of Critical Importance

Deciding to replace their LDS shaker with another, more modern one was certainly a vote of confidence for the brand, from a customer whose reliability concerns are among the most discerning in the world. With an extremely tight margin for error in their final product, and potentially disastrous consequences from the slightest testing problem, it is easy to see why such is critically important. Balancing time constraints and quality is always a dilemma, meaning right-the-first-time engineering is absolutely critical for RAL Space.

Executive Spotlight: David Ball, NewSat Limited

David Ball has 25 years of experience in the telecommunications, media and technology sectors with a significant portion of his career specialising in satellite communications. David has held senior positions encompassing sales team management, product development, engineering and space systems development. Prior to joining NewSat, David was the Regional Vice President Asia-Pacific for Intelsat and also held that position for PanAmSat prior to the merger between PanAmSat and Intelsat in 2006. More recently, David was the Managing Director for Intelsat Broadband Pty Ltd, a subsidiary of Intelsat Corporation.

David holds a Bachelor of Engineering degree (Communications Engineering) from the Royal Melbourne Institute of Technology and a Graduate Diploma in Business Management from Deakin University. Prior to joining PanAmSat in 1995, David served as a commissioned officer in the Royal Australian Air Force specialising in communications systems management.

David joined NewSat in April 2011 and has been instrumental in the strategy and development of the Jabiru Satellite Program's first satellite Jabiru-1, which will deliver high-powered Ka-band coverage across the Middle East, Africa and Asia.

SatMagazine (SM)
Given your 25 years of experience in the satellite communications industry, you have witnessed a great many changes in the world of communications. What do you believe to have been the biggest change in the satellite industry over the last decade?

David Ball
The emergence of digital video compression is probably one of the most significant changes I have witnessed over the last decade. It has enabled the move from transmitting one analogue channel per transponder to transmitting multiple digital channels on a single transponder. Due to increasingly efficient encoding algorithms, this technology has greatly evolved over the years, allowing for better quality digital signals in smaller amounts of capacity. The digital receivers have also come down in price markedly and this has facilitated wide adoption in consumer markets as well as in professional broadcast quality environments.

On the telecommunications side of the business, there have been notable advances in ground VSAT technology with more efficient error correction and ACM coding technologies. Satellite services can now be delivered to remote and rural users in a more cost effective manner, as the cost of remote terminals has decreased significantly.

SM
How did you decide that NewSat was where you wished to develop your career?

David Ball
I had been waiting for a home-grown satellite company to come along and create a step-change in the commercial satellite industry in Australia, and I saw this great potential in NewSat. I wanted to apply my experience to a new exciting project, and the Jabiru Satellite Program was a real attraction for me. I was extremely drawn in by Adrian Ballintine's vision and enthusiasm to launch an entire fleet of next generation commercial satellites which would lead Australia's space quest, and I was offered the amazing opportunity to build NewSat as an organisation and really have an impact on the future of the company.

SM
Looking over your time at NewSat, what would be some projects that have brought you the most satisfaction?

Executive Spotlight: David Ball (Cont.)

David Ball
So far my journey at NewSat has been exhilarating and extremely rewarding. The Jabiru Satellite Program has been incredibly satisfying to work on, as I was given the opportunity to oversee the whole process from end-to-end. Being involved in the capital raising process was also something new to me, and I have gained a lot of know-how along the way about satellite funding and what it takes to launch an entire fleet of satellites. Designing the Jabiru-1 satellite was a great experience, and I really enjoyed working with our key vendors, Lockheed Martin and Arianespace, to bring the Jabiru-1 design to life. We still have a lot to do in terms of filling out the team headcount and to procure all the required ground systems; nonetheless, we are getting closer and closer to fulfilling our vision of becoming a satellite operator.

SM
How do you think the satellite communications industry in Australia has evolved over the last few years?

David Ball
Satellite technology is a growing market in Australia, as it is so well suited to our geography. Australia is a vast country with people in remote locations who all have a need for reliable communications. The customer base for SATCOM services spans the oil, mining and gas sectors, the maritime sector and farming industries, as well as the **Australian Defence Force**—all have a need for reliable communications in locations beyond the reach of terrestrial networks.

Satellites are playing an increasingly important role in bridging the digital divide in Australia due to their ability to service those areas which cannot be reached by fibre.

This illustrates the natural advantage of satellites—the ability to cover the entire service area from day one without the need to wait for the rollout of terrestrial infrastructure or to worry about the impact of terrain or geography on service deployment.

Similarly, in disaster recovery situations satellites have proven to be vital in providing much needed disaster response communications when all other communication lines are severed.

In terms of natural geography and a place to originate services into the Indian Ocean region, Australia has many advantages. We have political stability, a good climate for operating teleports and we are an ally of the U.S., which creates the potential for generating significant business from overseas.

SM
2012 was an exciting year for NewSat, can you tell us a bit about what has been happening?

David Ball
In 2012 NewSat continued achieving milestones towards the Jabiru Satellite Program and focused on expanding its teleport business. Some of our major achievements were signing a contract with Kyprosat to secure eight orbital slots and securing approximately two thirds of the funding, US$390 million, for the Jabiru-1 project, via export credit agency debt funding from the US Ex-Im Bank and COFACE. To date,

NewSat's Jabiru-1 coverage map. Courtesy of NewSat Limited.

NewSat has signed US$618 million in binding pre-launch contracts for Jabiru satellite capacity, including customer contracts with MEASAT and TrustComm.

The Jabiru Satellite Program is now well under way, with the launch of Jabiru-1, Australia's first commercial Ka-band satellite, set to launch in 2015. NewSat also grew its teleport business by signing new contracts with government and enterprise-grade customers across the Americas, the Middle East, Asia and Australia and achieved record results, with a 29 percent increase in its yearly revenue growth.

SM

Jabiru-1, Australia's first commercial Ka-band satellite is currently under construction. How is this project progressing?

David Ball

The Jabiru-1 satellite project is progressing very well. We have selected industry leaders Lockheed Martin and Arianespace, the most reliable launch providers in the world, to build and launch the Jabiru-1 satellite. The project build began in December 2011 and in June last year we achieved a significant construction milestone with the completion of the Preliminary Design Review.

A satellite as large as Jabiru-1 can take some time to build, but once completed, will provide enormous benefits and flexibility throughout its on-orbit life. Jabiru-1 is set to launch from the Guiana Space Centre in French Guiana in 2015 and will provide superior coverage over South Asia, the Middle East and North Africa. Jabiru-1 will provide "new" capacity to these high demand regions through a range of separate payloads and, regional, multi-spot and steerable beams.

SM

What differentiates Jabiru-1 from all the other Ka-band satellites out there?

David Ball

The Jabiru-1 satellite has been designed to provide customers with the maximum amount of flexibility in configuring their networks. The design provides broad coverage beams which can be used for a diverse range of applications through the life of the satellite. These applications include cellular backhaul, enterprise networking, large data file transfer, mobility applications and video applications. Through the Jabiru Satellite Program, NewSat is focused on the provision of raw satellite capacity which can be used for a wide variety of applications. The Jabiru-1 satellite has been designed to address the requirements of enterprise, government and telecommunication users. It is important to note that NewSat is leveraging Ka-band in much the same way as the satellite industry has leveraged C-band and Ku-band with great success for decades.

Executive Spotlight: David Ball (Cont.)

By way of contrast, most existing and planned Ka-band systems are designed to provide managed service solutions, often tailored specifically around the provision of residential broadband service. These systems involve the deployment of antennas and equipment to hundreds of thousands of users and the provision of through-life subscriber management and help desk services to that retail user base.

NewSat is not at all focused on providing retail service to consumers—our focus is on enterprise users and telecommunication service providers. Our open architecture approach to the business enables customers to tailor solutions to meet their unique service requirements (e.g. dedicated non-contended links, asymmetric services, etc.) rather than having to constrain their requirements to fit into a pre-defined managed service solution.

SM

NewSat's Australia-based Teleports in Adelaide and Perth were awarded Top 3 at the 2012 World Teleport Association's Excellence Awards. Could you please tell us more about NewSat's Teleport business?

David Ball

We are extremely proud of the results we achieved in our teleport business last year. This is testimony to the dedicated team that we have at the teleports and the team that works with our customers to get their services on-air. NewSat's teleport business continued its record growth trajectory throughout 2012, growing its yearly revenue by 29 percent and signing 306 major contracts across the resources, maritime, construction and government sectors.

At the start of the year, the teleport business signed its largest individual contract, US$8.59 million, for the Wheatstone Project, which is one of the world's largest liquid natural gas (LNG) projects located off the North West coast of Western Australia. In addition to being rated in the Top 3 teleports in the world at the 2012 World Teleport Association's Awards for Excellence, NewSat's teleports are also accredited to supply services to the Australian Department of Defence (DRSS) and are recognized as a highly secure Global Access Point, supporting certified classified networks to ensure the transmission of vital and sensitive information for government clients.

SM

What is in store for NewSat for the rest of 2013?

David Ball

This year, NewSat will continue working towards realising its long-term vision of becoming a satellite operator and there is a tremendous amount that needs to be completed in order to make this transition.

As part of the Jabiru-1 program, we have placed resident engineers at the Lockheed Martin factory in the USA. The resident engineering team is responsible with interfacing closely with Lockheed Martin on a daily basis and constantly reviewing the details of the satellite build to ensure that all specifications are being met.

In addition, there is a significant amount of ground infrastructure that needs to put in place to be ready for the commencement of Jabiru-1 operations. We are finalising the design for the expansion of our teleport facility in Adelaide. The expanded facility will house the Jabiru Satellite Control Facility and Jabiru Customer Support Centre as well as provide extra technical facilities for customer equipment. The Jabiru engineering team will also be focused on procurement of the ground Earth stations and the TT&C facilities as well as the development of the satellite flight control system. In addition to all of that, we will continue to work closely with Arianespace to complete all the mission analysis and planning for the Jabiru-1 launch.

At the same time, our sales pipeline is looking very promising this year and our sales team will continue to grow, with overseas offices in the Americas, the Middle East, Asia and Africa. We are also looking forward to the launch of NewSat's Jabiru-2, which is a hosted payload on MEASAT's M-3b satellite, currently under construction at Astrium and scheduled to lift-off aboard an Ariane 5 launch vehicle at the end of the year. Jabiru-2 will deliver highly targeted coverage in and around Australia, Timor Leste and Papua New Guinea, and will be in strong demand.

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SatBroadcasting™—The Four-Point Advantage

By Richard Harvey, Product Manager, Fujitsu Network Media Solutions, Fujitsu Frontech North America

Increased flexibility, optimized remote monitoring and configuration, cost-effectiveness, and reduced concatenation make real-time IP encoding over satellite the ideal method for news and sports applications.

As IP video delivery becomes increasingly more common within the industry and H.264 encoders are more efficient, many broadcasters and content providers around the world are discovering that a hybrid IP-over-satellite approach to real-time newsgathering is the ideal method for preserving video fidelity while maximizing operational efficiencies. Delivering IP-based video over satellite has numerous advantages for news and sports applications, including increased flexibility, improved remote configuration and monitoring capabilities, reduced concatenation, and cost-effectiveness.

This article explores the benefits of using a hybrid IP/satellite approach to newsgathering, and utilizing advanced IP video encoding solutions. Included is a real-world case study of an IP-over-satellite application in a war zone.

Flexibility

Traditionally satellite links from trucks, fly-away systems, and remote locations are unidirectional; therefore, operators are unable to connect to computer networks without employing a separate network that can be expensive, possibly unreliable, or sometimes unavailable. IP links, on the other hand, are bidirectional. Supporting IP within a satellite setting gives operators the flexibility to move video content while allowing them to communicate with offsite personnel effectively, such as between onsite talent and an offsite producer.

Using IP, operators can access email, voice, and Internet services via satellite in order to send and receive important messages about the project at hand using cost-effective low-bandwidth links. When high-value video/audio content needs to be moved, the system switches to a higher

Photo courtesy of PRESSTV, Ltd., U.K.

bandwidth configuration. This capability not only improves communication, but also optimizes remote configuration and operation in a balanced and cost-effective method.

Remote Configuration + Monitoring

Entering an IP address on a web browser or using a management system, operators at the studio can configure the settings of the remote equipment, such as encoders, and fix any issues that may affect viewers' quality of service. These issues may include, but aren't limited to, loss of video signal, impaired audio, adjustments to transmission power due to rain fade, bandwidth limitations, scheduling changes, etc. This makes it incredibly easy for engineers in the studio to access equipment at a remote location and troubleshoot to determine the root of the problem.

Many times, issues can be fixed remotely without the need for additional engineering personnel to be deployed. For example, if packets are being lost due to overloading of the circuit, a user could easily access the unit from any location around the world and reduce the transport streams aggregate data rate to fit the link bandwidth. This enables unmanned, middle-of-nowhere types of operations, such as news coverage in distant locations, to be managed more efficiently.

Reduced Concatenation

Reducing concatenation is critical for video operators. As few as four or five concatenated links can result in visual blurring of the color image to the point where picture fidelity and integrity of content can be severely compromised. For a news organization reporting from the field, content can pass through 10 or more concatenation cycles before it is delivered to network affiliates. This is a major issue that needs to be addressed by broadcasters and content providers relying on a traditional DVB satellite for video delivery.

By digitizing video content, either into a file-based format or real-time IP stream, video operators can ensure the highest end-to-end fidelity. Once content is in a digital format it can be stored, transported, decoded, etc., and the archive version avoids additional concatenation cycles. Therefore, supporting a hybrid IP/satellite approach to newsgathering helps broadcasters maintain the highest level of consumer video quality.

Cost-Effectiveness

In addition to the efficiencies a hybrid IP/satellite approach to newsgathering provides, such is also cost-effective, especially during major sporting events and other remote operations requiring longer than typical onsite operations. During these events, there are only bursts of activity when an operator needs to capture video. Using standard DVB satellite methods, an operator could pay for satellite time not used. The need to arrange other network connections for data and voice circuits also increase costs over the already high satellite costs.

Using IP-over-satellite systems and service packages from companies such as OnCall Communications, ND SatCom, and ViaSat, the remote team could have access to a narrow bandwidth IP network via satellite for email, data, and voice circuits at a reasonable monthly fixed cost. When a larger bandwidth connection is needed for high-value content, the system shifts to a per-minute cost. For example, rather than pay-per-minute for the entire duration of the event, operators only pay for the time when they're actually streaming video. By providing broadcasters with increased efficiencies on bandwidth, a hybrid IP/satellite approach dramatically reduces operating expenses and adds features that would not normally be available in isolated areas.

Another advantage of using a hybrid IP/satellite approach is that IP-connected DSNG trucks can be managed remotely, enabling a video operator to keep a trained operator in the truck and higher-skilled engineers in the control room to manage multiple trucks. Additional cost-savings are realized by the operator in this situation because

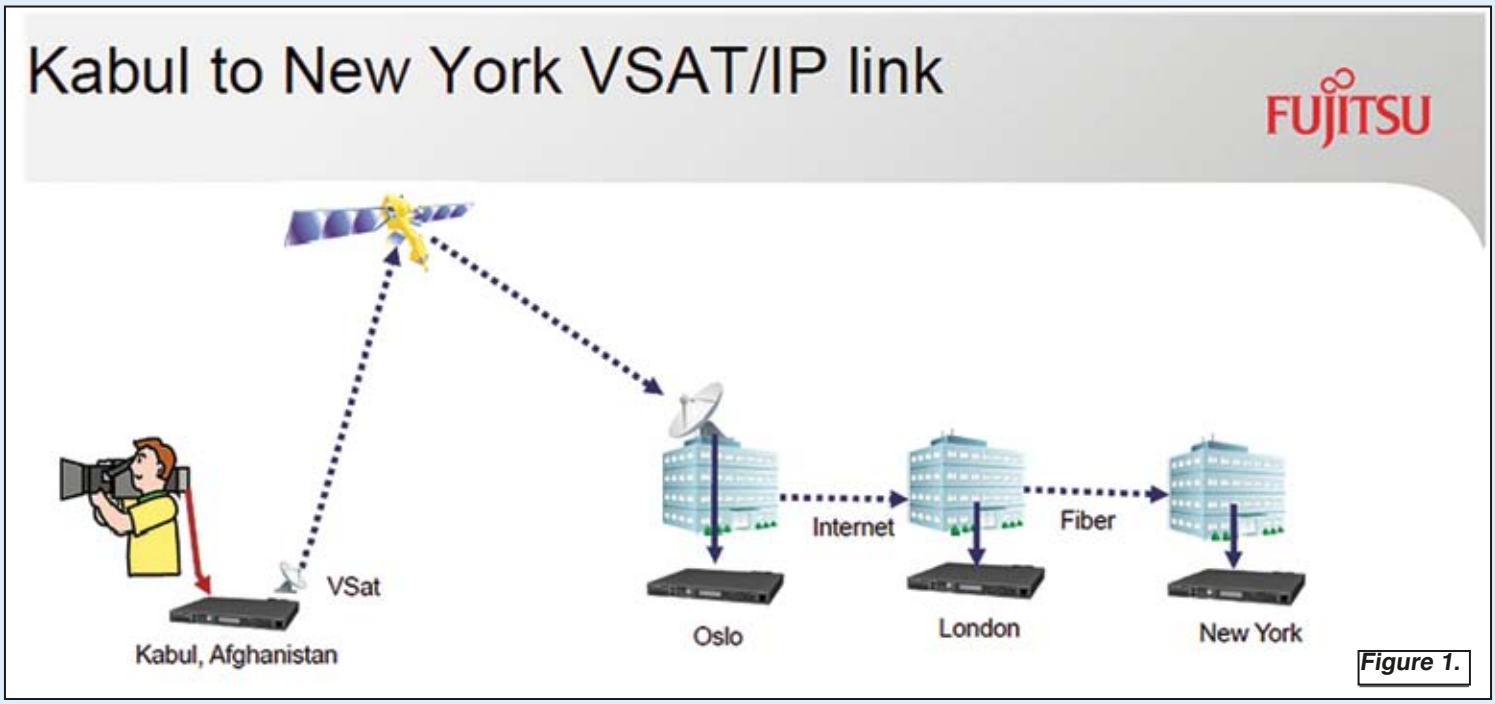

Figure 1.

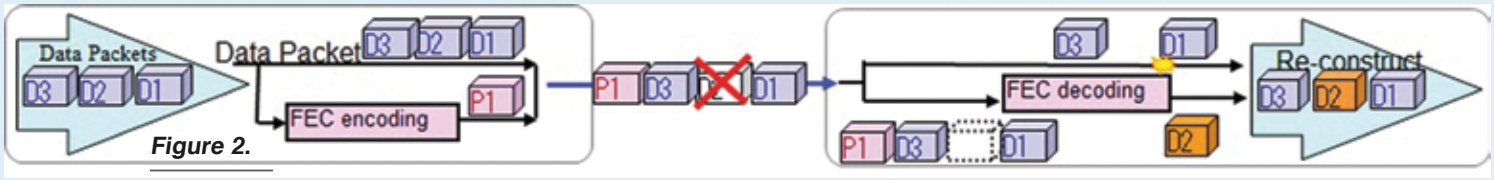

Figure 2.

a fully trained engineer is not required in each truck/facility.

Real-World Case Study

A great example of a successful hybrid IP/satellite approach to newsgathering involves a leading U.S. broadcaster who needed to transmit news content from Kabul, Afghanistan, to New York. There was no easily available local solution for video, voice, data, and phone services. A standard satellite link was not cost-effective and was not safe, given the fact the territory was a war zone. To resolve these challenges, the broadcaster switched to an IP-over-satellite architecture using a VSAT that could be placed in a secure location and quickly moved if needed. (See Figure 1 on the previous page.)

Using Fujitsu's IP-900 HD encoder and decoder, the broadcaster streamed live video and audio via IP over the satellite link to Oslo, Norway, at which point the signal travelled via the public Internet to London, and from London over fiber to New York where the decoder was located. This solution was more cost-effective as the broadcaster could access phone and data services on the same link, enabling them to work as if they were in the New York office. This also enabled Fujitsu's support team to access the unit remotely in order to monitor and reconfigure the encoder as needed and limiting the number of people needed onsite in a dangerous region.

Key to the success of this link was Fujitsu's robust error correction feature, which combines FEC and ARQ QoS techniques. Using a standard forward error correction (FEC) method, parity packets are created by the XOR calculation of payload packets. This type of FEC can recover randomly lost packets, but burst errors on the public Internet are more difficult to handle.

One of the most popular types of FEC is ProMPEG CoP3. ProMPEG CoP3 is an excellent FEC method; however, it cannot effectively recover packet losses when the packet loss ratio is very high. For example, in a scenario where there is 4 percent packet loss: ProMPEG CoP3 (10,10) => Packet Parity Ratio is 20 percent. The remaining PLR is 2E-4 (0.0002). If the bitrate is 8Mb/s, packet losses may occur every 7-8 seconds. Therefore, FEC adds to a video operator's bandwidth requirements and ether requires more bandwidth at additional cost, or reduction in bandwidth used for video and audio data which reduces the end to end video fidelity. (See Figure 2 above for FEC diagram.)

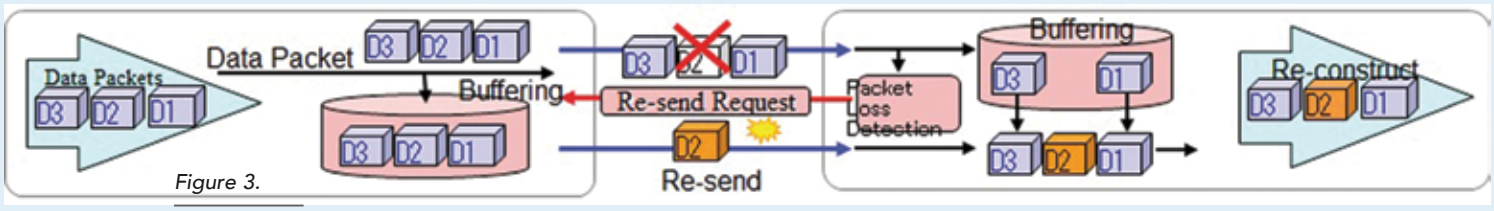

Figure 3.

In a conventional ARQ scheme, a decoder detects a lost packet and then sends NAK to the encoder. Upon receiving NAK, the encoder retransmits the lost packet to the decoder. ARQ provides better performance than FEC and can recover bursts of packet loss; however, ARQ will increase the end-to-end latency of the link and, if used carelessly, it can cause further network congestion, impacting upon other co-existing sessions such as TCP. (See Figure 3 for ARQ diagram.)

Fujitsu's QoS solution is a hybrid FEC and ARQ approach that seamlessly and carefully blends FEC and ARQ methods. The end result is that the overhead bandwidth shared by FEC and ARQ remains constant and end-to-end latency is kept as low as possible. (See Figure 4.)

In normal operation, the decoder uses FEC to recover randomly lost packets. When there is a burst of packet lost and/or random lost is so high it overwhelms the FEC's ability to recover, the decoder sends a NAK requesting lost packets

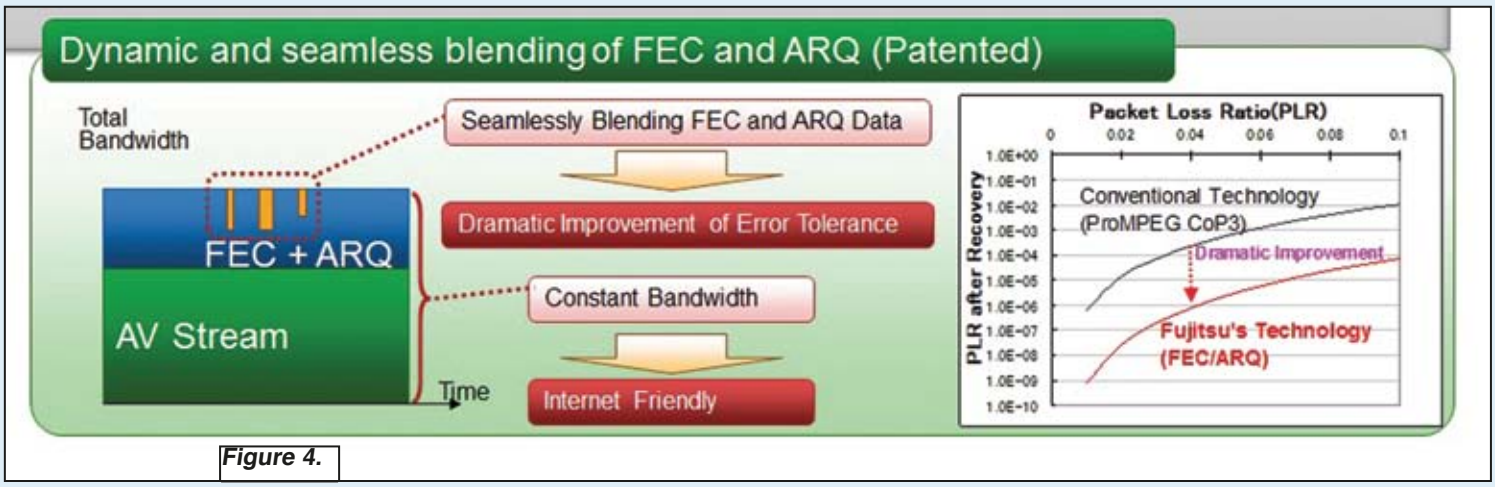

Figure 4.

be resent. When the encoder receives NAK, it resends the lost packet and simultaneously reduces the ratio of FEC packets relative to the increase of ARQ packets. This enables broadcasters and content providers to achieve a dramatic improvement in packet loss recovery, bandwidth utilization, and end-to-end latency compared with other QoS methods.

The Future of IP Satellite Newsgathering

IP networking and video delivery over IP are becoming more and more common nowadays thanks to the multiple benefits they offer, including increased flexibility. A hybrid approach that combines both IP and satellite gives broadcasters and content providers even more flexibility by enabling them to configure and manage video delivery systems effectively from remote locations or even support point-to-multipoint applications.

In addition to increasing flexibility and video quality, as well as reducing bandwidth requirements and costs, IP technology greatly decreases the complexity of the system required. For example, instead of needing a high-end routing system with massive amounts of bandwidth, broadcasters can use a more cost-effective system with reasonably priced bandwidth. Supporting point-to-multipoint communications, and eliminating the need to use IP terrestrial networks the entire time, operators are able to further reduce CAPEX and OPEX.

Given the recent introduction of Ka-band systems and release of the HEVC standard coupled with the continued demand for more satellite broadband, the hybrid IP and satellite newsgathering approach is expected to gain even more traction within the industry. Currently, ViaSat has an IP satellite in orbit, ViaSat-1, and is offering flyway systems and trucks supporting the Ka-band, and the military is also taking advantage of this spectrum.

As this equipment matures, HEVC becomes readily available and more IP satellites go into orbit, we will see an increase in IP video over satellite with smaller, portable, multifunctional system allowing us to do more with fewer resources, deployed personal, and bandwidth requirements.

About the author

Richard Harvey has more than 18 years of experience in the broadcast, satellite, and video distribution industry, including; the management of a Navy Broadcast Service (NBS) S.I.T.E. system onboard the USS Suribachi (AE-21); as sales manager of the Asia-Pacific Rim for a leading digital TV equipment manufacturer; and as the video product manager for another industry leader. Harvey has been involved with some of the industry's digital milestones, including the Navy Broadcast Service's digital satellite broadcast tests in 1991, ABC's ATSC turn on, the first HD broadcast in Sydney, Australia and other notable accomplishments. Additionally, Harvey is a member of the Society of Motion Picture Television Engineers (SMPTE).

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Satellite Backhaul In Emerging Countries

By Louis Dubin, Vice President Product Management, Comtech EF Data

The rural cellular market in emerging countries has changed significantly in the past couple of years. Newer usages and technologies have helped reshape the landscape. Social networking, smart and feature phones, sophisticated voice and data plans have all fueled the uptake of mobile communications and further reinforced the need for high data traffic.

These changes have implications on satellite backhaul. High throughput requirements with excellent quality of service (low jitter, low latency) have become crucial. Quality of service has to be guaranteed. Any limitation can immediately lead to dropped calls, degraded user experience, revenue loss and customer churn. All of this must fit within the mobile operator's stringent OPEX and CAPEX objectives.

In order to address the challenges, the available solutions have followed two general trends:

- TDMA VSAT with the concept of shared bandwidth
- SCPC with dedicated bandwidth, efficiency and performance

The TDMA VSAT operates under the assumption that not all remote sites of a mobile network will require high traffic capability at the same time. This allows overbooking of the capacity, but containment of CAPEX and OPEX.

However, this is often an inaccurate and generally costly misconception. CAPEX and OPEX end up increasing quickly as the bandwidth and capital equipment has to be provisioned for a larger shared carrier. Ultimately, even though individual sites need much less bandwidth than the total shared capacity they are burdened with the larger aggregate TDMA carrier.

Secondly, when traffic picks up and most remotes reach higher levels of traffic at the same time (which is often the case in mobile networks), the classic issues with an oversubscription model become apparent. Suddenly there is not sufficient bandwidth to support the user base. Calls are dropped and data is lost, all during the most profitable peak hours. Add to this the latency and jitter induced by TDMA, due to the need to frequently re-allocate the bandwidth with the shared technology and the lesser ability to convey real-time voice and data traffic, the impacts on quality of service are significant enough that they require measures to be taken to review the satellite backhaul technology strategy.

SCPC technology has a different concept. Here, the system dimensioning is made such that quality of service is always guaranteed particularly at peak traffic. Low jitter and latency, and low packet losses ensure that the mobile operator can provide a performing and efficient service. The latter is a determining factor today in deploying a successful satellite backhaul solution.

While not all SCPC solutions are alike, the latest ones have focused on key efficiency areas: modulation, FEC, frame encapsulation and protocol optimization. Advanced modulation capacity combined with better FEC helps increase spectral performance and maximize throughput or power. Optimized frame encapsulation eliminates overhead, which can hamper throughput, jitter and latency. Header compression addresses IP protocol overhead; payload compression also reduces the bandwidth required for user traffic.

In the end, there can be as much as 100 percent overall capacity improvements over TDMA which bring direct benefits to quality of service, OPEX (less cost for the satellite bandwidth) and CAPEX (lower requirements on BUC and antenna).

The choice of the technology is at a turning point in emerging markets today. From the remote village, which only needs voice capacity, to the affluent tourist resort where customers use their smartphones to upload their vacation videos, the requirement gaps are wide.

Subscribers expect to be able to initiate a voice call and to seamlessly watch streaming content at any moment. Quality of service has therefore, become a key component. Hence the technology choice relies upon a single option: SCPC. It is the only one that guarantees QoS, and best optimizes CAPEX as well as OPEX. More info at http://www.comtechefdata.com/

About the author

Louis Dubin is Vice President of Product Management at Comtech EF Data. In this role, he is responsible for business development and product management of the high-speed modems, TDMA modems, and broadcast products. Dubin joined Comtech EF Data in 2008, through the acquisition of Radyne Corporation. During his tenure at Radyne Corporation, he held the positions of President of Radyne's Phoenix, Arizona division and Vice President of Sales. Dubin has over 18 years of experience in the telecommunications and transmission industry. He holds a degree in Electrical Engineering from the Florida Institute of Technology, and completed the Stanford Executive program in Technology Management.

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Executive Spotlight: Amiee Chan, President + CEO, Norsat

Dr. Amiee Chan has more than 15 years of experience in executive management and research and development in the telecommunications industry. Offering a rare blend of technical and corporate strength, Dr. Chan's strategic vision has driven Norsat's innovative product development program and has resulted in consistent revenue growth since her appointment as the CEO in 2006. In 2012

Dr. Chan won a *Women's Executive Network Top 100 Award*, ranked third in PROFIT/ Chatelaine's list of Top Female Entrepreneurs, and led Norsat to win a *BC Export Award for Advancing Technology & Innovation*. Dr. Chan holds an Executive MBA from Simon Fraser University, where she majored in Strategy and New Ventures, and a PhD. in Satellite Communications from the University of British Columbia.

An accomplished engineer, she has been published more than a dozen times, holds three U.S. patents, and has contributed her expertise with high level research teams such as the NASA ACTS Terminal Program. Dr. Chan is a member of the UBC Engineering Advisory Council and serves on the Dean's External Advisory Board for the Beedie School of Business at SFU.

SatMagazine (SM)
You've been leading Norsat since 2006—where would you like to take the company in the near future?

Aimee Chan
Norsat has a long history of strength in research and development and our aim is to continue investing in these activities to bring the latest cutting edge technology and the next generation product offerings to our global customer base. We're also pursuing an aggressive growth strategy based on a combination of organic growth, mergers and acquisitions.

Our new **Norsat Power Solutions** segment, which was launched last February 2012, is an example of this strategy in action. The Power Solutions segment provides turnkey project-specific power conversion and energy storage solutions in the communications, transportation and resource sectors. We are also working to diversify our customer base to pursue opportunities with other militaries, and in other markets including commercial, resource, transportation, public safety, utilities and broadband.

Additionally, we are actively pursuing merger and acquisition opportunities. The current recessionary trends, coupled with Norsat's strong financial position and capital structure, have created excellent conditions for realizing growth through business combinations.

SM
How did you decide on a career in satellite communications?

Aimee Chan
I always had a pretty good instinct that I wanted to work in engineering because I like figuring out how things work, however, I didn't become hooked on communications technology until an internship in university that helped me realize the value of this work.

As part of this internship, I performed a lot of testing, which can be tedious. On one particular day I was given a box of 400 identical orange boxes and asked to take each lid off and replace one of the circuits. When my supervisor noticed I was getting bored, he began describing the purpose of the device, which was a rescue beacon. He told me about how the beacon had recently been used off the coast of Alaska, where a family owned fishing vessel had run into some trouble. A sudden storm capsized the boat and it sank, but because of the rescue beacon, the search and rescue team were able to locate the boat and save the lives of this family in a matter of hours.

This forever stamped into my mind the value of what we do here and I'm just as passionate about developing communications technology today as I was back then, so I know I've made the right choice.

SM
Norsat has historically relied heavily on sales into the U.S. Military. Do you have plans to diversify in the future?

Aimee Chan
We're actually now operating in 15 militaries worldwide including work with the **Finnish Defence Forces**, **Portuguese Defense**, and **Defence Forces Ireland**. We continue to focus satellite system development on improved transportability, ruggedness and ease-of-use, and we have developed expertise in the kind of systems that meet the stringent specifications of global militaries. Our recent contract with **NATO** resulted in a *dual-band, auto-acquire, rapid deployable terminal* (***DART+***), which is currently in use for operational communications in Afghanistan and on showcase to many of the 28 NATO Member nations, with further opportunities for purchase by them under the program.

With the development of HD broadcast technology for our fly-away terminals, we're also increasing a presence in the broadcast market, and a new line of M2M solutions will specifically target the Oil & Gas sector. Through our **Sinclair** division, we're already heavily involved in the resource, transportation and utility markets, and we plan to continue to offer complementary products to our combined customer base.

SM
What kind of trends are you seeing in terms of customer needs, and what do you anticipate in the future?

Aimee Chan
Customers are increasingly looking for communications technology that is lighter, faster, more portable and easier to use. Communications technology is used for a wide range of applications so flexibility and customization are key product drivers, and an ability to provide customer specific solutions is a distinct advantage.

Executive Spotlight: Amiee Chan (Cont.)

As customers around the world have increasing access to smartphones and other communications technologies they expect to remain connected at all times, regardless of where they are. Communications technology will need to continue to expand into the more remote regions of the world to meet this growing need.

SM
Are you developing products to meet these changing needs?

Aimee Chan
Yes, through our customer focused product development program we're always looking to more closely align our product offerings to our customer needs. As an example of this, we recently re-engineered our ***GLOBETrekker***™ fly-away terminal to be even more rugged, easier-to-use, and more compact for easy transportation. We also develop value-added benefits for our satellite terminals, like digital leveling for use on uneven terrain, and a one touch interface that makes satellite acquisition as simple as pushing a single button.

This year, we also launched our first smartphone application, the ***Satellite Locator***, in response to a common customer request for assistance with locating satellites and assessing obstructions. The free app has already been downloaded nearly 20,000 times, and we're pleased to see this simple solution has had such a big impact on customer success.

We recently introduced a line of *Airborne Block Downconverters* (**BDCs**) to better enable customers to maintain constant connectivity, and we're also developing complementary LNBs and BUCs for this purpose.

SM
Have you made any changes to your service offerings?

Aimee Chan
We frequently note that customers seek our assistance in the provision of complete end-to-end solutions, so we've made some changes to better leverage our expertise in integrating hardware, software and services. For the maritime market, we launched a ***Global-VSAT***™ hardware and service bundle, which provides VSAT terminals, installation, satellite air time, global coverage and customer service to better meet the needs of the maritime market.

Through our contract with the **First Nations Emergency Services Society** of BC (FNESS) we're continuing to provide broadband Internet access through a custom designed, managed network for remotely located First Nations communities. We've been able to grant Internet access to more than 2,300 residents of 17 communities through this program, and continue to grow this scalable network, add features like video conferencing software, and increase the speed of the network.

For the first time in 2013, we began offering a data as a service platform, through Sentinel RMC. This is another example of a hardware and service bundle, this time designed for the Oil & Gas market. Sentinel is a revolutionary offering, both for Norsat and for the market, and we've already seen how the provision of this kind of package is really what the market is looking for.

SM
With the launch of Sentinel RMC, you're now offering M2M solutions in the Oil & Gas market. How will you compete in this new market place?

Aimee Chan
Sentinel RMC offers remote site monitoring and control for down hole well monitoring, but the solution is flexible to work for any application requiring real-time data monitoring and control. Our product and service package is a complete end-to-end solution including the remote hardware, communication service, data storage facility and a customized web-based interface. Although many of our competitors offer a piece of this puzzle, we're providing a complete end-to-end solution, a package our customers find very attractive.

We're also one of the few players in the market to offer a truly global service, since we've engineered Sentinel to take advantage of a variety of communication services, including satellite, mobile, WiMAX or others. The customization aspect of Sentinel is also really attractive because it works, for not only our customers, but as a solution for our customers' customers; which means we're offering something that can be used for a variety of applications.

SM
What are some of the challenges facing the SatCom market, and how do you anticipate Norsat will navigate these challenges?

Aimee Chan
Customers are demanding more complex solutions such as Dual and Tri Band terminals to reduce their operating expenses, and the challenge is in meeting these needs while remaining competitive in the marketplace. The new GLOBETrekker 2.0 is a great example of our success in addressing this challenge—we were able to introduce the customer requested feature inputs, while making the terminal more flexible, so that can actually reduce the price.

SM

Ka-band technology is increasingly important to this industry. How do you anticipate this will affect product development at Norsat?

Aimee Chan

While C- and Ku- satellites are becoming more congested, Ka-capacity has increased globally, so we're staying ahead of this trend by developing a deeper, broader product line for Ka- use. Nearly all of our satellite terminals now operate in Ka-band and we've just introduced a range of microwave components including LNBs, BDCs, LNAs and BUCs for Ka-band to meet the needs of emerging service providers and system integrators. Norsat continues to offer these products on an off-the-shelf and custom designed basis, and we find ourselves becoming the go-to company for Ka-band needs.

SM

Are there geographic regions in which you would like to increase Norsat's presence?

Aimee Chan

We already have a very global presence, with products sold into 87 countries around the world, but we can see an increase in demand for our products specifically in Latin America and Russia. These emerging markets demand increasing attention, so we remain focused on providing products to meet their needs, and are actively growing our distribution network to better serve these customers locally.

SM

How important has customer support been in Norsat's growth and development?

Aimee Chan

Strong customer support has been absolutely essential to our success and we frequently hear that our commitment to excellent service is a key differentiator for our customers. Our ability to offer customized solutions ensures we can meet specific needs that our competitors often can't, so we continue to listen to our customers' needs to provide the solutions they ask for.

Through our ***Elite*** support program, we offer 24x7x365 service to our global customer base and we've time and time again seen the benefits of this commitment to going the extra mile. I could list dozens of examples, but a recent success story involves our work with a Public Affairs detachment with the U.S. Military.

The customer was using one of our fly-away terminals and needed to conduct an HD broadcast from Tonga back to Atlanta, but unfortunately there was no existing capacity for this link in Tonga. They reached out to our customer service team, who were able to find a creative solution by running the link through Australia and shipping equipment to the

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Executive Spotlight: Amiee Chan (Cont.)

Australian teleport. The team worked nearly through the night to meet their deadlines, and the result was a successful link and a happy customer. Our expertise and commitment to support ensures our customers trust us, and have peace of mind for their critical communications needs.

SM
In 2011 Norsat acquired Sinclair Technologies. How has the integration of the company gone?

Aimee Chan
Integration has gone extremely well and Sinclair continues to operate with strong revenues. With the successful application of LEAN manufacturing in our Vancouver office, we're now also bringing Sinclair onboard and look forward to seeing their operational efficiencies improve as well.

SM
Looking ahead at Norsat, which projects are you especially excited to see succeed?

Aimee Chan
We're launching a line of heavy duty fly-away terminals to better serve our commercial customers this year. This line will round our satellite terminal family and complement the military grade products we offer, so we're looking forward to better serving our commercial customers this year.

Sentinel RMC marks our entry into the world of M2M solutions, and with a first customer and order under our belts, we're already seeing the value we can bring through this equipment and data as a service package. With any new venture, there's always an element of risk, so it's gratifying to see Sentinel already succeeding in its short life. We're looking forward to seeing Sentinel expand in use throughout the Oil & Gas sector, and as well as through use in other applications in new markets.

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SatBroadcasting™—Changing SNG Forever...

By Lance Hiley, Chief Marketing Officer, Vislink International Ltd.

In recent years there has been a significant move to the production of lightweight, compact SNG systems that can be operated by a smaller news crew—usually a cameraman and a reporter—on the fly without the need for an additional engineer to organize the uplink. The need for "see it now" news and event coverage is predominantly driven by the expectations of today's modern, multi-device audience.

This, of course, means that broadcasters are under more pressure than ever to arrive at a scene and transmit footage as quickly and as efficiently as possible—and this must occur from increasingly remote, or difficult, locations because, after all, that's often where the action is.

This, in turn, challenges assumptions of being able to find an available satellite uplink, let alone booking and paying for the time. Satellite capacity in more traditional frequencies is being squeezed to meet this demand, resulting in reduced margins of availability.

However, with the satellite communications market growing rapidly and an ever-increasing demand for bandwidth, Ka-band is now being recognized as the next generation of satellite technology. Ka-band is providing new capacity, faster speeds and has driven the development and manufacture of smaller VSAT's to enable more cost-effective network deployments. Ka-band is well suited to support the next generation of communication applications. Ka-band's footprint is already expanding rapidly in Europe, North America, the Middle East and Russia and initiatives are under way in Australia and Latin America.

The costs of Ka-band services are also far more reasonable. They can be as much as 30 percent less expensive than BGAN transmission in many markets. With multiple satellite launches already completed and more planned for the future, competition among service providers is making booking and using satellite time much easier, as well as a far more economic proposition.

Vislink recognized Ka-band's potential some time ago. A case in point is the 2012 launch of Vislink's Advent Mantis MSAT Portable Data Terminal which, with a Ka-band configuration, looks set to transform SNG forever. Never before has Vislink had the combination of speed, flexibility and lightweight construction bundled into a single product. In less than a year, our MSAT system has become the fastest-selling satellite antenna in Vislink's company's history.

The reason for this is that MSAT is a lightweight, portable tri-band satellite data communications system specifically designed for rapid deployment in all environments. At 12.5KGs, it is easily carried by a single person and is ideal for secure and non-secure satellite broadcast, including military and special operations forces as well as civilian and emergency services applications. It supports VoIP and meets stringent military operating and environmental requirements (MIL 810F & IP65) for shock, vibration, humidity and rain.

There is a perception that Ka-band is more susceptible to interference from rain. It is true that water absorbs radiation much more in higher wavelengths, and Ka-band, at 31GHz, is higher in frequency than other popular bands; for comparison, Ku- is 14GHz and C is closer to 6GHz.

However, Ka-band system designers have compensated for this by designing-in an additional power margin that can be

Vislink's Advent Mantis MSAT

used by modems such as the iDirect e850mp to automatically increase output power when weather-induced fade is detected. The net result is high availability with outages only experienced in the most extreme weather and amounting to just a few minutes per month.

The benefits of Ka-band and the portable data terminals designed to take advantage of the technology are considerable. Commercial sector companies such as Inmarsat, **Eutelsat** and **Avanti** aren't simply launching numerous satellite initiatives to drive the use of Ka-band "because they can". Major broadcast networks have expressed a high level of interest in using Ka-band as it offers much needed access to more capacity at a significantly reduced cost.

Of course, as the popularity of Ka-band continues to grow and more and more operators and service providers take advantage of it, there may be a question as to whether its availability will diminish in a fashion similar to Ku-band. However, with high specification modems and ever-improving coding techniques—and with satellite operators continuing to launch new satellites to provide even greater capacity—any squeeze on Ka-band capacity is unlikely in the foreseeable future.

One of the major benefits in using Ka-band is the cost of use. With Vislink's MSAT system, a single setup of camera, tripod, sound gear and data transmission unit can be acquired for less than $100,000. That means that in less than a year, the system will have paid for itself when compared to BGAN-capable only units. In addition, the higher frequency Ka-band enables smaller systems to transmit higher data rates. For example, all other things being equal, a 65cm Ka-band system is similar in transmit capability to a 1.2m Ku- system, but with an obviously much smaller form factor.

That's one of the advantages of Vislink's MSAT system. Its small size, and ability to take advantage of any available band by simply swapping out a module, means that one person can, within five minutes of unpacking, start broadcasting from anywhere in the world.

The ability to respond to a location, capture the images, link to a satellite with the flexibility to take advantage of whatever band is available, and move that information back to base to feed the hungry public maw with news and information as quickly as possible is a now requirement, not an option. The advent of Ka-band and Vislink's MSAT capabilities are major catalysts in providing broadcasters with the immediacy their audiences demand.

About the author

Lance Hiley is Chief Marketing Officer for Vislink, responsible for marketing functions across Vislink International's corporate initiatives including its Advent, Gigawave, Link and MRC brands. Hiley's career includes more than 20 years in strategic marketing for a range of high profile media distribution, mobile device and semiconductor firms.

SatBroadcasting™—Protecting Broadcast Content Delivery

By Greg Caicedo, Vice President + General Manager, SAT Services, SAT Corporation

What if more than the lights went out during the Super Bowl? Imagine sitting at home and losing the audio of the broadcast and missing the ref's call... or, what about watching video that is so jumbled that the longest kick return in history is totally missed? You would have some unhappy customers and, no doubt, you would hear about it. Unfortunately, these things happen all the time. In today's highly competitive broadcast video marketplace, delivery of error free content is key to retaining your customer base.

Delivering high quality video content to an end-user customer is a highly complex process that involves multiple players and many different delivery methods. Stated another way, if there's a problem somewhere in the pipeline, will you find it in your networks and service layers and be able to fix it before customers experience difficulties? Just as importantly, how much time and money will be spent trying to root out the problems? In this article we'll look at the delivery of broadcast video from the perspective of the broadcaster and the cable operator, and how to preempt network disruptions and service related problems.

RF Interference + Broadcasting Revenue Threats

While there are numerous factors that can contribute to the degradation of the video carrier within the RF spectrum, let's address one of the most bothersome and most challenging to resolve—satellite interference. As more satellites are squeezed into the geosynchronous orbit within just a few degrees of one another, that crowding increases the possibility for the contamination or leaking of extraneous signals.

Interference also results from incorrect power levels at the uplink, a poorly tuned antenna, or an inexperienced operator. Additionally, the proliferation of VSAT terminals without RF operator expertise or terminals that are simply left unmanned (at the local gas station or convenience store using VSAT, terminals for point of sale operations), add to the problem. This unintentional interference accounts for roughly 90 percent of RF interference.

Then there's the growing phenomenon of deliberate or intentional interference, which is most prevalent in areas of geo-political unrest. This rogue jamming of signals is what occurred in the Middle East and North Africa during the *2010 World Cup*, with **Al-Jazeera**'s broadcasts being deliberately knocked off the air.

While broadcasters will ultimately find out about degraded services from their customers, that's probably the least preferred method of notification. Let's consider what broadcasters 'see' and don't see, and how to improve the visibility for identifying and locating problems before service goes dark, advertising revenue is lost, and customers complain.

Are You Doing Enough To Protect Your Content?

Broadcasters typically monitor their video feeds by receiving the signal via a small receive-only antenna, often collocated with the satellite uplink facility. While this provides a quick instant look at the actual (broadcast) picture as transmitted, it provides little diagnostic information about the satellite signal itself. A more proactive means of monitoring broadcast signal quality involves inserting a carrier monitoring system that demodulates the signal to support digital monitoring of the spectrum, both on the RF output at the broadcast uplink terminal and on the receive-only antenna. This technique allows the signal to be characterized, or 'read,' for potentially degrading signal anomalies often before such errors cause video distortion.

Another effective measure is to monitor the receive signal from another location using an identical signal monitoring device. This allows all three signal sources to be compared—engineers can quickly diagnose the sources of signal distortion. By analyzing the resulting signal measurement values from the different locations, it can be determined whether the problem is on the uplink or downlink side of the satellite transmission. A caveat to note is that manual RF spectrum analyzers are limited to identifying just those anomalies related to power levels and bandwidth occupancy. Unless the spectrum analyzer is digital and can demodulate the signal, then identifying issues below the noise floor of the signal is limited—and this is often where the troubles begin.

Reading The Signal

Even with the right equipment in place, monitoring the satellite RF for QoS requires an operator who understands the relationship between key performance indicators that comprise signal quality metrics. These indicators include C/N, Eb/No, Es/No, and various types of in-band noise. As an example, there may be a slight increase in the C/N that would normally not raise a red flag. However, when looking deeper, a skilled RF technician would immediately see the Es/No to be degraded, flagging the situation as potential interference. The signal can then be further characterized to determine whether interference is present using digital carrier under carrier techniques, and to initiate steps to remediate the issues well before it affects customers.

If Video QoS is the ultimate goal of any broadcaster, then employing digital RF monitoring can be one of the most valuable investments when it comes to delivering nothing short of perfect customer experience. Fortunately, in today's market, broadcasters have access to the signal measurement and characterization systems to identify troublesome issues before perceptible service degradation arises. There are also

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powerful service options available that can help broadcasters with the technical tasks such as accurate signal reading.

Full Control

Once the pristine video has left the broadcaster, it's up to the cable operator to (cleanly) move that content through their distribution networks. This presents a different set of challenges. The difficulty here is that today's cable operators manage a complex, multi-layer grid of systems and components designed to support the delivery of content over multiple platforms. Managing these transport and service layers as the standalone, stove-piped systems that they are creates more friction and disconnects, masking the causes and slowing the response to service degradation and outages.

In these complex ecosystems, advanced video content monitoring, network control, and redundant switching based on multiple NMS, EMS, and network probe data, are not only difficult to implement, they are often focused primarily on the network, not the services. These integrated network management systems also have to accommodate a wide-range of protocols, such as SNMP, XML, REST, SOAP, TL1, CORBA, TCP/IP, Serial 422/485, and TTL/Relay, to name a few. No matter how sophisticated the network elements and their management systems are, they can fall short of providing umbrella visibility, let alone "one touch" recovery and restoration of service if they're only focused on the network, and not the services, too. Operators need insight into the actual video service performance across the network. If you can't see or understand how the video services are traversing the distribution network, then you won't have full control over the quality of the product being delivered to the end consumer.

How Will You Recover?

The basic understanding of where each instance of a service resides on the network at both the ingress and egress ports of each network component is a great starting point. Take, for example, the monitoring of MPEG transport streams across all of the different transport domains; IP, ASI, RF, QAM. Each domain has its own tools to monitor the MPEG streams and report out issues through alarms. An operator may identify an alarm condition reporting from one tool that may be incongruent with conditions reported by another tool. Troubleshooting often occurs reactively through responses to network element alarms, and not the underlying content, service flow, and quality/performance indicators.

Only through the correlation of millions of messages, events and alarms across platforms and service layers will operators gain the insight into the actual video performance across the network, along with the knowledge of the service instances impacted and the quality of the MPEG stream. Intelligent monitoring platforms can now account for these varying conditions, making those complex associations and recommendations far more quickly and accurately than manually reconciling the events and logs from each separate system.

With our 'on-demand, always-on' world making the cable market ever more competitive, truly customer-focused, proactive organizations will want to understand system health and performance and how content services bear directly on key metrics such as call volumes, customer wait times, and expensive and unneeded truck rolls. Poor content quality or lack of availability impacts the business in a direct and measurable way, just look at numbers for increased customer churn, service related credits and increased operating expenses.

As these complex delivery networks continue to grow, protecting highly valuable content requires the tools and knowledge provided by experts. With the proper systems, processes and people in place, broadcasters and cable operators can have the peace of mind that they will continue to provide outstanding service to the customer.

About the author

Greg Caicedo is Vice President and General Manager of SAT Services SAT Corporation, the leading provider of products and managed services for RF interference mitigation for over 25 years. Readers may contact Greg at *gcaicedo@sat.com*.

Advanced Network Monitoring + Integrated Network Operations

For more than 25 years SAT Corporation, a Kratos Company, has delivered RF Spectrum Monitoring and Network Management solutions. SAT's products and services are used world-wide by prominent Satellite and Cable Operators and Service Providers to achieve their QoS goals.

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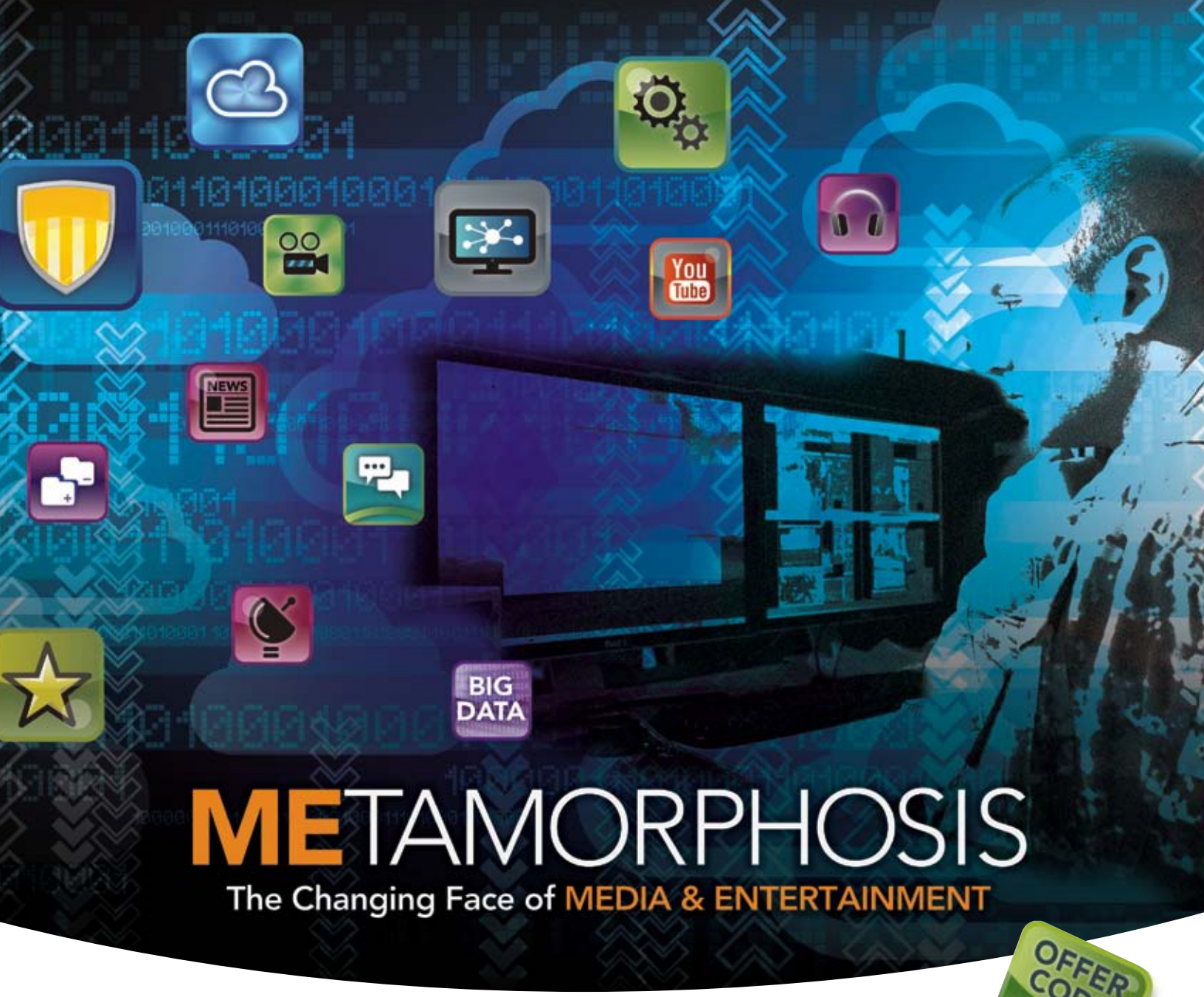
SAT's Interference Detection and Geolocation Service provides a fast and accurate all-in-one solution for locating and identifying ground-to-satellite transmission sources of interference due to equipment failure, operator error, intentional jamming, and unauthorized users. Based on the only global network of dual antenna sites, SAT's satID® product, and dedicated RF engineers, SAT delivers complete RF interference mitigation services to reduce the costly effects of interference. For more information, please contact ***sales@sat.com*** or visit ***www.sat.com***



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Sadtler On Careers: Good Doggie?

By Bert Sadtler, Contributing Editor

As a long time dog owner, I have found there is nothing more loyal than your dog who welcomes you with unconditional love when you arrive home from work. On the other hand, there is nothing more terrifying and upsetting than someone else's dog in your neighborhood that is loose, aggressive and capable of injuring you or your family.

We as owners have a responsibility to provide direction to our pets and a responsibility to keep our dogs from harming others. As a wise man said, "There are no bad dogs, only bad dog-owners." Put another way, once you have seen the bad dog, take a hard look at the dog's owner.

What does a doggie tale have to do with the business world and recruiting?

Today's business world faces constant challenges. Success is frequently the result of a cohesive team of employees who have overcome obstacles to win new business, retained a critical customer or solved an almost impossible issue. Many times, the sum of the team is greater than the parts, thanks to the team's leader. Motivating the team and keeping them focused on the mission becomes a true challenge of leadership. Failure to retain good employees and retain critical customers is frequently a sign that leadership has missed its mark.

Great business leaders give their employees a "long leash" and provide the employee with a feeling of empowerment. When such is done well, these employees work harder when their leader is out of the office while less motivated employees are spending some time being "silly" while their weak leaders are not watching them.

It is the weaker leaders that we might liken to a bad dog who may show aggression or intimidation to his or her employees. The result is a team of employees who perform under their potential and spend unproductive time talking about their leader's weakness and inconsistency.

The distraction alone of discussing the bad leader drives a loss of productivity. While this type of leader is an issue, is this leader really *the* issue? Who is responsible for this leader? Who is the leader's manager, and why aren't they providing appropriate direction to their direct report? Once you have seen the bad leader, shouldn't you direct your focus to the manager of the bad leader? Is this a situation of, "There are no bad dogs, only bad dog-owners"? How long can a business afford to perform under it's potential, thanks to a bad dog-owner?

Top performing employees become frustrated and move on. Customer and clients take their business elsewhere. There is no recruiting in the world that can acquire enough replacement employees to overcome the destruction from the bad dog-owner, weak leader. Good money and resources are being thrown away.

Make the commitment and remain committed to being a "Good Dog Owner". Strong leadership requires being accountable and holding all employees accountable. Leaders need to be strong enough to have good leaders reporting to them. Bring in and build up strong leaders, so you'll be leading the pack.

About the company

How does a company recruit and hire the right talent? It is more than just networking within the community of friends and business associates. It requires focusing on results through a process oriented approach. We are committed to reaching a successful outcome. Our recruitment method has repeatedly proven to deliver very qualified senior talent. We exclusively represent employers in the marketplace as a dedicated resource and discrete trusted advisor. Through original research and industry contacts, we will target qualified candidates and motivate them to consider the opportunity. We screen candidates against key criteria, analyze technical fit along with cultural fit, interview, contact references and present our recommendations. Upon making the offer, we are the employer's advocate and an active participant in communicating with the candidate until offer acceptance has been secured. Results are guaranteed.

Business TV—Watch Your Way To Knowledge

By Mike Tippets, Vice President, Hughes Solutions Group

Change is constant in successful businesses—they continuously invest in new systems, sales programs and other efforts to maintain a competitive edge. However, it's folly to expect success by pushing out new systems and programs to the employees on the front lines with nothing more than an email notification.

Leaders need to talk to the people on the front lines and share the 'how' and the 'why' any change will help to further drive the business. Training reps and CSR professionals in how to use the new systems and work the new programs is not enough—they need to buy into the changes and become committed to such, in order to maximize success. They need to see and hear your message.

Hughes Digital Signage @ Cabela's

Video is a powerful tool for communicating the message and managing change. Your audience will retain more information and get more from the messages when they watch you deliver it. Whether it's new hires, regional managers, or even corporate headquarters staff, they hear your words and they can see the passion and commitment of your presentation, which deepens their belief and motivates them to action.

The message also registers more deeply in their minds. Old school employee handbooks or online documentation is okay as reference material, but your employees' first introduction to new ways of doing things should be visual. Studies show that information retention improves about 38 percent when delivered through video—they watch their way to knowledge. Additionally, smarter employees yield better business results.

The speed and efficacy of video is particularly critical in today's busy 24-hour business world. Classroom training, or live mentoring, may be the ideal way to educate. However, a national retailer scaling up dozens or even hundreds of new hires for the holiday season, for example, can't afford such luxuries. Delivering classroom-style training or one-on-one mentoring to hundreds of locations presents enormous logistical challenges and delays. Plus, it's incredibly expensive. The company needs to get these people out working on the floor as soon as possible.

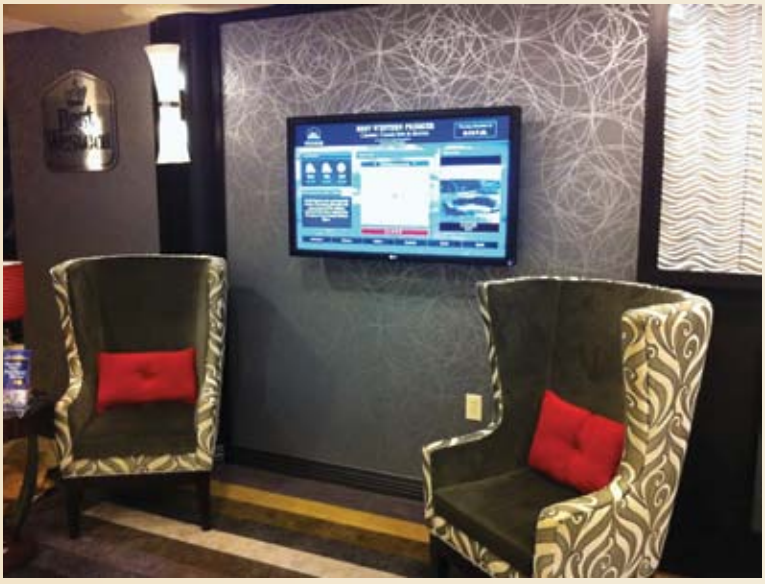
Another concern is consistency. If you have multiple people delivering the same message, it's likely each will skew the information to their own style and interpretation of what they believe is important.

Delivery + Distribution

The solution is a virtual classroom where an instructor presents from the corporate office and broadcasts to remote locations. Employees will have access to the same content in Boston as they do in Baton Rouge. Live, interactive sessions, if required, can be achieved with two-way voice communications between the instructor and trainees.

You can't, realistically, reach all employees with a live broadcast. You need to select a video delivery model that makes the most sense for your organization.

One large retail customer of **Hughes** prefers to gather all store employees together in its employee break room where they can watch live and recorded videos and interact as a group. But, what if you are in a small footprint location, such as a mall or convenience store that doesn't have the room for such larger group participation? In this environment, making recorded content available to employees on demand, whenever and wherever it is convenient—is the better model. Whether it's a computer, tablet, point-of-sale system, or smart phone, employees can train visually and virtually through browser-based video and become immediately more productive without ever leaving the retail floor.



Hughes Digital Concierge @ Best Western Franchise, Helm Hotels Group

Retailers are investing in smart mobile devices for services such as call routing and mobile checkout. Providing browser-based training over secure in-store WiFi would allow them to maximize that investment with the ability to log in and watch the content on their smartphones wherever they are situated. There's no need to try to catch up with training during downtime.

The same video content solution can be used to share product information videos with customers on these devices, enhancing customer service delivery as well. An example of such a media hub at the retail location is the ***Hughes HS3400***, offering on-demand video training materials as well as access to the content using web-enabled devices on the retail floor. The HS3400 allows businesses to improve employee knowledge and provides a job aid that improves service delivery, increases customer satisfaction and builds customer loyalty.

Hughes HS3400. Photo courtesy of Hughes.

Delivery

Video distribution is another critical issue for large, distributed enterprises. The choice comes down to a cloud- or premise-based platform. The choice is largely based on cost, bandwidth and security concerns.

A premise-based media appliance, such as the aforementioned Hughes HS3400, enables businesses to distribute video-based training to remote sites efficiently, securely and reliably over the corporate network. Employees select content on the appliance using a remote control. Available training materials are then available for employees to watch on demand.

Such devices offer the benefits of centralized content creation and management, with videos produced at corporate headquarters and multicast to all locations simultaneously over a satellite or terrestrial network. Training material can be easily managed and updated. Most premise-based platforms also provide tools to manage users and generate reports, so that corporate can track employee engagement and progress with the training content.

Cloud-based video training solutions, such as the ***Hughes Learning Portal***, offer a web-based training management system that is cost-effective and easy-to-use. It allows you to create, deliver and manage online training programs fast, with limited IT involvement and minimal hardware investment.

Cloud-based training is typically offered as a hosted, *software-as-a-service* (**SaaS**) model where your company is given a private-label, secure website on which to organize, manage and distribute online training over the Internet. An online portal makes it easy to upload and manage video content. And the site provides 24/7 access to training content to users anywhere, anytime and on any web-enabled device.

However, web-based training at stores and branch offices can be a concern for some bandwidth constrained enterprises that rely heavily on the corporate WAN for their transactional and operational data. They simply can't afford a situation in which a few employees are consuming the broadband connection doing video training to the detriment of processing credit card transactions, as an example.

At the other end of the spectrum, many large distributed enterprises cannot justify the cost and IT management required to install and manage specialized hardware at thousands of locations. If the greater concern is price per site, then situate the training in the cloud. If bandwidth is a concern, putting it on premise may be the better solution.

Or, the optimal solution may be a combination of both, where some sites have premise-based devices and others use the cloud—the training management system is seamless between them. In this scenario, employees can take their training with them when they are on the road, tapping into the cloud, and it all feels like a single system. They can minimize the WAN impact when they are in the store or office, and gain access to the same content when they're not.

The Satellite Advantage

Satellite offers many advantages when working with video and other rich-media solutions. Reliable multicast delivery of content is one; the ability to broadcast live video events

is another. Rapid deployment and high availability are also important advantages.

Business TV: Beyond Video Training

A premise-based solution offers one other advantage for businesses (especially retailers) that want to maximize their ROI in video: An integrated corporate communications platform, or what some are calling Business TV.

This platform addresses three corporate communications objectives: Employee information, employee training, and customer-facing information. When you consider that the goal of communications is to influence the behavior of a target audience, there's no reason to use a different system to achieve all three objectives. For employees, you may want them to learn a new system or program. Or, you may want to update them on corporate related news. If it's customers, you'll want to enhance their experience and increase sales all the while building loyalty to your brand.

Business TV combines employee training, corporate broadcasting and digital signage in a single solution. Digital signage is often misunderstood to be the replacing of store promotional posters with LCD screens around the retail floor. That assumption severely limits the opportunity for a business to take advantage of the dynamic power of video.

Digital signage can improve customer service, which increases customer satisfaction and loyalty. As an example, beyond PoS (point of sale) promotions, such signage can provide a digital concierge service with localized, helpful information as well as providing a customer-facing "digital associate" service who is presenting product information using simple to understand photos, graphics and videos.

Security

Once you've accepted that video is the most effective way to communicate with your people and customers, security is another decision point. You need to distribute proprietary company video securely. Whether it's streaming a live broadcast update from the CEO, or delivering on-demand training videos, you will want the delivery mechanism to use IP encryption for protection. Satellite offers a great toolset for this secure delivery requirement.

Once at the store you can use access control mechanisms (user ID and passwords) to manage access to content. A training video for store managers on cash control procedures or employee reviews would not be appropriate for the staff to watch. In these cases, access control through secure user logins should be sufficient protection.

User access control also provides the added benefit of being able to track which employees watched a specific video and for how long to monitor their professional development.

The Preferred Mechanism

In this era of *YouTube*, video has proven to be the preferred mechanism which people use to learn new things and improve their knowledge. Watching the delivery of the message is as important as the information itself.

Consistent delivery of information is particularly critical to large, distributed organizations. Delivering the same instruction and communications to all team members at all remote sites can be enormously challenging. On-demand video brings the personal experience of one-on-one communication to a vast audience affordably and effectively, allowing businesses to outperform their competitors.

About the author

Mike Tippets is vice president of the Business Solutions Group, North American Division at Hughes, responsible for the development of managed services, software applications, and other solutions based on Hughes products and technologies. Previously, Mr. Tippets served as president of Helius, which was acquired by Hughes in early 2008 and became fully integrated into the Hughes family in January 2010. As a leading provider of business-class IP video solutions, the former Helius provides solutions for training and learning, digital signage, and corporate communications to business customers around the world. Mr. Tippets is a 20-year veteran of the high-tech industry and brings a dynamic and passionate vision of what IP solutions can provide for businesses in the 21st century.

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Omar Hawary, Business Development Manager, EMEA, Video Technology Group, **CISCO**

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Each spring, the Space Foundation's *National Space Symposium* is offered in conjunction with a separate Space Foundation cyber conference. *Cyber 1.3* is a full-day event taking place on April 8th at The Broadmoor Hotel in Colorado Springs, Colorado, immediately preceding the opening ceremony of the 29th National Space Symposium.

Cyber 1.3 is for anyone with an interest in, or responsibility for, the cyber domain, whether government policymaker, industry executive or military cyber professional/ practitioner at any level.

Secure online registration for both Cyber 1.3 and the Space Symposium is available online now at ***www.NationalSpaceSymposium.org.*** Plus, an early bird discount for the Space Symposium is in effect through March 15.

General Hyten is Cyber 1.3 Luncheon Speaker

Lieutenant General *John E. Hyten*, USAF, vice commander, **Air Force Space Command**, will be the featured speaker at the Cyber 1.3 conference luncheon. As vice commander, *Hyten* assists the commander in organizing, equipping, training and maintaining mission-ready space and cyberspace forces and capabilities for **North American Aerospace Defense Command**, **U.S. Strategic Command** and the other functional and geographic combatant commands.

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- **Humans Wanted? Humans Needed? The Future of Cyber**
- **Joint Cyber Operations with Friends and Allies**

The Cyber 1.3 registration fee includes:

- *A networking breakfast, co-sponsored by Booz Allen Hamilton*
- *Featured speaker Major General Suzanne Vautrinot, USAF, commander, 24th Air Force, and commander, Air Force Network Operations*
- *The Cyber 1.3 luncheon, featuring Lieutenant General John E. Hyten, USAF, vice commander, Air Force Space Command*
- *A closing networking reception, co-sponsored by General Dynamics Advanced Information Systems*

The rate for active military/government personnel is $395 for the one-day conference. The standard industry rate is $495, which can be combined with Space Symposium registration for additional savings. Register now for Cyber 1.3 at ***www.NationalSpaceSymposium.org***.

International Participation @ Space Symposium

The **Space Symposium** will be held **April 8th through the 11th** at **The Broadmoor Hotel** and is expected to bring together more than 9,000 international participants from all sectors of the global space spectrum to address opportunities and issues. Some of the Space Symposium's key speakers and panelists will include:

- Andrea Jaime Albalat, executive director, Space Generation Advisory Council
- Wanda M. Austin, Ph.D., president, The Aerospace Corp.
- Craig R. Barrett, Ph.D., retired CEO/chairman of the board, Intel Corporation
- Romain Bausch, president & CEO, SES
- Charles F. Bolden, Jr., administrator, NASA
- Yannick d'Escatha, president, Centre National d'Études Spatiales (CNES)
- Lieutenant General David A Deptula, USAF, Ret., president, The Deptula Group
- Jean-Jacques Dordain, director general, The European Space Agency (ESA)
- General Howell Estes, III, USAF, Ret., president, Howell Estes & Associates, Inc.
- Admiral Mark P. Fitzgerald, USN, Ret., president, Aragosto Global, LLC
- Lori B. Garver, deputy administrator, NASA
- Samer Halawi, chief executive officer, Thuraya
- Lieutenant General Susan J. Helms, USAF, commander, 14th Air Force (Air Forces Strategic) Air Force Space Command, and commander, Joint Functional Component Command for Space
- Kiyoshi Higuchi, vice president, Japan Aerospace Exploration Agency (JAXA)
- Yasushi Horikawa, Ph.D., chairman, United Nations Committee on the Peaceful Uses of Outer Space
- Susan J. Irwin, president, Euroconsult USA
- Jean-Yves Le Gall, chairman & CEO, Arianespace
- Gilles Leclerc, Acting President, Canadian Space Agency
- Gerrit Nieuwpoort, Ph.D., director, Netherlands Space Office (NSO)
- Luigi Pasquali, president and chief executive officer, Thales Alenia Space Italia
- Frank A. Rose, deputy assistant secretary of state for Space and Defense Policy
- Kay N. Sears, president, Intelsat General
- General William L. Shelton, USAF, commander, Air Force Space Command
- Johann-Dietrich Worner, chairman, German Aerospace Center (DLR)

General Kehler is Corporate Partnership Dinner Speaker

General *C. Robert Kehler*, USAF, commander, **U.S. Strategic Command**, is this year's featured speaker at the **Space Symposium Corporate Partnership Dinner**, sponsored by **Raytheon**. The dinner will be held April 9th at The Broadmoor Hotel.

As commander, U.S. Strategic Command, Kehler is responsible for the plans and operations for all U.S. forces conducting strategic deterrence and Department of Defense space and cyberspace operations. Previously, he served as commander, **Air Force Space Command**, based at Peterson AFB, Colorado.

A key event at the annual Space Symposium, the Corporate Partnership Dinner recognizes the organizations that support Space Foundation programs. Admission to the dinner is included with military/government registration, and is an extra purchase for industry attendees. Seating is limited and the event tends to sell out early.

Reserve Dinner Tickets Now

Register for the Space Symposium and reserve dinner tickets now at ***www.NationalSpaceSymposium.org/register***.

Gen. Pawlikowski is Acquisition Luncheon Speaker

Lieutenant General *Ellen M. Pawlikowski*, USAF, commander, **Space and Missile Systems Center**, Air Force Space Command, will discuss the importance of space to national security at the final luncheon of the Space Symposium. The ***Acquisition Luncheon*** will be held on Thursday, April 11th, at The Broadmoor Hotel, and is co-sponsored by **United Launch Alliance**.

Pawlikowski was the featured speaker at last year's Acquisition Luncheon and she will continue her message for this year's attendees, addressing budget reductions and priorities in the current global space environment. As the U.S. Air Force program executive officer for space, *Pawlikowski* manages research, design, development, acquisition and sustainment of satellites and the associated command and control systems.

Luncheon Tickets

The Acquisition Luncheon fills quickly, so early registration for the Space Symposium and advance meal ticket selection is encouraged—additional meal tickets may also be purchased.

See details about Space Symposium registration and meal selection at ***www.NationalSpaceSymposium.org/register***, which includes a live chat tab for customer service questions.

SatBroadcasting™—Broadcasting To The Diaspora

By Eran Avni, Executive Sales Manager, ECS (European Communication Services)

As the world becomes a smaller place and people move from one end of the Earth to the other, broadcasters are realizing new opportunities. In the Diaspora World people may be far from each other physically, but they are never far from enjoying each other's experiences, lives and feelings. A sense of unity, in spite of the scattering of peoples across the globe, is enabled through the streams of information and entertainment produced by broadcasters, linking all to their homelands and their sense of "oneness."

In the same way that the Diaspora World provides ships, planes and trains and just about anything with wheels that enable almost any person to search and reach new geographic horizons, the broadcast world can reach each and every person who has changed his or her geographic identity—all the while remaining with the one in which they were born.

Savvy broadcasters and content providers realize that migrations and population movements—no matter how large or small—are new opportunities for increasing their audience. The prospect to expand one's marketplace into far away lands, while still remaining loyal to a local audience, can provide a breakthrough moment for a business.

Likewise, the opposite is true when an immigrant becomes a successful entrepreneur and wants to broadcast from his or her new place in the Diaspora back to the homeland. The beauty is to do this with relatively minimal initial investments and being able to take advantage of market forces to keep prices low. At ECS, European Communication Services, we know and understand these trends. We work to take the twists and turns of the Diaspora World and create advantages thereby opening new opportunities to transform broadcasters into winners.

The New Reality

The phrase 'Glocal' is pithy and is now a cliché. However, the phrase really does represent our new reality. Being locally based yet reaching the rest of the world, and for broadcasters, reaching that target audience far, far away, is the most recent trend for the broadcast market. As broadcasters and content providers seek to extract new revenues from advertising, reach new audiences and re-connect the homeland with the Diaspora, it is important for them to know that this can be done easily, with low expense and intelligently.

One of the most important caveats that broadcasters need to realize concerns the sensitivities of penetrating various types of markets. Whether reaching Nigeria, Kurdistan, Australia,

India, the Middle East, Bosnia, East London or Somalia, understanding that the right approach incorporates both the correct technology as well as the knowledge that cultural and business operations sensitivities abound. Whether recognizing how to best use the correct types of technical infrastructure that will enable a signal to be picked up by the most people for the least cost, or understanding how best to work with local distribution packagers, are extremely important. It is imperative to have an advisor onboard that understands how to operate in various local environments. This is especially important for small- and medium-sized broadcasters that want to be included in a specific broadcast neighborhood or need to be included in local content packages.

Advisors that can put together an end-to-end solution with a low expense threshold are highly appreciated by broadcasters—these advisors understand technology and culture and can operate in various localities to provide that extra plus that's required for growing a business. For instance, ECS provides such advisory services in researching the best methods for penetrating a market as well as providing the tools and means to reach and expand a market.

With ground station services in the United Kingdom connecting to world fibre networks, satellites around the world, and IPTV capabilities, we bring broadcasters and content providers to any geographic location. Offering remote and fully managed playout, uplink, downlink and turnaround, Earth stations, flyaway, channel management, aggregation, encryption, video monitoring and services for IPTV platform operators, ECS can provide all within a one-stop environment.

The Application Of Technology

ECS's ability to use technology and its knowledge of the markets enables it to reduce worldwide distribution costs. For broadcasters, this is excellent news, especially those from the U.K. or European Union (EU) that wish to engage audiences in Africa. ECS' full slate of broadcast services is able to take broadcasters from Europe to Africa with their programming.

ECS' turnkey solution for OHTV includes collecting its signal at a London PoP (Point of Presence), sending the signal by fibre to the Uplink Station, and then uplinking the signal to a Pan African C-band for distribution to the entire continent. Using contacts around the continent, the channel is able to locate local distributers for rebroadcasting throughout the region.

Another opportunity for ECS was the company's work with a Sub Saharan African TV channel to build out a world-wide multi-year distribution plan via four satellites to cover Pan Africa, Pacific Asia, Europe as well as the U.K. and North America. The channel has now received positive feedback from all over the world.

Another example of Diaspora broadcasting is the business of faith-based broadcasters. These groups wish to reach new audiences and shower the world with God's words. Many faith-based broadcasters either belong to, or are related to, movements with missionaries around the world, or in specifically targeted regions. To support their faith's expansion in the air, broadcasters seek novel methods to reach their audiences. Transmitting programming via TV and IPTV, these faith-based broadcasters can find their audiences around the world and support on-the-ground missionaries. Using specific satellites and specialized IPTV channels that reach cable, terrestrial and satellite operators, these broadcasters easily hook into a home and reach their flock.

Other faith-based broadcasters understand that the Diaspora has sent their believers around the world and they want to reach these men and women with a targeted message. Again, using any combination of distribution services can keep those far away linked to the religion. Thus, a local broadcast sent over a backhaul satellite to a centrally located ground station from where the signal can be sent via satellite or fiber to a point (or points) around the world is a perfect solution for the faith-based broadcaster or content provider. ECS works with a number of these broadcasters, both small and large, to enable them to bring the word of God to the people who really want to hear it.

The hunt for reaching far-flung audiences is a trend that will accelerate as the world continues to move into a Diaspora environment. Migrations for economic, health, political and religious reasons are age old. Now that technology has caught up, ECS is addressing the market with comprehensive and easy-to-create solutions that provide access and links between communities. We see these links as the backbone of world-wide growth.

SatBroadcasting™—A Submerged Challenge For DSNG

By David Leichner, Vice President, Gilat Satellite Networks

Deep underneath the QianDao Lake in Zhejiang province of China rests the thousand-year-old 'Lion City'. This ancient site was submerged half a century ago to build a reservoir that later became a hydropower station.

On April 27, 2012, China Central Television (CCTV), China's national TV station, launched a live broadcast of the exploration of the underwater city, filmed by divers at a depth of 90 feet. By leveraging Gilat's satellite-on-the-move (SOTM) antenna and power amplifier, CCTV was able to transmit live coverage of the exploration from a boat in high definition. The broadcast extended over a period of five days and was viewed by approximately 200 million viewers.

A Substantial Challenge

China Central TV's cameramen had to dive to the bottom of the lake to film the ancient city. The crew also used remote control robot cameras for some of the filming. The video from the divers and robots, in addition to interviews with the exploration teams, was processed from a small boat on the lake itself.

The RaySat EagleRay 7000 on the deck of the small CCTV boat. Photo courtesy of Gilat.

The EagleRay in use at the 2012 London Olympics.

The processed *high-definition* (**HD**) video needed to be backhauled to Beijing at a data rate of 8Mbps for the live broadcast—the lack of suitable terrestrial infrastructure meant that they could only rely on *digital satellite news gathering* (**DSNG**) technologies to further their broadcast. The challenge was to find a system capable of transmitting at a high bit rate over a satellite link while in constant motion.

The system would also need to be small enough to fit in the limited space available on the small boat's deck. This would call for a compact, lightweight and powerful broadband satellite communications system that could remain continuously locked onto the satellite while the boat is rocking and moving.

The Compact Solution

The solution arrived in the form on an integrated on-the-move satellite broadband system provided by **Gilat Satellite Networks**. The system included a ***RaySat EagleRay 7000*** satellite antenna system and a **Wavestream *40W Ku-band BUC***.

The RaySat EagleRay 7000 is one of Gilat's high performance satellite antennas designed for two-way communications from a moving vehicle. The EagleRay 7000 antenna was the perfect solution for CCTV as it has the necessary key features that include...

- **Compact; only 30cm high—requires minimal space**
- **Continuous satellite tracking—counterbalances the boat's motion**
- **No setup time—instant footage transmissions throughout the five days of filming**

Wavestream's 40W Ku-band BUC.

EagleRay in use for Hurricane Isaac in the U.S.

A Submerged Challenge For DSNG (Cont.)

Gilat's Wavestream BUCs use unique innovative technology. The Wavestream 40W BUC's light weight and low power draw made it possible to deploy onboard the small boat, and its high power output enabled the antenna to transmit at the high bit rate of 8Mbps required for the high definition video stream.

Thanks to Gilat's on-the-move DSNG solution, CCTV successfully broadcast the exciting footage of the exploration of the submerged city.

A Moving Tale

DSNG is not just about being at the right place at the right time—it is also about being able to broadcast immediately and to follow a story as it moves. For DSNG, the importance of a reliable, on-the-move solution is paramount.

Gilat's solutions for DSNG that have been used to broadcast live from significant events include the landfall of hurricane *Isaac* off the southern coast of the United States, the *2012 Olympic Games* in London, as well as other key events such as the of inaugural visit to Mexico of Pope Benedict the XVI, and the U.S. presidential campaign locales.

Gilat's on-the-move DSNG solution is optimized to enable broadcast of continuous live video while in motion. Improving ability and agility, Gilat's DSNG solutions enable news teams to:

- **Reach extreme locations unavailable to others**
- **Be the first (or only team) to reach and broadcast from hard-to-reach locations**
- **Film and broadcast while on the move**
- **Land in a new international location and install the equipment on a rented vehicle**
- **Park at an event without needing pre-arranged or special parking**

To learn more about Gilat's "Fast and First" DSNG solutions, please visit ***www.gilat.com/dsng.***

About the author

David Leichner is Vice President at Gilat Satellite Networks responsible for marketing and business development. Mr. Leichner has over 20 years of technical, marketing and management experience in the areas of space and defense, communications and enterprise solutions.

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SatBroadcasting™—Bridging The Gap

By Matthew Huntington, Vice President, Product Marketing, NAGRA

Broadcasters and payTV service providers are seeking to exploit the potential of convergence and are increasingly focusing on multiscreen delivery, enabling content to be enjoyed everywhere and on any device.

Over-the-top (OTT) delivery of video content to Internet-connected devices inside and outside the home is at the heart of this multiscreen revolution. OTT started with delivery to personal computers, but now extends to a wide range of IP devices including phones, tablets, connected TV sets, set-top boxes and games' consoles.

Until recently, video content delivered to IP devices has been on-demand content. However, increasingly consumers are watching and demanding linear/live TV content on these devices. Linear TV presents a much greater technical challenge to deliver OTT than on-demand content, requiring much greater scalability and reliability.

There is also an alternative, and complementary, approach to providing linear television content for multiscreen reception in the home. This is to transform the existing broadcast signal at the edge of the home using a gateway device into a format that can be consumed on IP devices.

Satellite's Big Challenge

In this new multiscreen world, satellite payTV providers face a particular challenge. Satellite has some clear advantages over cable and DSL in terms of delivering broadcast channels. For instance, satellite's ubiquity of coverage means wider geographical reach—most satellite payTV platforms are able to offer more channels than their cable or ADSL rivals.

However, when it comes to interactive and Internet-delivered services, satellite providers find themselves at a disadvantage against the two-way digital networks of cable and ADSL operators. They do have various options for providing on-demand programs to their subscribers and thus strengthening their competitive position against traditional payTV rivals and the new Internet players such as **Hulu**, **LoveFilm**, **MaxDome** and **Netflix**.

First, and most straightforward, is *push-VOD*, where programs are downloaded to the hard drive of a *digital video recorder* (**DVR**) from which the content can be accessed later by subscribers. This approach has some clear advantages—broadcast quality can be guaranteed and content is securely protected by the DVR's persistent *digital rights management* (**DRM**) system. The drawback is that the architecture involved—broadcasting by satellite and storage on a hard drive—means that only a limited amount of content can ever be offered for on-demand viewing via push-VOD as compared to the *long-tail* offered by Internet services.

A second approach, which more and more satellite payTV operators are adopting, is to use broadband connectivity (*i.e.*, **DSL**) to deliver a much wider range of content. In some cases, this means entering into partnerships with an ISP, but some satellite operators are becoming ISPs themselves as a way to ensure full control over the delivery of their OTT services to subscribers and thereby offer a guaranteed quality of service.

A third approach is simply to offer OTT content via the public Internet. This means that service can be offered to a larger audience than would be the case if limited to the geographic footprint

of a limited set of ISP partners. This does mean that quality of service cannot always be guaranteed because of the policies and limitations of third-party networks that deliver the content to end-users.

Inherent Advantages

When payTV service providers (whether satellite or other) choose to embrace OTT, they are able to enjoy some very clear advantages:

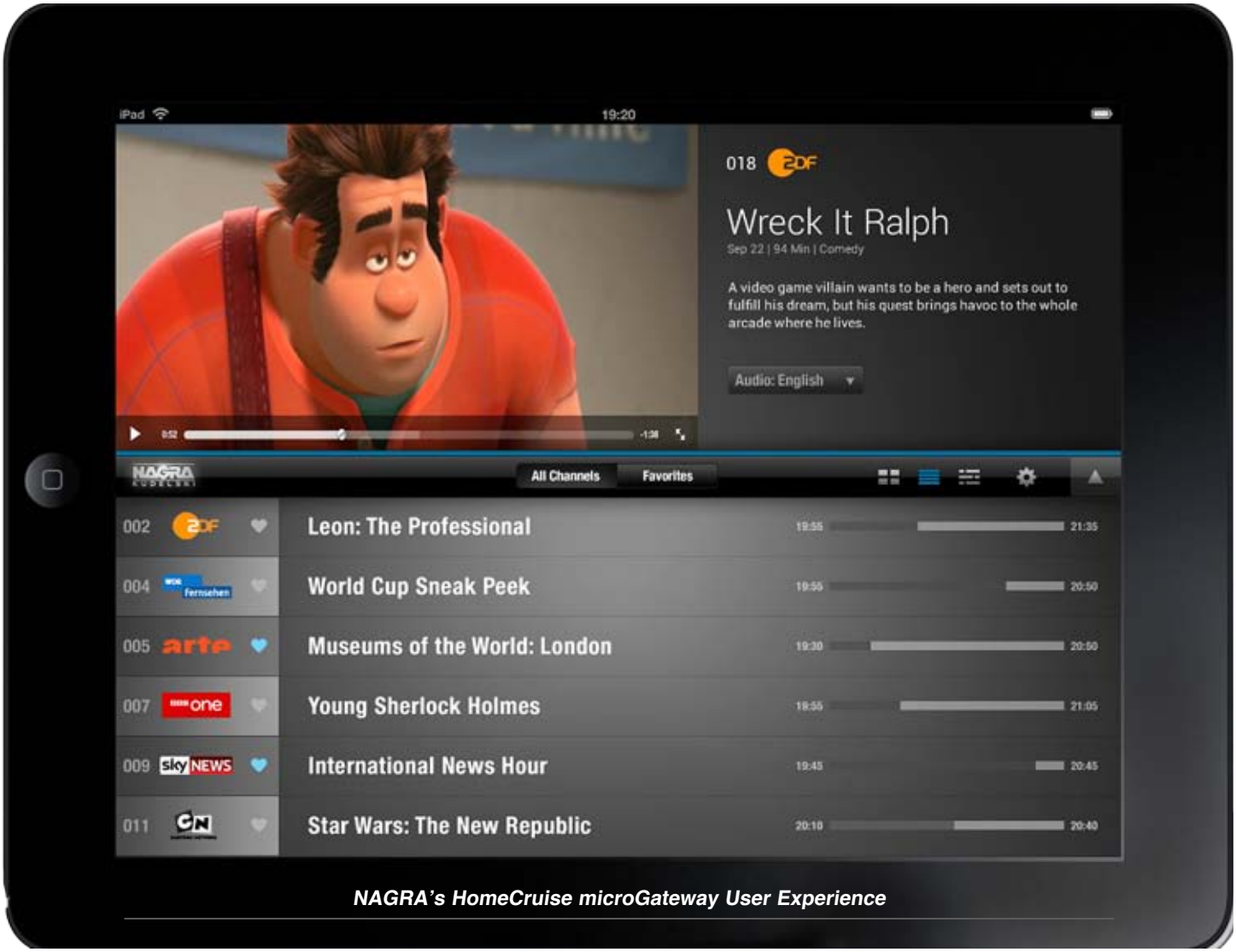
1. *They can exploit their existing billing relationships with subscribers to sell new OTT services*
2. *They can build on their existing relationships with studios and other content providers by acquiring additional rights for OTT delivery alongside their broadcast rights*
3. *If they are able to be providers of triple-play services (TV, telephony and Internet), service providers can seek to gain market advantage by pricing OTT television services very competitively, using them to add value, increase customer satisfaction and reduce churn.*

If satellite operators opt to become ISPs, or work in partnership with an established ISP, they are also able guarantee quality levels—for instance, by setting a minimum bandwidth for OTT TV so that reception quality is not affected by other broadband usage elsewhere in the home.

The Gateway Alternative

An alternative to using OTT to deliver linear TV to multiscreen devices in the home, is to transform, at the edge of the home, the existing broadcast television signal into a format that can be consumed by multiscreen IP devices (*i.e.*, tablets, phones and personal computers). This approach seeks to maximize the potential of traditional broadcast delivery by extending it to other screens in a secure environment. It means that satellite providers can compete more effectively with their old and new competitors.

This transformation can be done with a gateway device, which can be a *set-top box* (**STB**) or a standalone device. The required transformation is dependent on the capabilities of the target device. Typically it requires transcoding of codecs (to fit the bandwidth of the home network and to match the audio and video codecs supported by the target device),



NAGRA's HomeCruise microGateway User Experience

secure transcrypting (to move from a conditional access used by the broadcast signal to a DRM supported by the target device) and re-packaging.

There are various ways to offer a gateway. One approach involves the deployment of a new generation of advanced STBs (such as the **Horizon** device now being deployed by pan-European cable operator UPC part of **Liberty Global**) that are full home-media gateways in a single device and able to distribute broadcast- and broadband-delivered content around the home to any suitable IP-enabled device.

While this approach has benefits, it does require an expensive upgrade of STBs and may not be a viable option for some operators. An alternative is to complement deployed STBs with a dedicated gateway device. **NAGRA** will launch such a device—the ***HomeCruise microGateway***—during the second quarter of 2013 (*see the article sidebar*).

This *micro-gateway* approach presents many advantages over a direct OTT service for the service provider and consumer. For the service provider, it enables a revenue-generating multi-screen experience that leverages their investment in the existing payTV in-home infrastructure and STBs, all the while drastically reducing bandwidth requirements (the number of streams from the headend does not need to scale with number of devices in the home.)

Second, it allows the secure delivery of premium content beyond the main screen, and third, it provides a uniform user experience across screens—a key requirement from consumers that also allows service providers to extend their brand to CE devices while offering consumers a viewing experience they are familiar with through their television. Service providers can also consider using the micro-gateway to complement a "full" home media gateway—for example, by adding additional transcoding to increase the number of IP devices that can concurrently access linear TV services.

On the consumer side, the benefits are equally clear: they receive one subscription for premium content across all devices, the flexibility to consume TV anywhere in the home through a single user experience and the ability to navigate and discover content using a companion device.

Security Remains Fundamental

Whichever form of delivering OTT is selected, and whatever device is used to view it, robust content protection is a fundamental requirement for service providers, broadcasters and rights owners.

STBs, the traditional client devices of satellite payTV operators, can offer the highest level of content protection for OTT delivery when using a DRM solution that use chips with hardware security built into them, therefore being the most secure way to deliver television via broadband.

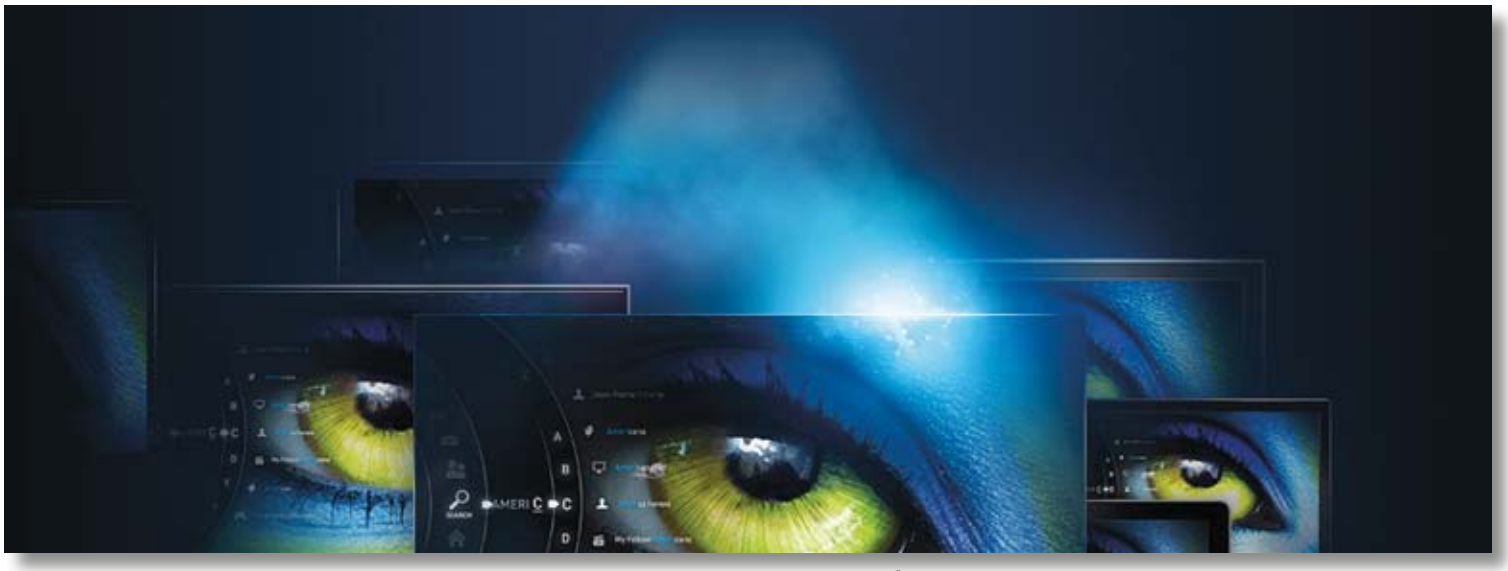
However, in today's multi-device world, devices such as PCs, tablets and phones, need software-based security, while connected TVs and Blu-ray Disc Players have varying degrees of openness and an increasing number are able to include some hardware-based security in their chipsets.

To address all of these cases, and deploy television services to multiple devices service providers, requires a versatile and robust DRM solution that spans the multiscreen environment. One such solution is ***NAGRA MediaAccess PRM*** (*Persistent Rights Management*) which supports all of these scenarios by...

- Taking advantage of built-in security, through the ***NAGRA On-Chip Security*** (**NOCS**) program)
- Also being able to be deployed in software-only environments

A robust DRM solution also needs, like MediaAccess PRM, to be *Hollywood-approved*. The major film studios are constantly raising the bar in terms of content security and service providers need to be able to show them that they can offer the required high level of security.

There is no pushing the OTT genie back into the bottle—payTV providers increasingly recognize that they, themselves, need to deliver TV over-the-top, alongside their traditional TV services. Despite the threat from new OTT-only providers, established satellite operators have many factors in their favor and can position themselves to make the most of the multiscreen and OTT opportunity.



The NAGRA HomeCruise microGateway

NAGRA's HomeCruise microGateway, as with a full home media gateway, is a device that enables service providers to distribute live linear channels to tablets, phones, connected TVs, IP set-top boxes and personal computers within the home. It is a pre-integrated solution that can be that can be deployed with minimal integration effort in a NAGRA conditional access (CAS) environment.

NAGRA—which is also is working with service providers on full home media gateways that combine multiple functionality in a single device—believes that there is a gap in the market for such complementary device. In addition to offering an incremental upgrade to existing set-top boxes, NAGRA's microGateway can also be used alongside "full" home gateways as a way to increase their potential—for example, by adding additional transcoding capability to enable live channels to concurrently reach a greater number of devices within the home.

The first release of NAGRA's HomeCruise microGateway includes two TV tuners and a dual transcode capability and uses NAGRA's MediaAccess content protection and OpenTV middleware. The box is connected through Ethernet to a Wi-fi router and receives incoming broadcast signals via a coaxial cable (either cable or satellite). It acts as an independent content-access point that tunes into channels to which customers have subscribed and then transcodes the signals into the correct format for viewing on additional devices without disrupting viewing on the main TV set.

It is powered by NAGRA MediaLive multiscreen, a solution built with field-proven components including the MediaLive Service Platform, which provides extremely flexible cross-device service management, and MediaAccess, NAGRA's content protection technologies. With the NAGRA HomeCruise microGateway, end-to-end security is provided through NAGRA's MediaAccess PRM (Persistent Rights Management), a DRM solution approved by the Hollywood studios, complemented by the NAGRA Media Player, a secure media player for open devices such as phones and tablets. The MediaLive Client Framework completes the MediaLive multiscreen solution by providing the right tools for creating compelling and seamless user interfaces across screens.

The HomeCruise microGateway offers many benefits to payTV subscribers including live TV on any compatible device within the homes at little extra cost and in a convenient "plug and play" format. Service providers can benefit from deploying the box by charging a monthly fee and by generating additional revenues from in-guide and addressable advertising. The device's ease-of-use benefits not only the consumer but also the service provider because it reduces the risk of calls to customer-management centers.

What's more the solution offers a compelling and seamless user experience, giving the viewer the ability to enjoy the same high-quality programming he or she is used to on the television but on the device of his or her choice. What's more, the HomeCruise microGateway can be deployed quickly and cost-effectively, offering service providers a solution that enhances the value of already installed set-top boxes.

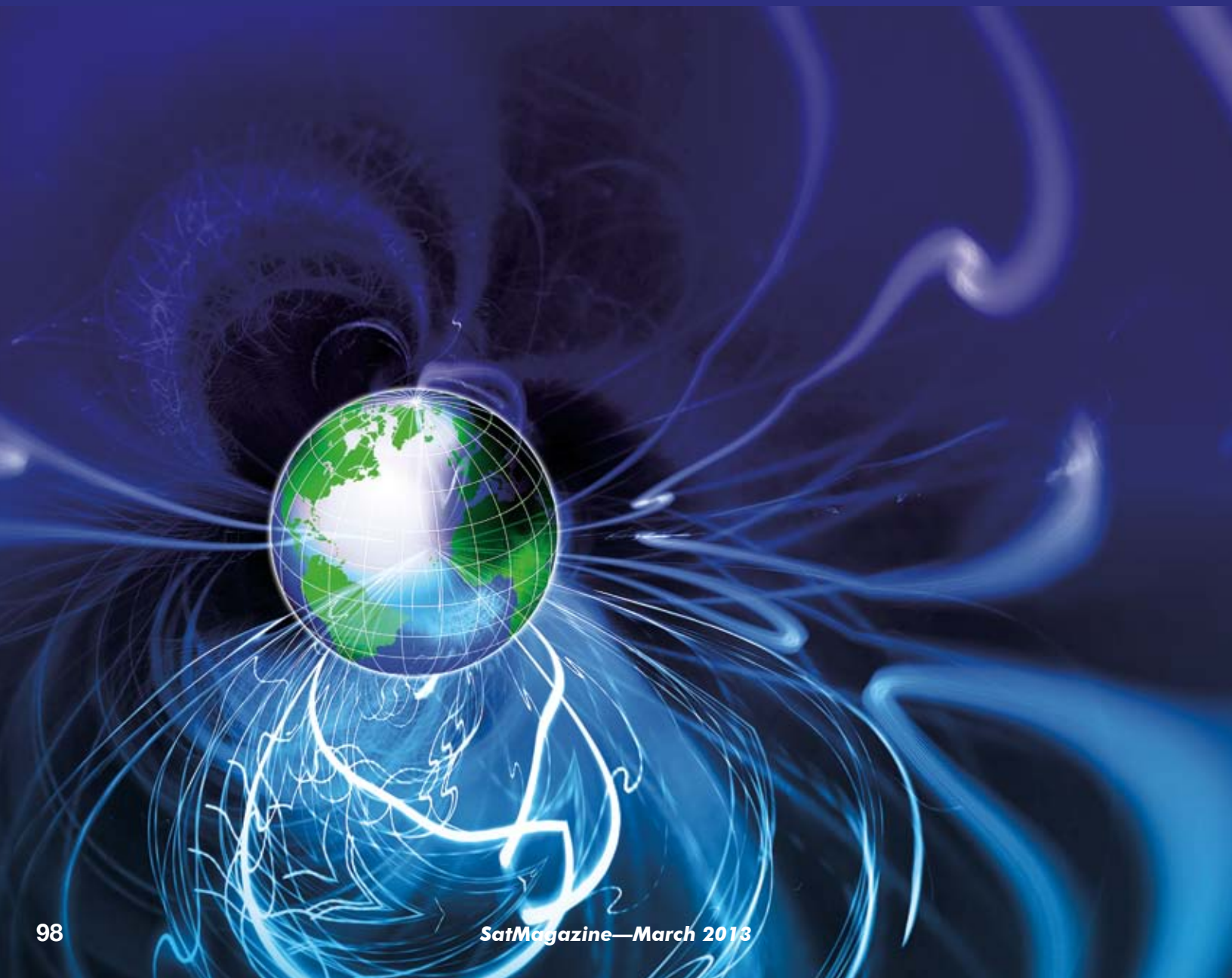
SatBroadcasting™—End-To-End SNG + Asset Management

By Greg Dolan, Chief Operating Officer, Xytech

For the first time in broadcasting history, the acquisition of content is no longer a major technical challenge. Satellites, microwaves, fiber and high-speed Internet connectivity put crews on the scene quickly, transmitting back to the facility repeatedly during the day from diverse locations. Compared to only a few years ago, the amount of content that now arrives at a facility is staggering. The number of times that content is repurposed continues to grow at an exponential rate as additional formats and platforms emerge and are monetized.

Think of the life cycle of a typical piece of feature footage. An original video can air live on one broadcast, be edited and formatted as a feature for use on several other broadcasts, edited again to live on the station's website and fed to news aggregators for use on their platform, then edited again for use in advertisements and promos for the variety of programs running through the day. If the video is part of a major story, the number of reuses grows to a staggering rate—the technologies for creating, manipulating, managing and distributing aren't slowing down one iota.

Legacy ENG business solutions have focused on the creation and monitoring of the signal path. While such offered good solutions to automating a subset of these steps as well as providing a limited view to the cost structure of each feed, in truth, they answered but a small part of the overall business challenge. The macro view requires a booking system to automate the signal



path creation as well as to mandate the management of the content once it has arrived through its various life cycles, using automation to extract efficiencies at every step.

Today, the amount of data involved in this process is staggering in its size. With economic pressures increasing, and more than 90 percent of ingested content deemed appropriate to repurpose, broadcasters are challenged to make up for that revenue stream by re-formatting, re-purposing, and re-packaging content for different distribution methods and for viewing on new screen types such as smartphones and tablets. Broadcasters are drowning in content—the pressure is on to squeeze every possible penny out of all of the content just to stay in business.

Merging Asset Management With Automated ENG

Faced with new pressures and a different business model, broadcasters can't afford to miss a single opportunity to capture and monetize content. This means that facility staff needs to know exactly where, and in what state, their content is in the digital supply chain.

Xytech's ***MediaPulse*** platform streamlines and drives efficiency into the digital supply chain by bringing disparate systems together and automating each step in the process. MediaPulse provides an end-to-end solution that enables facilities to have total control over assets, resources, and costs while maximizing the profit potential of each piece of content. This means automating more than the circuit creation, but all media services while simultaneously providing a single repository of federated content.

With the recent addition of a universal **SNMP** (*Simple Network Management Protocol*) adapter, which automates and natively integrates the signal path chain in *satellite newsgathering* (**SNG**), MediaPulse is the only out-of-the box solution on the market offering a truly unified facility and asset management system.

Now, users need only create simple feed requests and orders describing basic order metadata and the circuit path is created, individual components and subsystems are identified and native SNMP messages are radiated throughout the ecosystem. Additionally, devices may be monitored for traps and users alerted to impeding alerts and conflicts.

Total Feed Management

With the integration of the universal SNMP adaptor, MediaPulse now automates and controls every aspect of each feed. As the circuit patch is created, integrated resources, such as antennas or vans, automatically have their signal established through MediaPulse's SNMP adapter. The adapter, with or without the use of a management and control system,

continually monitors the equipment for traps and alerts users as needed. Producers, MCR staff, and truck operators each have unique views into the system information.

In the past, when the assignment desk noted a story they wanted to follow, they had to assign a news team to go out and record footage for the story. To assemble a team, operations staff would have to find the required equipment, schedule the live broadcast, and reserve space on a storage system. This manual process might involve five distinct and separate systems and five or more people trying to find all the elements needed to send the team. Meanwhile, no one involved had any idea how much it cost to film the video clip and produce the broadcast.

Now, the assignment desk simply books an event in the system and MediaPulse's SNMP adaptor does everything, from automatically setting up the truck after validating the network connection to landing the circuit in the asset management system. Simply put, the act of booking the truck automatically creates and executes the signal path. Sometimes there simply isn't time to route a breaking news event through the feed request systems. In this case, by monitoring truck and MCR control panels, MediaPulse creates feed orders and tracks metadata based upon unscheduled events it finds while monitoring the system. In this way, every action and feed is captured even in the fastest paced facility.

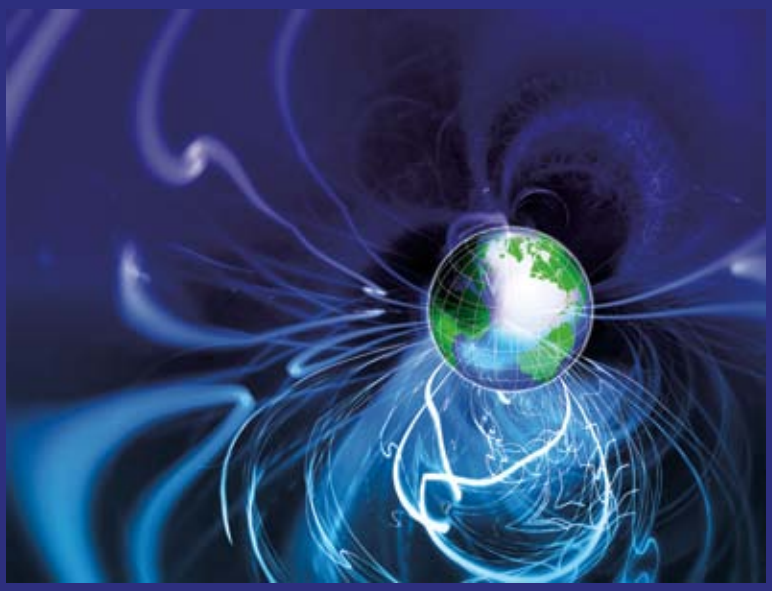
MediaPulse's SNMP adaptor takes advantage of bi-directional technology that's already embedded into all the devices, subsystems, and "stops" on the digital supply chain. With MediaPulse's platform independent, web-based user interface, crews can use smart devices to access information in the MediaPulse system.

Metadata + Asset Management

Most broadcasters don't have a signal path problem. The real challenge is to bring in the raw footage and then track it throughout its entire lifespan until it gets put on a server and used.

MediaPulse does more than automate the SNG truck setup and feed management, it automates the collection and integration of metadata about the feed as it's coming across the wire. This capability allows MediaPulse customers to attach crucial information to the essence: This includes who is involved in the recording of the video, where the event occurred, what the recording is about, how the video was taped, what the video is for, the clip's length, the audio type, and how much it cost to send the anchorperson(s) and the truck.

Once the content lands in MediaPulse's asset management system, facility staff needs to know what they can do with the material. To address this need, customers can configure the product to automate the enforcement of business rules. For example, a facility may want a new video clip to be delivered to an Avid for copying and editing after ingest and then moved to the next desired phase in the chain. MediaPulse handles those events and also adds metadata each time the asset goes through another step on its way through the supply chain.



Integrated Facility Management

Moving a feed from one point to another is a tactical problem that MediaPulse also solves.

By connecting and integrating feed ingestion with the entire MediaPulse platform, resource costs and expected revenue are now automatically associated with the feed. Xytech's customers have the ability to see the actual resources used, at a highly detailed level, while a broadcast is being assembled, rather than waiting until after the fact. This capability enables customers to tighten scheduling and make far better use of their resources.

While other platforms in this arena offer tactical solutions that go from this or that pain point, only MediaPulse addresses the big picture and demonstrably impacts the bottom line—all from the out-of-the-box software.

Broadcasters operate in highly volatile environments, both in the nature of the work they do and the business in which they operate. It's imperative that the assets they gather and manage, and the operations that support the business function at the highest possible level, operate at the highest level of efficiency, from booking through cost accounting.

MediaPulse optimizes efficiency, reduces costs, and allows staff to spend time on moneymaking activities, rather than on outdated, manual functions. From the time the camera is rolling to the point where someone's watching it on their *iPad*, thirty or more steps have to happen. Xytech's mission is to ensure each of those steps is more efficient, pulling the entire chain together in an easier fashion and far more efficiently.

About the author

Greg Dolan directs Xytech's sales and marketing organizations worldwide and plays a key role in setting the strategic direction of the company. Greg joined Xytech after a decade at another firm, where he was the primary driver for the company's growth. As a senior executive, Dolan led that company into new markets and greater visibility, while successfully introducing a suite of software products for the media services, broadcast, and video transmission industries. Prior to that time, Greg held several senior positions including CIO of the New York Media Group and Manager of Budget Systems for Sedgwick James.

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Gottlieb On Maritime: The Price Must Be Right

By Alan Gottlieb, Senior Contributing Editor

Word is on the street, and DPs and customers have been notified. A new, second round of Inmarsat price increases arrived on March 1st (in addition to the increases imposed by the Company last May) and they are expected to hit low volume users especially hard, providing new opportunities for competitive technologies and vendors.

Here Come The Competitors

Inmarsat's dual price hikes on low volume users are eroding its position among a major component of what has been a loyal user base—the less than 200 MB per month users—and competitors are moving to take advantage of this move.

Expect **Iridium**, with its upcoming ***Next*** platform (launching in 2015), to compete vigorously in this niche, assuming the new service is priced correctly. With its 1.5 Megabit capacity, low cost ***OpenPort*** type antenna and global coverage, Next could become a significant force in the market as a replacement for primary ***Fleet Broadband*** (**FB**) as a low-volume solution and as a back up for Ku-band VSAT.

Another competitor, **KVH**, has experienced success whittling away at Inmarsat in its low volume market with the low cost ***V3*** service that offers 1MB plans at a fraction of the FB cost. KVH has competed especially well in this niche against FB by offering an innovative ***Spread Spectrum Platform*** combined with "plug-and-play," and small, low cost antennas combined with aggressive pricing. KVH's new ***V11*** service offers a unique combination of Ku- that is backed up with C-band, an offering that combines high bandwidth, rain resistant C-band with Ku-band.

At the high end of its market, Inmarsat's Ka-band, ***Global Xpress*** service faces competition from other vendors with competitive Ku- based technologies. Major VSAT vendors such as **Marlink**, **Orange**, **MTN**, **Harris Caprock** and others continue to offer Ku-band with L-band backup.

Another competitive service to be reckoned with is **Intelsat**'s soon-to-be-launched ***Epic*** service, with its inherently more efficient combination of spot and wide-beam service and its ability to offer Ku-, C- and Ka-band. Epic is recognized by the major Maritime re-sellers as an attractive competitor to Global Xpress, in terms of capacity and resistance to rain fade.

By combining the efficient use of wide Ku- beams with the high power of dedicated, high power spot beams, the service will achieve a higher utilization rate that would allow it to offer lower per/bit pricing. Additionally, Intelsat's spot beams will offer 160MB capacity per/spot beam vs. Inmarsat's 42MB capacity per/spot beam. This combination of high efficiency and the ability to deliver very high capacity where its really needed along the Great Circle Routes has led to its adoption by such respected Maritime VSAT vendors as **Astrium**, **MTN**, **Harris Caprock**, **Panasonic Aviation** and others. In addition to these competitive challenges, Inmarsat will also have to contend with competition from competing regional Ka-band satellite constellations, as well.

For example, **Eutelsat**'s ***KA-SAT*** is expected to provide extremely low cost, high bandwidth coverage over Europe. **EPAK** of Germany will introduce a 90cm Ka-band maritime antenna in April that will be integrated to operate on the network's Tooway service.

Other antenna manufacturers are expected to introduce real-time switchable antennas that will accommodate both Ka- and Ku- frequencies allowing ships to communicate at low cost while in European waters, with the ability to switch seamlessly to Ku- for global voyages. **Telenor**, as well, will shortly introduce its own maritime focused Ka-band service over Northern Europe.

All of this means a dizzying array of choices will be available to vessel operators and a genuine competitive environment can be expected to emerge.

Of course, in the end, customers will ultimately determine which service is preferred service. What is certain is that two price hikes to the low-volume users within nine months—instituted contrary to Inmarsat's Maritime president *Frank Coles* statement that the May price hike of last year would be the last for the near term—have caused considerable unhappiness among what has been Inmarsat's loyal customer base and opened the door wider to competitors.

Maritime Buyers Ask Us: Which VSAT Service is Best?

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The Customer Impact—An Analysis

Essentially, the price hike consists of Inmarsat imposing a 10 percent increase in out of "Package," low volume, Fleet Broadband IP. However, greater increases with some re-sellers have been reported, with increases posted up to 18 percent (i.e., **Satcom Global** and **Otesat-Maritel**). "Money Bundles" (a unique offer where customers could substitute unused IP for voice) have also recently been eliminated forcing customers to buy a separate voice plan.

In particular, Bulk Carriers and vessels using more than 20 to 30 Megabytes and less than 200 MB per/month will feel the effects more so than others. While Inmarsat pricing is notoriously difficult to decipher due to frequent changes and differential pricing by *distribution partners* (**DP**s), based on the best available information—from written notification received by DPs—and information from shipping companies who have received the confirming notices of the price increase, we have examined the impact of the price changes and their impact on the shipping community and on Inmarsat. (*As always, we would welcome any clarifications from Inmarsat*). Currently, the minimum "Standard Plan" IP Plan includes 10MBs and costs approximately $150 retail and is sold at about $135 discounted price, depending on the reseller. At the current discounted level, the 50MB user is most likely paying 40 X $10.00 + $135 or around $535. Under the "New" pricing, this increases to approximately $675.

Why would a 50MB user pay $675 for only 50MB when, for around $700- $800 (new, estimated discounted price), they can obtain four times the MB capacity with the 200 MB "Entry Level" Plan? In reality, users who now require as little as 50MB will be at the $675 level under the new pricing and would almost certainly upgrade to the 200 MB package @ $800.

Under this very likely scenario, the net increase is approximately $265 per/month (from $535 to $800 for the 200 MB Plan) or $3,180 per/vessel, or about 50 percent more on an annual basis. This brings the net increase—including last May's price hike—to approximately 65 percent. For an operator sailing 50 ships, that's $159,000 per/year more with

the March 1st increase, and that's in addition to having to purchase the separate voice plan!

Also, recall that this price increase is on top of the increase imposed only nine months ago. Keep in mind that the model could differ, depending on individual re-seller pricing. However, based on information from several reliable sources, we believe these calculations to be accurate.

In addition, at this time it is also uncertain if "packages" at the 20 to 50MB level will continue to exist. These packages were originally instituted by some of the DPs, not Inmarsat. Their continued existence would be at the discretion of the individual partners. If they do continue to be offered, they will almost certainly rise in price along with Inmarsat prices.

Also, if users who purchase the 200 Megabyte Plan don't use it all, there is no "roll over." Unused MBs will be automatically reclaimed by Inmarsat and can be sold to someone else (at 99 City Road, they call this "Breakage"). If, on the other hand, the purchaser of a 200MB package uses more, they have to pay $6.00 for each additional MB (at present rates).

What is clear is that, although Inmarsat has made reasonable price concessions to high volume users under the VLA plans due to pressure from VSAT, low end users and, in particular Bulk Carriers, are suffering the brunt of extreme price escalation. Given the fact that the current average retail revenue, per user, is estimated to be around $800, the price hike affects a large percentage of Inmarsat's customer base.

In defense of the price hikes, Inmarsat's *Frank Coles* contends that communications' cost are but a fraction of the expense of a ship's operation, and that the 200 Megabyte bundle offers a lower fee per/MB.

While it is true that communication costs are a relatively small part of vessel operational costs, Bulk Carrier and Container Vessels are currently in difficult economic straits. Many are operating at significantly below break even cost—imposing significant price hikes on FB at this time will be especially burdensome and destructive of the supplier/customer relationship. This is especially true as Inmarsat, unlike its customers, is quite profitable with the price increase they imposed last May. Of course, Inmarsat defends its increases by noting that customers who purchase larger quantities get a "lower cost per/bit."

However, Ship Owners contend that a 200MB package is not a bargain if you don't need 200 MB and don't have the budget to pay for it. Traditionally, most ship owners have worked on fixed communications budgets and, as prices rose, they minimized their usage to accommodate the price rise—witness the vast number of software applications in use to manage volume. The volume price discount has not worked, a fact that has been recognized in the past by Inmarsat—odd that they would try to resurrect this argument. At this point, one would question the logic behind the "back-to-back" price hikes on low volume users. If we look closely, however, we can see that what they have done is extremely clever and enormously beneficial to their own financial and competitive position.

About the author

Mr. Gottlieb is Managing Director of Gottlieb International Group Inc. Established in 2001; his firm specializes in the application of VSAT Technology in Maritime and Oil and Gas Markets. Gottlieb International's mission is to provide vendors with the "hands on" information and contacts they need to structure product and service offerings and to assist Maritime VSAT buyers in choosing the appropriate service and vendor. The firm also supports Satellite related Private Equity Merger and Acquisition activities in the Maritime, Oil And Gas and Mobility sectors. Clients have included Iridium, Intelsat, KVH Industries, Globecomm Systems, Inmarsat, RigNet, Verestar, Parallel Software, THISS Technologies, (Singapore), Sonic Telecom, and Private Equity Firms Permira Advisors, Apax and Midwood Capital.

Mr. Gottlieb's career encompasses an unusual diversity of Market Research, Sales and Technical background in many segments of the wireless industry including VSAT, Cellular and Mobile Commerce. He has served as Vice President of Sales for Audiovox Communications, Director of Sales for Southeast Asia for COMSAT and Aether Systems, and Corporate Market Research Manager for a Division of Baker International (now Baker-Hughes). He has published numerous articles in SatNews, Digital Ship, and Satellite Market Research and has recently authored Buying Maritime VSAT, The First Independent Guide, a work that debunks the myths associated with buying Maritime VSAT. Mr. Gottlieb is a frequent speaker at Digital Ship, Offshore Communications, The Pacific Telecommunications Conference, Nor Ship, the Washington Satellite Exhibition, and other industry events.

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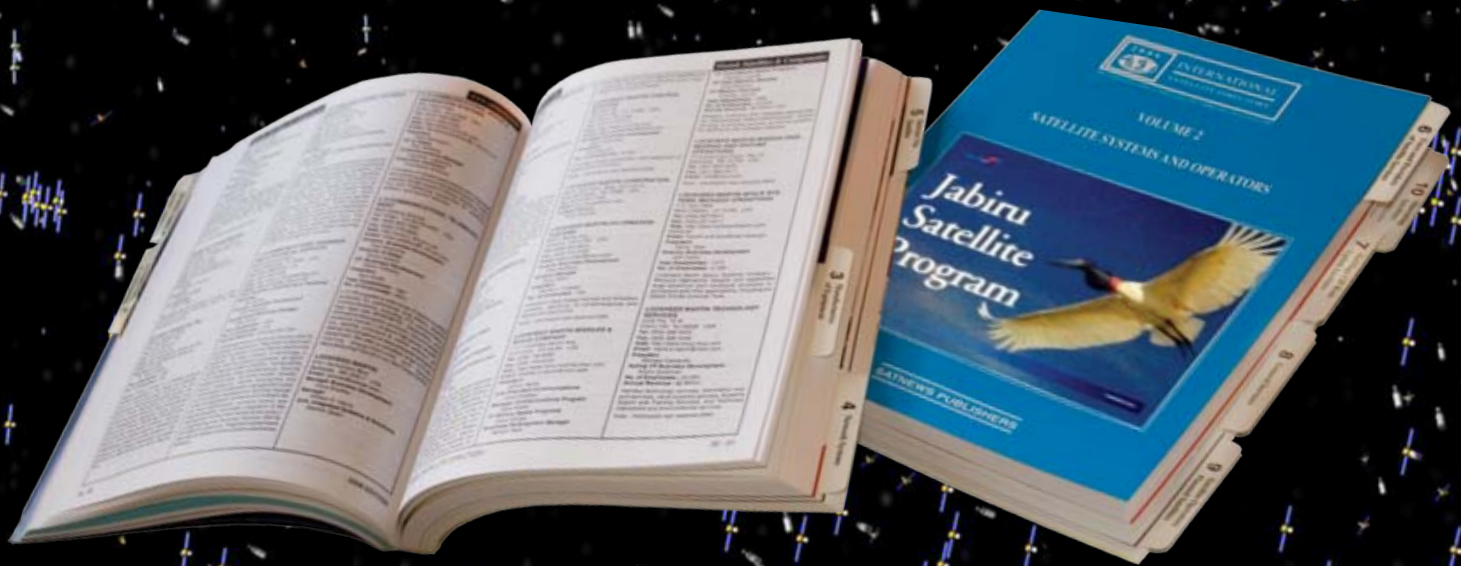

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