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May 2013, Vol. 7, #1

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Satellite Telehealth: Value-Add Opportunities

The life expectancy increase of baby boomers, a shrinking work force, inadequate funding of healthcare, a shortage of family doctors, plus high insurance premiums are all contributing factors leading to a primary healthcare system in the United Sates that's under extreme stress.

By Vince Waterson + Charlie Nahabedian, MEDEX Spot

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Satellite Telehealth: A Case In Point

Many of us have a healthy aversion to doctors and hospitals. That said, we're grateful they exist when we need them—especially those of us who live in urban areas with some of the most cutting-edge health care facilities and services available nearby.

By Tony Bardo, Hughes

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SatBroadcasting™: 4K Is Here + Now

Producers must start preparing... This year's recent MIPtv 50th Anniversary (Cannes, France, April 6-11) is, in part, a celebration of past achievements. However, MIPtv is also looking forward to broadcasting's next major move.

By Chris Forrester, Senior Contributing Editor

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Satellite Focus: Telesat's Anik G1

An International Launch Services (ILS) Proton rocket successfully launched Telesat's powerful Anik G1 satellite from Pad 39 at the Baikonur Cosmodrome on April 16th at 12:36 a.m. local time (6:36 p.m., GMT, on April 15th).

High Throughput Satellite: Dynamic Solutions

Make no mistake, satellite broadband has definitely arrived. From Bangkok to Lagos and from Moscow to Chicago, High Throughput Satellite communications are being delivered today to millions of users at subscription rates that transform the broadband value proposition… as well as the business plan.

By David Hartshorn, GVF

Executive Spotlight: Jörg Rockstroh, WORK Microwave

The way in which DVB-S2 ACM affected two-way communication over satellite was the biggest step forward that I have witnessed. There are always new technologies that promise better efficiency and lower cost, but ACM changed the principle of SATCOM links from fixed to flexible bandwidth and opened up the way to different service types.

Event Of Note: Space Tech Expo

New technologies, industry players, and economic pressures are driving innovation and new business models in the space business. How your organization positions itself in the dawn of this new age is vital to how successfully you capitalize on these new challenges and opportunities.

By Dan Freyer

The Afghan Connection: A Case In Point

A Globecomm conversation with Amirzai Sangin, Minister, Ministry of Communication and Information Technologies, the Islamic Republic of Afghanistan.

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Not All Ka-Band Satellites Are The Same

The congestion at C-band and the high levels of utilization of existing Ku-band capacity has resulted in the satellite industry expanding into the next frequency band available for satellite services, Ka-band.

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It's a Zoo Out There... Influences that include sequestration, the continuing resolution, political leadership conflicts and government spending reduction initiatives have contributed to a challenging start to 2013 for the U.S. SATCOM Business Community.

By Bert Sadtler, Contributing Editor

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Executive Spotlight: Ali Zarkesh, Vislink

A discussion with Mr. Zarkesh regarding the rebranding of satellite connectivity for Latin America (LATAM). A seasoned professional of the space and satellite communication industry, Ali Zarkesh has been the Business Development Director at Vislink for almost two-and-a-half years.

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Near Earth LLC Analysis: The M2M Landscape

Back in September of 2009, we published an article (See www.nearearthllc.com/analysis/presentations/vol5.9.2.pdf) on the incipient growth of the M2M sector, beating the drum that an array of factors ranging from slowing wireless handset revenue growth to better geospatial data to cheaper chipsets would revitalize its investment thesis.

By *John Stone, Near Earth LLC*

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A Walloping Good Start

NASA commercial space partner Orbital Sciences Corporation launched its Antares rocket at 5:00 p.m. EDT on April 21st from the new Mid-Atlantic Regional Spaceport Pad-0A at the agency's Wallops Flight Facility in Virginia.

This test flight was the first launch from the pad at Wallops and was the first flight of Antares, which delivered the equivalent mass of a spacecraft, a so-called mass simulated payload, into Earth's orbit.

The test of the Antares launch system started with the rocket's rollout and placement on the launch pad April 6th, and culminated with the separation of the mass simulator payload from the rocket.

The completed flight paves the way for a demonstration mission by Orbital to resupply the space station later this year. Antares will launch experiments and supplies to the orbiting laboratory carried aboard the company's new Cygnus cargo spacecraft through NASA's Commercial Resupply Services (CRS) contract.

Orbital is building and testing its Antares rocket and Cygnus spacecraft under NASA's Commercial Orbital Transportation Services (COTS) program. After successful completion of a COTS demonstration mission to the station, Orbital will begin conducting eight planned cargo resupply flights to the orbiting laboratory through NASA's $1.9 billion CRS contract with the company.

NASA initiatives, such as COTS, are helping to develop a robust U.S. commercial space transportation industry with the goal of achieving safe, reliable and cost-effective transportation to and from the International Space Station and low-Earth orbit.

NASA's Commercial Crew Program also is working with commercial space partners to develop capabilities to launch U.S. astronauts from American soil in the next few years.

NASA Administrator Charles Bolden said, "Congratulations to Orbital Sciences and the NASA team that worked alongside them for the picture-perfect launch of the Antares rocket. In addition to providing further evidence that our strategic space exploration plan is moving forward, this test also inaugurates America's newest spaceport capable of launching to the space station."

Much Ado About PEO C3T

Parvus Corporation, a Eurotech subsidiary and Cisco Systems Solution Technology Integration (STI) partner, has signed a teaming agreement with SAIC to support task orders under the Global Tactical Advanced Communications Systems (GTACS) program.

SAIC is one of 20 companies selected by the U.S. Army to compete for task orders under the multiple award, indefinite-delivery indefinite-quantity (IDIQ) GTACS contract to supply the Army's Program Executive Office for Command, Communications and Control-Tactical (PEO C3T) with communications devices and systems.

"We are excited by the opportunity to support SAIC to meet the Army's needs under the GTACS contract," said Parvus President Dusty Kramer. "Demanding mission requirements call for low-power, high-performance systems designed to withstand front line conditions; just the kind of capability we bring to the SAIC team."

The initial task orders are expected in 2013 and will continue over a five-year period. When appropriate, SAIC will look to Parvus for products and services as part of their proposed solutions.

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A Site For Young Eyes

The Center for the Advancement of Science in Space (CASIS), the nonprofit organization promoting and managing research on board the International Space Station (ISS) U.S. National Laboratory, showcased its new education website, "CASIS Academy," at the National Science Teachers Association conference in San Antonio, Texas.

CASIS Academy is an interactive learning website created to educate middle school students about the ISS and to pique their interest through multimedia videos and features.

The website incorporates multiple sections, including breakthroughs resulting from ISS research, a tour of the station and interactive definitions of key terminology.

Statistically, U.S. students are most likely to lose interest in science fields while in the middle grades. CASIS Academy targets students at this critical age, using the excitement of space as a tool to maintain and improve interest in science, technology, engineering and mathematics (STEM) careers.

"The unveiling of CASIS Academy highlights a core function of our organization: advocating the ISS National Lab as a STEM-learning platform," said CASIS Interim Executive Director Jim Royston. "Educating students on the innovative advances that have come from ISS exploration and the opportunities that exist in microgravity will inspire today's students to pursue careers in science and engineering tomorrow."

CASIS decided to unveil CASIS Academy at the National Science Teachers Association conference in San Antonio, Texas, due to the abundance of science educators in attendance.

For more information, please visit *www.casisacademy.org*.

Educator resources complementing CASIS Academy, aligned to support national education standards, can be found at ***www.iss-casis.org/educators***.

Support In The Outback

Beam Communications Pty Ltd. has provided a satellite communication solution to Just 4 Kids Children Charity to be used on their adventures trips for disabled and disadvantages children.

The organization, Just 4 Kids Inc., arranges several events to very remote areas in Australia. The worst nightmare for them is to be without communication in the middle of nowhere when a car breaks down.

To travel in remote areas with a lot of people needs planning, not just for food and accommodations, but for any scenario that can go wrong. Reliable communication is crucial to cover any emergency situation. With no mobile phone service and poor UHF and HF Radios during day periods, satellite communications is the most reliable communication in the outback.

"We travel extensively in remote areas where it is no phone service. Satellite communications is a life saver for us when something goes wrong. One fundraiser event to the geological center in Australia (Lamberts) saw us break two springs in our food wagon, crossing from Cameron Corner to the Strzelecki Track, an extremely remote location in the middle of the desert. The accident delayed our arrival at Arkaroola for the night. Needing to feed 100 people, a quick Iridium call to the chief at Arkaroola Village, some 400km away in South Australia, we organized a meal for all of our personal that evening. We were also able to call our spring manufacturer in Queensland to make arrangements for a new set of springs to be sent to Alice Springs," said Just 4 Kids Motorail Director Mark Louez.

Just 4 Kids Motortrails uses Beam's PotsDock 9555 (pictured to the left), which is mounted in the car with a privacy handset. The Iridium 9555 handset fits securely in the docking station which also features phone charging, RJ11/ Pots, GPS, tracking, Bluetooth, and can be configured to support periodic polling or emergency alert reporting.

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Setting Up For SatFilm

Deluxe/EchoStar LLC has announced that it has been selected by the Digital Cinema Distribution Coalition (DCDC) to provide digital asset management, distribution by satellite and other means, as well as operations support for its advanced theatrical digital delivery platform.

The Deluxe/EchoStar joint venture was formed in 2010 to bring together the digital asset management and distribution expertise of industry veteran Deluxe Digital Cinema Inc., a subsidiary of Deluxe Entertainment Services Group Inc.; with the satellite operations and transmission expertise of EchoStar Satellite Services L.L.C., a subsidiary of EchoStar Corporation.

DCDC was formed by AMC Theaters, Regal Entertainment Group, Cinemark Theaters, Universal Pictures and Warner Bros. to create a state of the art digital network open to all content providers and exhibitors for delivery of movies and other content to theaters in North America.

Theater owners across the country have invested heavily in digital upgrades at a cost of $70,000 to $100,000 per screen. Currently, most digital content delivery is achieved by loading new releases on hard drives that are shipped to and from theaters around the country. Secure satellite delivery of content will lower movie distribution costs, enabling exhibitors to offer theater goers live events and other special content.

Divider + Conquer

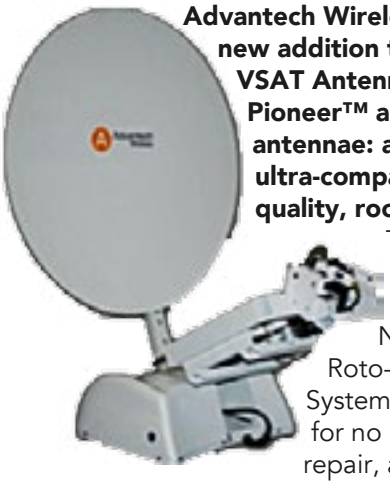
KRYTAR, Inc. now has a new 2-way power divider offering high performance over the broadband frequency range of 1.0 to 40.0GHz in a compact package.

KRYTAR's new power divider offers the widest frequency coverage in a single package on the market and provides superior performance. Targeting broadband electronic warfare (EW) systems and complex switch-matrix applications, KRYTAR has used its proprietary design to produce a wide assortment of matched-line directional dividers (MLDD) with ultra-high performance over a broadband frequency range.

KRYTAR's technological advances provide excellent operating performance of this new 2-way unit. Model 6010400 covers the frequency range from 1.0 to 40.0GHz with 14dB Isolation and ±0.60dB Amplitude Tracking. The 2-way divider exhibits Insertion Loss of <2.5dB across the full frequency range. Maximum Input VSWR is 1.85 from 1 to 20GHz and 1.85 from 20 to 40GHz. Maximum Output VSWR is 1.50 from 1 to 20GHz and 1.70 from 20 to 40GHz. Phase Tracking is ±7 degrees from 1 to 20GHz and ±14 degrees from 20 to 40GHz.

The power divider is a compact package measuring just 4.15 inches (L) x 1.00 inches (W) x 0.43 inches (H), weighs only 3-ounces, and comes with standard 2.4-mm coaxial female connectors.

Driving Away To New VSAT Heights



Advantech Wireless Inc. has released the new addition to its suite of Drive-Away VSAT Antenna line that includes Pioneer™ and Enterprise™ type of antennae: and the POLARIS K-Class ultra-compact, high performance, high quality, roof mount antenna system.

The POLARIS130K and POLARIS155K antennas use the patent pending Next Generation Removable Roto-Lok® Cartridge Drive System, specifically designed for no maintenance, ease of repair, and zero backlash. These antennas encompass the industry well-known Roto-Lok® wire drive pedestal and iPoint™, auto-positioning controller and amplifier into the antenna enclosure, making the system a robust standalone sub-assembly ready to install onto almost any vehicle.

With Integrated Auto-Pointing iPOINT Controller or separate Indoor Controller options, the new POLARIS K-Class Antenna acquires the satellite in less than three minutes. The iPOINT Auto Acquisition Controller uses industry standard position transducers and a sophisticated pattern recognition algorithm to confirm and refine its heading information using visible satellites.

"The system is simple to install, set up and use," stated Cristi Damian, VP Business Development at Advantech Wireless, "combined with the New Generation of High Power GaN based SSPAs/SSPBs, the POLARIS K-Class Antennas offer the ultimate solution for Broadcast Applications."

Circuit Emphasis

BringCom, Inc. has been awarded a new contract and several contract extensions by prime U.S. Government contractors.

The awards, collectively valued at $3.8 million, call for BringCom to provide satellite and fiber optic circuit services to U.S. Department of Defense-related projects operating in Africa, the Middle East and the Caribbean/Latin America regions.

The satellite contracts use BringCom's teleport facilities in Djibouti City, Republic of Djibouti, and Sterling, Virginia, USA, with connectivity through the Apstar 7 and Amazonas 2 satellites.

BringCom will also provide managed fiber-optic connectivity from Africa and the United States to customer-designated termination points under these contracts.

"These new or extended contracts reinforce BringCom's position as the reliable provider of carrier-grade fiber-optic and satellite services to U.S. Government prime contractors and international customers operating in these global telecommunications markets," said Fabrice Langreney, President and CEO of BringCom. "The awards of additional contracts from international customers with demanding requirements validate BringCom's strategy and investment in these regions. They are also a reflection of the dedication of BringCom's staff and partners in meeting and exceeding the needs of its customers with very challenging telecommunication applications."

The contracts use BringCom's extensive local partnerships in the Africa and Middle Eastern regions. They include connectivity, construction of in-country facilities, and continuing maintenance activities by BringCom's satellite and fiber network-capable Network Operations Centers (NOC) in both the United States and Djibouti.

Added Value, No Added Cost

In a rapidly changing technological world, speed and costs are everything in the world of connectivity.

NewCom International and XipLink have teamed up to increase the bottom line QoE (Quality of Experience) for clients by adding value to their broadband experience at no additional cost, while preparing their network architecture for further efficiency enhancements with optional equipment.

Jaime Munera, Director of Product Development & IT of NewCom International, said, "The beauty of this technology is we have the infrastructure in place to enhance the service given to all our clients on the iDirect platform in USA, Latin America and Africa, thus increasing their bandwidth efficiency. When our customers choose NewCom's iDirect-based service for your satellite communications needs, they automatically benefit from our built-in WAN optimization solution that optimizes outbound traffic across all of our multiple networks."

Munera explains that customers can also benefit even more with optional low cost equipment at their remote end for a 2-sided boost in performance and the result is an increased QoE on as much as 30 percent.

Jack Waters, CEO of XipLink, said, "There was no hesitation on the part of NewCom when it became apparent that this technology was available to improve customer quality of experience (QoE). The NewCom technical team was extremely diligent and helpful adjusting and improving the technology to insure their customers received the best possible service benefit from XipLink's products."

Mission Possible

On April 17, 2013, St. Thomas More Cathedral School (STM & ATK) kicked off Mission Possible.

STM's goal is to be the first K-8 program in the United States to have a student-built satellite launched into orbit by 2014. Reverend Robert Rippy, Rector of the Cathedral of St. Thomas More, said, "It is a blessing to have our students rooted in faith as they explore new frontiers."

Eleanor McCormack, Principal, said, "It is an honor and a thrill to provide the students of St. Thomas More Cathedral School with such an awe-inspiring opportunity."

With the assistance of STM Computer Teacher, Melissa Pore, and STM parent and NASA Mission Manager, Joe Pellegrino, STM students will help build a CubeSat satellite and then use the data the satellite collects for school research purposes. CubeSats are a class of research spacecraft called nanosatellites. The cube-shaped satellites are approximately four inches long, have a volume of about one quart and weigh about three pounds.

"As teachers, we have to take risks to meet the academic needs of today's students. We need to provide opportunities for them to discover and apply learning to real world scenarios. Students are able to formulate their own ideas and conclusions through teacher-guided activities and make them the leaders of their own learning experience. We will build tomorrow's leaders by working hard today. Our future is in their hands," stated Melissa Pore, STM Computer Teacher and Mission Manager.

"It was a teacher who sparked my interest in engineering when I was in grade school which led to rewarding career in the space industry. I hope to do the same with this CubeSat mission. For me, mission success is when a child turns to his / her parents and says 'I want to become an engineer or scientist'" expressed Joe Pellegrino, NASA Mission Manager and STM Parent.

"This is the kind of venture that inspires kids to make a career out of science," asserted Stephen Rozzi, STM parent and Spacecraft Manager.

STM is the first K-8 program to offer this exciting opportunity. Students, through hands-on work, will develop skills and experience used in the aerospace industry. The CubeSat program creates important educational opportunities for our future leaders.

STEM is an educational initiative that focuses on the coordination of science, technology, engineering, and math in classroom lessons. The STM faculty is coordinating the STEM philosophy with the curriculum guidelines of the Diocese of Arlington to provide students with an authentic educational opportunity.

According to STM's Assistant Principal, Marie Scheessele, "We are examining all curriculum guidelines including language arts, religion and fine arts to integrate STEM easily into a student's daily educational experience."

STM received its first donation of $10,000.00 from ATK Space Systems to assist in the building and launching of this project. ATK Space Systems is a strong supporter of STEM initiatives in K-12 schools focusing on inspiring young people to pursue careers in science and engineering.

If you would like to learn more about the project, donate resources or your time, please contact Melissa Pore at ***mpore@stmschool.org***.

Staying In Touch

Eutelsat Broadband's satellite business solution is helping workers from Ross-Shire Engineering stay in touch while constructing water treatment plants for Scottish Water Solutions II in some of the remotest areas of the country.

The engineers use the Eutelsat satellite broadband service for email and accessing systems at head office as well as for Voice over IP telephone calls while on site.

So far installed at five sites, including the Shetland Isles and on remote areas of the west coast, by Scottish reseller Internet Anywhere, Eutelsat provides an always-on satellite service delivering speeds of up to 20Mbps downstream and 6Mbps upstream, with no need for a telephone line.

The equipment is comprised of a small satellite dish and a modem or wifi router, which connects to the computer. The company first turned to Eutelsat when it found that its engineers were struggling to get a mobile 3G signal for telephone calls or data at some of the remotest Scottish Water Solution II construction sites.

Ross-Shire Engineering has an average of 10 workers on site at any one time building drinking water treatment plants for Scottish Water and the team are able to connect to the Eutelsat system via the wireless router and then access their office systems via VPN or make VoIP calls.

The service uses Eutelsat's KA-SAT High Throughput satellite, which ushered in a new era of competitively priced, satellite-delivered services for consumers, businesses and broadcasters when it was launched in 2011.

The satellite forms the cornerstone of a 350m euros state-of-the-art communications infrastructure, which includes a sophisticated on-ground network made up of eight main satellite gateways across Europe connected to the Internet by a fibre backbone ring.

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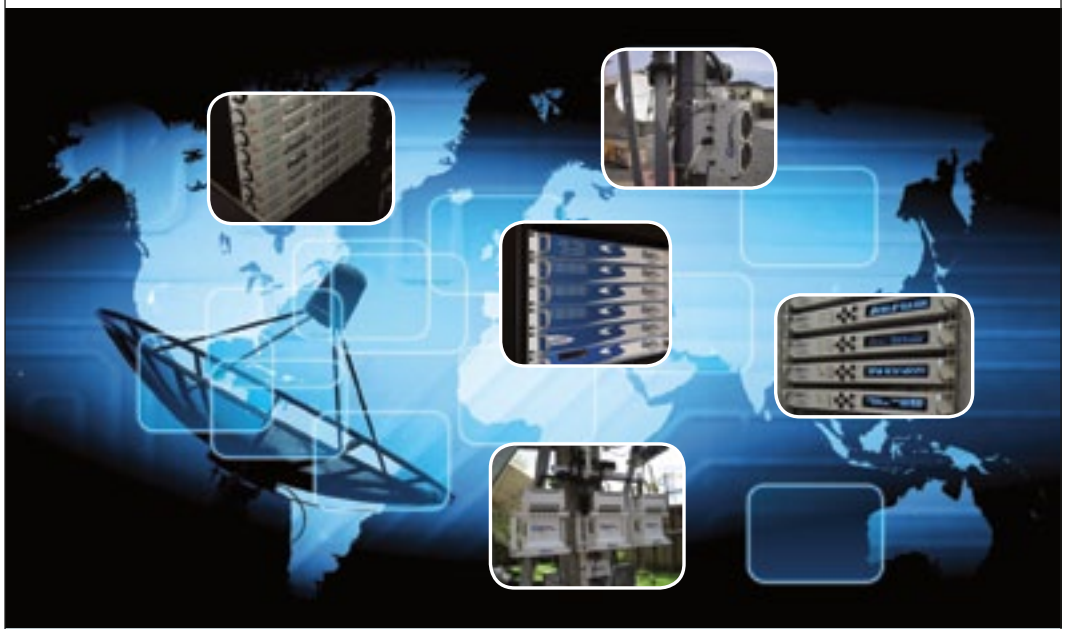
We are prepared to assess how our technologies can reduce your OPEX/CAPEX and increase your satellite link throughput. Contact us to learn more about how our market-leading bandwidth efficiency and link optimization solutions can benefit your network.



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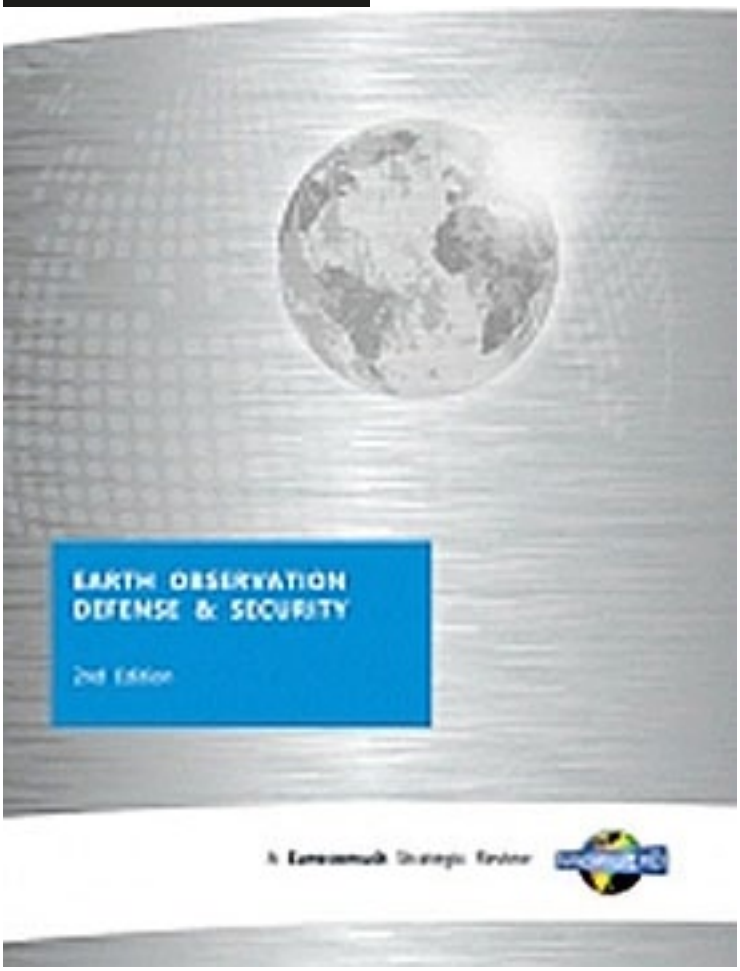


According to Euroconsult's newly released research report Earth Observation: Defense and Security, demand for data to support imagery intelligence (IMINT) continues to grow globally to support defense activities and military operations.

However, as a result of the relatively high cost to maintain and launch EO defense satellites and the investment required to fund R&D, only 11 countries have developed EO defense capacity dedicated to supporting IMINT.

"Since only a few countries operate proprietary high-resolution satellites, the commercial sector is expected to make up a significant part of future demand for IMINT," said Adam Keith, Director of Space and Earth Observation at Euroconsult and Editor of the report.

"The number of unclassified defense and dual-use satellites launched by these 11 countries totaled 75 over the past decade. This figure is expected to rise to 100 satellites over 2013-2022, with a further three countries launching dedicated capacity. With costs remaining high, and budgets strained, development of dual-use systems is therefore expected to increase, with costs spreading across multiple government departments in order to fulfill the data requirements of numerous public sectors, such as engineering, infrastructure and resources monitoring.

Further mechanisms to re-coup system costs and/or to support national industry will include commercialization of government satellites through dedicated data distribution entities, such as those already observed in France and Italy through the sale of data from their dual-use systems.

In 2012, 77 percent ($990 million) of the total $1.5 billion EO commercial data market was attributed to defense customers, realizing a CAGR of 20 percent over the last five years. Of this $990 million, close to 50 percent is attributable to the U.S. government, which, through the National Geospatial-Intelligence Agency (the NGA), represents the first customer of commercial EO data.

The increased level of procurement by the NGA drove growth in the overall commercial data market from 2006 to 2010. However, following the award of Enhanced View contracts to U.S. operators and data providers (DigitalGlobe and GeoEye) in 2010, demand stabilized, and indeed, U.S. procurement is expected to drop in 2013, with Enhanced View impacted by austerity measures within the broader U.S. government, prompting the merger of the two companies.

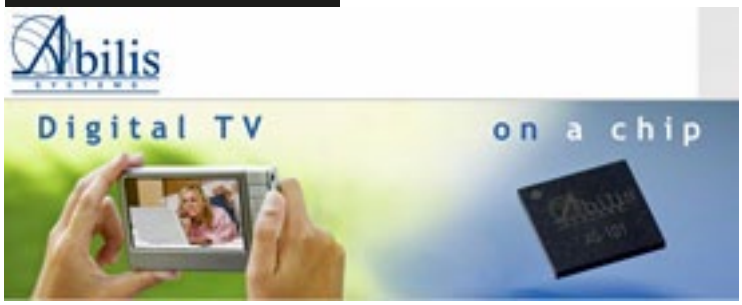
Growth in the commercial data sector is now being driven by wider global sales to defense users, particularly by countries with high IMINT requirements and limited viable proprietary solutions.

In order to meet these needs, commercial operators are finding success in providing direct access contracts to end-users, providing secure imagery access to defense clients. With continued high demand, revenues from commercial data sales to defense are expected to grow to $2.2 billion by 2022.

Over the last three years much has evolved in the wider defense environment. Continued global unrest drives requirements for satellite imagery to support defense applications, however this is being met by growing economic pressures in leading economies (particularly in North America and Europe) leading in the case of the U.S. to its support of the commercial sector being revisited.

In the second edition of Euroconsult's research report *Earth Observation: Defense and Security*, government attitudes towards imagery acquisition and satellite procurement are assessed in order to identify the preferred approaches to meeting defense requirements globally and to identify opportunities and risks for the commercial data industry in these challenging economic times.

Losing One's Head



Abilis Systems and MaxLinear have announced the world's first eight-channel satellite headless gateway reference platform.

This "headless gateway" platform addresses the ever-increasing demand for viewing of high-quality content on multiple screens. This platform is not directly connected to a TV, like a set-top box, but is network connected and accessible by multiple screens in a home.

Acting as a media server, these headless gateway platforms are optimized for SAT>IP and DLNA services. The gateway reference platform converts satellite TV content into IP packets for streaming in home, thereby enabling users to enjoy the benefit of watching today's DTH services on televisions as well as on IP-enabled devices such as tablets, laptops, smartphones, game consoles and other platforms.

The gateway platform has four RF inputs to be used with existing satellite dishes and low-noise block (LNB) down converters.

It combines the high throughput of the Abilis TB101 network processor with the MxL584 receiver to realize unprecedented low-power consumption and a very low bill-of-materials (BOM).

This new platform offers satellite operators a cost, performance, and size-optimized solution to expand their TV offering to tablets and smartphones.

The reference platform is very small and can be designed with multiple applications in mind, for example with a single LNB (using DiSEqC) up to four LNBs.

The small design is enabled by MaxLinear's highly integrated MxL584 Full-Spectrum Capture™ (FSC™) DVB-S/S2 receiver. The four-input MxL584 receiver integrates tuners required for multi-inputs, eight demodulators, and all the active front-end components, including the low-noise amplifiers (LNA) into a compact and cost-effective 10x10 QFN package.

Passing With Flying Colors

Artistic rendition of the Galileo satellites, image ESA. Courtesy of R. Kieffer.

The Galileo In-Orbit Verification (IOV) In-Orbit Test Review Board, held on April 9, 2013, at the European Space Agency (ESA) ESTEC facility in Noordwijk, the Netherlands, has been declared a full success.

The satellites, built by Astrium for validation of the European satellite navigation system Galileo, passed all their milestones. ESA confirmed that the satellites are fully operational after the launch and are capable of fulfilling the intended mission lifetime.

With this review, Astrium has demonstrated that the satellites are operating correctly and as predicted in ground-based tests, showing that the satellites fulfil their technical requirements. Routine operations are now able to take advantage of the lessons learnt during the in-orbit testing.

For Astrium, the development of the IOV satellites has a truly European dimension; it has involved hundreds of highly skilled people and 43 companies from 15 European countries.

The Astrium-built Galileo IOV satellites represent the first European navigation satellites with full functionality, initiating the build-up of the operational constellation. The first two IOV satellites were launched on October 21st in 2011 aboard the first Soyuz launch from Kourou. Both are well performing in orbit and have been transmitting all defined signals for more than a year now.

The second pair of IOV satellites were launched on a Soyuz rocket from Kourou on October 12, 2012, following a smooth, completely problem-free launch campaign. The following in-orbit of tests these satellites, reviewing the platform, payload and security issues, were completed by the end of February and revealed that the satellites and their payloads are performing well. This was formally confirmed by the Review Board on April 9th.

#2 Prep'd, #3 In Development

Photo of DubaiSat-2. Courtesy of SI.

Satrec Initiative (SI) of South Korea and the Emirates Institution for Advanced Science and Technology (EIAST) of United Arab Emirates jointly announced the development program of the DubaiSat-3 Earth observation small satellite system.

DubaiSat-3 will be a state-of-the-art small satellite carrying an electro-optical camera with 0.7-meter resolution imaging capability and weighting less than 350 kilograms.

The DubaiSat-3 program is the third space program of EIAST in collaboration with SI following the DubaiSat-1 (launched in July 2009) and DubaiSat-2 (ready for launch) programs.

The launch of DubaiSat-2 is expected in the third quarter of this year and it will be the first small satellite for commercial operation in the world that will provide 1-meter resolution image data.

EIAST will have the leadership in the development of the DubaiSat-3 system by maximizing the local activities in Dubai. SI has already signed an agreement with EIAST to provide technical consultancy for the DubaiSat-3 program this January.

Dr. Byungjin Kim, the President and CEO of SI, said "This third agreement with EIAST is a typical example that shows we have strong competitiveness in the small satellite market and we value the long-term needs of our partners."

Smartphones In Space

Three smartphones destined to become low-cost satellites rode to space last Sunday aboard the maiden flight of Orbital Science Corp.'s Antares rocket from NASA's Wallops Island Flight Facility in Virginia.

The trio of "PhoneSats" is operating in orbit and may prove to be the lowest-cost satellites ever flown in space. The goal of NASA's PhoneSat mission is to determine whether a consumer-grade smartphone can be used as the main flight avionics of a capable, yet very inexpensive, satellite.

Transmissions from all three PhoneSats have been received at multiple ground stations on Earth, indicating they are operating normally. The PhoneSat team at the Ames Research Center in Moffett Field, California, will continue to monitor the satellites in the coming days. The satellites are expected to remain in orbit for as long as two weeks.

"It's always great to see a space technology mission make it to orbit—the high frontier is the ultimate testing ground for new and innovative space technologies of the future," said Michael Gazarik, NASA's associate administrator for space technology in Washington. "Smartphones offer a wealth of potential capabilities for flying small, low-cost, powerful satellites for atmospheric or Earth science, communications, or other space-born applications. They also may open space to a whole new generation of commercial, academic and citizen-space users."

Satellites consisting mainly of the smartphones will send information about their health via radio back to Earth in an effort to demonstrate they can work as satellites in space. The spacecraft also will attempt to take pictures of Earth using their cameras. Amateur radio operators around the world can participate in the mission by monitoring transmissions and retrieving image data from the three satellites. NASA's off-the-shelf PhoneSats already have many of the systems needed for a satellite, including fast processors, versatile operating systems, multiple miniature sensors, high-resolution cameras, GPS receivers and several radios. NASA engineers kept the total cost of the components for the three prototype satellites in the PhoneSat project between $3,500 and $7,000 by using primarily commercial hardware and keeping the design and mission objectives to a minimum. The hardware for this mission is the Google-HTC Nexus One smartphone running the Android operating system. NASA added a larger, external lithium-ion battery bank and a more powerful radio for messages it sends from space. Each smartphone is housed in a standard cubesat structure, measuring about 4 inches square. The smartphone acts as the satellite's onboard computer. Its sensors are used for attitude determination and its camera for Earth observation.

The PhoneSat mission is a technology demonstration project developed through the agency's Small Spacecraft Technology Program, part of NASA's Space Technology Mission Directorate.

Satellite Telehealth

Value-Add Opportunities

By Vince Waterson, Chairman, and Charlie Nahabedian, CEO, Medex Spot

The life expectancy increase of baby boomers, a shrinking work force, inadequate funding of healthcare, a shortage of family doctors, plus high insurance premiums are all contributing factors leading to a primary healthcare system in the United Sates that's under extreme stress.

Fifty million people in the U.S. are without medical insurance—many are resorting to using hospital emergency rooms for minor illnesses as they have no insurance support. Many of these patients then avoid making the payments for their treatments. This leaves the hospitals with large, unpaid bills.

In 2010, one hospital in New York State lost $15 million on the operation of their Emergency Department, as the large numbers of patients that they were obliged by law to treat simply could not pay their bills.

There are many contributing factors. Ambulance chasing lawyers may not seem to be an obvious villain as a contributory cause in this dilemma. However, consider this—hospitals are so worried about being sued by patients that they frequently carry out unnecessary tests using expensive equipment and additional medical personnel. All to avoid a legal challenge to their work based on inadequate or inappropriate care. A change in the law that reduces how much hospitals can be sued for, monetarily speaking, would help ease this situation.

How many times have you had to fill out the same medical history forms when seeing a doctor for the first time? In this age of *Information Technology*, the U.S. medical industry is lagging behind Europe in terms of medical history automation and the better use of patient-centered services and databases. More can be done—and should be done—to automate the U.S. medical industry as one method to assist in curbing costs that are spiraling out of control.

The total U.S. health care spending in 2009 was approximately $650 billion above the expected cost levels. Two-thirds of the "excess" health care spending was directed toward outpatient care.

Direction + Solutions Needed For Developing Nations

There is an interesting phenomenon taking place in some developing countries where the governments are insisting foreign companies entering their borders should 'give back' to the indigenous people. The process has a name—*Corporate Social Responsibility* (**CSR**) and it's even been given a standard designation—**ISO 26000**.

Primary healthcare is high on the list for CSR donations; however, it's often delivered piecemeal using medical staff that possess varying degrees of capabilities The ISO 26000 currently does not address many quality of care issues.

A group of satellite and healthcare experts are in the process of forming a non-profit organization called the **International Satellite Telehealth Foundation** (*istfon.org*). ISTFON's mandate is to foster western standard healthcare practices by connecting *Telehealth* links via satellite to supervising medical staff in top tier hospitals to support local medical personnel and their patients in developing countries.

The Satellite's Role In Primary Healthcare

Satellites can play an important role in providing primary healthcare using Telehealth for developing countries as well as for facilities in urban, suburban, and rural areas of the USA.

Why would anyone want to use satellite in an urban U.S. location to provide primary healthcare, where there is surely Internet access? In a full service Telehealth system, it's important to have high quality video in order for the patient to acquire a competent virtual examination by the attending, remotely located medical professional. Typically, high resolution, two-way video over distance via the Internet is not guaranteed as far as quality is concerned, due to a variety of issues that range from peak use time periods and capacity to equipment failures.

There is another important reason to use satellite, and that is information security. A privately encrypted, two-way satellite circuit between patient and the medical professional which avoids the public networks protects patients' discussions and health records from the all-too pernicious hacking that is so prevalent on the Internet.

Additionally, overseas, satellite is often the only method whereby remote villages can be connected with hospitals for crucial Telehealth services. In Africa, for example, mobile clinics with primary healthcare equipment on premise as well as high technology devices, such as tuberculosis-detection X-ray machines, will soon be linked by satellite to a hospital in Belgium, where disease specialists can immediately evaluate the X-rays—taken mere minutes earlier—thousands of miles away.

Connecting The Dots

CVS, the U.S. drugstore company, is an innovator in Telehealth with walk-in, primary healthcare offered customers in their stores. Each walk-in clinic is staffed by Nurse Practitioners who may earn from $80-$100k per annum, plus cost factors for support staff. The ROI for these clinics typically requires 20 patients a day who pay upwards of $65 a visit to make such walk-in clinics profitable.

CVS garnered a profit on these clinics, requiring 10 years to do so. However, if the medical staff were to be moved from the front line to a call center, many more patients could be examined, more efficiently, and across a wider geographical area. However, you may ask, doesn't the doctor have to be present to make such examinations?

That was certainly the case until recent years—the advent of Telehealth allows medical practitioners to examine patients remotely. Backed-up by a supervising physician and specialists, the front line medical practitioner is the first professional who engages in triage and also administers the initial treatment prior to additional medical expertise being brought in by the doctor from the remote location to further consider the patient's case.

Manned MEDEX Walk-In Clinic

Satellite Telehealth: Value-Add Opportunities

The Role Of Automation In Primary Healthcare

Telehealth or *Telemedicine*? These two terms are frequently used to describe remote medical examinations. For the purpose of this article, Telehealth is the *one-on-one interaction between a patient and a medical practitioner*—Telemedicine is the *interaction between a medical specialist at a hospital and a medical practitioner with or without the presence of a patient*.

Telehealth has been traditionally used to provide chronically ill patients with vital signs monitoring equipment in their homes. This equipment is connected by phone lines or the Internet to a medical practitioner.

The growth of new FDA-approved Telehealth connected, vital signs monitoring devices has given rise to the potential for walk-in, primary healthcare kiosks in public places that are equipped with these devices and connected by a communications link to the medical practitioner.

One company which has perfected a self-service primary healthcare kiosk is **VideoKall** with its **MEDEX Spot Unmanned Micro Clinic**.

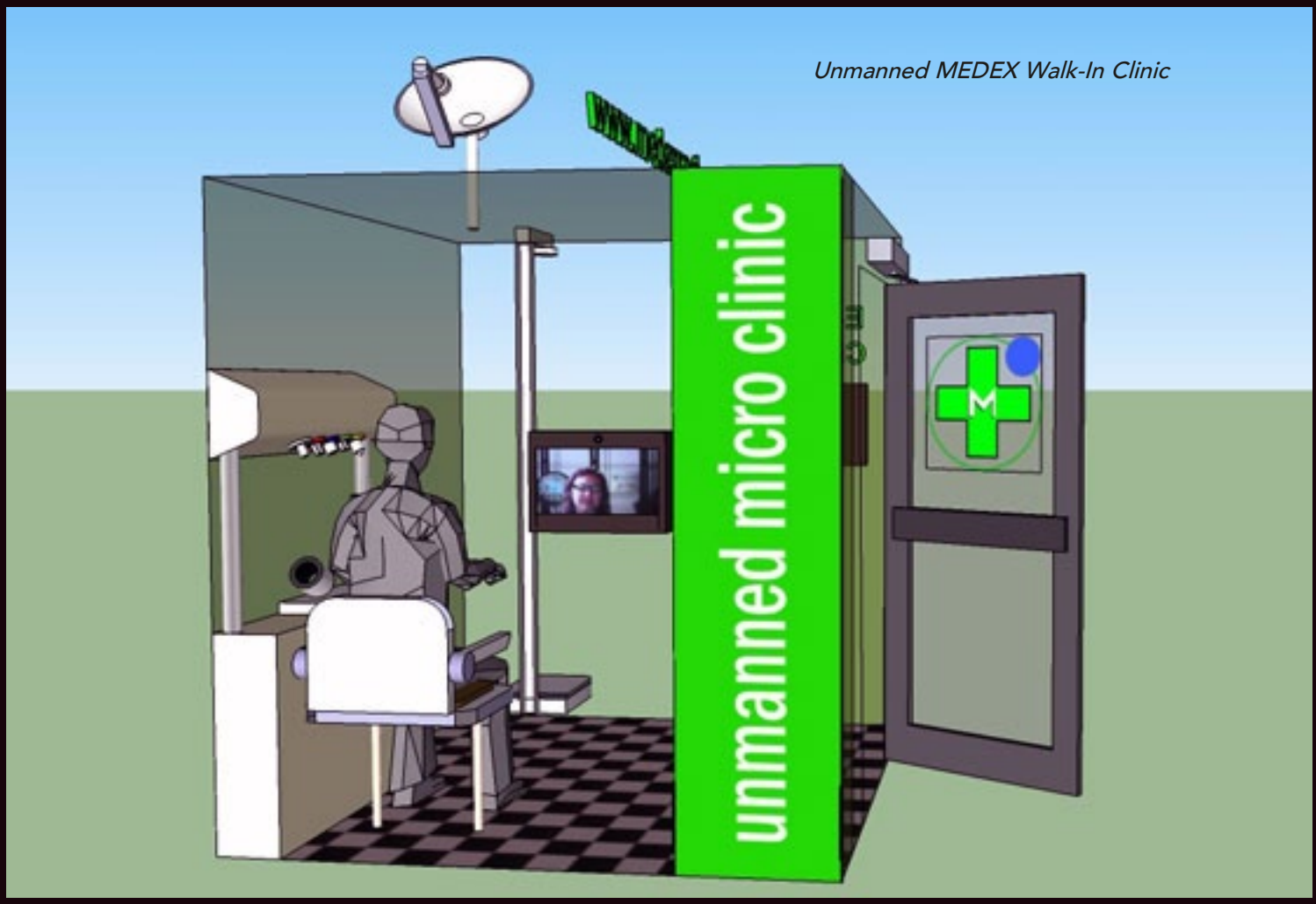
MEDEX Spot

The concept of vital signs monitoring devices in kiosks with a communications link to a medical practitioner may sound simple enough. The reality is that such is far from simple with an unmanned kiosk operation.

One principle issue is cleanliness. How do you make certain that the kiosk is always clean and the air, surfaces, and instruments are always sanitary? How do you allow a remote medical practitioner to, for example, place a stethoscope on a patients back, or allow a patient with chest pains to undergo an EKG, without a human presence at the kiosk?

The VideoKall Company solved these problems with their patent pending MEDEX Spot Unmanned Micro Clinic. This is, indeed, a big idea in primary healthcare as it enables wellness analysis to be provided on a self-service basis in a small footprint—a 5x6 foot size floor area cabin.

This unit can be easily located in drugstores, supermarkets, schools, senior housing centers, gas stations, airports, and even hospital Emergency Department waiting rooms. The other key aspects the unit addresses include optimal telecom architecture and medical call center equipment and operations.



Unmanned MEDEX Walk-In Clinic

Opportunities For Satellite Operators + Teleports

Satellite Telehealth services offers satellite operators and teleports the opportunity to sell value-added services on satellite. As healthcare is the one industry that will continue for as long as we inhabit the planet, this is a long term, sustainable, premium value-added service for the satellite industry. Even in the U.S. where there is an abundance of Internet connectivity, the flexibility and security offered by satellite-delivered Telehealth services has a strong position. Overseas, particularly in developing countries, the future for satellite delivered Telehealth services is without boundary.

VideoKall, which is already developing satellite Telehealth services for Myanmar and east and central Africa, welcomes the opportunity to work with satellite operators and teleports in the Asia/Pacific region and Africa that wish to leverage their satellite capacity with premium added value Telehealth services. More information can be found by visiting the company's web site ***www.medexspot.com***

About the authors

Vince Waterson has spent more than 35 years in the telecommunications industry in Europe, North America and Asia. His experience includes terrestrial wireless and satellite network implementation; satellite data broadcasting network design; plus satellite network system integration. In the late 80s, he invented FAXCAST, the first satellite based "group 3" facsimile broadcasting system. Ten years later he developed the technology for the Information Television Channel, the first satellite delivered EPG for cable TV head-ends in Asia operating on the Thaicom3 satellite.

Mr. Nahabedian has more than 40 years of management experience in telecommunications, manufacturing, software development, information technology, and services management. He has held senior executive positions from Director to CEO at wireless and telecommunications carriers, and computer system companies in small and large businesses. Charlie started his career at Bell Labs and AT&T and has received two patents as well as a national award for "Outstanding Contributions in a Field of Science."

MEDEX Micro Clinic

Satellite Telehealth

A Case In Point

By Tony Bardo, Assistant Vice President for Government Solutions, Hughes

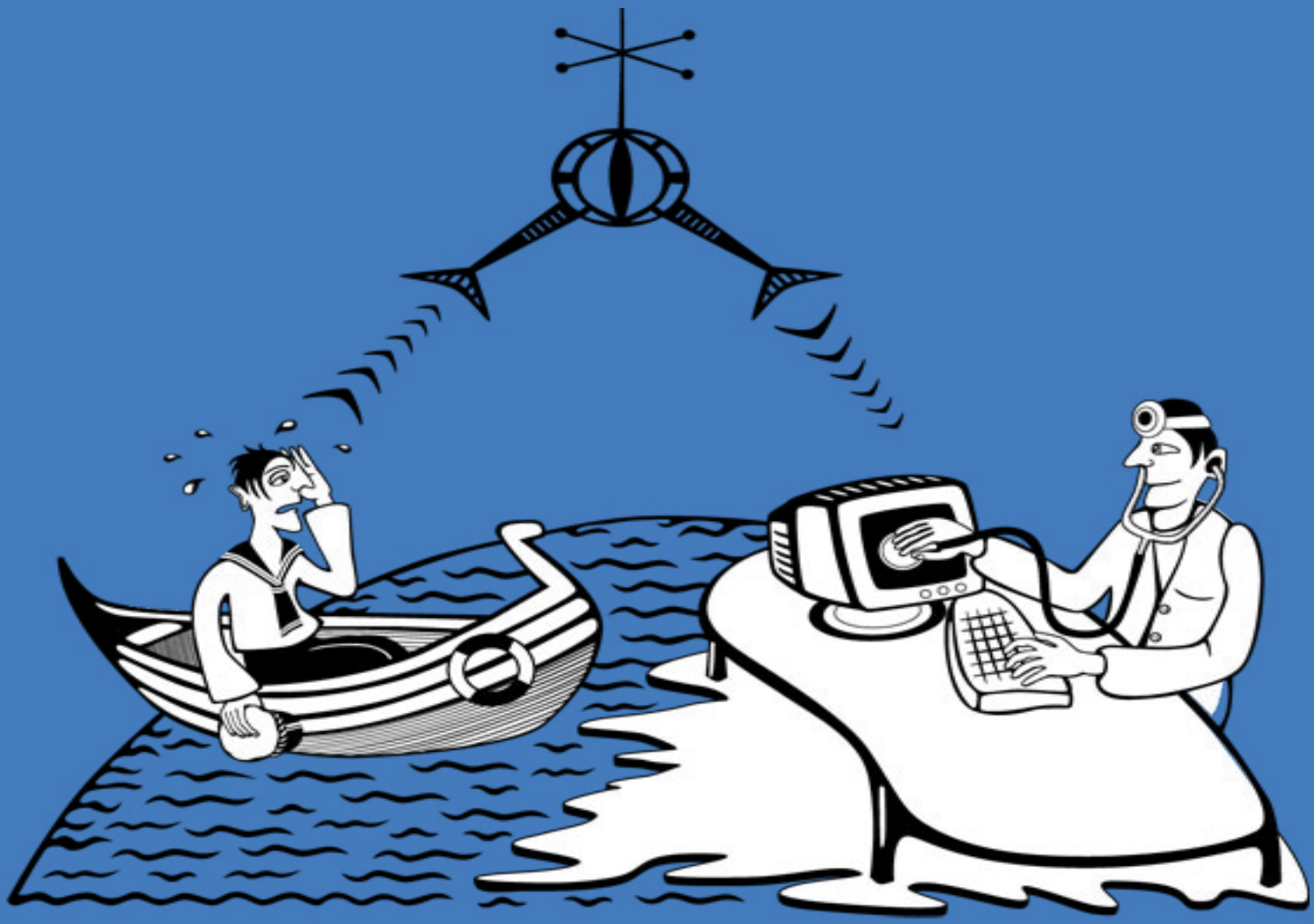
Many of us have a healthy aversion to doctors and hospitals. That said, we're grateful they exist when we need them—especially those of us who live in urban areas with some of the most cutting-edge health care facilities and services available nearby.

However, what about people who live in rural or remote areas that may be tens or even hundreds of miles from clinics? All too often, those patients are lucky to have medical care even at relatively close mobile clinics.

While the professionals at these mobile clinics are committed to offering the highest quality medical care, they are usually in areas with limited or no broadband Internet service—making it impossible to access the patient's electronic health records, or, for example, hold an on-line consultation with another physician for a particularly difficult diagnosis.

That's now changing, as evidenced in Northern New England, thanks to **Hughes** and the **New England Telehealth Consortium** (**NETC**).

NETC is a federally funded consortium of healthcare providers that serve more than 400 sites in Maine, New Hampshire and Vermont. NETC's mandate is to create a shared network among rural and urban healthcare facilities, research and academic institutions, as well as medical specialists, all with the goal of improving patient care throughout the region.



In building the network, NETC relied on the existing terrestrial infrastructure—until the infrastructure could no longer support users. The challenge became to bring broadband connectivity to the mobile clinics, no matter their location, even where no terrestrial service was present.

For example, harvesting Christmas trees, blueberries and apples occurs on farms in many of New England's most rural areas. Similarly, people on many islands located off the coast of New England must typically take a boat to shore and then drive to a clinic or hospital, which takes them away from their homes and jobs and can be costly.

NETC researched the feasibility of employing wireless networks and discovered only about 80 percent coverage—completely insufficient for developing a state-of-the-art telehealth network. It's all well and good that wireless coverage is available in many locations, but the "many" locations aren't enough if you're located at a site a few miles down the road from the mobile clinic and you don't have access to transportation.

NETC's problem is not unique. Recent **Federal Communications Commission** data indicates more than 14 million U.S. households in rural and even ex-urban areas are either unserved or underserved by terrestrial broadband. The answer is today's satellite broadband technology, which is high-speed, affordable and available virtually everywhere—nationwide.

As a global leader in broadband satellite networks and services, Hughes was up to the task of implementing such services. Hughes supplied a complete connectivity solution for mobile clinics, combining its high-performance routers integrated with **AvL Technologies**' auto-deploy antenna, enabling a wide range of value-added services, such as video conferencing, prescription dispensing, voice calls, transfer of Electronic Health Records, viewing of digital images, telemedicine and digital messaging.

This powerful transportable solution can be set up rapidly and automatically establishes connectivity with the **Hughes *SPACEWAY® 3*** broadband satellite throughout the NETC service area, harnessing the power of its on-board switching and spot beam technology to provide considerably higher speeds than could be obtained with traditional satellites.

Hughes and NETC are scheduled to complete the network installation in April, including the core facility, truck-based units and a ship-based installation. Soon, whether you ski in the White Mountains of New Hampshire, or vacation on an island off the coast of Maine, rest easy—no matter how remotely located you may be, you'll still have access to state-of-the-art healthcare, thanks to the power of satellite.

About the author

Anthony "Tony" Bardo has 20+ years of experience with strategic communication technologies that serve the complex needs of government. Since joining Hughes in January of 2006, Bardo has served as assistant vice president of Government Solutions, where he is focused on providing Hughes satellite broadband applications solutions to Federal, State, and Local governments. Bardo also recently served as Chair of the Networks and Telecommunications Shared Interest Group (SIG) for the Industry Advisory Council, an advisory body to the American Council for Technology (ACT).

Hughes dishes installed atop three New England Telehealth Consortium vehicles.

SatBroadcasting™

4K Is Here + Now

By Chris Forrester, Senior Contributing Editor

Producers must start preparing...

This year's recent MIPtv 50th Anniversary (Cannes, France, April 6-11) is, in part, a celebration of past achievements. However, MIPtv is also looking forward to broadcasting's next major move.

MIP is the twice-yearly programming market conference—the world's largest—where content of every type is bought and sold. It is **Ultra-HDTV** in all its forms that headlining consumer publication around the world. While much of the buzz is being generated from the display manufacturers and the usual 'early adopters', there's now little doubt that the technology is far from just being driven by the usual hype cycle—there's genuine enthusiasm from all the main industry players.

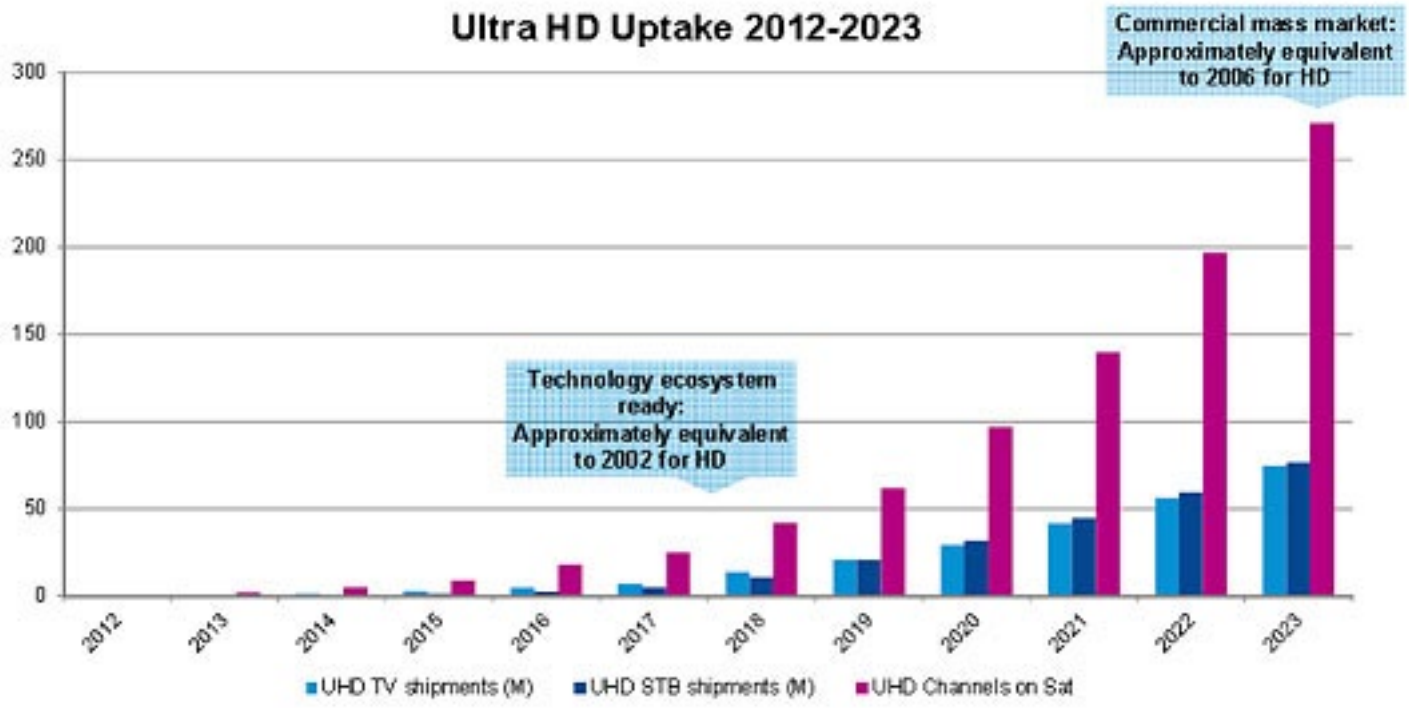
For example, the Japanese government is planning the world's first ultra-high definition 4K TV broadcasts as early as June of next year, just in time for Rio's World Cup soccer competition. Japan's **SkyPerfect TYV** will broadcast the soccer games in 4K. The news comes as the '*High Efficiency Video Codec*' (**HEVC/H.265**) compression standard was officially ratified by the **ITU** earlier this year.

This new TV standard is expected to drive **U-HDTV**, as well as *Over-The-Top* (**OTT**) video delivery of video content via telephone and cable wires. Japan's **NHK** pubcaster is still on track to launch 'full' **8K Ultra HDTV/2** broadcasts in 2016 and the company tested 8K from London's Olympic Park last summer.

UHDTV/1, also known as **4K**, offers definition four times higher than that of current HDTV. The technology was one of the main talking points at this year's giant **Consumer Electronics Show** (**CES**), where all the major TV manufacturers presented their UHD-capable models.

The **BBC** and **Sky** have undertaken trials of sporting events, including the Olympics and football from **Arsenal**'s **Emirates** stadium—no commercial services announced, as of this writing. Satellite operators **SES** and **Eutelsat** have demo channels on air for Europe and **Sky Deutschland** is expected to make what it describes as a major announcement at this year's August **IFA** consumer electronics show in Berlin. South Korea's **KBS** is testing 4K terrestrial transmissions. Similar tests are occurring in Spain and Italy.

Ultra HD forecast



Data: IHS Electronics & Media/SES

Meanwhile, the display manufacturers are ramping up production of ever-larger TV sets ready for receiving 4K broadcasts. These 4K displays, despite their current *Oligarch only* prices, are already selling, and savvy Hollywood producers—as well as those closer to home—are actually producing 4K content for the technology's introduction as well as future-proofing popular material for packaging into 'next generation' 4K Blu-ray discs.

However, let's be clear: 4K transmissions are not quite yet in sight. But the degree of planning now going on is surprising. *Berti Kropac*, who heads up **Kropac Media** and who shot Sky Deutschland's 4K soccer test-footage, said, "Sport looks wonderful in 4K. It´s breathtaking and you see things that you normally would only realize if you are on the location of the recording, standing next to the cameraman. It is amazing to see a close-up of a tiger, the fur, the whiskers, the eyes. For me it is like watching 3D without classes."

It is the same with the BBC. The BBC's *Natural History Unit* (**NHU**) is busy filming *Survival*, an epic 6-part series, partly in 4K. *Mike Gunton* is creative director at the NHU and has a spectacular pedigree at the BBC plus an enthusiasm for 4K, especially when taken holistically as part of potential theatrical and **IMAX**-type releases of its output. The BBC, working with Japan's NHK, also trialled the 'full fat' version of 8K at last year's **Olympic Games**.

The message is echoed in Europe where the **4EVER** consortium, backed by the **French Ministry of Industry**, look to make the current TV production and delivery chain capable of handling next-generation 4K content. The government support is helping a number of French-based companies, including compression experts **ATEME**, **Orange Labs**, **France Televisions**, **Technicolor®**, **TeamCast**, **DOREMI**, **GlobeCast**, and **Institut Télécom ParisTech**, to determine how to make 4K workflows and distribution a practical reality. 4EVER's aim is to wrap a complete production and transmission chain by the end of this year. In Spain, transmission company **Abertis** trialled 4K transmissions during the **Mobile World Congress** in Barcelona at the end of February.

Most industry observers expect 4K to first appear in a payTV environment—no surprise that established players such as **DirecTV** in the USA as well as **Sky** in Europe are paying attention to the new technology.

DirecTV's CEO *Mike White*, speaking on an analyst's call in February, was candid. "In terms of 4K, I don't want to get into the details on our longer-term product strategies, but DirecTV has a heritage of wanting to have the best sound and pictures. We are continuing to invest in the next generation of both sound and picture. [The content has] to be shot in 4K. So, again, I think you're probably a couple of years out. But it's a very exciting technology, and frankly, we're very interested in kind of how fast it will [impact] with consumers and certainly taking that into consideration in our longer-term product plans."

SatBroadcasting™: 4K Is Here + Now

Ultra-HDTV

The 'hype cycle' is happening, but in truth there are quite a few ducks that have to be lined up to make 4K and 8K transmission a reality.

- 1 Image capture, affordable cameras and data storage
- 2 Content, being created
- 3 Displays, at affordable prices
- 4 Broadcasters, transmitting U-HD
- 5 Set-top converter boxes, suitable for 4K

Ultra-HDTV: Unravelling the acronym soup

- 4K for cinema covers a pixel format of 4096 x 2160 (8.84 megapixels)
- DCI 4K Native resolution covers 4096 x 2160 (8.84 megapixels)
- DCI 4K Cinemascope (cropped) covers 4096 x 1714 @ 2.39:1 (7 megapixels)
- 4K for TV covers a pixel format of 3840 x 2160 (8.29 megapixels)
- 8K for TV covers a pixel format of 7680 x 4320 (33.2 megapixels)
- UHD/1 - same as 4K for TV
- UHD/2 - same as 8K for TV
- Super Hi-Vision – same as 8K for TV

Data: SMPTE/ITU

In Japan, there is their confirmation that 4K will be a reality in 2014, helped by a Japanese government initiative, and more than two years ahead of the already accelerated 2016 test-transmissions of 8K. The key question is whether this government initiative will lead to a faster or earlier development of the market cycle as well as improve Ultra-HD take-up rates. **Northern Sky Research** said, "The [Japanese] government initiatives on the supply side will have some positive effect on the ecosystem. Developments in next-generation compression standards, which in NSR's view is one of the most important to truly jumpstart the market, should proceed at a faster rate."

Futuresource's research consultant *David Watkins* admits that 4K still has some serious obstacles to overcome, not the least of which is the lack of content as well as an addressable audience in the shape of 4K displays. "Despite these barriers, most major TV [display] brands will likely launch 4K models over the next 12 months. Looking to the broadcast industry and payTV, the primary challenge is the increased bandwidth required to transmit 4K. Futuresource believes that there is a positive commercial scenario for consumer 4K."

The **European Broadcasting Union**'s *David Wood* is also positive. "Ultra-HD is not just an idea or someone's dream. The technical standards were agreed by all the nations of the world last August. Ultra-HD trials have already begun in Korea for terrestrial broadcasting, and these will continue. SES and Eutelsat are making trial transmissions with satellites. We could look forward to Ultra-HD internet trials later this year. ***The 'go' button has been pushed***."

Shooting in 4K

Pressing the 'GO' button on 4K needs, at least, 4K-suitable cameras. For a couple of years the Red Epic camera has been in use for Hollywood productions (and which enables shooting in 3K, 4K and 5K) and more recently Sony has been stunning the world with its impressive F65 camera system, which exceeds the resolution (exposure latitude, dynamic range, wider color gamut) of any model on the market.

Broadcasters are already tapping into the technology even though the prospect of them transmitting in 4K is perhaps some time off. One example is NBC which has used Sony Pictures Television (SPT) to shoot/test 4K on its 'Save Me' comedy show with Anne Hache. Showtime's 'Masters of Sex' drama series (starring Michael Sheen and Lizzy Caplan) was shot on an F65. SPT's Culver City Colorworks facility has been created in part to ensure that episodic TV can be produced in 4K at the same pace as 'ordinary' HDTV. M. Night Shyamalan's upcoming 'After Earth', scheduled for release next year by SPT's Columbia Pictures, is the first major motion picture to be shot using Sony's F65 camera. MIPtv's 4K Super Session will be showing a clip from the movie.

Cisco-NDS, on when broadcasters will be ready for 4K

"This is a hard question and the answer is dependent upon the demand created for Ultra HD content and how successful the TV manufacturers are in selling Ultra HD screens to the public. The demand for Ultra HD content is likely to increase rapidly over the next two years but may first be met by non-broadcast means, be it Ultra HD games, downloaded or streamed OTT content, or even user generated content from consumer cameras (Go Pros etc). In terms of true broadcast we are likely to see a roll-out start slowly in 2014 as High Efficiency Video Codec chipsets and encoders become available. Traditionally a major global broadcast event, such as the Olympics, has been used as a catalyst for the broadcast industry to adopt new technologies. Ultra HD broadcast will probably follow the same pattern."—Guillaume De Saint Marc, Office of the CTO, Service Provider Video Technology Group, **Cisco**, U.K.

Set-top box makers Pace, on when broadcasters will be ready for 4K

"Many of our customers are looking hard and/or trialling UHD this year. This has been pre-empted by enabling technologies developing, such as: U-HD camera technologies, compression technologies and the commercial availability of TV screens. It is clear that for some the World Cup 2014 and the 2016 Olympics remain key broadcast events to target trials. Considering the end-to- end content flow process it is likely to become mainstream 2015+."—Darren Fawcett, **Pace**, Chief Technical Engineer, U.K.

The EBU's view, on when broadcasters will be ready for 4K

"Ultra-HD is not just an idea or someone's dream. The technical standards were agreed by all the nations of the world last August. Ultra-HD trials have already begun in Korea for terrestrial broadcasting, and these will continue. SES and Eutelsat are making trial transmissions with satellites. We could look forward to Ultra-HD Internet trials later this year. The 'go' button has been pushed."

"But, no one is going to provide serious broadcast or broadband services until the Ultra-HD displays are in the public's hands. They will need to be within reach of the public financially. There are some sets available today, but they are very expensive. To be realistic, the prices are probably not going to lead to volume sales until 2015/16. I think that's the time we may see the first serious Ultra-HD broadcast services. For Europe and the U.S. these will probably be Pay TV services. For Japan and Korea, which are leading the world in Ultra-HD, the services may be rather wider in nature."—David Wood, Deputy Director, **EBU Technical**, Geneva, Switzerland

Kropac Media, on what's best in 4K

"All kind of sports are wonderful to see in 4K, it´s like looking through a window into the stadium, or the racetrack. You really get the feeling of being on location. But also documentaries about nature and wildlife are absolutely terrific in 4K. Movies, of course, as well as drama. And not forgetting the commercials. What I don´t yet see in this new ultra resolution is soaps or talkshows, because you need time to create breathtaking pictures with this extreme resolution."—Berti Kropac, MD, **Kropac Media**, Germany

BBC Natural History Unit, on investing for the future

"We are continuing to invest in the next generation of both sound and picture. [The content has] to be shot in 4K. So, again, I think you're probably a couple of years out. But it's a very exciting technology, and frankly, we're very interested in kind of how fast it will [impact] with consumers and certainly taking that into consideration in our longer-term product plans."—Mike Gunton, **BBC Natural History Unit**, U.K.

DirecTV, USA, on responding to customer demands

"4K is a very exciting technology, and frankly, we're very interested in kind of how fast it will [impact] with consumers and certainly taking that into consideration in our longer-term product plans."—Mike White, CEO, **DirecTV**, USA

The BBC's view

"Touching the skin, feeling the mud..."—Mike Gunton, head of the BBC's Natural History Unit in Bristol, U.K.

When will 4K transmission start?

"Looking to the future the meaning of transmission is becoming a bit blurred. Audiences now receive content in so many ways; in the living room, in the cinema, on smart phones, their laptops or elsewhere—at different resolutions and bit rates, what is meant by transmission is no longer a straightforward description. However, crucially for us in shooting nature sequences on large format cameras we can deliver content and innovation in the pictures we produce which will be appreciated on whichever screens our audiences get to see it."

Shooting in 4K. Is the extra cost worthwhile?

"The team didn't jump straight into the world of 4K, in fact quite the opposite. We were cautious and a bit nervous—would the cameras be robust enough? What would the 'aesthetic' of the images be like? And how about all the extra data generated? Frankly, was it worth it for just more pixels? But lots of camera testing (meticulously done by members of the Survival production team; Rupert Barrington, Tom Hugh Jones and cameraman Paul Stewart) gradually convinced us we were on to something new in terms of a look."

"Taking courage in our hands we set off on our first 4K shoot 'in anger'—filming elephants for Survival with veteran cameraman Martyn Colbeck. So nervous were we that we took a P2Varicam along just in case—but half way through Martyn emailed back saying, in colourful language, he loved the camera and what's more the images it was producing. Sure enough back at base the reason for his enthusiasm was there to see—the textures, the subtle and flexible application of slo-motion and the astonishing detail made it feel like you could step into the frame and touch the skin, feel the mud the elephant was wallowing in and all the water spraying around. Most excitingly it suited the editorial ambition of survival perfectly—an extra dimension of connection with our subjects."

"But as well the expansive range of frame rates and the dramatic 'look', it's fair to say that we have seen benefits in many other areas—the improved dynamic range, light sensitivity and greater colour palette, and the potential to grade the RAW images has been welcomed by the photographers and proved of real benefit to our producers."

"Also, shooting at 4K opens up creative flexibility in the cutting-room because of the amount we can zoom into a 4K shot, and still get an HD shot out of it. This allows us to get greater close-ups, create two shots sizes from one shot, to create zooms, or to go in on a static shot and pan across it to create a more dynamic image. This really hit home when we worked on a shot of a tiger chasing deer from a shoot in India. In the original, 4K shot, the tiger pounds across the plain, and occupies perhaps one-third of the frame. By zooming in, we can now create a shot in which the tiger is running at full speed, completely filling the frame from nose to tail. An otherwise impossible shot to film."

4EVER's view, from France

When will 4K transmissions start?

"It is too early to predict anything precisely because even though TV screens are starting to become available on the market, 4K production is far from common—yet, and is tending to target the cinema industry. Besides, we think that moving towards Ultra-HDTV does not only involve spatial definition, but also temporal and colour definitions, so we can't tell now if 4K on its own is enough to evolve towards "beyond HD" transmissions. More studies are needed, especially subjective evaluations of perceived quality. Last, but not least, compression is a crucial element in the TV transmission chain; we think that newly release standard "HEVC" first has to be deployed to envisage UHDTV transmission."

"We are also confident that current extra cost of 4K production will decrease when more equipment becomes available, especially TV production equipment like broadcast cameras at least."—Maryline Clare-Charrier, "4EVER" collaborative project leader/Orange Labs".

for Enhanced Video ExpeRience. ***www.4ever-project.com****.*

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Satellite Focus

Telesat's Anik G1

An International Launch Services (ILS) Proton rocket successfully launched Telesat's powerful *Anik G1* satellite from Pad 39 at the Baikonur Cosmodrome on April 16th at 12:36 a.m. local time (6:36 p.m., GMT, on April 15th).

***Anik G1* will be located at 107.3 degrees West and provide a range of communications services that include Direct-To-Home (DTH) video for Canada, X-band for government applications in the Americas and Pacific Ocean Region, and C-and Ku-band services in South America.**

The Satellite

Telesat's *Nigel Gibson*, the company's vice president of international sales, offers his insights regarding the Anik G1 satellite and the firm's focus on South America during a conversation with *SatMagazine*.

SatMagazine (SM)

Nigel, what's the best news for Telesat's international customers following the successful launch of Anik G1?

Nigel Gibson

The best news for international customers is that Anik G1 brings new capacity to South America. An additional 12 C-band and 12 Ku-band transponders from Telesat's 107.3 degrees West orbital location. Anik G1 offers single beam coverage of the entire continent in C-and Ku-band and is ideal for VSAT, video and cellular backhaul services.

SM

Why is the South American satellite capacity so important at this time?

Nigel Gibson

Attractive C-band and Ku-band capacity with good look angles and full continental coverage has been in short supply over South America. This has caused some projects to be delayed while others have opted for interim solutions that may not offer the robust and reliable communications links Anik G1 can deliver. Telesat can now go to the market with winning solutions in both C-band and Ku-band. Very few satellite service providers have this type of capability today.

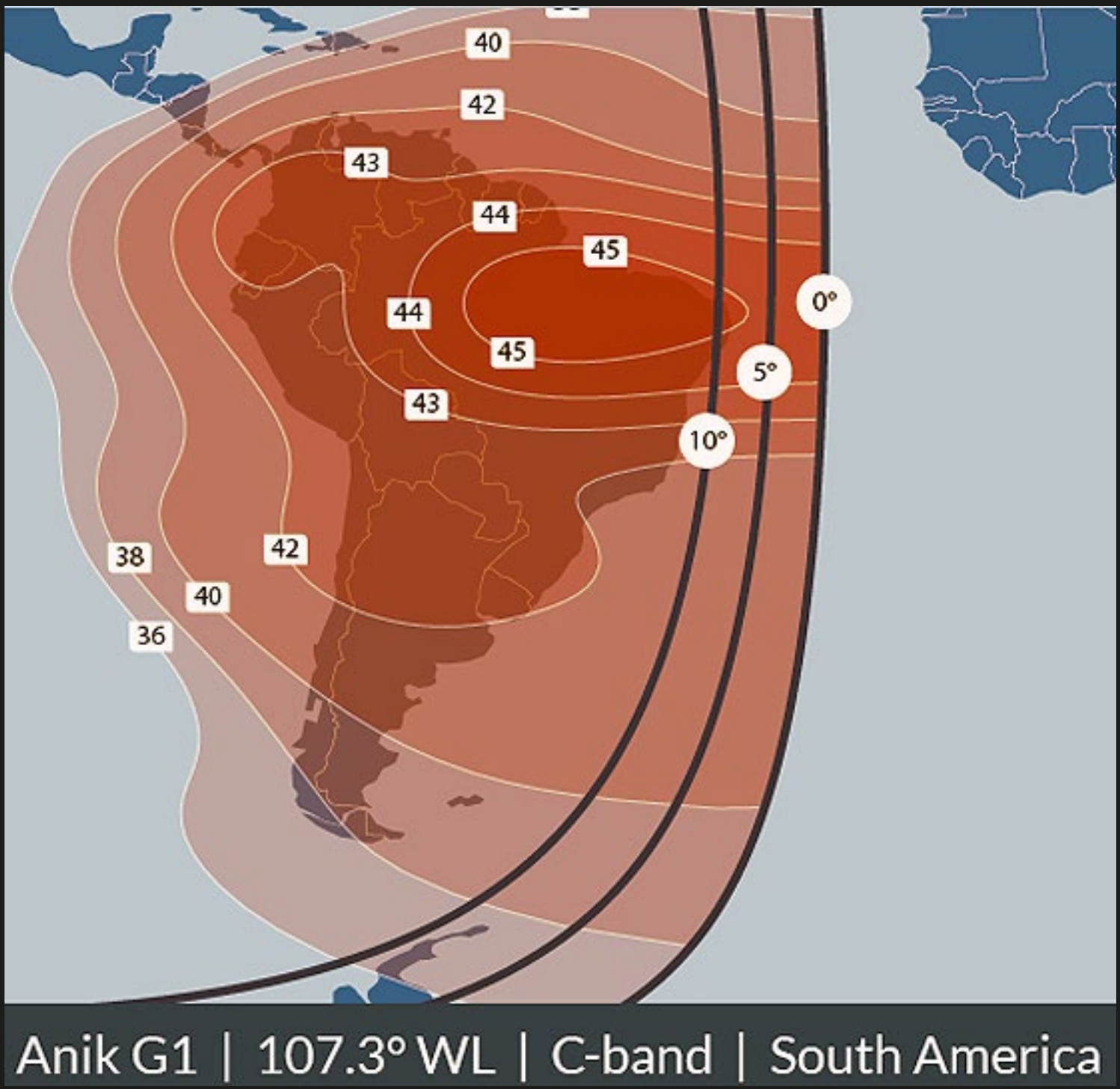
SM

What are the main advantages Anik G1 offers customers?

Nigel Gibson

In addition to having capacity available now, customers have flexibility to design networks in either C-band or Ku-band. Anik G1's power across the continent can yield very high data rates and network efficiencies. For example, Anik G1 Ku-band can deliver data rates of 60 to 80Mbps throughout South America using a 1.2 meter antenna. Its Ku-band coverage and power make Anik G1 the right choice for Panasonic Avionics that is expanding its aeronautical broadband service over Latin America by using Telesat's

The launch of Anik G1 @ Baikonur Cosmodrome. Photo courtesy of ILS.



Telstar 11N satellite in combination with Anik G1. For cell backhaul, Anik G1's C-band beam provides one of the most efficient solutions available with full continental coverage.

SM
How do South American customers view Telesat?

Nigel Gibson
Customers in the South American market are highly sophisticated and have a favorable view of Telesat. They appreciate that, with the successful launch of Anik G1, we now have four satellites serving the region. Those satellites are: ***Telstar 14R Telstar 12***, ***Anik F1*** and ***Anik G1***.

They also recognize that Telesat has been active in this market since the 1990s. Telesat saw the potential in South America and was among the first to bring Ku-band to the region with Telstar 14 at 63 degrees West, a Brazilian orbital slot. Customers also appreciate that, while Telesat is highly regarded for its technical expertise, we also have shown flexibility and creativity to close business. Telesat understands that our success in this market depends on the success of our customers and we have worked hard to build winning relationships that continue to pay off for both sides.

Satellite Focus: Telesat's Anik G1

"This is an important new satellite for Telesat and our customers. Anik G1 provides expansion capacity for DTH services over Canada, a new X-band payload for government services, and additional C-band and Ku-band capacity for South America, where demand continues to grow."
—Dan Goldberg, Telesat's President + CEO

"The SSL satellite platform provided Telesat with the flexibility to build on the commitment of one of its Direct-To-Home television customers with a satellite that serves multiple missions. We are known for being very responsive to satellite operators in order to tailor our cost-effective platform to meet business case requirements. In the case of Anik G1, we were able to combine a government payload, and a payload for Latin America with a high performance platform for delivering DTH service in Canada. Telesat is a great partner to work with and Anik G1 was completed on schedule and according to plan."
— Rich Currier, Sr. Vice President, Marketing and Sales, SSL

The Build + The Push

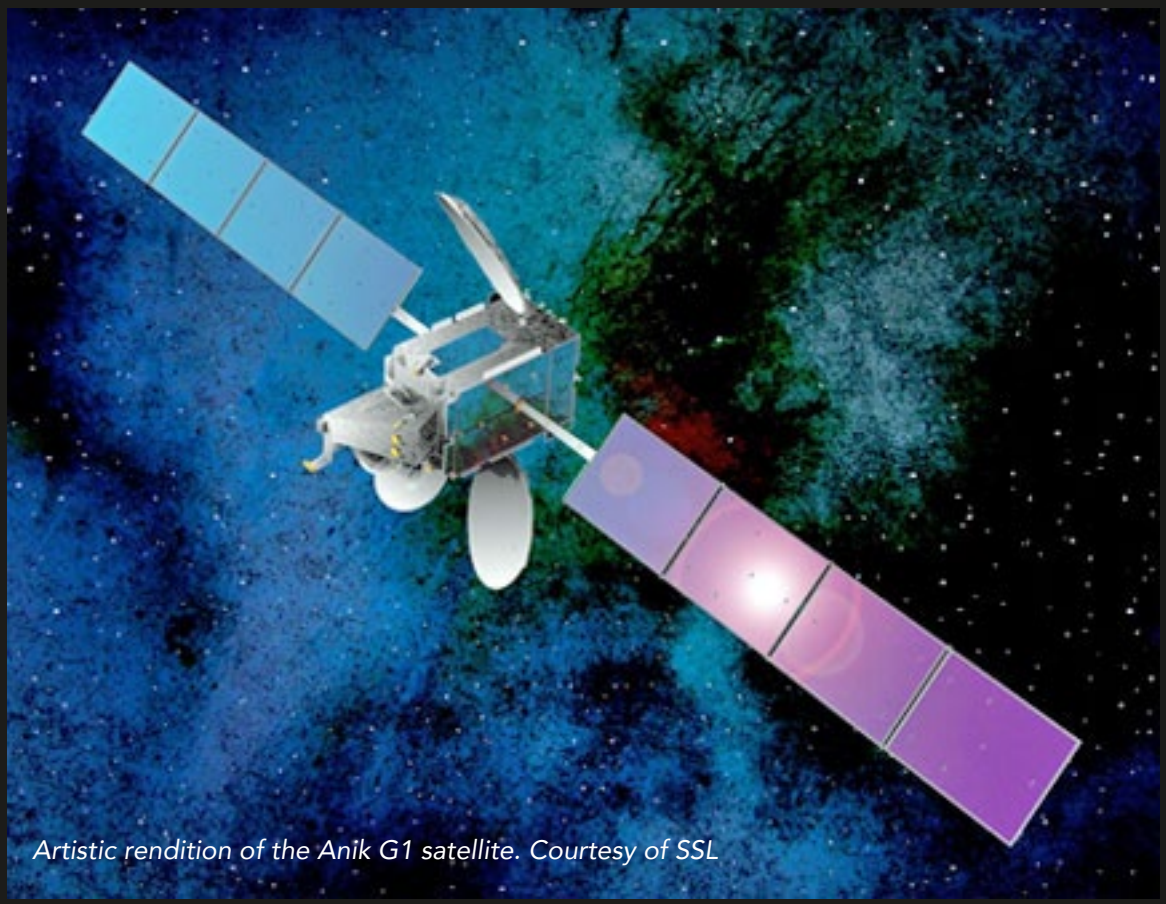
Anik G1's transponders total 55 in number; 24 C-band, 28 Ku-band, and 3 X-band The satellite separated from the upper stage of the rocket and its signal was acquired by Telesat's tracking station in Gnangara, Australia (near Perth) shortly after spacecraft separation, approximately nine hours after liftoff. This was the ninth Telesat satellite and the 26th SS/L satellite launched via the ILS Proton.

Anik G1 packs 16 extended Ku-band transponders that are fully contracted to **Shaw Direct** for 15 years. **Shaw Direct** currently uses Telesat's ***Anik F1R*** satellite at **107.3 degrees West** for its Canadian DTH services. The addition of Anik G1 at the same orbital location will enable the media company to seamlessly add more than 100 HD channels for their subscribers.

Anik G1 also has three X-band transponders that are fully contracted to **Astrium Services** for 15 years to support government applications across the Americas and much of the Pacific Ocean, including Hawaii. In addition, Anik G1 will bring new capacity to meet the growing demand for satellite communications services in South America. It will be co-located with Telesat's ***Anik F1*** satellite at **107.3 degrees West**, where it will effectively double the C- and Ku-band transponders that serve South America from this orbital location. Anik G1 offers C- and Ku-band coverage of the entire continent.

Anik G1 was manufactured by **Space Systems/Loral** (**SSL**) and is based on SSL's highly reliable ***1300*** platform. The *Fixed Satellite Services* (**FSS**) satellite has a mass of approximately 4900kg. and an expected 15-year mission life. Anik G1 will enter into commercial service after the satellite has successfully completed orbit raising and comprehensive in-orbit testing.

The **ILS *Proton Breeze M*** launch vehicle was built by Russia's **Khrunichev State Research and Production Space Center**—ILS provided mission management. The Proton booster used to launch the satellite was 4.1m (13.5 ft.) in diameter along its second and third stages, with a first stage diameter of 7.4m (24.3 ft.). Overall height of the three stages of the proton booster is 42.3m (138.8 ft.)



Artistic rendition of the Anik G1 satellite. Courtesy of SSL

Photo of the Proton Breeze M launch vehicle. Courtesy of ILS

I would like to encourage readers to check out Telesat's new mobile app and new website. We've gotten very favorable feedback on these additions and feel they are a great resource for everyone who uses, or is considering, Telesat services. Telesat has a superior operational and sales team in Brazil to meet customer needs. And now, with the successful launch of Anik G1, we look forward to reaching out to customers and presenting the many satellite solutions Telesat can offer throughout the region—solutions that are available today with superior performance.
—Nigel Gibson, Vice President, Int'l Sales, Telesat

About Telesat

Telesat is a leading global satellite operator, providing reliable and secure satellite-delivered communications solutions worldwide to broadcast, telecom, corporate and government customers. Headquartered in Ottawa, Canada, with offices and facilities around the world, the company's state-of-the-art fleet now consists of 14 satellites plus the Canadian payload on ViaSat-1. Telesat also manages the operations of additional satellites for third parties. Privately held, Telesat's principal shareholders are Canada's Public Sector Pension Investment Board and Loral Space & Communications Inc. (NASDAQ: LORL).

Select this direct link to view the Anik 1 launch video.

For further company information, head over to:
http://www.telesat.com/

In A Supportive Role

COM DEV International Ltd. has reported that the successfully launched ANIK G1 satellite included COM DEV-built multiplexers and switches on board.

"We are very pleased to be involved with this satellite which demonstrates the growing demand for more bandwidth." said Mike Williams, President of COM DEV International Products. "In addition to the increased number of HD channels it will provide to Canadian DTH subscribers, it will also double the C-band and Ku-band transponders serving South America from its orbital location."

Markets Overview

The number of applications for space technology has grown exponentially since the launch of the first satellite more than 50 years ago. Governments and commercial enterprises are increasingly finding that space-based solutions are the most efficient way—and often the only way—to meet certain objectives.

The space hardware market can be broadly divided into three major segments: commercial, civil and military. Each serves an important societal need for information, entertainment, observation, discovery or security.

COM DEV has long been established as a market leader in the commercial space segment, and we are working to build on the momentum we have established since making the strategic decision five years ago to seriously pursue the civil and military markets.

High Throughput Satellite

Dynamic Connectivity Solutions

By David Hartshorn, Secretary General, GVF

Make no mistake, satellite broadband has definitely arrived.

From Bangkok to Lagos and from Moscow to Chicago, High Throughput Satellite communications are being delivered today to millions of users at subscription rates that transform the broadband value proposition… as well as the business plan.

On planes, trains and ships, and in cities, villages and living rooms, the full spectrum of enterprises—and now consumers—are taking advantage of 30-100 Gbps connectivity and applications that require new definitions of "access."

Indeed, there have been a number of new announcements recently, including **United Airlines** discussing plans to use both Ka- and Ku-band technology for in-flight connectivity. **Euroconsult** predicts that in-flight connectivity will be a strong growth area for Ka-band take-up, but there are a whole multitude of applications already benefiting from ***High Throughput Satellite*** (**HTS**) and a lot more potential still to be fully seen.

Reaching The Unreachable

HTS opens up a wealth of opportunity for a wide range of applications, often in locations which were previously unreachable. Indeed, for the consumer market, it provides cost-effective broadband access where there isn't any, as well as being a competitive alternative to existing broadband services. Crucially, HTS means that people who previously couldn't afford access to broadband satellite can now. For the enterprise market, HTS provides a new type of offering, with higher throughput and again, a cost-effective offering.

The introduction of HTS has led to rapidly deployable *consumer class* terminals that provide much greater throughput than their predecessors. This has already brought astounding benefits to crucial groups, such as first responders and humanitarian organisations, as well as warfighters. Wireless operators are tapping markets that were previously unreachable through satellite backhaul of not only GSM, but also LTE, WiMAX, WiFi, Pico, and Femtocell solutions.

Brockville, Ontario, Canada—Mobile Health Care, NetVu® Antenna courtesy of C-COM Satellite Systems Inc.

The Perception

Despite all this success, there is still a feeling among some that HTS, such as Ka-band, is just not quite up to scratch. There is especially a certain amount of caution around the issue of rain attenuation. However, the industry has been working hard to ensure that any possible rain attenuation has minimal effect on the service being provided. Indeed, there are two main mitigation techniques:

- *Site diversity—typically, the operator will ensure there are uplinks in geographically diverse locations, which naturally means that if one site is being impacted by heavy rain, they can simply switch to another site. This is not a new approach, indeed it has been applied with good effect for decades*
- *Adaptive coding modulation—this works at the modulator end, by working out the whole picture, even where there may be some information missing*

From the experiences of people using Ka-band right now, the customers really are not seeing significant degradation or signal loss due to rain.

That said, I still believe it's important to remember that as with every other service, Ka-band is well suited for some applications, but not others. It is a question of having another tool in the kit from which to choose.

AvL Technologies' 1.2m Model 1280KVH-AAQ Ka-Band antenna has been approved for use by the FCC and multiple HTS networks and service providers.

Sematron: QD68 Ka-band satellite terminal: 10Mbits/s Mpeg4 HD With high throughput satellite technology, also quite affordable!

High Throughput Satellite: Dynamic Connectivity Solutions

The video feed for the Chinese government during an earthquake emergency, iNetVu® Antenna courtesy of C-COM Satellite Systems Inc.

The Business Opportunity

The business benefits are potentially huge and fall into two categories, the first being the opportunity for the consumer, and the second the enterprise business opportunity—I will deal with each piece separately.

The Consumer Business Opportunity

To fully appreciate the consumer business opportunity, we need to look back at the rollout of first satellite consumer service, *Direct-To-Home* (**DTH**) broadcasting, which was first rolled out to consumers in markets such as Japan, U.K., and the U.S. For many, the expectation was that satellite DTH broadcasting would be what consumers would purchase when there is no terrestrial access.

Such turned out to be true, to some extent, but the industry was taken aback by the growing interest in the urban and sub-urban areas of these territories. It turned out that satellite DTH was a competitive offering for consumers, which led to tooth-and-nail competition between satellite and terrestrial—today the satellite industry is doing very well in the broadcast market. I only have to look out my window in Washington to confirm that statement, with a street full of satellite dishes.

Coming back to HTS, there has similarly been an expectation, as these services roll-out, that satellite broadband will be on offer when no terrestrial service is available. However, if you were to talk to some of the satellite operators rolling out consumer DTH broadband, you would discover there is a similar trend starting to play out as occurred for satellite broadcasting. The satellite and terrestrial industries will once again be in a pitched battle for hearts and minds of consumers everywhere.

That is great, as competition is good. For the consumer, this creates a huge opportunity as both industries will refine and offer the most competitive pricing and bandwidth for the consumer.

The Enterprise Business Opportunity

The terrestrial industry has predicted the imminent demise of the satellite industry in the enterprise communication technology space—yet every single year, without exception, the satellite industry delivery of services in the enterprise market has grown. The reason being that the more point to multipoint the application, the more satellite is the best option. The fullest expression of this can be seen in markets such as the U.S., where there is the highest amount of terrestrial services, but also the largest installed base of

enterprise VSAT terminals. Terrestrial is unbeatable on point-to-point, but for point to multipoint, satellite is unbeatable.

In comes HTS, one more tool for the satellite industry, bringing enterprise class service provision to the next level.

Getting The Correct Business Model

As with any new satellite band, there are numerous questions about getting the business model correct. For example, what are the new pricing metrics? Have service level agreements changed fundamentally and, if so, how? What about reliability? How high is "high throughput"? New value-added resellers are entering the market; who are they (and do they know what they're doing)?

We are starting to obtain answers to these, drawing upon the recent track record of a growing list of industry leaders, including **Eutelsat** and **Avanti** in Europe, **Yahsat** and **Arabsat** in Africa and the Middle East, **IPStar** in Asia, and **Hughes** and **ViaSat** in the Americas. Added to their experience are the innovation and short-term plans of competitors such as **Inmarsat**'s ***Global Xpress*** service, **Intelsat**'s ***EPIC*** offering, **O3b**'s mid-Earth orbit solution, and more than a dozen other launches.

Indeed, more than half of the world's dozens of satellite operators have either ordered, or plan to order, High Throughput Satellites and 14 million households and 50 percent of enterprise terminals are predicted to be using high throughput platforms by 2020.

Discussions Abound

Naturally, while the future looks bright for HTS, a number of questions remain. We now need to draw on the experiences of those doing it already to find the best way forward. The GVF High Throughput Satellite Conference will serve as a forum where these trends, these companies—and their customers—will provide insights into how this exciting new chapter in satellite communications is rewriting the way that applications are delivered in the world today.

The GVF High Throughput Satellite Conference takes place from 21st – 22nd May in Washington D.C. For further information or to register, please contact... *paul.stahl@uk-emp.co.uk*

About the author

David Hartshorn is Secretary General of GVF and has worked in the satellite industry for more than 20 years. Mr. Hartshorn leads the Forum's efforts to facilitate the provision of satellite-based communications solutions throughout all nations of the world. In particular, Mr. Hartshorn works closely to support national-, regional- and global-level policy makers as they formulate state-of-the-art satellite regulatory frameworks. He is also responsible for creating greater awareness of the commercial, economic, political and technological advantages that satellite-based communications provide.

Mr. Hartshorn also currently serves on various public and private-sector advisory boards, committees, working groups, and project teams where he is involved in facilitating satellite-enabled disaster preparedness, community engagement, financially sustainable business, health, education and more. He is an ex-officio member of the Board of Directors of the Society of Satellite Professionals International, and is Founder of its U.K. Chapter.

Executive Spotlight

Jörg Rockstroh

Senior R&D Engineer, WORK Microwave GmbH

SatMagazine (SM)

As a senior R&D engineer, you have worked on, as well as witnessed, a number of new technologies that will impact the world of SATCOM. What areas have struck you has having the most potential to change our industry?

Jörg Rockstroh

The way in which **DVB-S2 ACM** affected two-way communication over satellite was the biggest step forward that I have witnessed. There are always new technologies that promise better efficiency and lower cost, but ACM changed the principle of SATCOM links from fixed to flexible bandwidth and opened up the way to different service types. I think the next big step is the wide usage of high throughput satellites and spotbeams, because they affect the applications as well.

SM

How did you decide upon a technical career within the satellite communications world, with a focus on the microwave segment?

Jörg Rockstroh

From an engineer's point-of-view, satellite communications promised to be an exciting work field, as it is both technologically challenging and an interesting application area.

A fascination with technical challenges led me to become an engineer. The satellite communications world offered a playground where these challenges dominate the overall application equally—if not more—than commercial or legal aspects. In the professional segment especially, compared with the mass market, the field is open for creative engineering. Plus, being able to communicate over a satellite is probably the closest I will ever get to being an astronaut, so explaining my job to kids is fun, as well.

SM
Why did you select WORK Microwave as the company of your choice for your engineering career?

Jörg Rockstroh
WORK Microwave is a very engineering-driven company with an excellent reputation in the industry and a flat hierarchy that encourages experts to work with enthusiasm. I liked the idea of working for a company that values working quickly, pragmatically, and on a personal level.

After I started working at WORK Microwave, I was given the opportunity to introduce a digital product line from scratch—starting with the **DVB-S/S2** demodulator. Prior to this point, the SATCOM product portfolio only included analogue products, so this was an exciting achievement for both the company and me professionally. During the product launch, I got the chance to see many of my ideas come to fruition, and it was very rewarding to see the benefits it brought to our customers and their applications. This kind of project is typically not something many people get to experience at the beginning of their career, and although it was challenging at times, the hard work paid off.

SM
What are your responsibilities with the company?

Jörg Rockstroh
In addition to being the project manager for modems and demodulators within our SATCOM portfolio of products, I am responsible for the digital development across our other three product divisions—Navigation, Defense, and Sensors. This involves working with our processor platforms, communication architectures, FPGA designs, software development, and more. Over the past several years, my team has developed many innovative technologies (*e.g.*, a high-performance **IPv4/IPv6** stack, generic *Linux*-based **M&C** platform, and low-level **USB** communication) that are now featured in the majority of our products, including the company's DVB-S2 SATCOM range as well as across our sensors or mil type modules.

In addition, I represent the company at trade shows, conferences, industry consortiums, and partnerships and customer meetings, especially when a strong technical background is required. Working closely with the CTO, I am involved in strategic decision-making and often give advice about the company's future technological direction.

SM
What training do you recommend to students today who are interested in IEEE certification with an eye toward working within the SATCOM or MILSATCOM environs?

Jörg Rockstroh
Students should seek out hands-on training whenever possible. Theory is important, but turns out to be quite useless when you have no idea how to weight facts in practical applications, *e.g.*, a tenth of a dB can be important in a mathematical equation, but is seen as insignificant in a C/N measurement.

SM
Would you please provide a summary of exactly what WORK Microwave offers as far as products and services are concerned?

Jörg Rockstroh
WORK Microwave's *SatCom Technologies* division offers a wide range of high-performance, advanced satellite communications equipment for telecommunications companies, broadcasters, integrators, and government organizations operating satellite earth stations, satellite newsgathering vehicles, flyaways, and other mobile or portable satellite communication solutions.

Our comprehensive portfolio—which includes satellite up/down converters, DVB-S/S2 modulators and demodulators, modems, and redundancy switch systems—is renowned for helping operators get the most out of expensive satellite bandwidth, optimizing data transport, and dramatically improving satellite signal quality.

All of WORK Microwave's SATCOM solutions feature optional customized bands, superior spectral purity, an intuitive user interface, compact and robust mechanical design, extremely low power consumption, high MTBF, and state-of-the-art technologies such as ***OptiACM*** and ***DaVid***. They come with a three year standard warranty and adherence to all European export control regulations for guaranteed customer satisfaction.

SM
Given your experience, what areas within the microwave segment do you see as having the most growth potential in servicing customer needs?

Jörg Rockstroh
The demand for bandwidth is ever-growing as consumers expect higher video resolutions, more Internet content, and additional communication in general. By expanding into the Ka- and Q-band in the future, communications and satellite providers can cost-effectively support next-generation, high-bandwidth services. In the meantime, today's technology can also resolve bandwidth issues by supporting higher frequencies and amounts of data, responding to rain fade, and supporting new infrastructures like high throughput satellites. Developing

Executive Spotlight: Jörg Rockstroh, WORK Microwave

easy-to-use solutions for highly complex applications is equally a big challenge and opportunity for the SATCOM industry.

SM

There are so many applications available… Are any of more interest to you than others? What do you truly enjoy working on, personally and for your firm? What projects in the past have brought a true sense of satisfaction to you?

Jörg Rockstroh

When I first started working at WORK Microwave, it was mainly an RF company. Within a few years, we successfully established a digital SATCOM product line. Over time, we've built up an equal expertise in RF and digital technologies. It brings me satisfaction to have been a major part of this process from the beginning, evaluating technologies, forming a strategy, and then finally seeing the products in their real-world applications being used by customers all over the world.

My favorite project to date was optimizing high-speed point-to-multipoint IP networks using ACM. Nowadays, everyone uses ACM technology, but a few years ago, ACM was viewed as a futuristic technology. It was well-specified on the signal side and most people had heard of it, but hardly anyone had an idea how the full system would work.

Initially it was thought that ACM would be ideal for VSAT applications, but there were some downsides for high-speed trunk links, so we decided to develop our own straightforward ***OptiACM***. One of the first big projects we won with the IP-Modem and OptiACM was a 150Mbps link from a European teleport to six different remote sites in the Middle East. While you can simulate and test a lot in the lab, you don't feel the same level of excitement as you do when you see the system working perfectly in the real world, connecting thousands of people to the Internet.

SM

Technicalities can sometimes bog down users with complexities. How does WORK Microwave, and your own involvement, reduce those complexities into truly usable solutions?

Jörg Rockstroh

With higher complexity it becomes more challenging to make devices that are easy to operate. At WORK Microwave, we make it a goal to design technology that isn't just for experts and scientists. Our solutions include powerful features and technologies that can be operated just as easily by experts as they can by less experienced users. The way that we address this is by carefully choosing the tasks we put our workforce on and not following every short-term marketing trend. We only develop new technology features that make real sense for users and their applications.

SM

What can we expect from the digital SATCOM industry over the next few quarters? What might be in the offerings for WORK Microwave, as well?

Jörg Rockstroh

Over the course of this year, we'll face the ever-present challenge of making DVB-S2 signals more efficient. As long as *Moore's Law* is valid, more processing power will enable additional complex signal processing methods that so far might only have been of theoretical value. We plan to address this issue by introducing DVB-S2 extensions to our SATCOM product portfolio. For example, we've already integrated 5 percent roll-off into our range of DVB-S2 modems. We plan to integrate the extended signal form that contains new modulation schemes and FEC code rates for very high and low SNR applications.

This year, we plan to introduce further technology features that will bring increased operational efficiency and cost-savings to satellite operators. We completely support the DVB standardization process. WORK Microwave will continue to follow of the latest market demands and aggressively invest in R&D so that we can meet our customers' most pressing needs.

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Event Of Note

Countdown To Space Tech Expo

by Dan Freyer

New technologies, industry players, and economic pressures are driving innovation and new business models in the space business. How your organization positions itself in the dawn of this new age is vital to how successfully you capitalize on these new challenges and opportunities.

Offering attendees and conference delegates unrivalled value, *Space Tech Expo 2013* is the West Coast's premier space event. The show brings together global decision makers involved in the design, build, and testing of spacecraft, satellite, launch vehicle, and space-related technologies. This annual trade show and conference will be held May 21-23, 2013, at the Long Beach Convention Center.

As one of the largest industry gatherings in the world, ***Space Tech Expo*** attracts scientists, engineers, C-level professionals, government representatives, policy makers, space agencies, military, venture capitalists and investors, industry entrepreneurs, and buyers from the satellite communications marketplace.

"This conference is a superb forum to see potential end states and talk with peers about how to prosper in this daunting future." — Major General Thomas D. Taverney, Senior Vice President – Space Systems, SAIC / Former Vice Commander, Headquarters Air Force Space Command, Peterson Air Force Base, Colorado

A new year sees the show in a new venue—Long Beach, California, USA. This relocation to the heartland of cutting-edge engineering, groundbreaking science and high-technology communities committed to excellence, with close proximity to major manufacturers, US Air Force and NASA facilities, cements Space Tech Expo as the must-attend event for 2013.

With mpore than 140 exhibiting companies, Space Tech Expo is a full-line event established to introduce the supply chain to the wider buying chain. While some events emphasize networking opportunities, Space Tech Expo guarantees a highly professional B2B platform to discuss and conduct business.

In addition to the exhibition, this event features a C-level three-day conference entitled ***The Business Case for Space*** at a highly competitive rate of $695. Also offered are free learning opportunities for all exhibition attendees through the ***Open Tech Forum*** workshops and the ***Satellite & Space Summit***. This unique approach ensures that your time away from the office pays dividends and is both money and time well spent.

The interaction between suppliers and buyers is as critical as ever as ever, whether you are looking at hosted payload options, launch services, electric satellites, improved propulsion technology, longer orbital life, testing efficiency, spacecraft, payload and launch options, and many other topics.

Register today online at ***www.spacetechexpo.com***—learn from a first class line-up of industry speakers, be involved in free-to-attend workshops, and meet a wealth of space-qualified exhibitors. If you attend just one show this year, you should place ***Space Tech Expo*** at the top of your show list.

About the author

Dan Freyer is the U.S. Public Relations contact for SPACE TECH EXPO 2013. He may reached at (310) 849-0721 or at ***dan@adwavez.com***.

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The Afghan Connection
A Case In Point

A Globecomm conversation with Amirzai Sangin, Minister, Ministry of Communication and Information Technologies, the Islamic Republic of Afghanistan.

Few public servants have made as big a difference to their countries as *Amirzai Sangin*. Trained in **the United Kingdom and Sweden, he helped found Swedish Telecom**'s international unit (now known as **Telia International**) before returning to Afghanistan in 2002. First as an advisor, and then as Minister of Communications, he led development of the first modern communications network in the nation's history and the creation of the nation's first independent telecom regulator.

Globecomm has been privileged to work with Minister Sangin and his Ministry since 2003, when the Company developed a *Government Communications Network* (**GCN**) providing voice, data and video links between 42 government offices in the capital and 34 provincial offices. A *District Communications Network* (**DCN**) was built, linking 337 legislative district offices as well as international gateways for voice and video. Along the way, we and our Afghan partners provided training to a new generation of telecom technicians, so that the capacity to maintain and grow the network became as much a national asset as the network itself.

In this interview conducted by Globecomm, Minister Sangin discussed the unexpected path that led from these government communications projects to a true telecommunications revolution at the local level.

Globecomm
Minister Sangin, could you tell us about the origin of the Village Communications Network?

Minister Sangin
While the Government Communications Network was being developed, we seized on an opportunity to improve mobile telephone service. A previous administration had purchased CDMA mobile switches and placed them in our largest cities. City dwellers who could afford it had mobile phones, but they could only use them to call others in the same city. They were telecommunications islands. We asked Globecomm to connect these switches to the GCN and to host switching and international services for them.

It's probably hard to appreciate what a difference this made to people's lives. Before this advancement, people had to travel to Pakistan or Iran to make an international phone call. Even in our biggest cities, they were cut off. Now they could have a phone in their pockets that connected them to the world.

We now have more than 17 million mobile phones in Afghanistan, reaching about 60 percent of the population, after just seven years.

Globecomm
We were very proud to be part of that transformation. But what about people who do not live in cities?

Minister Sangin
That was a question I asked myself. Most of our people live in rural areas. Afghanistan is a very big country, very mountainous. People can be terribly isolated from each other, the north isolated from the south, provinces cut off from the rest of the country. When we switched on the District Communications Network, we began to extend mobile coverage out of the biggest cities and into smaller urban areas. That gave me an idea. Why not go the rest of the way and put a phone into every village?

Globecomm
Satellite makes that possible, but not necessarily easy.

Minister Sangin
We had to leap over many technical and business hurdles before we could install the first village phone. We asked you to redesign the DCN hub in order to serve a large number of individual phones instead of major network nodes.

Minister Amirzai Sangin (left) with Globecomm Chairman and CEO David Hershberg

Globecomm
How is it working?

Minister Sangin
We are monitoring it closely. On average, the units are doing very well: $700-800 per month, which is very good. At that rate, the phone is doing much more than providing telecom services. It is creating economic development in the village—directly for the man who owns the phone, and indirectly from the ripple effect of his prosperity and the improvements that communication brings to the village itself.

Globecomm
The solution was to use demand assignment to allocate a pool of satellite bandwidth among the terminals. It's very efficient compared with traditional single-channel-per carrier links.

Minister Sangin
Then there was the challenge of the terminal. It had to be inexpensive, extremely rugged and able to operate from a car battery or small solar panel. We didn't want bells and whistles: We simply needed two voice lines and two Internet circuits.

Hughes turned out to have the right terminal but they are produced in limited quantities. We have had to be patient. We have ordered 1,000 terminals, but so far, have only 850 installed in the villages. Our goal is to have 2,000 in place.

Globecomm
The technology works but, as always, isn't it the business model that determines the success of the project?

Minister Sangin
Correct. We thought very carefully about how to make the Village Communications Network succeed in the context of a rural village. Our concept is a public-private partnership. We have put together a package for the phone that includes a satellite modem, antenna and receiver, everything that a user needs. The price is 100,000 afghanis or about US$2,000. We sell the unit to a person in the village, who produces revenue from selling the voice services to villagers at an agreed price. The revenue is shared equally between Afghan Telecom for hub services and the villager who owns the phone. Part of that goes to pay the loan that makes the village phone so inexpensive to acquire.

Globecomm
How hard is it for a local entrepreneur to get a phone and start up in business?

Minister Sangin
It was definitely a logistics challenge to get the units out to these villages. We were not about to ask people to journey to Kabul for a phone. We resolved the problem by distributing the units through our network of government centers. Afghan Telecom takes the initial responsibility to train the owner for installation—which is quite easy—or actually installs the unit in the village, aligns the antenna and makes sure it works. If there are technical problems, the same office takes care of maintenance. But fortunately, the problems are few because the technology is so rugged.

Globecomm
These are challenging times in Afghanistan right now. The security situation is serious. How has this affected your work?

Minister Sangin
We moved very fast in 2003 and 2004, with the help of international agencies and companies such as Globecomm, to get the networks into place and to start delivering service.

The Afghan people want these services very much. They need them in order to make progress in so many areas. Unfortunately, the security situation has worsened since then, particularly in the southern part of the country. It has made telecommunications development uneven: More developed in the north and less in the south. However, we believe that the Village Communications Network will continue to grow. It is something that villagers own. We provide the unit to somebody in a village and it becomes an asset for everyone there. This makes our job a little bit easier.

Not All Ka-Band Satellites AreThe Same

The congestion at C-band and the high levels of utilization of existing Ku-band capacity has resulted in the satellite industry expanding into the next frequency band available for satellite services, Ka-band.

As more and more satellite operators adopt Ka-band as the next frequency to satisfy the consumer market, Ka-band is often equated to consumer broadband, High Throughput Satellites (HTS) and spot beams. However, contrary to popular misconceptions, spot beam systems were in fact pioneered at C-band. Thaicom's HTS satellite, IPSTAR, also features spot beam technology that uses Ku-band.

Ka-band should be regarded as what it really is, a frequency band with "new" spectrum which can be used for a wide variety of applications, just like C- and Ku-band. Satellites using Ka-band frequencies are able to deliver the same services that are delivered at C- and Ku-band, for consumer broadband as well as to government and enterprise-grade customers.

SPOT Beams + Ka-Band

Spot beams are often the main type (and, at times, the only type) of beams used by consumer broadband Ka-band satellites, as exemplified by **ViaSat**'s ***Viasat-1*** and **Eutelsat**'s ***KA-SAT,*** for instance. As a result, the presence of spot beams on a satellite is commonly associated with consumer broadband, Ka-band and HTS.

However, there are exceptions. Some Ka-band satellites that are HTS and feature spot beam technology are not aimed at servicing the consumer broadband market. For example, **NewSat**'s Ka-band satellite, ***Jabiru-1***, is a satellite similar to those using C- and Ku-bands to serve customers today. Jabiru-1 will provide "raw" capacity to government and enterprise markets through a range of regional, steerable and multi-spot beams.

The difference between providing capacity for the consumer broadband market as opposed to the enterprise-grade market can be best illustrated by examining the mode of delivery of the service to the customer: Megabit versus megahertz, or, in other words, managed services vs "raw" capacity respectively.

"Raw" capacity enables enterprise-grade users to have complete control over their own network implementation, rather than having to constrain their communications requirement to fit within the limits of a pre-defined managed service solution.

Regional Beams + Ka-Band

Some Ka-band satellites feature regional beams. As opposed to narrowly-focused spot beams, regional beams can cover large surface areas at any given time. They deliver "raw" capacity, in megahertz, in any of the main bands typically reserved for commercial satellite communications, C-, Ku- or Ka-bands, with the technology first being pioneered at C-band.

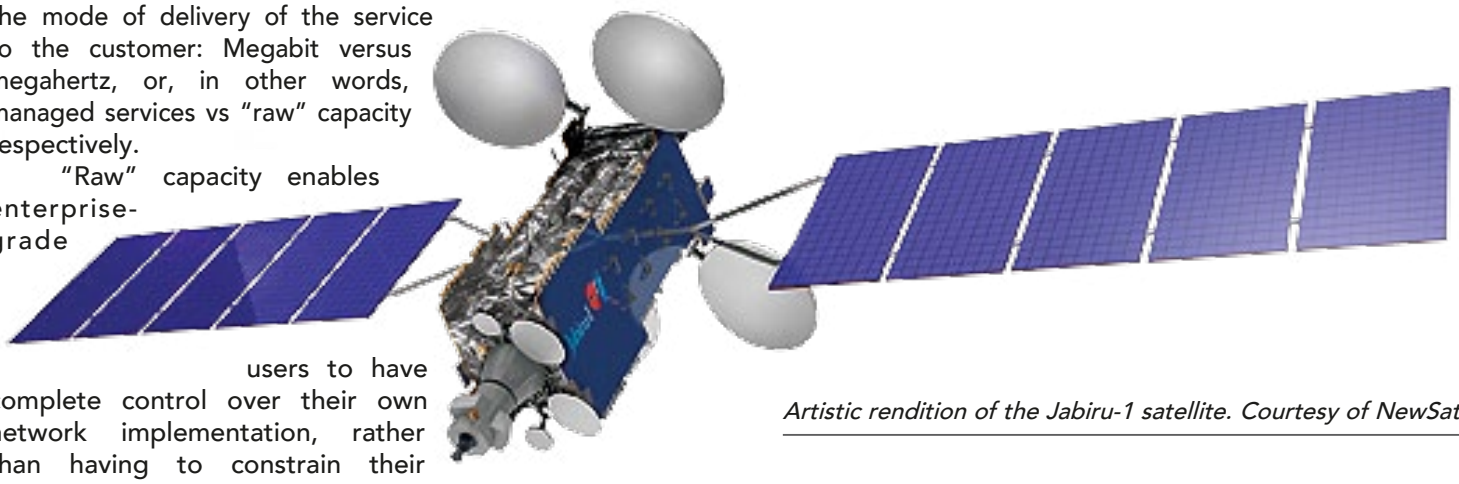
With the erosion of spectrum at C-band due to terrestrial encroachment and the near-saturation of Ku-band capacity, service growth is now highly dependent on the availability of spectrum. As spectrum at Ka-band is readily available, all can expect to see quite a few upcoming Ka-band satellites. These satellites will feature regional beams and will sustain and expand services that have been traditionally provided by C- and Ku-band satellites.

Ka-Band Satellites Equal "New" Capacity

New Ka-band satellites use regional beams, which, essentially, act like traditional C- and Ku-band capacity, therefore providing much needed "new" and "raw" capacity to meet the expanding demand for connectivity. Some Ka-band satellites also incorporate steerable beam technology, such as NewSat's Ka-band Jabiru-1, which is similar to regional beam technology with the added advantage of flexibility. Steerable beams can be positioned to focus on a particular region or moved to support evolving customer requirements, providing fresh capacity into high demand regions.

In addition to the "new" capacity to compliment C- and Ku-band, Ka-band enables smaller end-user antennas, increased mobility, cost-effective network deployments and higher bandwidths and speeds. Ka-band is an attractive satellite communications offering, providing customers with many types of services to choose from.

Please scan QR code to download white paper—***Not all Ka-band satellites are the same*** or visit... ***www.newsat.com/whitepapers.html***



Artistic rendition of the Jabiru-1 satellite. Courtesy of NewSat

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Sadtler On Careers

A Great Time For U.S. SATCOM Business Growth

By Bert Sadtler, Contributing Editor

Why is the employment scene like a zoo?

How does Darwin play into this equation?

What makes this a great time for employers to make exponential gains?

With the first quarter of 2013 in the history books, three employment-related trends are worthy of mention. Our information comes from industry conversations in multiple settings including the recent March SATELLITE 2013 Show in Washington DC.

It's a Zoo Out There

Influences that include sequestration, the continuing resolution, political leadership conflicts and government spending reduction initiatives have contributed to a challenging start to 2013 for the U.S. SATCOM Business Community.

The U.S. Government has been forecasting growth in jobs across the country. However, the feeling within U.S. SATCOM is that only a few companies are hiring senior level talent while more companies are narrowing the number of their senior level employees to address a challenging business climate. For the employers who are hiring, they feel there is a plethora of available, qualified talent "on the street". One comment coming from numerous exhibitors at the SATELLITE 2013 show was, "About every other person walking up to our booth was carrying their resume and either looking to return to being employed or looking to change their current job."

The talent comes from areas that include:

- *Employment transition through corporate rightsizing/downsizing*
- *Actively employed but pursuing options because their employer has announced cost reductions*

- *Actively employed but open to options since their employer has been talking about challenging times and potential budget trimming*

Today's SATCOM employment landscape could be likened to:

» *Unlocking the cages in the zoo, opening the cages and then standing back while all of the released zoo members stampede toward the "We-Are-Hiring" sign. Note that this comparison of zoos includes a full range of both desirable and undesirable inhabitants. Yes, too many candidates can be just as big a problem as not enough candidates.*

» *Hiring challenges for critical senior level talent has shifted from attracting the best talent to filtering out multiple candidates who are not a fit in order to focus on the selective few candidates who could become finalists for the eventual hire. Now more than ever, employers are under pressure to get it right. With the large number of available candidates, employers are challenged to filter candidates through a structured and accurate process. For some established employers, hiring just one or two critical senior level people could be the difference-maker in banner earnings for years.*

Only The Fittest Will Survive

What does this have to do with Natural Selection and how does Darwin factor in? Charles Darwin is known for his Survival of the Fittest evolutionary theory and natural selection. Within the current marketplace, the strongest, fittest employers will out-survive weaker competitors. Meeting company goals is very challenging for today's employers.

As an example of challenges, the U.S. Federal Government has become further delayed in awarding contracts. Compared to the historically faster moving, smaller dollar contract award Commercial Market Sector, there has always been contract related delays from the Federal Government. Most recently, the time of delay has stretched from a few months to up to 12 months or more.

Employers with a limited understanding of the Federal Government contract award timeframe may become frustrated from the delay. Weaker employers may not be able to financially afford to wait up to 2-3 times longer for a contract award. While this is unwelcome news for most employers, it is not unwelcome news to all. Through Darwin's theory of evolution only the fittest will survive as the ranks are culled.

Good Conditions For Growth

Yes, businesses may feel that dark clouds have been rolling in with rain in the forecast. Remember, during rainy periods, the umbrella and poncho businesses do well.

Thus, there is opportunity for the fittest to grow. It can be argued that the current conditions offer the fittest employers the opportunity to exponentially grow:

- *The ranks have been thinned, leaving an uncluttered, more clearly defined competitive landscape and ideally a higher probability to win contract awards*
- *Top talent who recently would have rejected an alternative employment opportunity have a new level of receptiveness to seriously entertain their options*
- *With the successful winning of new business and the successful recruitment of top talent, competitors are faced with great difficulty in responding by trying to upgrade their own new talent or grow revenue through investing in campaigns for bid responses*

Adjustments are a natural force in the business world. Everyone has to make them. For the U.S. SATCOM Sector, many of today's adjustments have a negative reactive response. For the employers who can decisively and deliberately add critical talent and successfully pursue new contract awards, this might be regarded as a time to make giant steps forward while facing little opposition.

Happy hunting... (if you can)...

About Boxwood Search

There is a battle for senior level talent. A great hire can make a long term positive impact and a failed hire can prove to be very expensive. 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.

Executive Spotlight

Ali Zarkesh

Business Development Director, Vislink

A discussion with Mr. Zarkesh regarding the rebranding of satellite connectivity for Latin America (LATAM).

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

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

SatMagazine (SM)
Good day, Mr. Zarkesh. You have seen a number of technological changes for SATCOM over your 20 years in this industry. Over the past year or two, what recent advances do you believe hold the most opportunity for the various SATCOM market segments?

Ali Zarkesh
In my opinion, Ka-band provides the biggest opportunity—as it provides a large new capacity to complement Ku-band. Existing satellites operating in the Ku-band simply cannot keep up with the ever rising need for broadband; specifically, they don't have the available capacity needed by three main groups.

First, businesses are increasingly relying on richer content to expand their business as well as keep ahead of their competitors. Second, consumers who want to surf the Internet, stream films, send and receive emails, phone and video calls, all require capacity. Finally, governments around the world need high-bandwidth applications to provide services to their people.

Over the past two years there has also been an expansion of man portable satellite systems using reflector sizes of below 1.2m, often using a 65cm reflector (or even lower). Such systems are generally used in the military and surveillance sectors (X- & Ka-band) where size and weight are of optimal concern. Many militaries are now using these small terminals for tactical communications in support of foot patrols and also to get data and video back from the battlefield to base. However with the expansion of Ka-band systems, smaller units are also being used in the broadcast markets.

SM
What prompted you to take your talents over to Vislink?

Ali Zarkesh
I wanted to join Vislink as they are the leading provider of satellite communications equipment. They're a global organization, providing significant opportunities for development while allowing me to contribute to Vislink's long term goals by providing a wealth of experience for our customers—both new and existing.

SM
How can satellite communications equipment provide reliable access to those who need it, such as broadcasters and emergency services?

Ali Zarkesh
SATCOMs are more continually reliable than land-based communications networks, such as wireless or mobile networks, as these services are susceptible to being knocked out following a disaster or a large-scale event, either where the physical equipment required is damaged due to disaster, or is overloaded due to a large scale event. The benefit of SATCOMs in these eventualities is that the technology does not rely on surface level based equipment to function. The equipment can't be damaged by a natural disaster, nor can it be overloaded due to the multiple satellites in operation. This makes SATCOM the perfect solution for broadcasters who are looking to provide up-to-the-minute live coverage of breaking news events, as well as emergency services seeking to relay important information to headquarters or command posts.

SM
Given your role as the Business Development Director, you must know your markets—how is Latin America's (LATAM) perception of satellite technology changing, in light of the recent launch of the Amazonas 3?

Ali Zarkesh
There is currently a big push in the American and LATAM regions to increase available communications capacity and coverage. Given the local terrain and lack of existing coverage, satellite communications is the perfect solution for these particular needs as it cuts out the requirement for numerous and costly relay stations and provides a continuous method of communication.

SM
Why does the LATAM market need specific satellite hardware to address different applications and market needs?

Ali Zarkesh
Latin America, traditionally, has had a poor "view" of satellite connectivity. For years, satellite has been seen as a high-cost, high-latency and unreliable solution. However, as modern satellite hardware has dramatically advanced, this view is gradually starting to change. The launch in February of the ***Amazonas 3*** Ka-band satellite, which promises to deliver broadcast TV, fixed and mobile telephony, broadband and communication services, is a case in point and provides the region with much needed communications infrastructure.

SM

Will the launch of Amazonas 3 impact on Brazil FIFA 2014 and Rio 2016? If so, how? What will the SATCOMs legacy be?

Ali Zarkesh

As the demand for responsive and timely communications across Latin America continues to increase—particularly in Brazil with the 2014 FIFA World Cup and the Rio 2016 Olympics upcoming—satellite communications is rising up the necessity agenda. This is especially true as the existing fixed line infrastructure cannot be relied upon for communications today, let alone when the region plays host to what are arguably the world's biggest sporting events and the resulting influx of visitors.

However, while satellites like the Amazonas 3 will provide much needed capacity to the region, this is only one part of the puzzle. For SATCOMs to really become a viable communications tool, satellite hardware that tackles specific applications and requirements is also needed.

Emergency services forces, for example, need quick, immediate and reliable access to detailed incident intelligence and communications networks. Often in these cases, the uplink speed and portability of equipment are critical requirements. Broadcasters have different needs,

often using stationary terminals as their main hub, but relying on multiple portable terminals for the best images and video. Again however, the availability and speed of communication is critical.

Network capacity will be a primary concern for the region, particularly as the whole world will be watching during FIFA 2014 and Rio 2016 and there will be a need to deliver a consistent and reliable communications signal, the legacy of which will be to bring the LATAM market up to the same standard as the rest of the world.

SM

What do you see occurring within our industry that will assist in offsetting satellite interference?

Ali Zarkesh

Satellite providers are making their regulations more stringent, resulting in larger dishes or a reduction of radiated power. There is a balancing act at play here. Vislink is presently working on new modulation and encoding schemes that will allow more data to be packed into the same bandwidth without an increase in power requirements. Any power increase will result in interference—Vislink's aim is to deal with the interference issue in this way. We also have carrier identification included in our transmissions that will allow the satellite authorities to identify terminals causing interference.

SM

What other challenges will the SATCOM industry face over the next year or so that need to be addressed immediately to overcome?

Ali Zarkesh

The major challenge over the next year will be, in my opinion, the issue of interference as satellite spacing become closer together. As mentioned before, this will require a careful balancing act to allow clean transmissions while allowing data rates and terminal sizes required by users.

SM

Given your experience, when you look over your career, what projects have you been involved in that bring a smile to your face?

Ali Zarkesh

Over the past 20 years I have been lucky enough to be involved in many projects from which I have acquired new knowledge. However, if I was to name one, it would my involvement with the Vislink MSAT project. This development was carried out in less than nine months and involved a small team of dedicated professionals. The team spirit and technical excellence required to complete the project on time and schedule will always bring a smile to my face, especially as MSAT has been so well received in the market place.

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- Buyer's Guide and Index

Near Earth LLC Analysis

The M2M Landscape

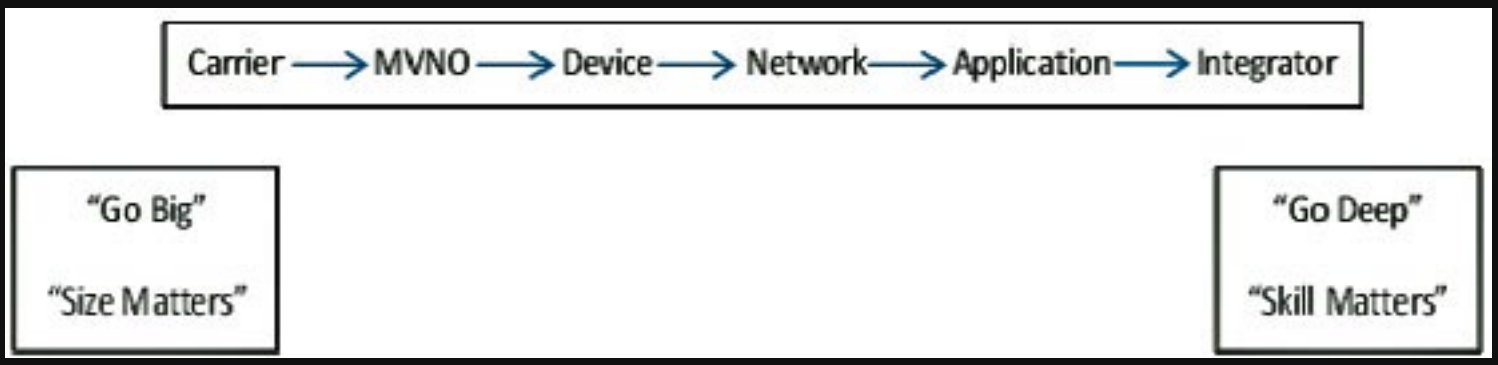
By John Stone, Partner, Near Earth LLC

Back in September of 2009, we published an article (See www.nearearthllc.com/analysis/presentations/vol5.9.2.pdf) on the incipient growth of the M2M sector, beating the drum that an array of factors ranging from slowing wireless handset revenue growth to better geospatial data to cheaper chipsets would revitalize its investment thesis.

Three and a half years later, I thought it worthwhile to look back and see how far we've come, and where we might be going.

Let's start with an overview on the structure of the sector. Here at Near Earth, we view the M2M value chain as consisting of the following functional subsectors, with the respective players operating in one or more of them.

Carriers—As we presaged in our prior article, more recently M2M has become much more important to the carriers, which heretofore were much more focused on selling phones and plans to consumers and businesses. Each of the wireless and satellite carriers now has substantial human and financial resources devoted specifically to M2M. Each has retooled their data offerings to be more attractive to M2M users directly, rather than focusing on a reseller strategy. And, most tellingly, there have been some impressive investments made to acquire capability in the M2M sector through inorganic growth, reflecting both time pressures as well a shortage of expertise as M2M has grown overall.



As you can see, we've noted that the overriding strategy thrust transitions as one moves across the value chain, with scale being the emphasis at one end while specialization rules at the other. In addition to guiding the strategy for the players in a respective vertical, to date this has also tended to result in the respective market participants focusing their attention to one or more immediately adjacent portions of the chain. However, as we discuss below, this tendency is weakening over time in our view.

Looking across the landscape, let's take a look at each sub-sector in turn, with the idea of forming a holistic view of M2M overall.

Perhaps most spectacular was **Verzion**'s acquisition of ***Hughes Telematics*** for $612 million for a whopping 7.9x revenues—reflecting their view of the potential for tapping the market of consumer vehicles as subscribers (penetration of M2M amongst fleet operators, while still growing rapidly, is relatively more mature).

Over time, we expect this trend to continue and even accelerate as the carriers find that more and more of their "subscribers" don't have flesh and blood. Consider that industry forecasters Analysys Mason expect the number of connected devices to grow to 1.2 billion by 2021—a compound annual growth rate of 36 percent—dwarfing revenue growth from conventional cellular traffic. In other words, starting now, the growth engine for the carriers is M2M.

In the satellite world, where M2M was early to garner carrier interest, we've seen the carriers invest heavily in expanding across the value chain—with a substantial investment in **SkyWave** in **Inmarsat**'s case and no fewer than four acquisitions by pure play M2M carrier **ORBCOMM** [including **MobileNet**, where **Near Earth LLC** advised]. In both these cases (and through Inmarsat's **Stratos** and **Ship Equip** acquisitions—which focused on non M2M traffic), the satellite carriers are transforming themselves into one stop shops pushing along the value chain all the way to the end user. We expect this trend to accelerate going forward for both satellite and terrestrial carriers that increasingly become much more than providers of commodity bandwidth.

Mobile Virtual Network Operators—M2M first came on the scene when the adoption S curve for the cellular market was steep and carriers were racing to build out their marketing, distribution and communications infrastructure—and frankly didn't want to be bothered with a tiny upstart technology. Capitalism being what it is, MVNOs filled the niche with repackaged airtime into more M2M friendly formats, provided higher levels of customization and customer service and generally aggregated the initially small demand to levels where carriers were willing to talk. But, as M2M traffic has grown exponentially, pure M2M MVNOs are becoming increasingly unneeded in our view. Consequently, we expect the carriers to appropriate their strategies, disintermediating the MVNOs in the process, and where the valuations are compelling, acquiring them as well. This mirrors the earlier case of the voice (principally prepaid) MVNOs, which have largely become captive brands of the incumbent carriers (*e.g.*, **Boost Mobile**, ***Virgin Mobile***, etc.).

Alternatively, the existing MVNO's will respond by transforming themselves, both organically and through acquisitions, into operations that capture more of the M2M value chain. We, therefore, expect today's leading MVNO's will look very different in the next few years—or they will have different owners.

Device Manufacturers—Compared to the mature space of the carriers, the M2M device space is very much the wild, wild west. In this sector, manufacturers ride the wave of exploding demand, while trying to hold back the forces of commoditization and price erosion. New standards (*e.g.*, **802.11p**, **LTE**, **Weightless 1.0,** etc.) come on to the scene, each requiring substantial nonrecurring engineering and each running the risk of being stillborn like **Ultra Wide Band** or **WiMax**. Similarly, as old standards (think **AMPS**, **2G**) stop being supported, it is forcing everyone from hardware vendors to end users to jump through hoops, allegedly for their own good.

In this sector, as well, we are noting expansion across the value chain. Some home grown examples include **Digi**'s ***iDigi Device Cloud*** (effectively a captive MVNO) and **Telit**'s ***m2mAIR*** offerings (bolstered by the **Crossbridge** acquisition), while **CalAmp** recently expanded into this sector with its acquisition of network operator **Wireless Matrix**. Of course, as noted in our diagram, going big is also an advantage in this subsector, so we have seen acquisitions that are more to build scale rather than expand beyond devices (*e.g.*, **Telit**/**Motorola**, and others). We expect both acquisition trends to continue.

Network Operators—With less pressure to grow for growth's sake and the ability (or is that a luxury?), therefore, to specialize to a greater degree, the M2M Network Operator space has the largest number of players in our universe. Here the growth emphasis has largely been organic, taking advantage of the relatively low penetration (and concomitant growth opportunities) that most M2M subsectors have. In cases where relative market maturity (*e.g.*, truck fleet monitoring/tracking) restrains growth, or, alternatively, where capital is cheap (such as for **Fleetmatics**, which recently bolstered their cash reserves with a $192.5 million secondary), we expect operators will be more acquisitive. On the disposition side, we wouldn't be surprised to see a spinoff or IPO of **General Motors**' ***OnStar*** unit, which could be valued north of $5 billion, a number that we doubt is fully reflected in its parent's stock price.

Application—With the ability to scale software alone, such can provide the freedom to work with a variety of hardware vendors using different interfaces—we have been bullish on building block application providers such as **Axeda** and **Sensorlogic** for some time. While we remain so for the future, to date this sector has been more promise than practice. We believe that this largely reflects the immaturity of the subsector, and in particular limited experience with end users and integrators. As M2M blossoms and end users and integrators need less hand holding, we expect this issue to disappear with time. While we may be somewhat early in our call, we remain committed to our bullish view.

Integrators—As noted previously, end users are still trying to figure out how to take advantage of the rich data and remote management opportunities that M2M offers. This is where the integrators come in.

With end users focused on ROI, skilled integrators that can deliver it via M2M solutions are thriving. With low capital requirements (the main assets here are human capital, not plant and equipment) and many niches to fill, this subsector offers opportunities for competitors small and large. Many firms focused elsewhere on the value chain are finding that captive integrators can be profitable as well as serving as a sales channel for their parents. Likewise, independent integrators may make tasty acquisition targets for firms that wish to add or augment their captive operations.

With close customer ties (and thus, market knowledge) and a plethora of market participants, we expect the integrators (independent and captive) to lead the continued expansion for M2M.

There you have it—a bit of a review of how we got here, with a few predictions thrown in for good measure. Let's check back in couple of years and see how this all turns out! In the mean time, here at Near Earth, we'll be helping to make it happen.

About the author

Mr. Stone brings a wealth of finance and industry experience to the Near Earth team. In addition to his background in corporate finance and as a senior research analyst for both equity and debt securities, John also has an extensive background in science and engineering. As a consequence, his efforts for the group reflect a combination of financial acumen, broad technical knowledge and a scientist's rigor. Prior to joining Near Earth, Mr. Stone worked in the corporate finance unit of National Securities, where he was involved in sourcing, banking and distribution of private placements for early stage technology companies. From 2000 to 2002, he worked as a senior equity and debt analyst at Ladenburg Thalmann and Company. At Ladenburg, he covered satellite and cable broadcasting equities, and satellite/launch vehicle manufacturer and the debt of a networking company. While primarily dedicated to research during his tenure at Ladenburg, Mr. Stone also worked in a support role for the company's corporate finance activities.