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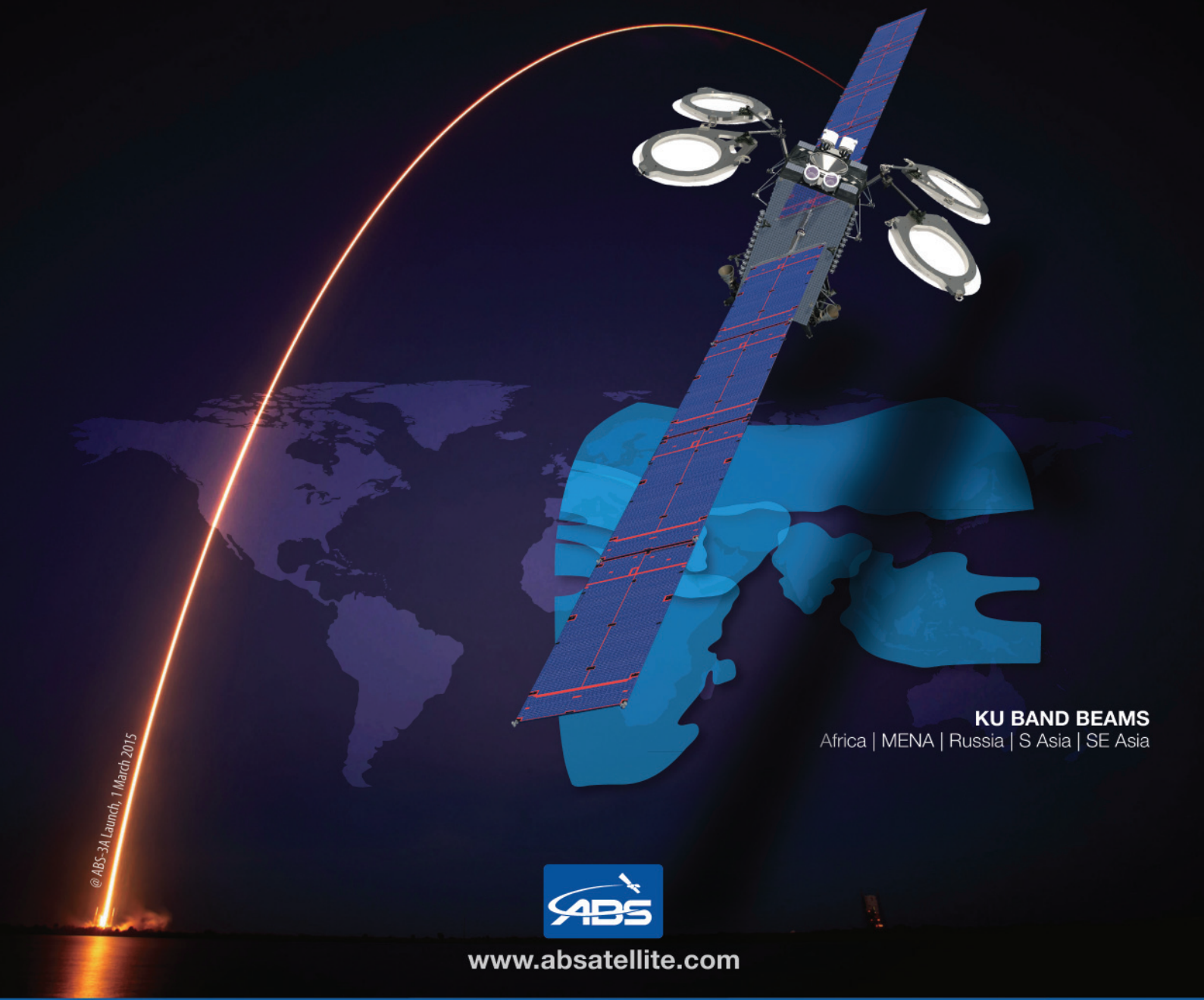

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Richard Hooper
Publisher

Protecting the people?

I am not sure that I recognise the world anymore. It is much more dangerous than the one I grew up with. A world that is beset with natural disasters, famine, a European refugee crisis and terrorism. As countries look to secure their citizens' personal safety, more and more money is being spent on so called 'homeland security'. But what does that actually mean? Are we talking about our private lives coming under more scrutiny from eyes in the sky or being able to go about our day-to-day business safely?

Reliable, high-quality communications are the foundation of every defence and government department around the world. Satellite plays a major role in homeland security from monitoring of borders through to maintaining flood defences. Good satellite communications saves lives, and enables the rapid exchange of vital information during key national events, be they during times of war, disease or natural disaster.

> "Reliable, high-quality communications are the foundation of every defence and government department around the world....."

Australia is a country that prides itself on keeping its citizens safe and uses satellite technology as a part of the homeland security mix. In addition to physical and digital threats from terrorists, satellite technology can also be used to tackle other vital concerns like food and water security. In South Australia, participants from 10 countries gathered in January/February 2016 for the Southern Hemisphere Space Studies Programme to develop remote sensing technologies to address food and water security challenges that could be rolled out worldwide. The programme is an intense course offered by the International Space University (ISU).

In the news recently has been the Zika virus which has established itself in parts of South America and is causing concern ahead of the Olympic games in Rio. In February, two cases of the virus were confirmed in New South Wales. The victims had recently travelled to the Caribbean but there is no real threat and the virus is not expected to spread throughout Australia. However, the incident highlighted some interesting ideas regarding the use of satellites to tackle disease. A mosquito's ability to survive and transmit viruses is highly-dependent on environmental conditions, which can be mapped via satellite. Although remote sensing is less accurate than in-situ measurements, it enables low-cost, long-term, convenient disease spread mapping.

So as you can see there is more to homeland security than just the eye in the sky. It is not solely about terrorism - it is about protecting people from a diverse range of threats including the pesky mosquito. ■

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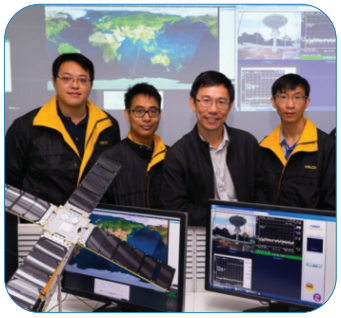

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World renowned futurist to confront what it means to be human in a digitally transformed world

The next 20 years are likely to bring more changes to humanity than the past 300 years – these are the words of Gerd Leonhard, Futurist and Founder and CEO of The Futures Agency – a man The Wall Street Journal has dubbed as "one of the leading Media Futurists in the world."

Leonhard predicts that in the next five years, globally increased connectivity, super-computing and vastly more powerful interfaces will bring about exponential changes in how we communicate, how we consume media and content, how we transact and do business and how we learn and design our future. Speaking at this year's CommunicAsia2016 Summit and BroadcastAsia2016 International Conference, Leonhard will deliver the combined Visionary Address title "The Next five years in Global Digital Transformation" on 1 June 2016 at Marina Bay Sands, Singapore.

Offering a preview to the highly anticipated session, here is Leonhard's take on what the future will bring:

1. Global Digital Transformation: the 10 'ations' that will impact every business

According to Leonhard, global digital transformation is bringing about an age of digital "ations" that all beg the question: what will it mean to be human in a digitally transformed future? Gerd's "ations" include: mobilization, digitization, screenification, disintermediation, automation, virtualization and robotization.

We are already nearing the pivot point where very few ideas seem to actually remain in the realm of science-fiction for a long time. In a world where connectivity flows like water, we can expect intelligent software and machines of all kinds to play an increasingly larger role in the future of communication, and drive gargantuan growth in the video and radio streaming industries. In the coming years we will see OTT become the new normal, and computing become invisible.

2. Limitless and Ubiquitous: Connectivity will Flow Like Water

Leonhard took his prediction of the age of 'ations' a step further by stating that with the world becoming increasingly hyper-connected, technology will become omnipresent – it will become normalized and a part of the very fabric of our environment. He emphasised that this will change the nature of our interactions and fundamentals of our environment whereby, "everything that can become digital will indeed become digital – coining this era as one of "smart-everything".

Leonhard went on to express that this will have a monumental impact upon society, culture and business in the near future. The future presents us with the means to revolutionize industrial processes and increase efficiency through advances such as "smart farming", "smart logistics" and "smart transportation". On the other hand, with artificial intelligence feeding big data and the Internet of Things, Leonhard cautions that our new age of hyper connectivity will also exponentially heighten the present challenges (such as piracy and cyber-security) and it will become of utmost importance for us to tackle the unintended consequences of this hyper connected, borderless world – the age of digital ethics is here.

3. Digital Captives in a Limitless World

Security will become a priority – with technology becoming part of our everyday lives, society will be even more susceptible to threats such as cyber warfare. The implications of data losses or breaches will reach new heights as cyber criminals become increasingly savvy and technology begins to play an even greater role in personal enterprise, business and government. The vast movement of data will be further catapulted by high speed, cheap devices and easier access to technology.

The future of cyber security, predicted by Leonhard, will also lie in combining solutions and efforts to achieve an International Agreement on Data Standards and Digital Ethics. He stressed that a Global Treaty on Ethics and Security (including Artificial Intelligence) will be essential as technology is moving from outside of us to 'on top of us' to finally, 'inside of us.'

Leonhard concluded by summarising that "the future is about identifying and managing the balance between maintaining our humanness in a highly automated and technologised world: embrace technology but don't become it! "

As a top-rated futurist, with over 1,500 engagements in the past 15 years and a combined audience of over 1.5 million people, attendees can expect Leonhard's visionary address to highlight near-future, 'nowist' observations and actionable foresights in the sectors of humanity, society, business, media, technology and communications. He will also share his view on the opportunities and challenges that lie ahead for ICT professionals in the Asia-Pacific region as we continue our path towards a hyper connected world.

For more insights, catch Gerd Leonhard, Futurist and Founder and CEO of The Futures Agency at this year's CommunicAsia2016 Summit and BroadcastAsia2016 International Conference to find out how your business can leverage smart technologies to meet the demands of today's and the expectations of tomorrow's connected consumer. ■

Comtech EF Data receives $1.6 million of orders for SATCOM infrastructure equipment for deployment in government network

Comtech EF Data has received US$1.6 million of orders for satellite communications infrastructure equipment. The equipment will be deployed in a government network.

The orders specified Up and Down Frequency Converters. As a recognized leader in RF products, Comtech EF Data offers an extensive product line of frequency conversion and amplifier solutions for indoor and outdoor environments. The products are cost-effective and provide the field-proven performance and reliability required to support satellite communications in fixed, mobile and transportable applications.

"These orders demonstrate the US government's confidence in Comtech to supply field-proven infrastructure products to support mission-critical

applications," commented Dr. Stanton Sloane, President and Chief Executive Officer of Comtech Telecommunications Corp.

Comtech EF Data Corp. is the recognized global leader in satellite bandwidth efficiency and link optimization. The advanced communication solutions encompass the Heights Networking Platform, advanced VSAT solutions, modems, RAN & WAN optimization, network & bandwidth management and RF products. The company is recognized as a technology innovator, and has a reputation for exceptional product quality and reliability. The solutions enable commercial and government users to reduce OPEX/CAPEX and to increase throughput for fixed and mobile/transportable satellite-based applications. ■

Unique prepaid card covers crew voice and data access on VSAT and MSS

Marlink has introduced the innovative Universal Card Go, a new single multi-band prepaid solution for crew Internet access and voice calling on all service types. As a single communication payment solution for maritime crews, Universal Card Go makes using the telephone and Internet much easier for crews, while streamlining the billing process for vessel managers. Universal Card Go is the first pre-paid solution in the maritime market that covers both voice and data usage and is for use across all Marlink VSAT (Very Small Aperture Terminal) services, including new 1GB plans offered with separate prepaid crew access.

Universal Card Go is an evolution of Marlink's established Universal Card solution, which is today used by over 40,000 seafarers. It was developed in response to demand from ship owners, crew members and service provider partners for simplified access to voice and data services on VSAT and MSS (Mobile Satellite Services). By reducing the amount of prepaid methods required for accessing different services to just one, Universal Card Go instantly simplifies the whole process for crew communication facilities. It works for calling mobile phones and land lines, sending SMS and Internet connectivity over Ku, C and in the future Ka-band VSAT, in addition to L-band MSS from Inmarsat and Iridium.

Using a Universal Card Go account, crew can communicate using fixed terminals on board or on their own personal devices over Wi-Fi. Each time a call, message or web session is initiated, remaining credit is reported to the user. Airtime and data costs are highly competitive, providing excellent value for money for crews in parallel to the benefit of not having to top-up multiple accounts to access different types or services. Vessel operators also benefit, as Universal Card Go separates corporate and private networks so bandwidth is always available for business critical and operational communication.

Universal Card Go is compatible with new 1GB VSAT service plans from Marlink, which provide post-paid data and two voice lines for ship's business activities. The new 'entry-level' plans provide a reliable, global and always-on link up to 1.5 Mbps data throughput purely for business

connectivity applications, such as monitoring of vessel performance and collaboration with headquarters. Customers can also per vessel choose to add the Crew prepaid package, which provides an additional two voice lines and Internet connectivity for crew, administered through Universal Card Go, and without affecting the data connection for business needs.

"Universal Card Go enables senior officers to concentrate on vessel operations while crew members enjoy hassle-free access to communication facilities. A single payment solution for multiple connectivity services fits perfectly with our multi-band approach, which focus on the application more than the frequency band of the service," said Tore Morten Olsen, President Maritime, Marlink. ■

Singtel picks EUTELSAT 70B satellite for network connectivity across South-East Asia

Singtel has selected capacity on its EUTELSAT 70B satellite to support network connectivity in South-East Asia.

Singtel is establishing a new relationship with Eutelsat, a global satellite operator, through a flexible contract that enables it to progressively ramp up capacity over the coming 12 months as demand grows.

The high-performance Asian footprint of EUTELSAT 70B, that stretches from Myanmar to Australia, enables users to operate secure, scalable networks and extend access to outlets in rural and isolated regions areas.

Jean-Francois Fenech, CEO of Eutelsat Asia, located in Singapore said: "We are honoured to win the confidence of Singtel following its consultation of various satellite alternatives, and to strike a new relationship with a reference telco in Asia. Thanks to the orbital position and footprint of the EUTELSAT 70B satellite it is in a strong position to serve diverse South-East Asia markets that include corporate networks, video distribution to cable headends and cellular backhaul. As part of Eutelsat's global fleet it also connects to the rest of the world. Satellites are a vital infrastructure in fast-developing Asian markets and we are delighted to increase our participation in this growth." ■

SES signs contracts for new-generation satellite programme

SES has signed contracts, in the presence of Luxembourg's Deputy Prime Minister and Minister of the Economy Etienne Schneider, for the next phase of the development of a new-generation satellite programme which was launched in 2013. Under the Electra programme name, OHB will be developing a fully electric satellite platform to reduce mass and launch costs.

The Electra programme is based on the SmallGEO range, a European Space Agency (ESA) and German Aerospace Center (DLR) funded project with the objective to develop a general-purpose small geostationary satellite platform. The contract signed is an element of ESA's ARTES (Advanced Research in Telecommunications Systems) programme. It calls for the development of a highly competitive generic small geostationary platform for satellite launch mass below three tonnes. This contract foresees the launch of an Electra satellite and its in-orbit qualification. In 2013, SES signed a first private public partnership with the ESA and OHB System AG of Bremen to support these goals.

Under ESA contract, SES will define the satellite mission and lead the procurement phase. To this end, SES will work in close cooperation with OHB System AG of Bremen, who will act as the prime contractor to SES. "The partnership with the world's largest satellite operator, SES, on the one hand and the support of ESA and its Member States, particularly Germany, on the other, will open up excellent possibilities for us, allowing us to assert ourselves in this attractive market," said OHB Chief Executive Officer Marco Fuchs. "The fully electric GEO platform is a strategic product for OHB, whose importance for future contracts goes substantially beyond the telecommunications segment."

"Electra perfectly fits into the innovation priorities of SES. Decreasing the total cost of putting a payload into orbit and increasing the range of possible applications is a key strategic element for the satellite operator community. Electric propulsion is poised to inject increased competitiveness into the satellite industry, an essential element for the sustained development of the satellite-based commercial telecommunications market. SES is pleased to trigger this Electra initiative and to establish a strong relationship with ESA," said Martin Halliwell, SES Chief Technology Officer.

"An innovative R&D investment is the key weapon for European industry to stay ahead of the intense global competition. Electra is an example of how we can achieve this," said Magali Vaissiere, ESA Director of Telecommunications and Integrated Applications. "Our approach combines best practice gained from several years of experience, with careful customisation according to the peculiarities of each case and the needs of each partner. This is a dynamic and sustainable model for stimulating innovation, by leveraging public money to attract private investment". ■

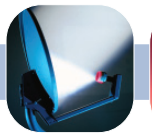
Norsat introduces new ATOM series products

Norsat International has announced the ATOM 250 Watt Ku-band Block Upconverters (BUC) and Solid State Power Amplifiers (SSPAs), as the latest editions to the ATOM Series products.

The ATOM 250 Watt Ku-Dual band BUC provides 250W of saturated power (200W @ P1dB) in one of the most compact sizes in the market. Covering transmit frequencies from 12.25 to 18 GHz, including CDL-Band and Low Ku-band, the ATOM 250W SSPAs and BUCs can be configured to suit operation on any Ku-band satellite. Ethernet, redundancy configurations, EMI/EMC, and other custom options are available upon request.

The ATOM series are up to 85 percent smaller, 90 percent lighter, and 60 percent more energy efficient than alternatives, enabling a wide range of applications including TWTA replacement, satellite news gathering, transportable VSAT, satcom on the move, and radar. The ATOM 250W also includes ATOMControl, the same Management and Control software that powers the full ATOM Ku and Ka family of products.

"We are pleased to announce yet another product in the popular line of ATOM Series of BUCs and SSPAs,



"stated Norsat President & CEO, Dr. Amiee Chan. "We continue to build upon the strengths of this product offering to develop the next generation technology. Our ATOM product line sales continued to gather market traction and our customers continue to be extremely pleased with the ATOM products and our customization capabilities to meet their highly stringent demands." ■

O3b and SpeedCast sign agreement to improve connectivity for the residents of the Republic of Kiribati

O3b Networks and SpeedCast International have announced an agreement to provide connectivity over the innovative O3b satellite network. The service will be provided to consumers, businesses and government customers by Amalgamated Telecom Holdings (Kiribati) Limited (ATHKL), a subsidiary of Amalgamated Telecom Holdings of Fiji.

The Republic of Kiribati has a population of about 100,000 living on 33 atolls and islands, across 3.5 million square km of ocean. O3b is the ideal solution, as the dispersed geography makes laying undersea fibre cables unreasonably expensive and time-consuming.

Existing geostationary (GEO) satellites can't match the O3b network's high throughput and low latency, which is necessary for modern e-commerce, e-government, e-education and e-Health applications.

Kiribati is in the final stages of testing the O3b link, and will first deploy the service to Tarawa, the largest island in the country. The multi-year agreement provides flexibility to expand capacity where required, to ensure ATHKL can provide high performance connectivity for HD video, e-commerce, online education, or cloud services.

O3b's Medium Earth Orbit (MEO) satellites orbit at 8,062km above the Earth and have a latency of less than 150 msec—25 percent that of the geostationary (GEO) satellite systems connecting Kiribati. The switch to the lower latency, higher throughput O3b service will transform the island nation providing connectivity equivalent to long-haul fibre, while avoiding the exorbitant cost of laying an undersea cable to the island.

"SpeedCast is happy to partner with ATHKL and O3b to quickly and cost-effectively provide the people of Kiribati cutting-edge technology, enabling economic growth and access to all forms of e-commerce, education and health," said Pierre-Jean Beylier, CEO of SpeedCast. "ATHKL will first bring their world class internet connectivity to the people of Tarawa, and, in time, to the rest of the country."

"O3b and SpeedCast are delighted to support ATHKL in bringing Kiribati into a new era of connectivity," said Imran Malik, VP Asia for O3b Networks. "With O3b's high throughput and low latency connection, with value adds from SpeedCast, Kiribati is stepping into the future."

This announcement follows the expansion of SpeedCast's O3b-based infrastructure in the Pacific, with customers in Port Moresby and Lae, PNG; Christmas Island, Australia; and Solomon Islands, already benefiting from O3b's high throughput low latency advantage. ■

Recognized for innovation

EM Solutions emerged from its predecessor company, MITEC, in 1998 to provide products and solutions to the defence, maritime, broadcast and telecommunications industries at home in Australia and abroad. Amy Saunders spoke to Rowan Gilmore, Managing Director of EM Solutions, to find out more about how the company has grown since its inception, its latest projects, and what it expects from the future.

EM Solutions manufactures a comprehensive series of microwave subsystem products, including but not limited to, block up converters (BUCs) with microwave solid state power amplifiers (SSPAs), filters, Ka-band and X-band LNBs, frequency synthesisers and linearisers. It also specialises in multi-satellite communications on the move (COTM) terminals.

Question: Can you provide an overview of how EM Solutions has developed since its emergence from MITEC in 1998? How has the company and its offerings to the satellite industry changed since then?

Rowan Gilmore: After MITEC was acquired in 1998, a number of technical staff founded EM Solutions as a specialist RF and microwave communications company, providing products to both the satellite and terrestrial communications sectors. The company has since migrated up the value chain to provide increasingly complex systems, and shifted out of supplying lower value commoditised microwave components into bespoke products and terminals for specific satellite markets. So while we used to design and manufacture microwave filters and amplifiers, today our products include sophisticated high power Block Up Converters (BUCs) with in-built linearisers, low noise block down-convertors, and best in class satcom terminals for on the move applications on land and sea. But even today, EM Solutions still maintains in-service products developed by MITEC over thirty years ago!

Question: What is EM Solutions' assessment of the current satellite industry? What are the key emerging trends and challenges, and how will EM Solutions respond to them?

Rowan Gilmore: The satellite industry overall continues to grow because its value proposition remains attractive in a number of market segments. The industry is responding to the ubiquitous need for ever increasing data rates, and so are we. Our response has been to migrate to the higher frequency bands that support high speed data, and to meet the associated challenges. For example, RF power is more difficult and less efficient at higher frequencies, so sophisticated electronics and cooling become more important. High frequency antennas are more directional, so must be more accurately pointed. In turn, we have invested significantly in firmware and associated control systems for antenna stabilization. Our specialty is in high-speed communications, which is the sweet spot for all telecommunications equipment providers.

Question: Where does EM Solutions see itself in the local and global market?

Rowan Gilmore: In satellite markets we are known as Ka-band specialists,

Rowan Gilmore, Managing Director

although we do have products in lower frequency bands as well. Our BUCs are among the smallest and lightest on the market, particularly when considering their agile broadband capability across the entire Ka-band. We are building dual-use on-the-move terminals that cover both the commercial and military segments of Ka-band, and shortly that will extend to X-band. Our on-the-move terminals have been proven to be the quickest to acquire the satellite and to reliably maintain connectivity under even the most severe motion conditions. The development of this unique antenna pointing technology has taken us on other fruitful journeys; for instance, for our subsidiary EMClarity, we have developed E-band (80GHz) radios that now link the New York financial markets, offering double the speed, double the range, and an order of magnitude faster latency than our closest competitor. These point-point mm-wave terminals operate at 10Gbps - a far cry from satellite links!

When the company was first founded, we never imagined we would require the capabilities in software, mechatronics, and mechanical design that today are so fundamental to our success!

Question: EM Solutions is a major operator in the maritime industry. With data consumption by the maritime sector expected to grow by around 10 percent/year for the next few years, how will this affect EM Solutions' business?

Rowan Gilmore: Because of our unique antenna pointing and stabilization solution, we have been successful at developing terminals that can be used even on very small vessels in high sea states. In addition, naval and border protection users need assured communications. Our terminals provide the ability to roam between satellites, and switch bands if there is congestion or poor weather. Our dual-use Ka-band maritime terminal has been developed specifically for Inmarsat and its GX network, but also to enable operation on the WGS network. To this we are now adding X-band capability, and one customer has even requested Ku-band - all on the one mobile terminal! This will be an unprecedented solution.

Question: EM Solutions has made the news in recent years for its involvement with several projects with the Australian government. Can you tell us how these projects were developed?

Rowan Gilmore: It was in 2008 that EM Solutions won its first contract with the Australian Defence Force to develop a land-mobile Ka-band terminal. We were fortunate that we were able to test multiple prototypes over the Optus C1 satellite and to perfect our 'monopulse' pointing technology before progressing to WGS testing. That particular terminal is now in its third generation of production, and has subsequently been tested all over the world, including in the prestigious motion lab at the Frauenhofer Institute in Germany, where it performed impressively. Subsequently, the Royal Australian Navy awarded a contract to EM Solutions to adapt the terminal for maritime use, where negative look angles are required, and to add the Inmarsat Ka-band and WGS X-band capability to its feature set. That is all achieved in a single terminal and feed system and will be ready for sea trials in July this year. That terminal is intended to offer more robust and assured communications than a single satellite is able to offer, by switching between bands and satellites all on the one platform automatically.

Question: What other major projects has EM Solutions been working on lately?

Rowan Gilmore: We are a highly collaborative company, and through partners in Italy and Spain, for example, we have developed products to meet the emerging needs of defence forces in those and other countries around the world. These include high power BUCs that operate across Ka-band as well as multi-band terminals for both maritime and land use. Of course, we are also serving civil defence forces as well, for instance in Japan where the Fukushima disaster has caused a re-evaluation of the country's communications infra-structure.

Question: What will EM Solutions focus on for the rest of 2016?

Rowan Gilmore: We want to remain globally recognized for the level of our innovation, and we want to be the partner of choice for more multinational defence system integrators. With a large variety of specifically customized products, we hope that we can scale many of those into much larger production volumes. And finally, we intend to carve an even deeper niche for ourselves in high end satcom on-the-move terminals and high speed telecommunications products. ■

Photo courtesy BP PLC

Photo courtesy Prodigy

Satellite news gathering expands across Asia

Analogue satellite news gathering (SNG) has been in use since the 1970s. Its application was famously demonstrated in 1982 during the war between the UK and Argentina over the ownership of the Falkland Islands. It entered regular use in the next ten years, at which point digital SNG largely replaced it. Today, SNG units, often fixed to vans for easy transportation but sometimes carried by hand or backpack, are used by broadcast teams throughout the globe. Here, Satellite Evolution reports on recent developments in this rapidly-expanding sector.

SNG has revolutionized broadcasting in recent years, enabling the rapid spread of information from disaster zones, breaking news events and live streaming from the sporting and music worlds, among others. What once took hours or days to reach global awareness now takes minutes thanks to satellite technology. Indeed, when Typhoon Utor hit the Philippines and China in August 2013, detailed images and video of the damage emerged within minutes.

So how does it work? SNG units are equipped with two-way audio and video transmitters with dish antennas that communicate with geostationary satellites. Thanks to ever-advancing technologies, these units are now small enough to fit in a backpack, so a single reporter can get to the heart of an ongoing event and report live without delay, in situations where a larger team or van would have been hindered. A control room receives the broadcast from the satellite, where it can be uploaded to the relevant networks for distribution.

SNG expands across Asia

Speed is paramount when it comes to news broadcasting. The first companies to report live from the scene of a major event boost their ratings, reputation and credibility. Asia's SNG market is a rapidly-growing arena; discerning consumers are demanding faster news reports and more live event streaming, while both technology and available capacity are gaining pace.

In March 2015, Indonesia's largest telecommunications company, Telkom, opted to equip its SNG fleet with Kyrion CM5000 encoders from ATEME's local partner PT Aditech Matra to expand and upgrade its operations. The encoders,

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which were designed to streamline SNG and occasional use uplink operations, were selected for their outstanding vector quantization (VQ) performance and bandwidth efficiency. With a very short boot time and a unique front panel with confidence monitoring, the Kyrion CM5000 allows SNG vehicle operators to load or edit transmission profiles rapidly and be on air within seconds.

"As our market demand increased, it was important that we invest in equipment that is ready for the next generation of video compression. We used ATEME, not only for the best video quality, but also because the Kyrion encoder provides our SNG vehicle operators with reliable, scalable and future-proof equipment," said Asril Ahmad, PT Telecom's Satellite Service Operation Centre Manager.

Meanwhile, in May 2015, Singapore's MediaCorp announced plans to increase its group-wide deployment of LiveU technology at all of its new bureaus in Asian countries like China, Hong Kong, Japan and Korea, among others. The new equipment includes LU500 backpacks, small live video field units for OB transmissions, as well as LU-Smart mobile apps, which enables LiveU's broadcasting and online video customers to extend their coverage using a smartphone or tablet. MediaCorp has recently used LiveU technology for events like the MH17 Air Asia plane crash, protests in Hong Kong and the passing of Lee Kuan Yew, Singapore's founding father.

"The technology has given us more flexibility in the way we deliver live reports from our regional bureaus. In the past, we were bound by fixed internet lines in the studios and paying monthly charges, even when most of our coverage is from the field. With the option of using LiveU over the cellular network, it works better for our news coverage," said James Hollis, Assistant Vice President, Production Services for Channel News Asia, MediaCorp.

Smaller antennas for better mobility

As is the case in many industries, a trend towards smaller and more lightweight equipment in the satellite sector has been ongoing for numerous years. Smaller antennas have lower capital investment costs, lower maintenance costs and, due to their reduced weight, result in less stress on SNG vans.

C-COM Satellite Systems has launched a range of innovative, small antennas that includes driveaways, flyaways and fixed motorized systems. In July 2015, its iNetVu 1.2m Ka-band vehicle mount antenna system received type approval from ViaSat Inc. for use on the network that powers the ViaSat Exede Enterprise service. The new antenna operates in Ka-band, but is field switchable to operate in Ku-band. It was designed for use by broadcasters, SNG, oil and gas exploration and first responders, as well as for the government and military markets.

"C-COM's new and approved antenna model uses proprietary controller technology which has been field tested and enhanced for over a decade and is paired with more than 7000 iNetVu units in the field," said Leslie Klein, President and CEO of C-COM. "This sleek and low cost driveaway system offers an alternative to our customers who insist on a higher diameter cost-effective antenna which might perform better under more adverse weather conditions."

Meanwhile, in September 2015, DataPath, Inc. launched the DataPath QCT90, a lightweight man-portable satellite terminal with a diameter of 90cm and a weight of 20.6kg. It is available in configurations for both military and commercial markets and operates over X, Ku and Ka-band frequencies. The QCT90 is made of military-grade carbon fibre and die cast magnesium and was engineered for ease-of-use and rugged field performance. As it has just two parts, it can be snapped together and be 'on air' within three minutes. The system includes an integrated antenna, modem and RF transmitter unit, which locks into the folding tripod. It packs into an airline checkable case or a backpack. The QCT90 can transmit HD video, capture real-time sensory data and provide carrier-quality voice and data communications via high throughput satellites (HTS).

Hybrid vans - greater flexibility with reduced costs

Hybrid vans have been making waves in the broadcasting sector for several years now. The ability to broadcast using traditional electronic news gathering (ENG) methods, analogue SNG or digital SNG affords a huge amount of flexibility. Their advantages are many, including reduced upfront and maintenance costs, greater efficiency, reduced vehicle sizes and lower fuel consumption. Companies like TVU offer retrofit solutions to allow ENG vehicles to be upgraded to hybrid vehicles, providing a way for smaller broadcasting outfits to enhance their technology for a reasonable cost.

In August 2015, LiveU, Diadem and Sony Professional Solutions China showcased their new joint hybrid SNG vehicle at the BIRTV show in China. The vehicle combines Sony's video source with LiveU's LU700-SV video encoder, LU500 cellular uplink units and Xtender antenna array, together with a BGAN/VSAT terminal and ADINNO seei.tv webcast. It was designed to offer broadcasters comprehensive live video coverage for OB events for TV and online viewers. Broadcasters can switch between the static LU700-SV encoder and LU500 backpacks to transmit different video angles in real-time. Production teams can store, edit and forward edited video footage back to the studio using LiveU Central, a cloud-based management platform, as well as add graphics, advertising and other elements using third party video production systems. Meanwhile, through the seei.tv webcast, consumers can view the live stream in real time online.

"Using cellular technology together with satellite offers customers a highly flexible solution for transmitting live video from the field with significant cost savings. We're already seeing demand for this solution from TV broadcasters and other organizations," said Sun Zili, General Manager, Contents Creation Marketing Div., Value Creation Group, Professional Solutions China, Sony.

Key SNG live stream events

If you were to go back just ten years ago, live streaming was just not on the public radar in the way it is today. Videos from around the globe were instead reported by the media after a short delay, which now, in the age of the always-connected, would feel like an age. The modern consumer has come to expect a massive array of programmed events and breaking news alike to be reported to them instantly.

In April 2015, the 7.8 magnitude Gorkha earthquake hit Nepal, killing around 8000 people and injuring 21,000 more. Reports of the devastation came in thick and fast from local media. As many communications networks went down, satellite operators such as Thaicom, SES and Spacecom rushed to provide communication services with the Emergency Telecommunications Cluster (ETC). The AMOS

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satellite fleet operator, Spacecom, focused more capacity on Nepal via the AMOS-4 satellite. Emergency responders were granted free of charge capacity, while additional capacity was made available to SNG operators. This enabled the broadcast, via SNG, of up-to-date reports of the devastation and rescue operations in the area. Despite the large amount of technological and financial aid supplied, due to Nepal's pre-existing poor communications infrastructure, the emergency telecommunications services did not cease operations for five months after the earthquake.

Another key event was the Baku 2015 European Games, Azercosmos was appointed as the official supplier of broadcast telecommunication satellite services for the entire event. Azercosmos supplied a SNG truck to relay the feed from the canoe sprint races taking place at Mingachevir to Baku in June 2015 and transmitted coverage of the games via its Azerspace-1 satellite to 74 international broadcast centres and billions of viewers around the world. Azerbaijan, one of Asia's most rapidly-developing and major regional market economies, received a major boost from both the location of the inaugural European Games and its smooth broadcasting of the events.

In July 2015, Azercosmos was awarded an honorary diploma by the International Sports Broadcasting Company for its contribution to the provision of satellite services during the First European Games.

May 2015 saw Sky News break the world record for the largest number of concurrent web streams for a live event. Streams were fed from 138 SNG units from 150 locations across the country during the UK General Election. Broadcasting students operated a variety of LiveU units, including LU200 and LU500 backpacks, at each polling station during the event. The entire LiveU solution for the event included:

- Live streaming all feeds, primary and backup, continuously on the Sky News YouTube channel at 2000Kbps per stream;
- Delivering 150 streams to the Sky News studio;
- Previewing all 150 streams on the LiveU Central platform at a rate of 350Kbps per stream; and
- Concurrent delivery of a HD version of select streams to Sky News studio for use in its broadcast chain.

All of the 150 LiveU feeds were routed over IP to Osterley, Sky News Broadcast Centre, in what Sky said was the largest IP OB of its kind. Each stream was sent to Google cloud servers to be streamed live to YouTube. Simultaneously, an SD proxy was sent to Sky's News Operations Control (NOC) room in Studio B and displayed on ten 4K monitors.

SNG growth expected for the foreseeable future

SNG is one the most rapidly-growing markets in the satellite industry, both on a global scale and in Asia in particular. Demand for advanced SNG equipment is expected to continue to grow as consumers require ever-more news coverage and event live streaming becomes increasingly commonplace.

As technological advances reduce the capital outlay and enables small companies to invest in their own equipment, the number of SNG units and combined cost of SNG facilities is set to increase in the coming years. ■

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SpeedCast is a leading global network and satellite communications service provider. It works with many partners across the globe including Winbasic Technology Solutions and has achieved some exceptional results for Pacific Helicopters PNG as a result of this partnership, including reducing telephone costs by 40 percent and providing a faster, more secure network.

Pacific Helicopters is a well-established aviation company in Papua New Guinea with operations throughout the Asia-Pacific region and around the world. A leading supplier of helicopter charters and hire services, Pacific Helicopters operates a varied fleet of 26 helicopters. Pacific Helicopters are headquartered in Goroka, PNG and have airbases in remote sites all over the country. The vast majority of the company's pilots are employed on a Fly-in-Fly-out basis, stationed offshore for protracted periods of time.

The challenge

Pacific Helicopters required a new value for money network to facilitate a number of different challenges facing the company and staff. They required a network to facilitate efficient allocation of bandwidth to ensure effective communication between the three largest airbases; Goroka (HQ), Kopi and Moro. As pilots spend long periods of time offshore, the new network also needed to support voice and real-time applications to ensure staff could communicate with families who were offshore for recreational purposes. As part of this, competitive VoIP services needed providing to ensure overall cost-efficiency. The new network also needed to be flexible, provide extensive monitoring and support to the entire organization network whilst responding to ever changing requirements.

The SpeedCast solution

In late 2013, a collaborative partnership was formed between SpeedCast and Winbasic Technology Solutions, a local PNG IT Business Solutions consultant with network expertize, to tackle Pacific Helicopters' unique network requirements.

Utilizing SpeedCast's expertise in providing efficient bandwidth platforms for Internet connectivity, the three key bases were connected via a high performance teleport in Sydney. This created a unique network design which facilitates the ability to share the outbound bandwidth between the three sites. Bandwidth reserves automatically and switches to the active site when the remaining two sites are not using the bandwidth. This dynamic sharing between sites provides unlimited bandwidth (based on guaranteed charges). The new network is also based on a C-band Hybrid SCPC network topology and so is more resistant to the wet climate conditions of PNG.

"Based on our experience and customer demands, the recommended option of a shared download pool and a dedicated upload for each site is the optimal solution to support VoIP and other real-time applications." said Sherak Adam, Associate Director of Operations, SpeedCast. "The upload can be equally split or remain individual per site, increasing the cost effective approach to bandwidth solutions SpeedCast is renowned for."

The new network's voice services are provided by SpeedCast's core network with direct connectivity to TIER 1 carriers including an E1 straight into Telikom PNG. SpeedCast is one of only a handful of carriers in the Pacific region with this feature due to the number of minutes it operates across the region; up to 20 million a month.

To ensure maximum efficiency and seamless interconnectivity, SpeedCast integrated its value-added services into the network. Its bandwidth management tools, QoS and Application Filtering, were integrated to prioritize certain applications and contain the bandwidth usage. The online network monitoring provides an online portal which

schedules and completes on-demand reporting on all aspects of the new satellite network.

New value for money network

The SpeedCast and Winbasic Technology Solutions collaboration surpassed Pacific Helicopters' expectations in designing and implementing a new value for money network. The dynamic allocation of bandwidth ensures maximum efficiency of its reserves and greatly improved communications between the three key air bases and beyond. Pacific Helicopters has made significant savings in voice calls thanks to the new network, resulting in faster Return On Investment (ROI) and Total Cost of Ownership (TCO). Standard calls to Australia were costing the company US$3 per minute using a local provider but now with VoIP their costs have reduced to $0.25c. Especially important, the pilots can now communicate with their families whilst located offshore via various platforms including VoIP lines, Skype, Messenger and Social Media.

"The SpeedCast satellite solution, in collaboration with Winbasic Technology Solutions, is an ideal fit for Pacific Helicopters in both corporate and welfare applications. The new network enables fast and secure connectivity and has so far saved us 40 percent in VoIP costs," Said Ben Ignas, Pacific Helicopters. "We anticipate additional gain in our overall operations by further reducing network costs while adding more value to our customers and employees."

SpeedCast will continue to monitor the existing network, provide recommendations and adjustments to the QoS to ensure network efficiency is maximized and that continued saving costs are made for Pacific Helicopters. This project has helped strengthen SpeedCast's position as a market leader in providing fully managed and value-added satellite communications services across PNG. ■

DTH satellite TV: outdated or here to stay?

DTH satellite broadcasting over the Ku-band began in the 1980s, when SES launched the first medium-powered satellite to provide coverage over Western Europe, Astra-1A, which allowed DTH reception with small (90cm) antennas. Throughout the 1990s, many satellite manufacturers and broadcast companies entered the market, and DTH satellite TV became commonplace in much of the world. Here, Satellite Evolution investigates the current market, potential challenges and outlook of DTH satellite TV.

Euroconsult's most recent report on the industry, '*Satellite Pay-TV: Key Economics & Prospects,'* states that DTH satellite TV has grown strongly in the past five years. On a global scale, satellite TV subscriptions grew to 196 million in 2013 and produced US$97bn in revenue. Subscriptions are expected to reach 340 million by 2023. Emerging markets like much of Asia now account for 60 percent of global subscribers and almost 100 percent of year-on-year subscription growth.

Media Partners Asia (MPA) reported similar findings in its *'Asia-Pacific Pay-TV and Broadband Media Markets'* report, with market growth expected to stem from India, China, Japan, Korea and Southeast Asia. The report highlighted that Asia's island nations, with their considerable land spans and widely-dispersed populations, are particularly well-suited to satellite TV consumption. Asia's growing middle class is another driver towards paid-for content, with the population becoming more willing to spend money on satellite TV services.

"We see operating leverage growing for market leaders in India, Indonesia and Malaysia in particular, as well as long-term upside from strategic recalibration in Australia and New Zealand. Better monetization in the Philippines should help the market leader properly scale its DTH business and take it to the next level. We also predict incremental growth and value in Vietnam," said MPA's Executive Director, Vivek Couto.

Many operators around the globe are now upgrading from SD broadcasting to HD and 4K, which will lead to larger

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demands on satellite capacity and increased consumer prices for both services and hardware. In January 2016, Taiwan's Dish HD Asia announced that, with a new investment in Thomson Video Networks encoding equipment, it would be able to power its new, Ultra HD 4K, all HEVC-HD (high efficiency video coding - HD) satellite service. This will double its capacity to more than 120 channels, broadcast throughout Northeast Asia. To accompany the launch, it also introduced a new Ultra HD HEVC set top box (STB). Dish HD Asia is the first provider of 4K satellite TV in Taiwan.

India: one of the largest growth markets in DTH satellite TV

The DTH satellite TV market across Asia is highly fragmented. There are countries like Malaysia that have just one operator, while others, like Bangladesh and Pakistan, are home to many. Industry insiders, while positive about the future growth of satellite TV throughout Asia, expect industry consolidation in the coming years as competition grows fierce. Nowhere is this truer than in India, where a massive number of DTH broadcasters and satellite TV channels, many already in HD, operate in fierce competition with frequent new market entrants.

India is one of the biggest success stories in DTH satellite TV right now. As literacy levels, newspaper consumption and TV household numbers continue to grow, so does satellite TV consumption. MPA expects Indian TV households to grow from 175 million in 2015 to 197 million by 2019, with DTH satellite TV increasing its market revenue share from 41 percent to 47 percent by 2019.

In August 2015, India's Dish TV launched a video-on-demand (VoD) service called Dishflix, which provides a collection of ad-free films that are updated on a monthly basis through a STB via satellite. The equipment costs Rs5990 (around US$87) and the monthly subscription is Rs100 (US$1.50). The films include a mixture of Hollywood and Bollywood titles, in Hindi or English languages. The launch came shortly after that of Eros International's ErosNow, as well as Hooq, which is backed by Warner Brothers, Sony Pictures and Singtel. In contrast with Dishflix, both provide ad-free films streamed via broadband Internet on subscription. ErosNow and Hooq beat Netflix's Indian launch in January 2016 by a considerable margin, allowing them to gain a head-start on market share.

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Even new DTH satellite TV market entrants like Videocon d2h, which launched in India in 2009 as the sixth private sector satellite TV provider, are making waves in the sector. The company has more than 13 million subscribers already, of the 175 million TV households available. Videocon d2h is in advanced discussion with Hollywood regarding proprietary content and currently offers 4K programming, as well as more HD and local channels than its competitors.

Challenges to DTH satellite TV

Many in the DTH satellite TV industry were quietly concerned when video streaming via Internet started to become commonplace. Companies like Netflix, Amazon Prime and Hulu provide content streamed over the Internet for a low subscription cost, with the added convenience that the end user can watch the content on any Internet-enabled device, unlike satellite TV.

Netflix, which launched in 2007, rapidly become the market leader in the VoD streaming industry. A big part of its success can be attributed to its original content, with recent blockbusters including 'Orange Is the New Black' and 'House of Cards.' In January 2016, Netflix announced that it had launched its service globally, excluding China, where it is still exploring its options. US government restrictions prevent services being supplied to Crimea, North Korea and Syria. "Today you are witnessing the birth of a new global Internet TV network," said Nextflix's Co-Founder and Chief Executive, Reed Hastings. "With this launch, consumers around the world - from Singapore to St. Petersburg, from San Francisco to Sao Paulo - will be able to enjoy TV shows and movies simultaneously - no more waiting. With the help of the Internet, we are putting power in consumers' hands to watch whenever, wherever and on whatever device."

On a global scale, satellite TV has continued to grow in popularity despite the challenges, although there is some concern that, in some western regions like the USA and the UK, new subscriptions have stalled even as household numbers grow. One reason for continued global growth is that the VoD streaming alternatives are limited to those with access to affordable, high-speed broadband.

In much of the developing world, this is still sorely lacking. Broadband prices rise significantly in remote and sparsely-populated regions, which includes much of Asia, and notably the Asian islands. Such regions also often only have access to low-speed broadband, which renders streaming unreliable or impossible. In other areas, broadband is only available via satellite, where data usage is capped at levels that severely limit video streaming. Netflix estimates that speeds of 3Mbps are required to stream SD content, 5Mbps is needed for HD and 25Mbps for 4K, although new codecs like HEVC may enable HD streaming at 2.5Mbps and 4K at 15Mbps. However, average broadband speeds in India hover around 2.5Mbps, with lower speeds experienced in other parts of Asia.

Satellite manufacturers and operators have made it clear that they believe in the continued growth of DTH satellite TV with frequent launches of new satellites designed specifically for that market, often produced in collaboration with DTH broadcasters.

Indeed, in February 2016, SpaceX launched the SES-9 communications satellite, which was designed to meet

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growing demand from the DTH, maritime and aeronautical markets. SES' Senior Sales Director (Asia), Matthew Oh, said that continued strong demand for pay-TV services means that, "There has never been a more exciting time for our DTH customers to realise the vast potential of TV markets in Southeast Asia." The SES-9 satellite provides Ku-band beams specifically to address strong DTH uptake in these regions.

"SES-9 marks a major milestone in strengthening our prime video neighbourhood at 108.2° East, with five DTH platforms reaching more than 22 million TV households in India, Indonesia and the Philippines. Video consumption is on the rise, and the youth populations in these countries are driving up demand for high-quality content that can be accessed across multiple screens," said Deepak Mathur, Senior Vice President, Commercial Asia-Pacific and the Middle East, of SES. He added that, with new technologies like 4K becoming more widespread, SES-9 provides more capacity for its customers to offer 'enhanced viewing experiences to attract more subscribers.'

Satellite TV - here to stay, but maybe not as we know it

In the near and medium-terms, it's likely that DTH satellite TV will continue to expand on a global basis due to increased uptake in the developing world. However, subscriptions are stalling in the western world as younger viewers switch to streaming content via the Internet. As reliable, high-speed broadband gradually becomes more prevalent in the developing world, more viewers are likely to adopt this habit, which is often available at a lower cost and with greater convenience than satellite TV.

Enter Hybrid Broadcast Broadband TV (HbbTV): Hbbtv is being hailed as the future of video consumption on many forums. The solution combines free broadcast TV, paid-for satellite TV and Internet streamed VoD, including paid-for services like Netflix and free catch-up services like the UK's BBC iPlayer, into a single solution like a SmartTV or HbbTV STB. The tactic of 'putting all your eggs into one basket' in terms of hardware has proven popular when it comes to smartphones and tablets, which have been adopted on an almost global scale thanks to their versatility. Indeed, HbbTV appeals to the young and mature alike, as it combines the traditional satellite TV viewing that many are already accustomed to with the new options for streaming via Internet that is so popular among the youth. ■

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Bringing India's rural areas into the nation's banking system

Easy access to bank accounts and an ATM on each corner is something we take for granted in the western world. However, it's a very different story when you look at developing economy countries like India. The lack of a reliable, well-established banking sector in rural areas means that many citizens fall prey to money-lenders or criminal elements, easily finding themselves in debt or hardship. N.V. Jairam, Director of SME & Enterprise Marketing for Hughes Communications India Limited, outlines the government's ongoing programme to expand banking services throughout rural India using satellite networks.

More than 40 percent of India's 1.3 billion people, until recently, lacked access to basic banking services such as savings and checking accounts. The government of India was very sensitive to the fact that an overwhelming 60 percent majority of this under-banked population resided in rural India where the economy was predominantly agrarian and needed steady cash infusion and immediate access to money or credit.

The government was also acutely aware of the challenges faced by this rural populace; the rural bank branches were few and far between and the ATM infrastructure was virtually non-existent. Opening a bank account was also a tedious and lengthy process requiring several documentations, which, in general were hard to obtain. This dissuaded most from going to traditional banks. This situation had given rise to a parallel banking system operated by local money lenders charging exorbitant interest rates leading to large scale exploitation of the rural populace with little or no recourse to redress the wrongs done to them.

The Prime Minister's Jandhan Yojna

To aggressively address these challenges, over the past few years, the government has worked successfully in bringing a large part of this rural populace under the ambit of the country's banking system by introducing several programmes targeted at financial inclusion for all citizens to bridge the banking divide. The Indian Government's latest financial inclusion programme is the 'Prime Minister's Jandhan Yojna'

(PMJDY), a massive campaign targeting the rural population of the country. Its objective is to provide a bank account to each and every citizen of the country.

To support this and other government programmes like Direct Benefit Transfer (DBT), which ensures cash government benefits go directly to the individual's bank account electronically to curb pilfering and duplication, India's banks had to develop service channels at the rural level. ATM infrastructures and micro/small branches in rural areas were among the major options for ensuring that the rural population could take full advantage of these bank accounts. Satellite communications have been an essential element in connecting rural ATM and branch networks to India's core banking network.

Satellite offers reach, speed, and economy

Satellite is the most cost effective and reliable communication medium for remote banking solutions in India - superior to dial-up and wireless broadband or MPLS, with a shorter deployment timeframe and a guaranteed reach pan India.

The Indian telecom market has a good core network that criss-crosses all the major cities. The challenge comes in getting efficient last-mile access. Even in Tier 1 and Tier 3 cities, where there is no dearth of terrestrial capacities, banks look to VSAT networks as a primary or a back-up connectivity solution. The further one goes into rural India, the less viable the terrestrial options get. The inherent advantage of VSAT (high availability, quick and easy deployment, flexible bandwidths) pays off.

Cost is another factor. In a typical small branch with not more than two to three users operating the basic banking application, the flexibility that VSAT bandwidth providers makes the total cost of ownership much lower than a terrestrial link.

India's satellite-linked ATM and branch office networks are growing quickly. Hughes Communications India Limited (HCIL), a subsidiary of Hughes Network Systems, LLC, has connected the highest numbers of off-site ATMs and bank branches on VSATs anywhere in the world. To date, HCIL has deployed over 40,000 off-site ATMs and 33,000 bank branches with a secure VSAT satellite network.

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HCIL serves nearly all the private and public sector banks, including State Bank of India, Punjab National Bank, HDFC Bank, ICICI Bank, Bank of Baroda, IDBI Bank, Bank of India, Union Bank of India, Dena Bank, Corporation Bank, Canara Bank and United Bank of India. HCIL monitors these networks and also provides network and field engineering support.

ATMs are typically located in public buildings, bank branches, shopping centres, retail outlets (specifically gas stations), and condominiums, etc. The public sector banks have even started 'human ATMs,' also known as banking correspondents, in rural areas. These are franchisees appointed by banks which have a PC and basic connectivity. They open bank accounts and handle basic financial transactions as a bank branch would.

The Ministry of Finance and a consortium of public sector banks in India entered into a contract with multiple ATM Managed Service Providers for installing and managing a total of 63,000 off-site and onsite ATMs across urban and rural India, by far one of the largest initiatives adopted by the Indian government to widen the reach of banking facilities. ATM penetration in India is expected to continue to grow and reach an estimated 200,000 ATMs later this year.

Satellite technology has expanded banking services across India

The government's rural banking programme has been a phenomenal success, with more than 200 million accounts opened since August 2014 and a deposit base of over US$4.5bn. In the PMJDY initiative, households will not only have bank accounts with RuPay debit cards, but will also gain access to credit for economic activity and to insurance and pension services for their social security.

Through ATM infrastructures, banks have been able to increase their reach and the services they offer rural customers. Rural customers can pay utility bills and credit card bills through an ATM. They can use any bank's ATM even if they do not own an account in that bank. None of this would have been possible without a networked banking environment connected by satellite broadband. ■

Photo courtesy Shutterstock

Connecting Asia with satellite broadband

With just over two months until CommunicAsia 2016 takes place at the Marina Bay Sands in Singapore we hear from one of the exhibitors, Inmarsat, about how satellite broadband is changing the connection needs for many. Michele Franci, Chief Technology Officer at Inmarsat explains why.

The Internet is everywhere. Even in the remotest parts of the world, in countries which lack the billions of dollars' worth of investment that the western world has benefited from, connectivity is becoming a feature of modern life.

It is a service which moves at lightning speed: first came dial-up connection, next came broadband, then fibre and now satellite. The evolution of the World Wide Web – a relatively new service in the grand scheme of things – has certainly been startling but key differences between traditional terrestrial broadband networks and modern satellite broadband mean that Internet provision currently stands poised on the brink of yet another world-changing moment in time. In order to understand why, it is important to first understand what those differences are and what they mean – particularly for areas like Asia, where land mass is widely dispersed.

Terrestrial vs satellite

The main difference between terrestrial and satellite broadband is the fact that terrestrial broadband requires a capillary ground mesh of cables and provides connectivity to one geographical area. The most familiar form of this is perhaps the wireless router, most commonly seen plugged into the phone port, somewhere in the home or office. This technology has made rapid advancement since its inception, and continues to do so with the advent of superfast fibre optic services, but it remains susceptible to failure. Bad weather, vandalism or other outside forces can cause network failures anywhere along the infrastructure, causing a sudden – and occasionally prolonged – outage.

In addition to its obvious drawbacks, traditional broadband is simply not a viable option for many parts of the world, whether this is due to costs, infrastructure limitations or other factors such as environment or terrain. Satellite broadband, on the other hand, is a viable option with many benefits.

For geostationary satellites, just three satellites are required to provide global coverage. Whether you are flying from Europe to Asia, or sailing across the Pacific, you will always have access to satellite broadband, both as you move within each satellite footprint and from one satellite footprint to another, meaning you only require one satellite terminal to access the network wherever you go.

Communication via satellite is also possible through both fixed and mobile equipment, making mobility another significant advantage of satellite broadband. This is useful if you are on the move, as you only require one terminal to connect to the satellite network wherever you go. If you have fixed operations but need to communicate globally, you have the flexibility to install one form of communication that's consistent across your entire operations.

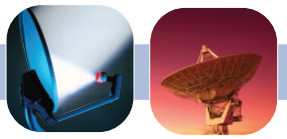
Satellite broadband is also much more resilient than terrestrial networks. Compared to terrestrial networks, there is less risk of network outages purely because satellites in geostationary orbit aren't subject to possible vandalism or bad weather. A complete satellite network can work independently of terrestrial infrastructure and maintain connectivity as long as the equipment is powered and connected to the home station.

This independence brings an abundance of benefits. In the event of a power outage, the continued provision of Internet service through terrestrial broadband is very much dependent upon whether the service provider has the appropriate back-up power supplies in place. Even where they do, these will only be designed to run for a few hours. This means that in the event of a prolonged outage, coverage could cease. Indeed, as the global need for electrical power grows, we can expect prolonged black-outs to become more common as the existing infrastructure struggles to cope with the increased demands being placed upon it.

So what does this mean for Internet provision? The possibility of a prolonged black-out causing problems to the terrestrial infrastructure and potentially taking services offline is admittedly small, but it is a possibility nonetheless. In countries where investment in infrastructure has happened at a slower rate, this is particularly true and satellite broadband is the key to solving this potential problem.

Connecting Asia

Containing nearly half of the world's Internet users, Asia is uniquely positioned to take advantage of the many benefits that satellite broadband can offer. The geographical spread of its land mass – which comprises 30 percent of the Earth's total land area and includes many rural and isolated areas – means that even the latest advance in fibre optic terrestrial



broadband does not make this a realistic solution. Furthermore, the region's incredibly busy aviation and shipping industries mean satellite connectivity can directly improve and expand operations, improving Asia's commercial and domestic markets.

Away from the everyday, in a region of the globe that is more susceptible to natural disasters than most, satellites can provide double cover – acting as an early warning system to help predict and protect against potentially devastating events such as tsunamis, as well as providing crucial connectivity should a natural disaster cause damage to existing terrestrial networks.

There are, however, challenges in regards to the provision of satellite broadband services. The scale and pace at which you can upgrade traditional terrestrial networks is quicker and more dynamic than satellite – you can't simply send an engineer up with a screwdriver to mend a satellite. Nevertheless, the pace of innovation is changing and the pace at which satellite networks can be designed, built and launched is rapidly improving.

The obvious advantages of satellite broadband will fuel a global increase in demand for this service over the next few years. New applications will be developed for existing satellite networks, as well as new players to the market – we have already seen big names like Facebook and Amazon making a move to utilize satellite technology. With this in mind, the requirements for satellite broadband go beyond the issue of access – the need for these services to be reliable, resilient and high-speed will peak in the coming years and satellite broadband will have to be able to deliver.

But in an industry that literally didn't exist 30 years ago, that is perhaps not too tall an order – the growth that has happened in that time has been incredible and progress never stops.

CommunicAsia2016, taking place at the Marina Bay Sands Expo and Convention Centre in Singapore from May 31 to June 3, will showcase the latest technologies and bring together the industry's major players. Inmarsat will be among those in attendance, showcasing the latest Global Xpress services along with a suite of L-band services for land, sea and air.

There have been a number of major breakthroughs in satellite broadband over the last few years, including the recent announcement from Inmarsat that it had achieved global Commercial Service Introduction (CSI) for its new Global Xpress (GX) constellation. The constellation is formed of three Ka-band, high-speed mobile broadband communications satellites and delivers broadband speeds globally to customers on the move on land, at sea and in the air. This opens up a host of new opportunities to enable bandwidth-hungry applications and solutions even in the remotest and most inaccessible parts of the world.

The future of satellite broadband

Heterogeneous communications networks are likely to become more prevalent in the future as connectivity requirements evolve. The number of smart personal devices has increased exponentially over the last decade, and is set to increase at an even more rapid rate over the next ten years – as the advent of the Internet of Things (IoT) sees more and more devices utilizing an Internet connection, it is no longer just your smartphone or tablet that will be connected. The continued adoption of these smart devices and the expected growth in IoT technology creates both a thirst for connectivity and media consumption – increasingly, satellite technologies are becoming an integral and necessary complement to terrestrial mobile and Wi-Fi.

This increased need for constant connectivity is even set to change the way we travel. With companies such as Inmarsat planning to create a European Aviation Network which will allow passengers to access high-speed connectivity in flight, the day when we will all be able to be connected all of the time is most definitely edging closer.

There is also a move towards greater collaboration and open technologies which can drive innovation across the board. There is a huge worldwide community of developers that are both looking for new opportunities and have deep knowledge of local markets.

We are being approached by developers who have never worked in satellite before and want to understand the dynamics of the satellite communications industry and how they can bring their innovative solutions to Inmarsat's customers and partners.

Growth in Asia has been slower than the rest of the world, for a variety of reasons. Now, with the evolution of satellite broadband technology and greater investment, we can expect to see this begin to change over the coming years. It is time for the East to catch up with the West and satellite broadband is a key factor in making this happen. ■

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Australia – smart satellite use for homeland security

In a world where threats come from increasingly obscure sources, homeland security is of the utmost importance. Governments around the globe must invest massive sums to keep their borders and citizens safe, not just from terror threats, but from natural disasters and disease as well. Such events are catastrophic to the local economy, the farming industry and nearby inhabitants. To protect against these threats and more, Australia makes heavy and consistent investments in new security technology. Here, Amy Saunders takes a look at the country's recent homeland security advancements.

Reliable, high-quality communications are the foundation of every defence department around the world. Good satellite communications save lives and enables the rapid exchange of vital information during key national events, be they during times of war, disease or natural disaster.

The Australian Department of Defence (ADD) recently agreed to extend its C1 satellite services contract with Optus, seeing out the satellite's life to 2020. Optus, a wholly-owned subsidiary of Singtel, is the second-largest tele-communications company in Australia. The ADD and Optus first launched the C1 satellite in 2003, sharing the costs of building and launching the service. Optus operates commercial services in the Ku-band, while the ADD uses the Ka-band, UHF, and X-band for communications across Australia and the Asia-Pacific region.

In 2014, the ADD initially signed a AU$19.5m contract renewal with Optus for services on the satellite until 2018, but in February 2016 it announced that the agreement had been extended until 2020. Commodore David Greaves, Commander Defence Strategic Communications in the Defence Chief Information Officer Group, said that the 2003 satellite offered the ADD 'its first sovereign satellite communications capability.'

"The extension of this important agreement to the satellite's end of life reinforces this important relationship with Optus," said Greaves in a statement.

Investment in satellite innovations for defence

EM Solutions, a Brisbane-based designer and manufacturer of broadband satellite communications equipment, has played a major part in the development of the Australian government's satellite defence programme in recent years, with several deals for innovative projects announced.

In 2014, EM Solutions was announced by Australia's

Minister for Defence, Senator David Johnston, and the Assistant Minister for Defence, Stuart Robert, as the recipient of a grant under Round 18 of the AUS$13m Capability and Technology Demonstrator (CTD) Programme. The CTD programme supports the development of new technologies that could contribute to defence capability. According to Johnston, seven technology proposals from Australian companies and universities were selected to demonstrate possible defence applications. The proposals had the potential to advance defence capability, produce innovative products for defence and civilian use, and stimulate Australian industry growth.

"This award will enable EM Solutions to develop a third-generation, mobile wideband satellite communications terminal. Using the company's proven satellite acquisition and pointing technology and its broadband radio systems, this terminal will have the potential to roam between WGS (X-band and Ka-band) and commercial Ka-band satellites depending on location and weather in the same way that a mobile phone can roam between cellular networks," said Rowan Gilmore, Managing Director of EM Solutions. "We are excited to be working with the ADD once again to develop leading edge technology that we can take to the world. This award is a wonderful initiative and a great opportunity for the company to develop an innovative local high technology product."

"EM Solutions has proven performance in development and delivery of a wide range of complex RF products ranging from subsystem elements of phased array radars or satcom on the move (OTM) technologies. One of the quiet achievers in the defence electronics sector, EM Solutions is a great example of a Queensland SME acting globally and thinking locally," said Queensland Government Defence Industries Envoy, Lindsay Pears.

In a recent correspondence with *Satellite Evolution*, EM Solutions' Gilmore said that the CTD terminal is expected to be ready for demonstration in June 2016.

In December 2015, EM Solutions announced another deal with the Australian government to develop the world's first MilSatCom/GX maritime terminal in partnership with Inmarsat. EM Solutions has adopted mono-pulse tracking techniques to provide exceptional accuracy and stability, in addition to reducing the demand on motors and other moving parts, which minimizes power, weight and operational stress. The new terminals will use EM Solution's Diamond Series Ka Multiband Block Up Converters, which utilize the latest in gallium nitride (GaN) technology and cover both commercial and military Ka-bands in a highly efficient, single package. This family of maritime terminals is known as the COBRA series and will be further developed for other capabilities in the near future.

Photo courtesy NicoElNino/Shutterstock

"Today's announcement is a further example of Inmarsat's strategy of responding quickly and effectively to customer demands. In this instance, the Australian government customer was looking to increase the operational capabilities of their satellite communications within significant budget constraints and the requirement to reduce the footprint of satellite equipment on-board its new vessels," said Andy Start, President, Inmarsat Global Government. "We are seeing a growing understanding within government satcom circles of the important role that commercial satellite communications can play in augmenting existing MilSatCom capabilities. Partners, such as EM Solutions, play a vital role in helping us to develop new solutions, which are tailored specifically for government users."

"We have been working on this product platform for a number of years and the opportunity presented itself to take a product through both Inmarsat GX certification and ultimately WGS certification to deliver a unique offering to an Australian government customer," said Gilmore. "We believe this terminal will be the first jointly certified system to enable automatic switching between MilSatCom and Inmarsat GX satellite systems."

Keeping Australia's satellites safe

Lockheed Martin and Electro Optic Systems (EOS) recently broke ground on a new space object tracking facility in Australia that aims to provide government and commercial customers with an unprecedented view of orbital space debris fields. It is estimated that there are hundreds of thousands of debris objects in orbit, including rocket parts and pieces of defunct satellites. These objects pose a major threat to satellites in orbit that power everything from national security and global financial markets to smartphones and weather prediction.

"The expansion of space debris tracking by EOS and Lockheed Martin is expected to make a significant contribution to the preservation of the space environment, by providing data which will enable cost-effective debris manoeuvre for satellites," said Mark Valerio, Lockheed Martin's Vice President and General Manager of Military Space. "The accuracy of our optical sensor network, combined with an ability to reschedule tracking operations according to commercial priorities, will provide a trusted source of critical space data to government and commercial operators."

The network developed by EOS and Lockheed Martin, called Optical Space Services (OSS™), was formed in August 2014. Sensor systems like OSS serve as a complement to radar-based systems like the US Air Force's Space Fence, which will sweep the sky tracking 200,000 objects. Sensors, lasers and optic systems will be fused together by software enabling OSS to hone in on, characterize and track human-made objects orbiting the depths of space. That data will then be delivered to customers, allowing them to manoeuvre

satellites and prevent collisions. The system can also predict the paths of debris, giving operators advance warning of potential collisions.

"The strategic collaboration with Lockheed Martin has allowed a critical mass of sensors, data and services to be assembled, enabling OSS to deliver the suite of asset protection services requested by customers," said Ben Greene, EOS' Chief Executive Officer. "This new tracking capacity will provide unique data which is exclusively available to EOS and Lockheed Martin, enabling each organization to offer both data and services to meet global market needs. Based on current contracts and active negotiations, EOS expects to commence the delivery of data and services by late 2016."

Technology training at Talisman Sabre 2015

It's not enough just to have the technology to defend the country; training and practice exercises are a vital component to ensure that a country is ready and able to respond to any threats, making the best use of all the technology at its disposal.

As such, Hughes Network Systems' Defence and Intelligence Systems Division (DISD) partnered with the ADD and the United States Military at Talisman Sabre 2015 to test its advanced TDMA waveform technology. The ADD used the Hughes HX System with advanced waveform technology during the exercises to deliver higher performance satellite connectivity than ever before. It will also deploy it in future military exercises.

"Hughes provided direct support to the Army for the conduct of the US and Australian Bilateral Exercise Talisman Sabre during the period of March – July 2015," said Colonel Shaun Love, Director of Land Network Integration, ADD. "Australia is still maturing its understanding of deployed TDMA satellite operations, and the support from Hughes was fundamental to both the successful outcome of the exercise, and educating the Army on planning and executing operations utilizing TDMA waveforms. Hughes provided field service representatives to both the barracks and Field COMMEX supporting exercise work up, engineering, and ultimately informing the SATCOM architecture deployed by the combined US and Australian Division."

Photo Dmitry Kalinovsky/Shutterstock

Talisman Sabre 2015 was the sixth biannual joint training exercise with the ADD and the US Military. Some 30,000 Australian and American forces participated in these exercises, which are the largest of the year for the ADD. Hughes DISD spent a year participating in trials leading up to them.

"Advanced TDMA waveform technology is critical for efficient global military satellite communications," said Dan Losada, Senior Director at Hughes DISD. "Hughes is pleased to see the ADD experience stronger battlefield communications with our advanced satellite waveform technology, and we look forward to continuing to support the Australian Army in the future."

Boosting agriculture with remote sensing

In addition to physical and digital threats from terrorists, satellite technology can also be used to tackle other vital concerns like food and water security. In South Australia, participants from 10 countries gathered in January-February 2016 for the Southern Hemisphere Space Studies Programme to develop remote sensing technologies to address food and water security challenges that could be rolled out worldwide. The programme is an intense course offered by the International Space University (ISU).

Food and Water Security team project Chair, Ray Williamson, said that the topic was of vital importance, especially for developing economy countries, at a time when the southern hemisphere was in the grips of the El Niño effect.

"We'll be looking at sensor networks on the ground that communicate with satellites in orbit and then send back information about specific plots where you've got your sensors – temperature, humidity, soil moisture," said Williamson. "By combining different filters in the data you get back, you can begin to determine things like stress on crops, because a stressed patch of corn will show a signature in different colours, just like when you see the leaves turn brown. We'll be using satellite systems that are already operating and may want to explore the possibility of dedicated satellite systems. The other thing we'll be looking at to tie in with the satellite data is data taken from drones flying over, which is a new and rather exciting possibility."

The programme authorities identified South Australian company Myriota as an example of the possibilities that can be achieved. The company was formed to commercialize technology developed by the University of South Australia's Institute for Telecommunications Research and will use LEO satellites to provide two-way data connectivity for remote sensors and devices for industries such as agriculture, where there is a need to access data in very remote locations.

Fighting disease through earth observation

In February 2016, two cases of the Zika virus were confirmed in New South Wales. The victims had recently travelled to the Caribbean and the virus is not expected to spread throughout Australia. "It is very unlikely that Zika virus established local transmission in New South Wales as the mosquitoes that spread the infection are not established here, although they are found in some parts of Queensland," said

Vicky Sheppeard, Director of Communicable Diseases at NSW Health.

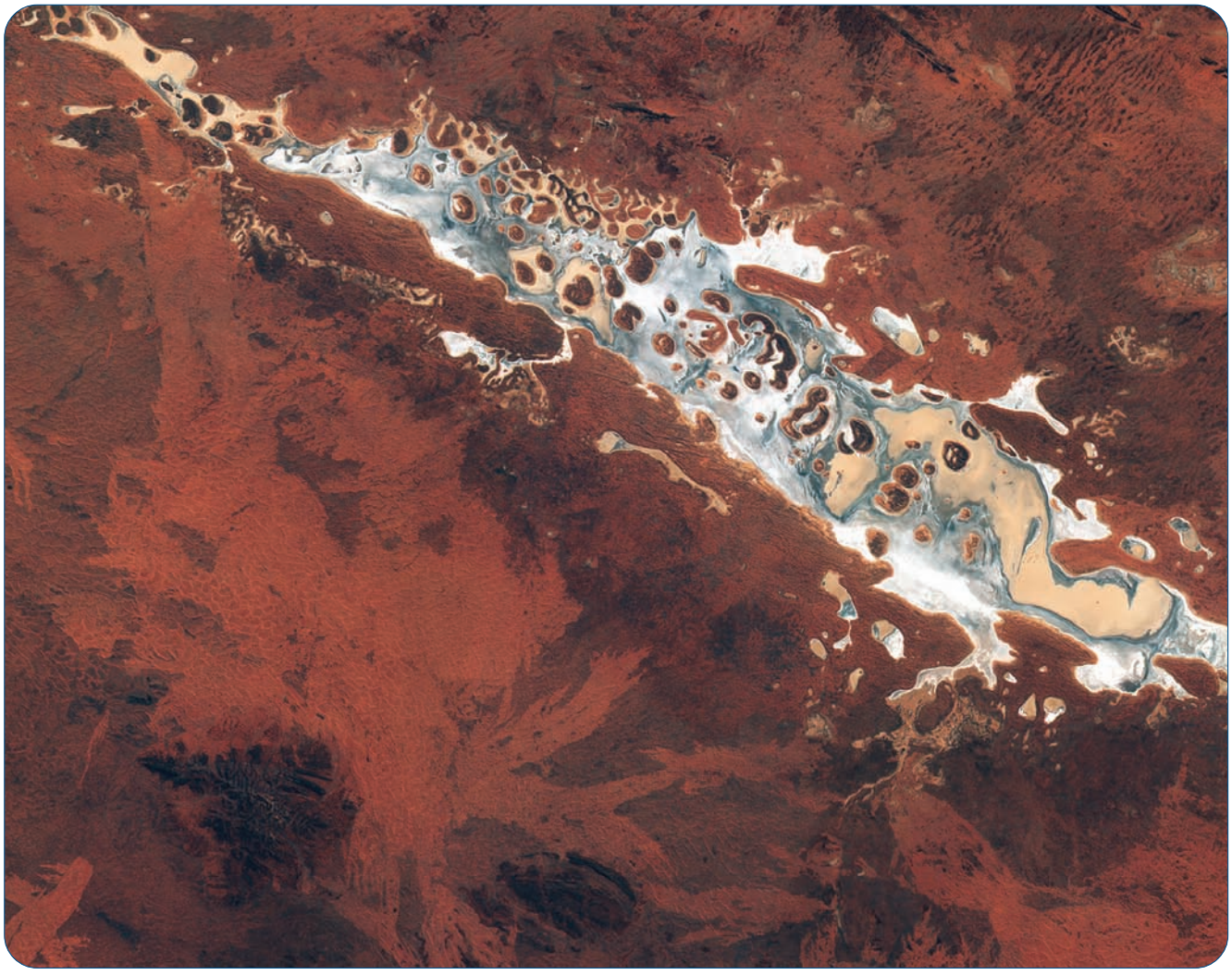
The incident highlighted some interesting ideas regarding the use of satellites to tackle disease. A mosquito's ability to survive and transmit viruses is highly-dependent on environmental conditions, which can be mapped via satellite. Although remote sensing is less accurate than in-situ measurements, it enables low-cost, long-term, convenient disease spread mapping. Predictions of new outbreak locations can be made in advance; thus suitable precautions can be made. The mosquitos that carry viruses like Zika and Dengue fever thrive in warmer, drier, environments. While it's true that their breeding requires damp areas, the fact that more rainwater is stored for longer periods of time during the dry seasons means that mosquitoes have more time to breed and transmit diseases. Temperature and rainfall can be monitored via weather satellites, while the relative urbanization, and thus increased incidence of large quantities of stored water, can be studied via earth observation satellites.

Following the report of the two Zika victims, Dr Cameron Webb, an expert on mosquito-borne viruses, said to Sky News Australia: 'We're very fortunate that the authorities in Far North Queensland have a lot of experience dealing with these small outbreaks of mosquito-borne diseases. The same mosquito that spreads dengue fever in Far North Queensland is the species that's spreading Zika virus," he said. Webb added that even if an infected traveller came to the area and infected local mosquitoes, authorities would be able to respond using the strategic framework already in place for cases such as Dengue fever, making any outbreak 'likely to be very minor.'

Policy lags behind technology

Although Australia continues to invest in satellite-based homeland security technology, there is a lot of room for growth in its satellite sector. As highlighted by Andrew Dempster, Director of the Australian Centre for Space Engineering at the University of New South Wales: "We're the largest economy in the world not to have a space agency and there's no real excuse for that."

Industry insiders have noted that Australia's space regulations were written when missions cost hundreds of millions of dollars. This is no longer the case, but still, the policies have not been updated to reflect that. The Minister for Industry, Innovations and Science, Christopher Pyne, said in October 2015 that the government would review legislation on civil space activities in Australia to 'ensure it appropriately balances Australia's international obligations with encouraging industry innovation and entrepreneurship.' It is hoped that new policies will further drive satellite sector innovations, which in turn could be used to ramp up homeland security. ■



Australia desert. Copernicus Sentinel data (2015)/ESA

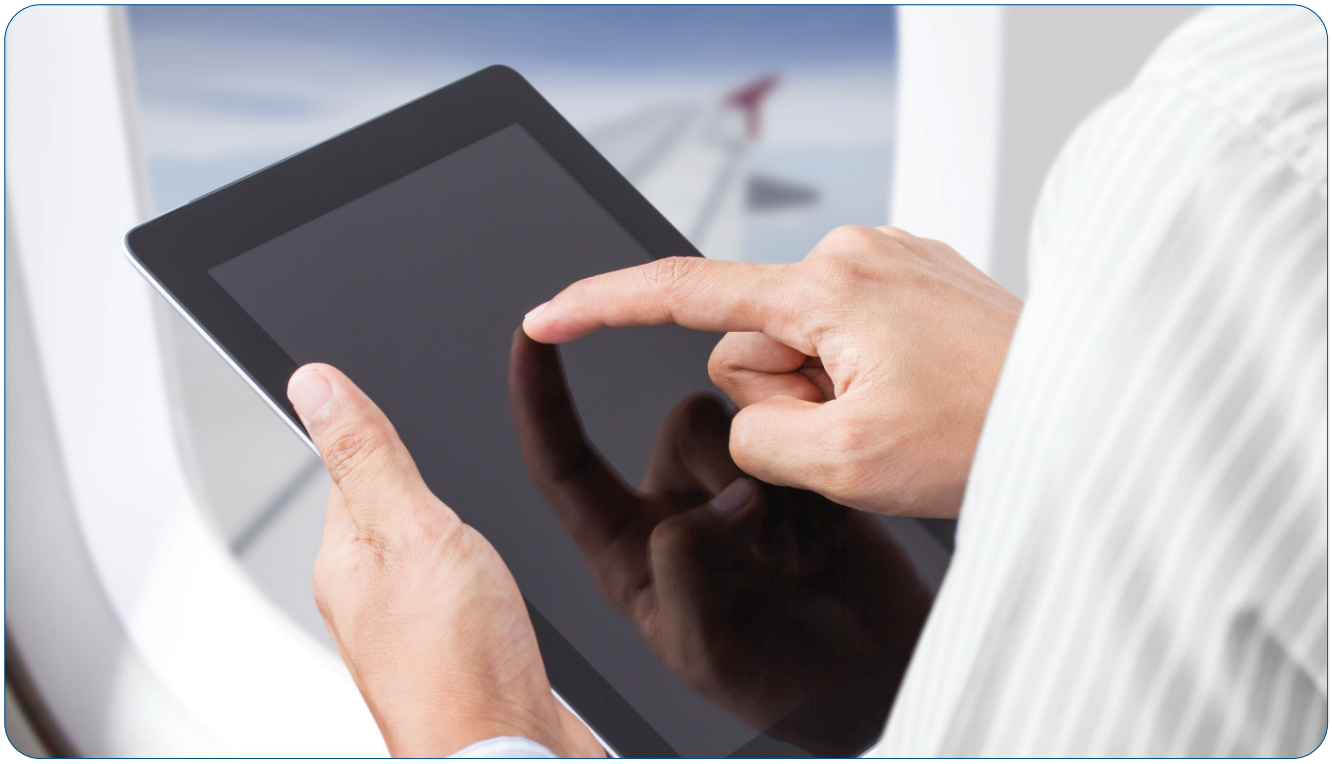


Photo courtesy Shutter_M/Shutterstock

Reaching for the stars with in-flight connectivity

It seems like in every article written about multimedia on-the-move, the author will start by saying that always-on connectivity is an ever-growing demand set to expand exponentially in the years to come. There's a reason for this: It's true. Despite those among us who would rather we all learn to put away out devices at key times like family meals, the rest of us just can't help ourselves. We've become so used to constant connectivity that, when we find ourselves suddenly offline, it's like a small hole has encroached on our lives. Nowhere is this truer than on planes. Being stuck on a plane for thirteen hours without the Internet can seem like a lifetime, a fact that is becoming ever-more clear to airlines and service providers alike. In this article, we take a look at the current trends and developments in the world of in-flight connectivity.

Numerous recent surveys all point in the same direction when it comes to in-flight connectivity: Up.

According to Euroconsult, the revenue from in-flight connectivity is expected to increase eight-fold in the next ten years, from US$700m in 2015 to US$5.4bn by 2025. "At the end of 2015, 72 airlines had already installed or announced plans to install passenger connectivity systems on board, and the number of connected commercial aircraft had increased by 21 percent compared to the end of 2014," said Geoffrey Stern, Senior Consultant at Euroconsult and Editor of the report. Stern said that the greatest growth in the 2015-2025 period would be in the Asia-Pacific region, which, at the end of 2015, boasted the largest number of connected airlines:

- Asia: 22;
- Europe: 21;
- Middle East and Africa: 17;
- North America: 9; and
- Latin America: 3.

Currently, just 6.2 percent of passengers use in-flight connectivity at an average cost of US$12.5/session. According to Stern, pricing is a key issue; airlines must find a balance between charging so much that nobody uses it, or so little that everyone uses it and capacity comes under strain. However, as more and more HTS come online, with their lower price per bit and higher speeds, costs are expected to fall as services scale.

A 2015 survey of more than 6,000 airline passengers by market research company GfK and Inmarsat found that, in Europe, demand for in-flight broadband is high across all demographics and consumer groups. In-flight broadband is also expected to be a strong source of revenue for airlines, as well as a key differentiator for carriers looking to stand out from rivals.

The survey found that 80 percent of passengers would use in-flight broadband if given the opportunity, while more than three out of five passengers reported that they need in-flight connectivity. The demand for in-flight connectivity was also found to impact airline choice, and can be a differentiator for carriers which offer the service, making them a more attractive airline for passengers. Some 69 percent of those surveyed would pick an airline that provides in-flight connectivity, while 67 percent would feel more valued by a carrier with the service. Among those who indicated that they would connect their devices in-flight, 67 percent would be willing to pay for the service.

"In a highly competitive environment, where airlines are vying to stand out from the crowd, onboard connectivity is a powerful differentiator. Connected passengers are happier passengers, who not only feel more valued by their airline, but would go as far as opting for a carrier that provides in-flight Wi-Fi over one which doesn't. Additionally, with a majority of passengers across all age groups willing to pay for onboard connectivity, this is an opportunity that the airline industry simply cannot afford to miss," said Leo Mondale, President of Inmarsat Aviation.

The latest advancements in in-flight connectivity

A number of global companies currently offer connectivity services to commercial aircraft, including Panasonic, Gogo, Global Eagle Entertainment, Thales, SITA OnAir and ViaSat. With such strong competition, reliability and frequent new innovations are key to retaining and growing market share.

Gogo has been developing its new 2Ku satellite Internet service for in-flight connectivity. According to Gogo, 2Ku is capable of matching or exceeding the bandwidth of any other system currently offered and benefits from the global coverage and redundancy of the more than 180 Ku-band satellites. In contrast, Ka-band systems are only able to access a small number of satellites.

The service has undergone numerous flights tests and performed better than expected. Gogo engineers have been able to stream videos on more than 40 devices simultaneously. The tests have demonstrated that 2Ku's proprietary antenna design delivers at least twice the performance of any gimbaled antennae currently on the market, regardless of spectrum band, and uniquely solves the 'skew angle' problem that plagues current generation systems when aircraft are flying in tropical regions.

"Gogo has a big advantage in that we aren't tied to any one particular technology. We looked at every available alternative on the market and found significant shortfalls with all of them," said Gogo's President and CEO, Michael Small. "So what did we do? We designed 2Ku to deliver peak performance in terms of coverage, cost, capacity and reliability without any of these shortfalls."

While 2Ku system testing continues, Gogo is making rapid progress towards the commercial launch scheduled for later this year. Initial installations are complete at Aeromexico and in progress at Virgin Atlantic. In 2015, Gogo grew its backlog of 2Ku aircraft to more than 800 aircraft and is ramping-up installations at airlines like Air Canada, Delta, GOL and United. It aims to complete most of the installations by the end of 2018. JTA, a member of the Japan Airlines Group, is the latest airline to select Gogo's 2Ku in-flight connectivity solution.

In December 2015, Panasonic Avionics installed its 1,000th commercial Global Communications Services network line, to a China Eastern Airlines plane. It has supplied around 70 airlines, which is more than 50 percent of all connected airlines, and 3,000 aircraft. In 2016, it will add another 600 aircraft to its network, expanding to an extra 12,000 aircraft by 2025. Its Ku-band network now delivers broadband and live TV to 99.6 percent of all commercial aviation routes.

"In April, we will introduce HTS service over North America and the Atlantic. Europe and the Middle East will follow later that year, and by mid-2017, we will complete our HTS network, offering over 200Mbps in regions that cover 80 percent of all traffic routes," said David Bruner, Vice President, Global Communications Services for Panasonic Avionics. "Leveraging our unique HTS design, we'll be able to tailor the inflight experience to match passenger expectations for bandwidth and give them even more access to the services that they use every day on the ground. We will also be able to expand the number of channels available in our global live television service, which continues to become increasingly important to our customers and their guests."

In February 2016, Panasonic Avionics and Telesat signed another multi-year contract for nearly all of the HTS Ku-band capacity on the newly-launched Telestar 12 VANTAGE satellite. The satellite covers the Mediterranean, Europe and the Middle East from its 15° West position. The contract will enable Panasonic to serve the in-flight Wi-Fi, maritime and oil and gas markets.

"Telesat's cooperation in adjusting the position of the HTS spot beams on Telstar 12 VANTAGE to meet Panasonic's requirements was outstanding. This further optimizes the

Photo courtesy of Panasonic Avionics

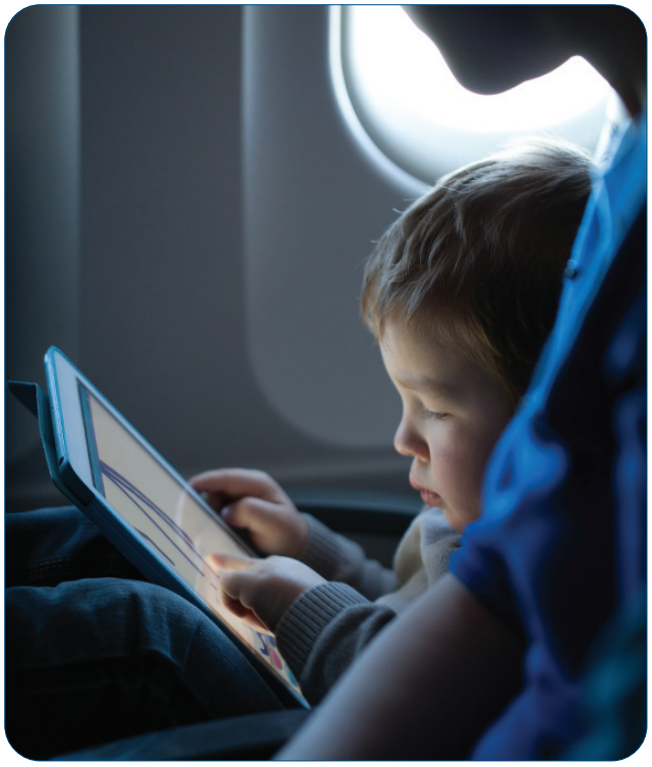


Photo courtesy d13/Shutterstock

service for Panasonic and gives us an edge in winning mobile broadband business in the air and at sea," said Bruner. "Panasonic now has Ku-band capacity on four Telesat satellites and, with this latest contract for nearly all the HTS Ku-band covering the Mediterranean, Europe and Middle East on Telstar 12 VANTAGE, we are well positioned to expand in maritime and energy markets across Europe."

What does it all mean for in-flight entertainment (IFE) systems?

It's been established time and time again that passengers prefer the seatback IFE system to overhead monitors or other options. According to the 2015 Airline Passenger Experience Association's (APEX) Global Passenger Insights Survey, 70 percent of fliers prefer to use seatback screens, while just 30 percent want to access in-flight entertainment streamed wirelessly to their own devices.

There is, however, a third category of in-flight entertainment consumer emerging: The dual screen user. As many will observe in their home lives, consumers, especially the younger audience, often consume media using at least two screens simultaneously. This pattern has been highlighted by Euroconsult and was discussed at length by Joe Leader, CEO of the APEX, at GVF's recent Connectivity 2016 event in London, UK.

"Passengers are expressing a desire to use more than one screen at the same time - by having an embedded device in front of them, they may use their smartphone or other device in tandem," said Leader.

Technology that can pair multiple devices is currently being rolled out by a number of operators. JetBlue and Thales, in a project that dates back to 2014, have recently launched their new Airbus A320, which features direct-broadcast satellite TV and Internet connectivity through one seatback interface. Thales' new Android-based system, STV+, enables personal devices such as phones or tablets to be paired via near field communication (NFC) to stream content wirelessly.

Leader said that NFC could both improve passenger experience and open up lucrative earning opportunities for airlines. "For products, this provides an incredible sales opportunity that will translate into more revenue when integrated into a second screen. Most people do not want to interrupt their show, but if they can multitask on a second screen, then the revenue opportunity increases dramatically."

Other airlines that have not traditionally featured any form of IFE system are taking a different approach to keep ahead of competitors. Dutch LCC Transavia recently partnered with Piksel to enable passengers to download digital content, such as TV programmes or films, onto their own devices ahead of a flight. The content becomes available for viewing when the passenger boards the plane and is deleted at the end of the journey to comply with licensing laws.

"The way people consume media has changed rapidly in recent years and the airline industry needs to reflect this in its in-flight entertainment systems," said Roy Scheerder, Chief Commercial Officer at Transavia. "Our aim was to both boost the flying experience for our customers and cut the high costs of installing onboard infrastructure for video delivery."

Plenty of room for growth

It's clear from the surveys that, although in-flight connectivity has grown exponentially in recent years, there's still a massive amount of growth ahead in the sector due to increasing demand from the always-connected generation. As technology advances and capacity expands, we'll begin to see more options for in-flight connectivity as we take to the air. Although the greatest uptake in the next ten years is expected in the Asia-Pacific region, it seems likely that we'll also begin to see more and more connected aircraft throughout Europe, where adoption has been slow, thanks to business and leisure travellers alike. ■

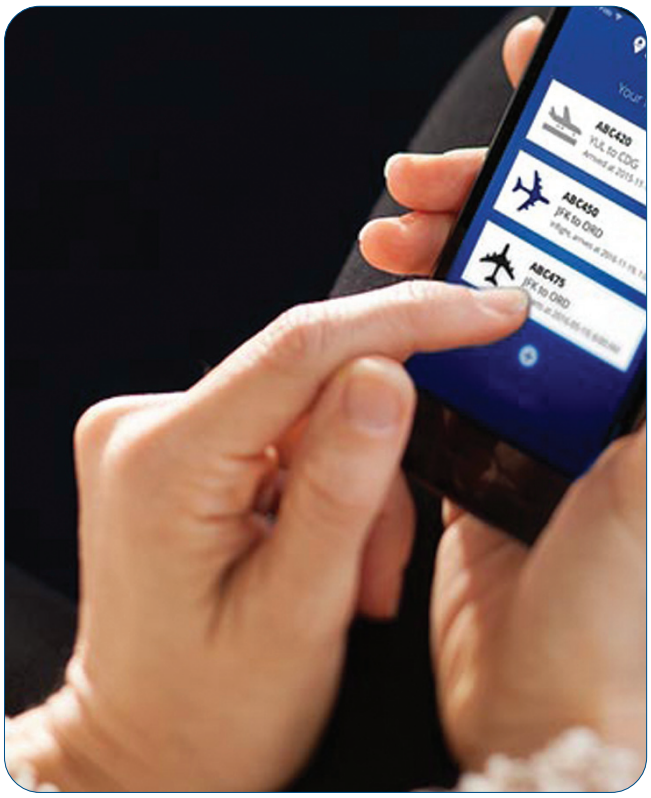


Photo courtesy of Global Eagle Entertainment

Photo courtesy of ND SatCom

Modem technology: big business

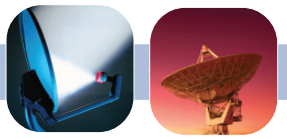
Modems are big business in the satellite sector. Fundamental for all satellite operations, modems establish data transfers between ground stations and satellites while converting between bitstreams and radio frequency signals. The best modems perform this function while minimizing bandwidth use, thus reducing expensive satellite capacity costs. New technological advances mean that modems and, as a result, satellite operations, are more efficient and flexible than ever before, reducing operational costs and boosting performance. Here, Satellite Evolution reports on key recent developments in modem technology and new partnerships getting started in Asia.

As in any industry, the satellite sector values flexibility extremely highly. Consider mobile phones: Ten years ago, a phone was just a device for making calls. These days, phones are our cameras, our computers, our music and TV devices. We can watch films, play games, even pay for things with them. Each of these advances has afforded greater flexibility, resulting in higher efficiencies and improved performances. While several companies expanded their satellite modem offerings in the last twelve months, Advantech Wireless, ND SatCom and Datum Systems made standout contributions to the sector in terms of flexibility enhancements.

In March 2015, Advantech Wireless launched the Series 7000 VSAT routers/modems, addressing the call for tangible multi-service solutions. The new products use Advantech Wireless A-SAT-IITM Bandwidth Optimized Satellite System technology, providing a greater than 50 percent reduction in satellite bandwidth through dynamic transmission switching between multiple access schemes, achieved by application- and volume-aware algorithms, literally serving any type of applications using:

- MF-TDMA (Multi-Frequency-TDMA) required for high variable internet traffic;
- InterSKYTM-BM-FDMATM (Burst Mode-FDMA) ideally suited for video streaming, cellular backhauling and highly reliable QoSaware Trunking pipes; and
- CM-SCPC (Continuous Mode –SCPC) for always on, non-shared mission critical applications.

The Series 7000 VSAT routers support star, mesh and hybrid architectures with dual modulator and dual demodulator units supporting any frequency band: L, S, C,



X, Ku and Ka. There are multiple models available for different applications and verticals such as cellular backhauling, SCADA, broadcasting, oil and gas, enterprise and corporate, maritime and cruise lines, in-flight entertainment, homeland security, consumer internet, military and mobility.

"Our new Series 7000 family is an order of magnitude more powerful than its predecessors S4120/S5420, contains a powerful multicore networking processor and supports over 200 Mbps/100Kpps on forward link and 20 Mbps/13kpps on return link of sustained data/video/voice throughput, as these routers are also equipped with dual ASI inputs and outputs for direct MPEG2/MPEG4 video streaming that can operate simultaneously with IP bidirectional traffic," said John Landovskis, VP PLM and BD VSAT and Modem Products at Advantech Wireless.

VSAT and comprehensive IT capabilities into a single device

Meanwhile, in June 2015, ND SatCom launched the SKYWAN 5G unit, which combines VSAT and comprehensive IT capabilities into a single device. It includes an MF-TDMA modem with integrated DVB-S2 receiver and achieves significant data rates. Designed with high network redundancy and a wide range of IP support, SKYWAN 5G allows data to be transmitted in a single hop directly from origin to destination, avoiding double hops and extra delays. Bandwidth is dynamically allocated as required, which provides substantial savings on satellite capacity costs.

The SKYWAN 5G design fits all VSAT topologies, including star, multistar, hybrid or full mesh networks. Each unit has full functionality on board and supports switching to another topology over time. It also plays any network role such as hub or remote, thus simplifying logistics and customs' handling, and enables unprecedented scalability as demand for network growth increases. Additionally, the SKYWAN 5G can be integrated into Manpaks, Fly-Aways or other VSAT solutions and allows unit stacking to further boost network performance.

Also in 2015 ND SatCom launched a partner programme for integrating the SKYWAN 5G modem as a key element in VSAT terminal solutions by selected partners. "We are very proud to offer the SKYWAN 5G technology to new partners, allowing them to build their own products. This includes completely mobile ad-hoc networks with geo-redundancy. Hub-less networks consisting solely of Manpak terminals will become a game-changer in the VSAT market of disaster recovery and also in tactical military networks," said ND SatCom's Head of Product Management, Michael Weixler.

ND SatCom recently revealed to *Satellite Evolution* that several MoDs are testing SKYWAN 5G integrated in ManPack terminals from various suppliers like partners in Thales Group, not only for tactical military networks that benefit from the low weight, but also for the network topology flexibility. Additionally, equipment and services provider RUAG uses SKYWAN 5G for its ad-hoc military networks solution ARANEA. Ad-hoc networks benefit from the MF-TDMA robustness against intermittent interferences or shadowing and the radio-aware dynamic routing protocols to adapt quickly to rapidly-changing accessibility situations, where sites are either mobile or not always online. The MoD of one Baltic Sea state has also replaced an existing DVB-RCS network with SKYWAN 5G.

In other news, Datum Systems recently announced a new partnership with XipLink, which specializes in standards-based wireless optimization software and hardware, to embed its latest generation of optimization software (XipOS 4.3) into Datum's M7 Series modems. By integrating XipLink's XE-Series wireless optimization software within Datum's modems, which already offer carrier cancelling, sharper carrier roll-offs and sophisticated low latency coding schemes, Datum's modems will now accelerate and compress TCP/UDP data for maximum capacity.

"The more than double throughput capability of XipLink's optimization software coupled with Datum Systems' more than 50 percent carrier bandwidth savings make the M7 a true dual optimized modem and a win-win for our customers. Xiplink's powerful optimization and advanced streaming compression capabilities with our reliable high performance modems allows us to provide greater throughput and network efficiency to satellite based IP networking customers than ever before," said David Koblinski, Vice President of Datum.

"We are excited by the flexibility and lower capital cost this partnership will bring to Datum Systems' growing customer base. The XE-Series software will also include XipLink Real Time (XRT) functionality to further extend and improve the current high performance Datum Systems' line of satellite modems," said Bruce Bednarski, Senior Vice President for XipLink. "Technical enhancements such as XRT will compress, coalesce and prioritize VOIP and UDP for significantly more bandwidth and packet efficiency without compromising quality. XRT can provide bandwidth savings up to 50 percent on this traffic classification."

With Datum's evolution to the M7 series modem, customers will still have access to TCP acceleration and compression functionality, but now delivered on a significantly more powerful platform capable of supporting the complete portfolio of XipLink's wireless link optimization features. New high performance features such as byte-level caching and advanced cellular compression (ACC) will deliver sizeable reductions in the amount of bandwidth required to transport applications in several high growth vertical markets. For

Photo courtesy of Shutterstock

instance, byte-level caching reduces required bandwidth requirements by approximately 80 percent on repeated traffic including images, audio and video. ACC can reduce header and payload transport by up to 40 percent on both 3G/4G voice and data content as it traverses the network connection.

New contracts and partnerships

With demand for more satellite bandwidth and services growing around the world, and in developing countries like much of Asia in particular, sales of more efficient satellite equipment like modems are on the rise. In addition to new operations, many service providers are updating their facilities in order to become more competitive and to meet the requirements to use Ka-band HTS.

Comtech EF Data recently won US$5m of orders for equipment and services to expand a communication network in Asia. The customer will use Comtech's CDM-570A/L-IP satellite modems and CDD-564A IP demodulators to allocate bandwidth and optimize data traffic as required among different sites. This latest upgrade to the CDM-570 series includes support for Comtech's VersaFEC® low latency LDPC Forward Error Correction, the revolutionary DoubleTalk® Carrier-in-Carrier® bandwidth compression and optimized transmit filter roll-offs down to five percent, providing significant bandwidth-power savings. The modem also features intelligent header compression and a lossless payload compression engine to ensure that only essential information is transmitted across the satellite link. With Comtech's complete modem and multiplexer solution, the customer is able add remote sites and allocate bandwidth resources when and where necessary.

In November 2015, ORBCOMM was selected by China International Marine Container Company's (CIMC) Intelligent Technology Division to provide next generation OG2 satellite service and modem technology for its dual-mode telematics solution being developed as an original equipment manufacturer (OEM) product designed for dry shipping containers.

CIMC is the world's leading supplier of logistics and energy equipment. It builds nearly 50 percent of the world's shipping containers and has a capacity that exceeds 2.4M/yr of units. Its satellite-based telematics platform can be installed as a factory option or retrofit for its customers, which include some of the world's largest shipping fleets and container leasing companies. With ORBCOMM's satellite connectivity and modem technology, CIMC's telematics solution will track and monitor its shipping containers in real time, which will improve the information flow throughout the intermodal supply chain. Customers will gain greater visibility of their loads and valuable business intelligence, resulting in improved equipment utilization, security and operational efficiency.

"In addition to new operations, many service providers are updating their facilities in order to become more competitive and to meet the requirements to use Ka-band HTS."

"We are pleased to join forces with ORBCOMM to launch a factory-installed telematics solution for our large customer base worldwide. CIMC has worked closely with ORBCOMM to integrate its satellite modem technology into our product," said Shouqin Zhou, General Manager of CIMC's Intelligent Technology Division. "By delivering a 'smart container' solution to the intermodal industry, our customers can seamlessly track and monitor their assets over the sea, rail and road from their origin to their final destination using ORBCOMM's ubiquitous OG2 satellite network."

CIMC is expected to start its field trials of the OEM telematics solution in the first quarter of 2016.

Hughes' JUPITER system

In October 2015, Global Eagle Entertainment Inc. (GEE), a provider of aircraft connectivity systems, operations solutions and media content to the travel industry, signed an agreement to use Hughes Network Systems' JUPITER System HT Aero Modem, including the core router module and JUPITER mobility technology, to power GEE's next-generation, high-performance broadband aeronautical service.

This newest version of Hughes' HT Aero Modem incorporates significant technological advances that will enable GEE to deliver industry-leading aeronautical services on any Ku-band satellite, including both wide beam and HTS capacity. With the capability of the Hughes modem to support fast and seamless beam switchover, within a satellite or between satellites, consumers of GEE's service will enjoy superior broadband service around the world.

"We're excited to expand our already strong partnership with Hughes and to incorporate this new technology to provide unrivalled connectivity to passengers," said Dave Davis, CEO for GEE. "With the upcoming launch of our new global Ku-band antenna, the impending launch of Ku-band HTS satellites and this new technology from Hughes, we anticipate massive strides forward in the global inflight connectivity market and continued improvements in the passenger experience."

The Hughes JUPITER System mobility option incorporates a number of important features, including hitless beam switching, which preserves the TCP connection either within or between satellites; doppler compensation; fast out- route acquisition; and return channel spreading to ensure compliance with adjacent satellite interference regulations. ■

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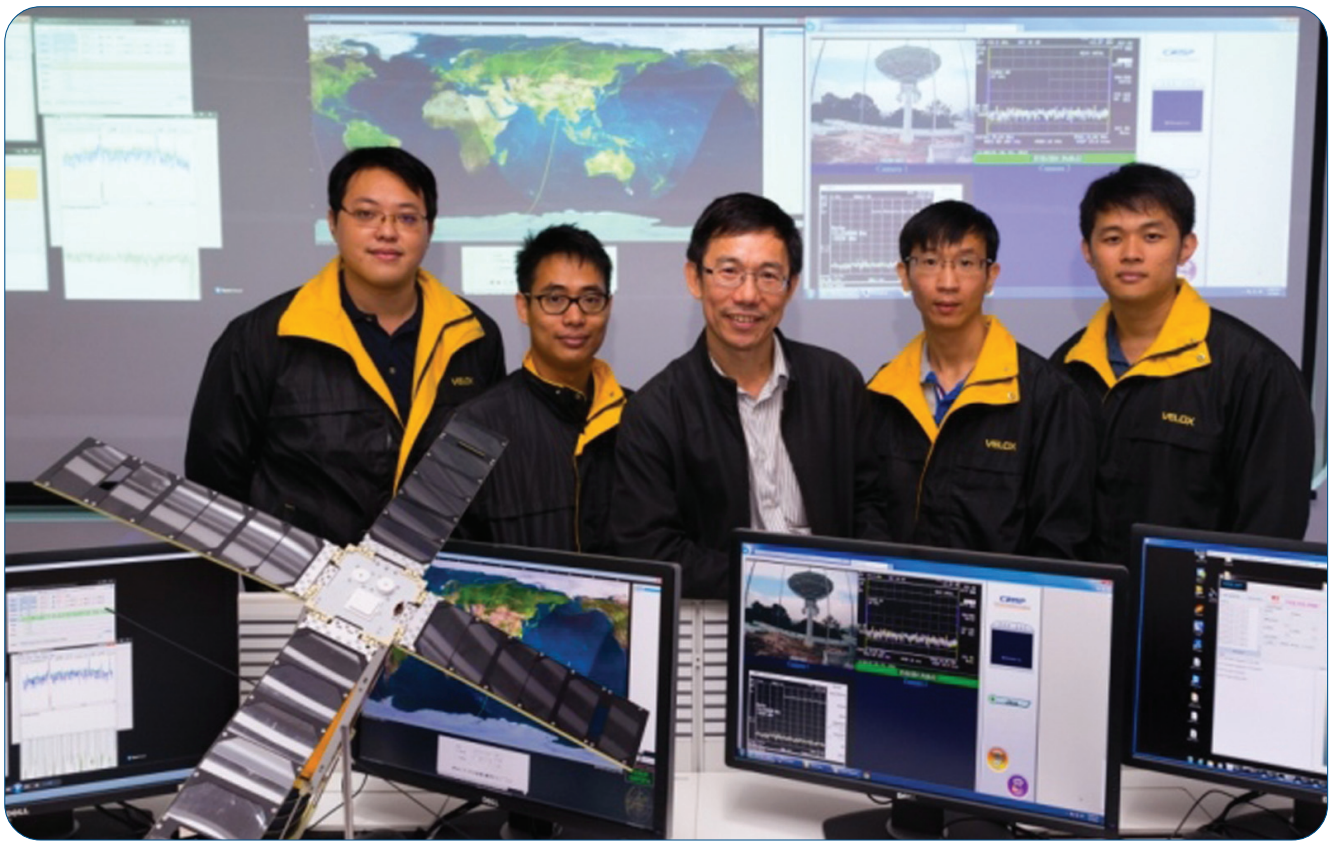

Singapore now has two new satellites orbiting in space, built by Nanyang Technological University (NTU).

Small satellites take big steps across Asia

Satellite manufacturing is big, expensive, business. Space mission costs, including satellite production, insurance and launch services, can easily exceed US$200m. These astronomical costs have traditionally kept many countries from investing in their own space programmes, meaning that only the richest nations like the USA, Russia and China have highly-developed space industries. However, with the advent of small satellites, it has become possible for smaller countries and commercial organizations to begin their own space programmes. Satellite Evolution takes a look at recent developments in the field of small satellites and some of the Asian countries currently taking major steps in space.

The trend of small satellites has been discussed for many years now, but I think that we can finally say, small satellites have hit the big time. Their advantages are obvious; lower production and launch costs, faster manufacturing times and, usually, faster launch times. Indeed, small satellites can be launched either by piggy-backing on larger operations like the International Space Station or through dedicated, low-cost launch solutions. Interorbital Services, for example, offers launch facilities for CubeSats for US$12,500/kg.

Mini- (100-500kg), micro- (10-100kg), nano- (1-10kg) and pico- (0.1-1kg) satellites are all available commercially today, while femto-satellites (0.01-0.1kg) have received much less research. Most of the recent advancements in small satellites have been micro or nano-satellites. “Originally a platform for university and technology development projects, we are now seeing interest from the commercial, government and military sectors in using 1-50kg satellites operationally,” said Northern Sky Research’s (NSR) Analyst, Carolyn Belle.

Although there has been a strong uptake of small satellites, they do not come without their disadvantages. When it comes to manufacturing, there are many challenges to consider. By their nature, small satellites require smaller parts. This means that smaller version of all of the traditional satellite equipment like modems, amplifiers, transponders, computers

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etc., must be sourced, potentially with less choice. There's also the question of propulsion and attitude control, which are inherently riskier when the payload is so small. Cold gas thrusters, chemical propulsion, electric propulsion and solar sails are all used to manoeuvre small satellites to their intended position thanks to recent advances. There are also limitations during piggy-back launches, not the least of which means that the main payload will always take priority.

Despite the potential drawbacks, countries with young space industries are testing the water when it comes to small satellites. In February 2016, Azerbaijan's Azercosmos was reportedly in talks with the Turkish Space Technologies Research Institute (TÜBITAK UZAY) for mutual scientific and technical support for the production of micro and nano-satellites. Azercosmos, which currently operates one satellite and has another under development, could fare very well out of the low-cost small satellites, avoiding the heavy investments required by early adopters.

Singapore joins the space race with domestically-manufactured satellites

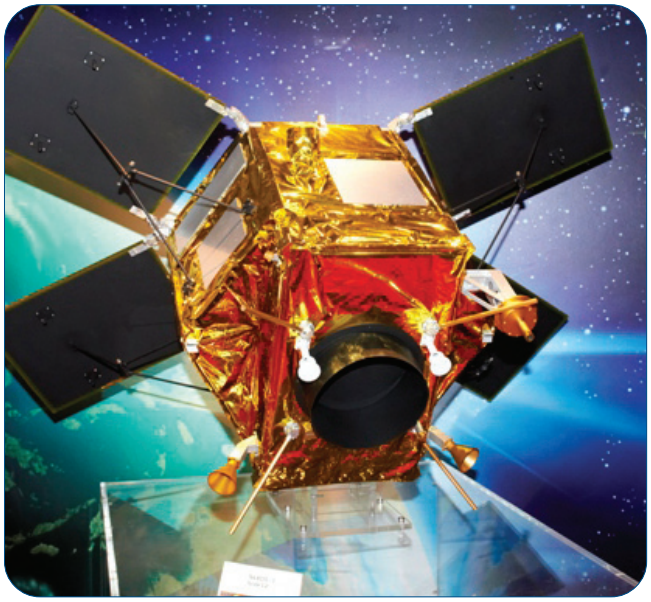
Singapore is one of the newest entrants in the space race. In August 2012, the country established the Office for Space Technology and Industry (OSTIn) in order to develop Singapore's space industry. "Companies looking to design and manufacture small satellites, as well as expand their downstream services, can leverage Singapore's political neutrality, existing technical capabilities and business-friendly environment to capitalize on the growth of the satellite industry in Asia," said OSTIn's Director, Gian Yi-Hsen.

In December 2015, Singapore launched its first domestically-produced mini-satellite, TeLEOS-1, from the Satish Dhawan Space Centre, India. TeLEOS-1 weighs 400kg and orbits 550km above Earth. It is currently undergoing in-orbit tests and should start commercial operations in the middle of 2016. The Earth observation satellite's applications include disaster and environment monitoring, maritime safety, coastal surveillance, urban planning and homeland security.

At the same time, Singapore's Nanyang Technological University (NTU) launched its fifth and sixth satellites. VELOX-CI is a 123kg mini-satellite that will study Asia's climate for three years and test a new navigation system. VELOX-II, meanwhile, is a 12kg micro-satellite that will test an experimental communication-on-demand technology for one year. With Addvalue Innovation's Inter-Satellite Data Relay System, VELOX-II should be in constant connection with NTU, even without line-of-sight. According to Tan Khai Pang, Chief Operating and Technology Officer of Addvalue, the inter-satellite communication system is the first of its kind for low-orbit satellites.

The December 2015 launches followed the launch of the VELOX-I and VELOX-PIII satellites from the Satish Dhawan Space Centre, India in June 2014. The satellites, which are in orbit 650km above Earth, were built by students at NTU's Satellite Research Centre (SaRC). The satellites are operated by NTU at its custom-built Mission Control Centre, which also operates two older NTU satellites, including VELOX-PII, a 1.3kg NTU student-built satellite launched in 2013, as well as 105kg micro-satellite X-SAT, Singapore's first domestically-built satellite.

Commenting on the recent launches, Low Kay Soon, Director of the SaRC, said, "Our current pipeline of even more sophisticated space projects will not only train our students for a career in the aerospace and space industry, but will also further strengthen NTU as an exceptional institution known for its excellent satellite technology."



TeLEOS-1 photo courtesy of ST Electronics

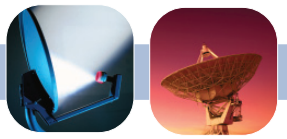
The NTU also recently launched a joint satellite research laboratory with Thales Alenia Space, called S4TIN (Smart Small Satellite Systems – Thales in NTU). The laboratory will develop technology for remote sensing, environmental monitoring, navigation, maritime security, automatic identification and imaging. "Together with Thales, we now aim to develop more advanced satellite technology to bring the world better telecommunications and more accurate climate sensing and observation data. This is also the more sustainable route, as smaller satellites require less resources and time to build, launch and operate," said NTU Provost, Freddy Boey.

Japan expands its fleet with home-grown small satellites

Japan is one of the world's early adopters of satellite technology. Research began in the 1950s and in 1970, the country became the fourth globally to launch its own satellite, Ohsum-1. In recent years, Japan's satellite industry has lagged somewhat due to a reported lack of forward planning. However, in 2015, the government released draft revisions to Japan's Basic Plan on Space Policy. In the coming years, Japan will expand its satellite fleet considerably with contributions from both the private and public sectors.

In February 2016, Japan launched the ASTRO-H X-ray astronomy satellite from Tanegashima, Japan. The 2,700kg satellite took with it three small satellites; Horyu-4, ChubuSat 2 and ChubuSat 3. The launch was initially expected to carry eight CubeSats for an American operator, but these were removed for unreported reasons.

ChubuSat 2 and 3 are 50kg micro-satellites operated by Nagoya University. ChubuSat 2, produced as a collaboration between Nagoya University and Mitsubishi Heavy Industries, has a radiation detector and infrared camera to study solar and terrestrial radiation. ChubuSat 3 has a high-resolution imaging system and will be used mainly for environmental research and to monitor orbital debris. Horyu-4 is a 10kg technology demonstrator satellite built and operated by the Kyushu Institute of Technology. It will test a high-voltage solar cell design in orbit, collecting data on solar cell performance, effects on the spacecraft's electrical charge and arc



discharges as a result of the higher-voltage of the solar cells compared to previous designs.

Training the next generation

Small satellites provide interesting opportunities for a variety of sectors, but perhaps most notably, the education industry. All over the world, programmes are springing up at schools, colleges and universities where students are able to design and build small satellites without the previously-prohibitive costs. Given that many of the satellite industry's key players are nearing retirement, it is of the utmost importance that new generations learn the fundamental skills of satellite engineering.

The first satellite built by US high school students was launched in 2013 by NASA. The launch carried 29 nano-satellites, including the TJ3Sat cubesat built at Thomas Jefferson High School in Alexandria, Virginia, USA.

"Onboard the satellite, a Text Speak module is used to convert text messages into an analogue voice signal," said the website. "Students and other users from around the world can submit text strings to be uploaded to the TJ3Sat website. Approved text strings will be transmitted to the satellite and the resulting voice interpretation will be relayed back to Earth over an amateur radio frequency using the onboard Stensat radio."

NASA's Cubesat Launch Initiative has selected more than 90 cubesats from public and private institutions and government labs to launch as auxiliary payloads aboard commercial rockets since 2010.

"The advancements of the cubesat community are enabling an acceleration of flight-qualified technology that will ripple through the aerospace industry," said Jason Crusan, Director of Advanced Exploration Systems. "Our future missions will be standing on the developments the cubesat community has enabled."

In recent years, private companies have begun to focus their satellite educational efforts at school-age students. Australia's Launchbox, founded in 2014, produces several kits based on CubeSat technology, designed for use in primary and secondary schools. The participating students plan launch missions, record measurements from the launch process, and receive and analyse HD video and GPS measurements from the launched satellite 32km above Earth. Since inception, the company has introduced more than 50 schools to space.

Satellite constellations

The advent of small satellites opens the door for numerous new opportunities, including low-cost satellite constellations. The constellations can be designed for specific tasks at relatively short notice, in keeping with the rapidly-changing needs of the modern world.

OneWeb and Airbus Defense and Space recently announced the creation of OneWeb Satellites. The new 50:50 joint venture will design and build 900 satellites for the OneWeb constellation, which will offer high-speed internet with global coverage. OneWeb Satellites will also be able to build satellites, platforms and equipment to be marketed by Airbus Defense and Space to other operators of future constellations.

"As we build out the constellation, besides its very reliable satellite performance heritage and technical support, Airbus brings design for manufacturing capability into this operation, which is key to achieving both our short term and long term goals for providing cost effective solutions on time for our future customers," said Matt O'Connell, CEO of OneWeb.

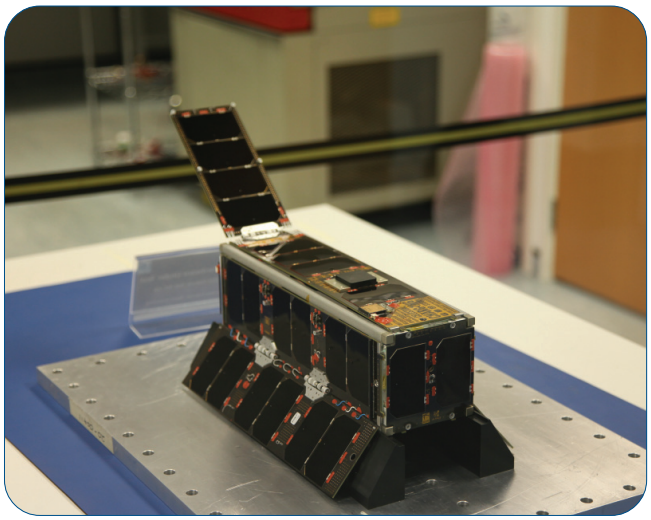
"On both sides of the Atlantic, our teams are now working under a common flag to meet the incredible challenge: To mass-produce 900 satellites for the OneWeb constellation," said Eric Béranger, Head of Programmes Space Systems. "For several months now, we have been working on the design of this unprecedented constellation and how we are going to manufacture them – both ground-breaking in their own way. The next step will be to set up a prototype line in Toulouse for production of the first ten satellites. This will also be used to test the industrialization method for the series production of the other satellites."

OneWeb Satellites will undertake design activities for the entire OneWeb satellite fleet and the manufacture of the first ten flight models will take place in France, with the first ever mass production of the operational satellites planned for North America. Each satellite will weigh less than 150kg and will operate in low Earth orbit (LEO). They will be launched by Arianespace and Virgin Galactic starting from 2018 and reach their orbital positions using electrical propulsion.

In other news, two Japanese Universities, Hokkaido University and Tohoku University, and eight Asian countries (the Philippines, Vietnam, Indonesia, Malaysia, Myanmar, Bangladesh, Thailand and Mongolia) have joined forces to build a network of up to 50 micro-satellites to monitor the region for natural disasters. The micro-satellites are 50cm cubes weighing 50kg each, with a manufacturing cost of US$2.54m per unit. They will be launched using Japanese rockets or from the International Space Station. The satellites will orbit 300-500km above the Earth's surface and be equipped with a camera that can achieve Earth surface photographs with a 3-5m resolution. Two of the satellites have already been built by the Philippines and will be transported to the International Space Station in the Summer of 2016 for launch.

Small satellites are here for the long haul

Small satellites are here to stay. As nations collectively tighten their belts in response to slowing economies and an uncertain future, the cost and speed advantages of small satellites cannot be ignored. The ultimate effect this will have on the rest of the satellite industry is unclear, but satellite parts manufacturers would be wise to invest in the development of parts optimized for small satellites in the near future. ■



UKube-1 courtesy Steve Greenland 2MoSCG

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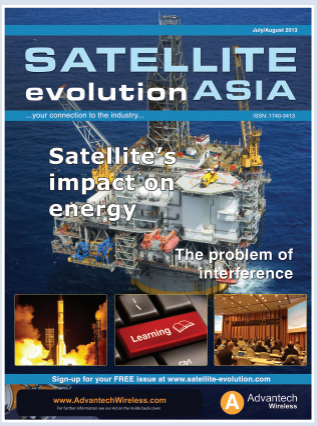

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