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Editor’s View....

How are people feeling?

Attending conferences and forums is one of the best ways to get a real indication of how people in the industry are really feeling on certain topics. As such, the CASBAA Satellite Industry Forum (SIF) 2017, which took place on 22nd May, was an excellent opportunity for those seeking to learn more about the Asian market.

“We’ve all been hearing a lot about the threat of OTT to traditional broadcasters, but those active in the sector don’t see it as the harbinger of doom we’re hearing about. "Standard viewing is remarkably resilient, dropping by around only two percent each year, despite OTT disruption for the best part of 10 years,” commented Andrew Jordan, Executive Director and CEO, AsiaSat. Deepak Mathur, Executive VP, Global Sales, SES Video, agreed: "We’re not seeing the drop off in linear TV consumption in developed markets even when there’s great broadband access, they’re both being consumed at the same time. There’s going to be a long-term transition rather than a complete death of TV."

With key flight routes in the Asia-Pacific, mobility was always going to be an important topic for discussion. An increasing amount of capacity designed for mobility applications is coming online as demand for in-flight and maritime connectivity booms. “We expect terrific growth in the aviation business, and we see the maritime business changing, despite it being a traditional business that adapts to change slower. Combining technologies and getting the best out of the data that’s transmitted is becoming more and more important,” said Philip Baiaam, Chief Strategy & Marketing Officer, Inmarsat.

However, it’s important not to just keep adding more and more capacity without considering the markets in question, according to PJ Beylier, CEO, SpeedCast: “It doesn’t make sense to me that all these satellite operators are putting huge amounts of identical capacity over the same areas - it’s mad!” Patrick Carroll, Regional President, APAC, Gogo, also held rigorous beliefs about capacity: “Not all areas of the Asia-Pacific need the same amount of capacity, it’s a major social differentiator. China and India both want higher levels of connectivity. Do we require these higher data rates? In time, maybe in 5-10 years, but not today.”

Antenna technology was highlighted as a key limiting factor to delivering inflight connectivity. “One factor about aero that’s really important is that we have these very small disadvantaged terminals on the antenna on the aircraft. There’s a real mismatch between cost and expectation, and very few people are willing to pay more for service,” stated David Bruner, VP, Global Sales & Marketing, Panasonic.

There was a lot of controversy around electronically steerable antennas (ESAs) this year. Pricing and affordability is key to widespread uptake, but many are dubious that they will ever be affordable en masse. Leslie Klein, President & CEO of C-COM Satellite Systems Inc, expects a trickledown effect of ESAs to the wider market over time: “Phased arrays are inherently expensive; they’re going to enter the premium market first and work their way down through aviation, maritime, and finally the consumer or ground market. For them to really take off, they’ve got to fall to less than US$1,000.”

Market readiness was another aspect under dispute. Erwin Hudson, VP of Telesat LEO, Telesat Canada, stated: “Telesat LEO has based its business plan on parabolic antennas; we don’t expect ESAs to be ready in the next couple of years. ESAs don’t operate as well when they’re aligned in certain directions, so parabolic antennas still make a lot of sense for many applications.”

The satellite manufacturer panel had a great deal to say on future technologies, with mixed constellations, flexibility, and future-proofing integral to their plans. “The prevailing topic is flexibility. We’ve got to get the costs down low enough to compete with terrestrial and 5G in the future. As well as ensuring the satellites last as long as possible, customers also want to update content on a frequent basis,” said Dawn Harms, VP, Global Sales & Marketing at Boeing Satellite Systems International, Inc. Thomas Choi, CEO at ABS, agrees: “In the future, our competition isn’t going to be other satellite companies, it’s going to be 5G. In future is software definable satellites, which are going to enable capacity to be moved and changed to where it’s needed. It’s right around the corner.”
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Reusable launch vehicles

We’ve been launching satellites into orbit since the 1950s, demonstrating a continual evolution in capabilities in terms of mass, speed, accuracy and reliability. Much has changed over the years. Today’s launch service providers have astounded the world with their achievements, and continue to advance their technology to achieve more and more. Now, we’re entering into an era where launch providers are able to reuse launch vehicles to increase profitability and launch rates, and really usher us into the future of space travel.

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Imagine Communications assists Naaptol with expansion of online shopping channels

Imagine Communications has supplied critical infrastructure to quadruple the channel playout count at Naaptol’s production and playout facility. All four channels are now running 24 hours a day, seven days a week. Home to one of the largest online retailers in India, the Naaptol facility, which now delivers content to its viewers over cable and satellite, was upgraded in close collaboration with Ideal Systems, a leading systems integration firm based in India.

At the heart of the expanded centre are Nexio® servers with Nexio Farad™ high-performance online storage, giving show producers instant access to any content and allowing them to manipulate live, on-air promotions and pricing in accordance with current stock levels. The infrastructure also includes a sophisticated automated master control switcher and graphics, further increasing the ability to make instant adjustments in a dynamic environment. A Platinum™ VX router, along with additional Imagine Communications multiviewers and infrastructure products, tightly ties together the entire installation.

“Imagine Communications is clearly committed to the Indian market, with a large local presence and proven projects with major broadcasters,” said Gautam Dhundale, head - broadcast operations & engineering, Naaptol Network. “Imagine Communications and Ideal Systems completely understood our requirements, both in terms of operations and the level of reliability we required. They gave us confidence from the start that we would be able to deliver the best picture quality, 100 percent of the time.”

By adopting a seamless, automated and highly reliable media technology platform, Naaptol was able to focus on its primary aim of delivering content that enhances the experience of India’s online shoppers. The quality and reliability of the Imagine Communications’ solution stood out in a crowded competitive field. Working with Ideal Systems, Imagine Communications was able to complete the channel expansion project, which included a significant increase in storage capacity, with zero downtime.

“Ideal Systems has been a systems integration pioneer in India for many years, and was chosen by Naaptol to implement this best-in-class solution to meet the rigorous demands of its audiences on these online shopping channels,” said Michael Tholath, Managing Director, Ideal Systems South Asia. “We integrated these solutions into Naaptol’s existing workflow to efficiently and effectively meet the company’s superior quality requirements and operational goals while the system was on air.”

JLG selects ORBCOMM for end-to-end telematics solution for global equipment fleets

JLG Industries, Inc., an Oshkosh Corporation company, has selected ORBCOMM to provide an end-to-end telematics solution platform for its global fleet of aerial work platforms and telehandlers.

ORBCOMM’s solution will provide global wireless connectivity along with state-of-the-art hardware and a robust web platform for asset management.

JLG, the world’s leading designer and manufacturer of lift and access equipment, will use ORBCOMM’s ruggedized PT 7000 solution as well as other telematics hardware to provide its customers with access to critical engine and equipment operational data, including location, engine hours, utilization, fuel levels, and maintenance schedules, and to monitor fault codes or other critical alerts. The hardware is compatible with ORBCOMM’s web interface, which has been tailored for the JLG ClearSky™ platform, to deliver comprehensive dashboards, advanced reporting capabilities and analytics as well as custom charts, alerts, self-service administrative functions, and more. The solution will also be available through a mobile app, enabling customers to manage their aerial equipment on the go, in real time from any mobile device. By integrating ORBCOMM’s industry-leading solution, JLG’s ClearSky will provide its customers with enhanced support through improving equipment operations and performance and proactively managing equipment maintenance schedules.

“Our new supplier relationship with an industry leader like JLG demonstrates ORBCOMM’s leading position in providing large-scale, customized telematics solutions for the global OEM market,” said Marc Eisenberg, ORBCOMM’s Chief Executive Officer. “The ORBCOMM solution provides actionable data through predictive data analytics and prognostics, which will enhance JLG’s fleet management support services.”

“ORBCOMM stood out among all other telematics systems for their proven expertise in servicing large heavy equipment OEMs and providing the flexibility, scalability and resources needed to support the global deployment of their solution across JLG’s customer base,” said Jonathan Dawley, JLG’s Global Vice President, Aftermarket. “We look forward to partnering with ORBCOMM to redefine the next generation of telematics solutions and how they are utilized by our customers in the construction and equipment rental industries.”

JLG began rolling out the ORBCOMM solution in the first quarter of 2017 to pilot customers in North America and will continue deployment to customers in key regions including North America, Europe, China and Australia throughout 2017 and beyond.

Intelsat appoints new leaders to advance broadband, mobility and media businesses

Intelsat has announced three new leadership appointments expected to drive product development, innovation and growth for the organization and its customers. Under the new structure, J. Jean-Philippe Gillet will lead the Broadband business, Mark Rasmussen will head the Mobility business and Robert Cerbone joins the company as the head of the Media Services business.

“This change to our leadership structure is a reflection of the dynamic evolution currently taking place in the telecommunications landscape,” said Kurt Riegelman, Intelsat’s Senior Vice President, Sales & Marketing. “Our customers require transformative technology to solve their challenges and ubiquitous,
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reliable connectivity that is accessible anytime and anywhere. Our new organizational structure, aligned more closely to the major customer sets served by our business, meets those needs while bringing new agility to our market presence, greater innovations and value to our customers, and accelerated growth for our business initiatives.”

Intelsat’s Mobility business provides satellite services across the maritime, oil and gas, and aeronautics sectors. In his new role, Mark Rasmussen will lead a team responsible for strategy and new product and service development for the global mobility sector, including expansion of the new IntelsatOne Flex Maritime and Aeronautic managed services. Mr. Rasmussen’s team will also develop innovative solutions to support emerging technology markets such as the connected car and Internet of Things. Mr. Rasmussen has more than 18 years of experience in enterprise network solutions, including mobility, serving in a variety of sales and marketing leadership positions. His most recent role was Vice President, Americas, where he led all sales activity related to Intelsat’s Media and Network Services organizations throughout the Americas.

Intelsat’s Broadband business serves customers in the wireless and enterprise sectors. In his new role, Jean-Philippe Gillet will lead a team responsible for strategy and new product and service deployment, including those built upon Intelsat’s award-winning Intelsat EpicNG high throughput satellite platform.

Mr. Gillet’s team will also focus on incorporating new ecosystem developments into new applications for customers delivering broadband to connect the unconnected, as well as creating a new range of services for multinational corporations requiring globalized networks. Mr. Gillet has more than 20 years of experience working in the satellite industry, 14 years of which were spent at Intelsat in a variety of sales leadership positions. He most recently served as Intelsat’s Vice President, EMEA, where he was responsible for leading the company’s sales effort in Europe, the Middle East and Africa.

Intelsat’s Media Services business serves customers in the content distribution and direct-to-home video sector. In his new role, Robert Cerbone will be responsible for the development of Intelsat’s linear and non-linear media strategy, new product and service development, and leading Intelsat’s media initiatives worldwide. Mr. Cerbone’s team will develop innovative solutions for the complex challenges facing media customers today, including streamingline distribution across various global platforms to drive new opportunities, as well as new services enhancing cost efficiency, distribution quality and reliability. Mr. Cerbone joins Intelsat from Time Warner Cable (TWC), where he held a number of senior leadership positions. He most recently served as TWC’s Vice President and General Manager for Wireless Products, where he led a team that was responsible for the strategy, planning, development, deployment and lifecycle management for TWC’s wireless products and services as well as overseeing the company’s relationship with Verizon Wireless.

AsiaSat and Globecast distribute Russian language “RTR-Planeta Asia” on AsiaSat 5

Asia Satellite Telecommunications Company Limited and global media solutions provider Globecast, have reached an agreement to deliver “RTR-Planeta Asia” to viewers via AsiaSat 5. The deal continues expanding the exposure of Russian-language programming available in the Asia-Pacific region.

Russian television channel RTR-Planeta strengthens its reach across Asia through a new partnership with Globecast for content management services and AsiaSat for Asia’s most popular international satellite TV platform. An international service owned by the Russian state television and radio broadcaster VGTRK, RTR-Planeta Asia provides cultural and prime time news, sports, movies and documentary films.

The new agreement demonstrates AsiaSat 5’s extensive coverage and powerful penetration across Asia and Australasia are well recognised by international broadcasters. The satellite operator is gathering momentum in further expanding its Russian TV neighbourhood, serving Russian-speaking viewers residing across the Asia-Pacific region.

Globecast is providing RTR-Planeta with complete distribution services to the channel via this deal, including across Asia-Pacific, Europe and North America, building upon Globecast and RTR’s longstanding relationship, which began in 2003. Vladimir Zhdanov, Senior Legal Advisor Media at RTR-Planeta says: “With the sheer volume of programming we offer, we need technology partners that deliver faultless services, and there is no better choice for this project than Globecast and AsiaSat. Through our partnership with them, we can now deliver our content further across Asia, without hassle or worry.”

Biliana Pumalovic, General Director at Globecast in Russia says: “We have a very well-established relationship with AsiaSat and this deal is another example of the benefits to broadcasters that this brings. We also have significant reach across the Russian market, working with a variety of channels. We are very pleased to see this expand even further with our increased partnership with RTR-Planeta, providing it with great reach across Asia to Russians living there.”

Barrie Woolston, Chief Commercial Officer of AsiaSat, says: “Our ever-strengthening partnership with Globecast continues to deliver quality solutions for broadcasters in the Asia-Pacific, and we are very pleased to once again expand our service to the Russian-speaking community across the region with the new delivery of RTR-Planeta Asia on AsiaSat 5.”

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This second piece in my myth buster series focuses on the notion that LTE is all about high-speed. Press releases, newsletters and LinkedIn posts from the satellite industry are full of new and groundbreaking achievements in LTE top speed while using satellite as backhaul. While it is true that it is quite easy to achieve very high speed to a single user using LTE over satellite basically matching the max throughput of a satellite modem, it has no bearing on real use cases in the markets satellite typically serves. The quest among vendors in the satellite industry to outdo each other in what top speed is possible to achieve using LTE is misleading the customer base and misses the whole point of what LTE is all about. As an industry, we owe it to ourselves to try to understand what the real drivers are behind LTE over satellite and to seek the truth of what matters to Mobile Network Operators. Read on and I’ll explain why.

Long Term Evolution or LTE is the natural upgrade path to higher speed data services for mobile operators running GSM, 3G or CDMA networks. LTE is also commonly referred to as 4G LTE, which was first standardized in 2008. Its foundation is an all-IP-based flat network architecture in the Core Network and a new radio interface from the base stations (now called eNodeB) using OFDM in the downlink and FDMA in the uplink. The radio interface can operate in both Frequency Division Duplexing (FDD) and Time Division Duplexing (TDD) modes and can make use of carrier aggregation to bond together channels of different widths in different frequency bands to enable very high data throughput.

**LTE Advanced**

To most end users, LTE networks are synonymous with very high data rates that in some commercial networks today can provide speeds exceeding several hundred Mbps in the downlink to a single smartphone user. In the latest iteration of the standard called LTE Advanced, LTE will finally become a true 4G standard as defined by the ITU by achieving 1 Gbps of download speed. This is done by bonding together 60MHz of spectrum in different frequency bands using 256 QAM modulation and 4x4 Multiple Input/Multiple Output (MIMO) antenna systems. While it will likely be another year or so before handsets supporting...
Richard Swardh is Senior Vice President, Mobile Network Operators for Comtech EF Data. In this role, he leads the market development and direction for the 2G/3G/LTE mobile backhaul market, directing long-term strategic initiatives and defining solution suites and feature sets. A mobile network backhaul veteran, Swardh’s background includes strategic and operational positions at Ericsson with business development, partnership management and strategy execution responsibilities. He holds both a Bachelor of Science degree in Mechanical Engineering and a Bachelor of Business degree in Administration and Logistics from Vaxjo University in Sweden.

Gigabit speeds (called Category 16 terminal) will be available commercially from major vendors, it is astonishing what data rates LTE has managed to achieve in its still early life.

So, is LTE all about just high-speed services then? Let me challenge that myth and examine some of the reasons behind why LTE is the fastest growing wireless standard ever.

The ability to offer end users with very high data rates over LTE certainly gives a Mobile Network Operator (MNO) some marketing bragging rights. However, what really matters to an MNO’s bottom line are LTE’s various innovations that enable the cost per bit delivered to an end user to be significantly lower than what is possible with existing GSM and 3G technologies. A very efficient and interference-tolerant radio interface with flexible bandwidth channels in many frequency bands bonded together coupled with the latest modulation and coding techniques ensure the best use of the most valuable asset an MNO has, namely licensed spectrum. An all-IP flat network architecture called Evolved Packet Core delivers low latency and offers the scalability and operational efficiency needed to support data services at a lower cost per bit than within the GSM or 3G ecosystem. Most of these innovations, although many times aimed at reaching higher and higher data rates not only benefit consumers and enterprises looking for fast connections, but also ensures that an MNO can support use cases requiring low-to-medium data rate services more efficiently. Increased spectral efficiency and faster delivery of data means that more users can be supported within a given licensed spectrum. A clear example of this is a recent addition to the standard called Machine Type Communication (LTE-MTC). This is a new low data rate and long range enhancement to the LTE radio interface that allows for billions of devices to connect to the Internet using very low cost and power-efficient LTE modems that can run on two AAA batteries for more than 10 years. LTE-MTC is designed for the Internet of Things (IoT) and enables MNOs to offer new machine to machine (M2M) services very cost efficiently while re-using existing LTE infrastructure. Interesting for the satellite industry is that some of the upcoming LTE-MTC deployments are in very remote areas or in mobility markets (air, sea) where satellite has a strong value proposition creating another good synergy between satellite and mobile technologies.

Embracing LTE

Today, there are several examples of MNOs around the world embracing LTE over satellite for delivering data services to their subscribers more efficiently than via GSM or 3G technologies. A few of these LTE deployments are aimed at very advanced use cases achieving tens and even hundreds of Mbps to a single end user. However, most deployments are, in fact, for traditional rural deployments where an average data rate around a few Mbps to a single end user is sufficient many times over.

The primary advantage for MNOs that deploy LTE-based satellite backhaul is the ability to address new markets that may have not been previously profitable. Essentially, regardless of what data rates are supported to end users, the cost per bit delivered is more than 50 percent less than it would have been using GSM or 3G networks for a similar throughput. So, while the technical capabilities are there, LTE in the satellite backhaul use case is not only about delivering the highest possible data rate to an individual end user, but about being able to deliver data services to consumers and enterprises at a lower cost per bit enabling a better business case for the MNO. Lower cost per bit delivered to end-users is a key reason why LTE is the fastest growing wireless standard ever and why it will enjoy tremendous success together with satellite backhaul.

“To most end users, LTE networks are synonymous with very high data rates that in some commercial networks today can provide speeds exceeding several hundred Mbps in the downlink to a single smartphone user.”

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When it comes to launching satellites, there’s a very limited provider pool to pick from: Arianespace and SpaceX dominate the market, while China Great Wall Industry Corporation (CGWIC), Eurockot Launch Services, Indian Space Research Organisation (ISRO), International Launch Services (ILS), Mitsubishi Heavy Industries, Orbital ATK, and United Launch Alliance (ULA) deliver more niche services for customers in specific regions or vertical markets. Blue Origin, Rocket Lab and Virgin Galactic are set to enter the market in the coming years, each with their own take on next-generation launch services.

While we’ve seen small advancements in launch capabilities over the years, including dedicated small satellites launches, new fuels and electronic propulsion, major steps have been few and far between until now. Reusable rockets have gone from science fiction to science fact.

Reusing launch vehicles
The concept of reusing satellite launch vehicles is not a new one by any means. Discussed at length since the 1960s, and with projects planned or attempted and then shelved, reuse is expected to afford a meaningful solution to tackle high launch costs and the time and resources it takes to build launch vehicles.

But is there really a need for it? Some say not, and that reusability is simply a vanity project. Satellite Evolution spoke to Jacques Breton, Senior Vice President of Sales and Business Development at Arianespace, who opined that, for some, reusability is a must, while for others, it is unnecessary: “SpaceX is moving towards reusability because they’re...
Launch Sector....

looking at a huge number of launches each year; they have this huge market in the US, and they intend to launch a constellation with thousands of satellites. For them, reusability is a must just to keep up. Our launch rate is more modest, and when you have such a launch rate, reusability might not be economically interesting, because when you want to reuse a stage, you need to use propellant to bring it back and you need built-in landing capabilities and so on, which means using mass that is not useful for the initial launch.”

Demonstrating reusability

It’s one thing to talk about re-using launch vehicles, but it’s an entirely different matter to actually achieve it. What’s particularly interesting to note is that neither of the two most prominent companies exploring reusability technology are traditional satellite launch providers; Blue Origin founder Jeff Bezos and SpaceX founder and CEO Elon Musk are both heavily invested in a wide range of next-generation technologies, each with their own vision of providing consumers access to space.

“We are building Blue Origin to seed an enduring human presence in space, to help us move beyond this blue planet that is the origin of all we know,” wrote Bezos in a blog post. “We are pursuing this vision patiently, step by step. Our fantastic team in Kent, Van Horn and Cape Canaveral is working hard not just to build space vehicles, but to bring closer the day when millions of people can live and work in space.”

Blue Origin has been working on its launch technology since 2000 and plans to use the New Shepard vehicle for sub-orbital space tourism and as a microgravity science laboratory. The company made history in November 2015 when it launched the New Shepard rocket to 329,839 feet and then recovered it at the launch pad using eight drag brakes, fins fitted outside of the vehicle, and the BE-3 engine. The New Shepard crew vehicle also landed safely with the aid of parachutes.

Jeff Bezos commented in a blog post after the achievement: “Rockets have always been expendable. Not anymore. Now, safely tucked away at our launch site in West Texas, is the rarest of beasts; a used rocket. This flight validates our vehicle architecture and design.”

A further four launches and recoveries of the same vehicle have taken place since then, and the company is on track to start trialling its new heavier rocket, the New Glenn, for which it has already agreed launch contracts with Eutelsat for 2021-2022. The New Glenn will come in two or three-stage versions, both with a reusable first stage powered by seven BE-4 engines.

Speaking at the CASBAA Satellite Industry Forum 2017 in Singapore, Clayton Mowry, Vice President of Sales, Marketing and Customer Experience at Blue Origin, stated that, for the first re-flight of the New Shepard, the engine was not removed, thus the time between launches was only a couple of months. The New Glenn has been designed to enable the same capabilities. “The engines are designed for 100 uses; we’re trying to design and build the system so that it’s robust, so that there’s not a lot of work needed. Right now, we’re thinking we could have a couple of weeks between flights,” said Mowry.

SpaceX, too, has invested heavily in recent years to make reusable launch vehicles a viable option for satellite operators, as well as to further its own commercial interests towards cost-effective access to Mars. Shortly after Blue Origin achieved the first recovery of its New Shepard vehicle, SpaceX achieved the same with the Falcon 9 in December 2015. To date, the company has recovered 10 boosters, six on drone ships and four on land.

In March 2017, SpaceX made history with the first ever successful launch of a satellite on board a flight-proven (reused) SpaceX Falcon 9 rocket. SES-10 was launched from NASA’s Kennedy Space Centre in Florida and is today operating as expected, while the flight-proven Falcon 9 first stage was recovered for a second time on a drone ship in the Atlantic Ocean. According to SpaceX, the company is working on a final iteration of Falcon 9, due for debut later this year, which will be capable of achieving around 10 launches.

“We are thrilled to have achieved the successful launch of a flight proven Falcon 9. This is an historic milestone on the path to complete and rapid reusability,” said Gwynne Shotwell, President and COO at SpaceX, after the successful launch. “We are pleased to have accomplished this milestone with SES, which has been a strong supporter of SpaceX and innovation over the years.”

Advancing its programme further, SpaceX is currently nearing the final stages of development for the Falcon Heavy, a reusable launch vehicle able to carry 63,800kg to low Earth orbit (LEO) or 8,000kg to geostationary transfer orbit (GTO).
The first stage of the two-stage Falcon Heavy will consist of three Falcon 9 nine-engine cores, while the second stage features the same Merlin engine utilised on the existing Falcon 9. In March 2017, Elon Musk said on Twitter that he might attempt to recover the second stage of the Falcon Heavy as well as the first stage to enhance reusability.

Jonathon Hofeller, Vice President of Commercial Sales at SpaceX, outlined SpaceX’s plans for the Falcon Heavy at the CASBAA Satellite Industry Forum 2017: “Moving beyond reusability, we’re going to start launching human test flights next year, following testing the Falcon Heavy vehicle this year. To reuse the Falcon Heavy, we’re looking to recover three boosters on drone ships or two of the boosters on land and one on a drone ship.” He added that the refurbishment time for all reusable launch vehicles needs to be reduced to a matter of days or even hours to be a viable option. “We’re taking the data from the SES-10 flight and learning how to do it better. We’re trying to cut down the refurbishment time,” said Hofeller.

Different strokes for different folks?
History has definitely been made in 2017 as far as reusable launch vehicles go, and we can certainly expect to see more flight-proven launches in the coming years as capabilities are refined and technology further advanced.

Whether reusable launch vehicles will be required to keep satellite launch companies competitive remains uncertain.

SpaceX and Blue Origin aren’t only pursuing reusable launches for economic reasons, given the bold plans to make transport to sub-orbit and even Mars affordable for the general public with reusable launchers, so do other launch providers necessarily need to follow suit?

Jacques Breton explained that reusable launch vehicle capabilities are not a priority for Arianespace: “The direction we chose was to develop Ariane 6, which is a simpler launch vehicle compared to Ariane 5; it’s simpler to design and to build, and therefore, less costly. We think that with Ariane 6, we’ll be able to stay competitive on the market, while retaining our reliability and quality of service. Of course, we have technical activities running in parallel to look at future reusability; we’re looking at the building blocks for evolution, looking at a new engine using liquid oxygen, but this will come after Ariane 6.”

For SpaceX, however, which plans to launch a constellation of 4,425 satellites into orbit, in addition to its longer-term space exploration plans, reusability is key. “With these reusable launch vehicles, there’s going to be an abundance of vehicles. We’re still producing one every couple of weeks, and we have an entire fleet available. The way I see the future is that we’ll have a tonne of vehicles on standby, ready to launch for customers, in addition to our own constellation. We have three launch pads right now, which are capable of launching every two weeks, and soon we’ll have another launch pad operational,” explained Hofeller.
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Question: In January 2017, Speedcast completed the acquisition of Harris CapRock in a US$425 million transaction. What can you tell us about the incorporation of Harris CapRock into Speedcast, and what benefits will the acquisition deliver?

Pierre-Jean Beylier: We announced the acquisition of Harris CapRock on 1st November 2016, and we started the planning for the integration in the same month. We put together an integration team comprised of personnel from Harris CapRock, Speedcast, and external consultants to make sure it would progress smoothly.

We closed the transaction on 1st January 2017, and because we had started planning early, we were able to announce the new organisation on 17th January. We wanted to reduce the period of uncertainty to the minimum, to make sure everyone knew what their role would be, and I think we managed that quite well. We have very actively integrated Harris CapRock into our business now.

Today, we have 15 work streams, with more than 100 people involved with those work streams, half being from Speedcast and half being from Harris CapRock. We’re very happy with the progress of the integration. We’ve announced US$24 million in cost synergies in 2018. By the end of June 2017, we’ll have finished a lot of the heavy lifting of the integration, although there will be a number of activities still going on in some work streams, especially larger IT projects.

Question: Can you provide an update on Speedcast’s key vertical markets, including any recent changes?

Pierre-Jean Beylier: We continue to focus on a key few verticals, although their importance in terms of our business has changed following the acquisition of Harris CapRock. Energy is now our biggest vertical, representing 45 percent of our revenue, up from 15 percent before the acquisition. Our second-largest vertical is maritime, which has been a strong growth engine for us over the years, and today makes up 35 percent of our revenues. It remains a major vertical, and we see a lot more growth potential going forwards. The remaining 20 percent of our business is in enterprise and emerging markets. Within that, we serve...
Q&A Speedcast....

Question: When we last spoke in 2016, you identified Africa and South America as new growth markets for Speedcast. What progress has been made in those regions?

Pierre-Jean Beylier: In Africa, we’ve been quite focused on oil and gas and cellular backhaul. On the oil and gas front, it’s been quiet there for some time, but in the last few months we’ve seen a change in the mood; our customers are back at work, and they’ve got new projects. We’ve spent quite a lot of time on new proposal quotations. So, today, there is some business there, although it remains quite small; the bigger investment projects are still a few quarters away in terms of decision making and implementation. We anticipated this would be the case when we completed the acquisition, but it’s good to actually see it happening. We will continue to invest in the region, potentially opening new offices, as we see the development of new market share and winning business there by combining Newcom’s customer relationships and presence on the ground with Speedcast’s capabilities. We anticipated this would be the case when we completed the acquisition, but it’s good to actually see it happening. We will continue to invest in the region, potentially opening new offices, as we see the development of new market share and winning business there by combining Newcom’s customer relationships and presence on the ground with Speedcast’s capabilities.

In Latin America, we acquired Newcom International on 1st April 2016, which is headquartered in Miami and focused on Latin America. They have a few offices in Mexico, Colombia, Peru, and are active in a number of countries in Latin America. We are winning market share and winning business there by combining Newcom’s customer relationships and presence on the ground with Speedcast’s capabilities. We anticipated this would be the case when we completed the acquisition, but it’s good to actually see it happening. We will continue to invest in the region, potentially opening new offices, as we see the development of new market share and winning business there by combining Newcom’s customer relationships and presence on the ground with Speedcast’s capabilities.

Question: During the 12-month period upon which the WTA award was based, Speedcast partnered with Airbus Defence and Space to construct and manage the first ground anchor station for the Skynet5A satellite in the Asia-Pacific region. What can you tell us about this project, and what made it so significant?

Pierre-Jean Beylier: It’s an exciting project. For Skynet5A, the first in a new series of military satellites, we built two large X-band antennas at our teleport in Adelaide. It’s an exciting development because with Skynet5A, we have a unique solution for the region in terms of several things that have played in our favour. What we’ve built at Speedcast is quite unique; our teleport network, which includes about 40 teleport all around the world, 19 of them owned, is second to none in our industry, in my opinion. Speedcast has been a success over the last 17 years, we’ve come from a small money-losing start-up to the largest satellite service provider in the world. That success has been based on our passion for and focus on customers. We have fantastic people who constantly go the extra mile. Customer satisfaction is at the heart of what we do; it seems pretty basic, but it makes a big difference. That’s also why we’re investing a lot in our culture, in our values, and in the programme around that.

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In cellular backhaul, we’ve made some good progress. We’ve been building relationships with operators, explaining our value proposition and what we can bring to them, and I’m hoping we’ll announce the first meaningful win in Africa in the very near future. We’ve also had some business from Asia-Pacific customers for Africa in the resources sector, mainly Australian and Asian resources companies, and we’re continuing to build on that. It’s been a bit quiet in the mining sector, but we’ve started to see things picking up. We’re interested to see how it’s going to translate into new opportunities for us in the coming 12-24 months.

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of its security aspects, and that’s very important to our government customers.

It’s significant because we’re seeing potential in growing our government business, and we think this project can be a significant growth engine for us. Government spending is on the rise again in Australia and the US, and I think that Europe and NATO countries will follow. There’s significant pressure for all NATO members to deliver on their commitment to spend two percent of their GDP on military expenditures.

In order to grow the government market, we need partnerships with well-established defence companies that have solutions that we can market to our government customers. Airbus Defence and Space was one of our first major successes in partnering with a very large, global, defence company that has recognised our ability to help them operate and manage their assets. They have also recognised that we are the right partner to market services on that satellite to the Australian and New Zealand Governments, and beyond.

We have actually also just recently expanded our contract with Airbus in Asia Pacific, to include a partnership in the Philippines. With this extended contract, Speedcast will work with Airbus to build relationships and partnerships with local agencies. It will also provide X-band communications in the Philippines region.

**Question:** What do you expect Speedcast to achieve in the rest of 2017?

**Pierre-Jean Beylier:** In 2017, the biggest priority for us is the ongoing integration of Harris CapRock. Looking at how it’s going, I think we can be optimistic about the results. The cost synergies are well on track, but the key driver behind that acquisition, just like all our acquisitions, is revenue synergies.

Together, we can win more business and increase our market share. We will see how that plays out in the next couple of years.

I think we’re very strongly positioned in the communications landscape to capture growth as the energy sector rebounds.

2017 is all about building that strong platform to achieve sustained organic growth in energy and maritime.
“What is impossible today will be possible tomorrow”
— K. Tsiolkovsky

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Market expectations

The Cable and Satellite Broadcasting Association of Asia (CASBAA) was established in 1991 as the association for digital multichannel TV, content, platforms, advertising and video delivery across markets throughout the Asia-Pacific. Amy Saunders spoke with Christopher Slaughter, CEO of CASBAA, to find out more about the Association’s role, activities and market expectations.

Question: Can you provide a brief overview of CASBAA?

Christopher Slaughter: CASBAA is the Asia-Pacific region’s largest non-profit media association, serving the multi-channel audio-visual content creation and distribution industry. Established in 1991, CASBAA has grown with the industry to include digital multichannel television, content, platforms, advertising, and video delivery. Encompassing over 500 million multi-channel homes within a footprint across the region, CASBAA works to be the authoritative voice for multichannel TV; promoting even-handed and market-friendly regulation, IP protection and revenue growth for subscription and advertising, while promoting global best practices.

CASBAA’s core agenda is to facilitate the often tricky process of transition into an almost 100 percent digital world for our members and the entire industry at a time of unprecedented technology and market change.

This is all part of the CASBAA remit to Represent (via advocacy with governments); Inform (via conferences, formal submissions and other communications); and Connect (via networking opportunities for members and others).

Question: Which key emerging trends will have the biggest impact on CASBAA members and how should they be addressed?

Christopher Slaughter: The most challenging, and most interesting, area of activity for the association over the past couple of years has been the exceptional variety of digital issues (online piracy, digital advertising and the fast-changing economics of content creation and distribution) that have emerged across our 16 geographic markets within a CASBAA footprint that runs from China to Australia, from India to Japan.

We also work to build on a global coalition to fight ‘illicit streaming devices.’ We help organize a cross-industry group fighting piracy in various APAC countries, and we keep up the pressure on advertisers and payment processors to get them to cut off pirate websites. We continue to work on the implementation of Singapore’s television audience measurement system, and we yet again grappled with Indonesia’s regulators over content and advertising laws.

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been in this role has been the reinforcement of the importance of the ‘end-user,’ the customer, the consumer.

Today our members (content creators, channel aggregators, platforms of all kinds and technology vendors) have such an enormous trove of data to hand that they are obliged to respond to the subscriber needs on an almost moment-to-moment basis.

**Question:** With OTT so pervasive across so many of your markets what are the ramifications for traditional free and paid-for TV broadcasters?

**Christopher Slaughter:** While OTT has emerged as a new distribution mode with many nuances that are even now being addressed, we see OTT as a ‘value add’ to FTA and paid multi-channel video. This may sound a cliche, but OTT is not a threat. We have seen a very significant shift – what was once viewed with suspicion and resistance is being embraced and welcomed. As with so many digital developments, it is an outstanding opportunity for all.

We’ve acknowledged that when it comes to online delivery of video, the TV industry as a whole has adopted and slightly misapplied a telecom industry term. When the designation ‘over the top’ (OTT) was first coined by our telco friends, it was fairly pejorative, and meant ‘any content (video or otherwise) that runs over the top of our network,’ with the implication ‘…that we didn’t create and don’t directly monetize.’

Similarly, when the multichannel TV industry adopted the term, the definition shifted slightly to mean ‘video that is delivered to consumers without going through the set-top box.’ As such, our industry also viewed OTT as a rather negative acronym, since it referred to companies operating outside our monetization footprint – they didn’t play by the same rules, they didn’t follow the same business model, they were disintermediators, cowboys, and in some very obvious cases, even pirates.

But even with the overall embrace of OTT services by traditional pay TV companies, there are still issues to resolve before consumers can expect to have their online cake and eat it too. From a menu of various factors inhibiting development of OTT services, ranging from legacy systems to regulatory restrictions, our respondents singled out content rights availability and pricing for content rights as the key stumbling blocks. And although concerns about viable business cases remain, broadband deployment is less of an issue, presumably based on the success of OTT services in various broadband-challenged markets in the region.

**Question:** How are global regulations changing in line with the evolving broadcast sector?

**Christopher Slaughter:** Of course, with technology and markets changing so fast, governments and regulators need to be as fully informed as possible of those changes and their implications. That’s where organisations such as CASBAA become ever more important.

Our most challenging task is to assist the regulators (and politicians) to adapt as quickly as possible to this new world, and to help them to ‘see the future’ and that’s not easy for anyone. CASBAA works to keep our members informed of regulatory developments in our many markets, and also advocates for governments to adapt to the new realities by reducing the regulatory burdens on the pay-TV industry so existing operators can compete fairly. It’s not an easy message to ‘sell,’ because bureaucratic rice bowls, tax revenues, and special-interest political goodies are all hooked to existing over-regulatory approaches. That said, there were some positive signs in places like Singapore, New Zealand, Korea and Vietnam where a few rules were erased. But there remain many miles to travel down the road of rationality, before we can be satisfied.
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Low distortion for high signal integrity
- Built-in linearizer enables low distortion in power transmitters

Ku-band GaN HEMT line-up expansion
- Combining GaN MMIC with existing 50W and 80W GaN HEMT enables configuration of multiple power amplifier stages

Mitsubishi Electric’s Ku-band 20W monolithic microwave integrated circuit (MMIC) amplifier for satellite earth stations, features the world’s first gallium nitride (GaN) high-electron mobility transistor (HEMT) MMIC with integrated linearizer to compensate for distortion. The MMIC GaN HEMT, has an output of 43dBm (20W) and linear gain of 20.0dB, will contribute to the downsizing, high-performance and faster development of power transmitters. Along with the company’s existing 50W and 80W GaN HEMTs the range enables power transmitters to be configured for a wide range of output power.

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Extending government modernization to the network’s edge

High speed Internet connectivity is a service that many of us have come to take for advantage today, enabling us to stream media content, stay in touch with loved ones, shop online, and work effectively from home. However, one of the most surprising aspects of modern day connectivity is that many governments and enterprises aren’t getting anything like the speed of service delivered to consumer homes, making connectivity a major challenge to operations on a day-to-day basis. Here, Tony Bardo, Assistant Vice President of Hughes Government Solutions, outlines the lackluster services often delivered to government and enterprise customers today, and how satellite can provide an effective solution.

Despite the many pushes for government IT modernization over the past few years, legacy technology remains entrenched in too many agency networks—underperforming yet expensive, with even basic functionalities like high-speed Internet connectivity often lagging behind enterprise or consumer standards.

Network modernization challenges

The Government Accountability Office has reported that the federal government spends more than 75 percent of its total IT budget on operating and maintaining legacy technology, which is not only delaying but actively damaging the modernization process. Even though identified by agency CIOs as being moderate to high risk, ongoing support of legacy technology has meant increased spending of around nine percent of overall budgets since 2010, while investments in modernization and enhancement have actually fallen by a collective US$7.5 billion. Without even getting into the resulting negative impact of limited or no services to constituents because of old technology limitations, this lockjaw condition shouts out that government desperately needs more innovation.

The low-hanging opportunity can be found at the edge sites of the agency network. While terrestrial broadband infrastructure continues to remain unavailable in many rural areas—despite ongoing public pushes—the fact is that a
Government Modernization....

viable alternative for providing the level of connectivity that agencies need to efficiently achieve their missions does exist in the form of satellite broadband. Unfortunately, the largest impediment to implementing this solution—which today offers high-quality, affordable connectivity nationwide—is lack of awareness. Many simply still don’t understand that satellite broadband in fact closes the so-called digital divide i.e., being unserved or underserved by terrestrial broadband in low-density areas because of the high cost of building out infrastructure.

Broadband regardless of location

This myopia has too often resulted in agencies buying and ‘stacking’ terrestrial T1 lines to overcome insufficient bandwidth, which is tantamount to throwing good money after bad. Given that a single T1 line is limited to speeds of only 1.54Mbps each and costs hundreds of dollars per month (with escalated costs for remote locations), it’s not difficult to conclude that this is not a prudent way to spend taxpayer money chasing broadband comparable to what many of us receive in our homes.

Enter satellite broadband, which in fact has been available for the past decade with superior performance and today at much lower cost. Indeed, it’s an ideal solution for agencies facing considerable budget cuts and the upcoming Enterprise Infrastructure Solutions (EIS) contract transition, which is now forcing them to seek cutting-edge alternatives that can both reduce costs and improve performance. As a case in point, instead of continuing to stack multiple T1 lines, a logical alternative which many progressive enterprises have discovered is to choose a trusted provider to implement managed broadband, which integrates existing core (MPLS, for instance) networks together with satellite and wireless in the most cost-effective and advantageous hybrid architecture.

The fundamental difference in build-out costs between terrestrial and satellite is that the former is dependent on distance, whereas satellite connectivity remains the same everywhere under its coverage area. As a result, a location even a few miles away from the nearest terrestrial switching or traffic aggregation point will likely cost more to connect than by installing a compact satellite terminal, including modem and external antenna.

The next generation of high throughput satellite service

Unfortunately, for many government agencies this has been a well-kept secret. Today’s satellite technology boasts unprecedented performance thanks to the continuous innovation by a thriving global satellite industry. Indeed, the FCC recently recognized that satellite broadband in the form of the new generation HughesNet service is the only Internet connectivity delivering 25Mbps download speeds coast-to-coast. Operating over EchoStar XIX—launched in December 2016, the largest broadband satellite in the world with over 200Gbps capacity—and two earlier high-throughput satellites, HughesNet now serves over one million residential and business subscribers. And it is equally available to agencies at a mere fraction of the cost it would take to stack T1 lines to reach the 25Mbps and even higher tiers of speed.

As agencies continue to see a rise in network traffic with more connected devices and more cloud-based applications, the expensive yet limited bandwidth from legacy network technologies is clearly not sustainable. Agencies are right to start considering how they can use current government vehicles, such as the GSA’s Schedule 70 and Networx Enterprise Contract, in lieu of waiting for future avenues, like the planned EIS award to address their network challenges today. It’s encouraging to see procurement officials intelligently leverage limited budgets for maximized return on investment as this will help agencies to do more with less during this critical period of IT modernization.
Delivering innovation to the ground terminal space segment

Isotropic Systems was founded to deliver innovation to the ground terminal space segment with next-generation antenna technology based on scientific advances in the field of optics. With their unique antenna design, terminal costs are expected to be a fraction of those available on the market today, making the technology a key enabler for bridging the digital divide and accessing greater satellite market share by closing the most challenging business cases. Amy Saunders met with John Finney, Founder of Isotropic, to learn more about the company’s objectives, progress, and roadmap to launch.

Question: Can you outline the reasons behind the founding of Isotropic Systems, and tell us about its ultimate objectives?

John Finney: Isotropic’s overall objective is to provide disruption to the ground terminal space, just as we’re seeing today with high throughput satellites (HTS). We’ve got a very unusual industry dynamic right now, with somewhere in the region of US$16 billion of HTS investment, of which at least US$9 billion in NGSO constellations, but yet nowhere near the same degree of investment focus going into the ground segment. In my opinion, that’s because those investing heavily in HTS space segment believe that the ecosystem is there to support them, to innovate and come up with solutions that fit nicely in their plans. That’s a fantastic opportunity for us.

What we aim to do is to provide an enormous amount of price disruption and fuel industry growth. There’s a number of phased array and flat panel antennas today that we’re hearing a lot about in the press. Those antennas fit nicely into the top end of the pricing pyramid, for enterprises with a business model that includes a high willingness to pay very high prices for electronically steered antennas such as aeronautical, super yachts, etc. The reality of being at the top of the pricing pyramid is that the volume is low; there’s only so many aircraft and yachts in the world.

The idea of HTS was to create a greater market share for the satellite industry. It was really looking at consumer applications, the Internet of Things (IoT), connected cars, a very wide variety of market segments. Part of the HTS business model also aims to bridge the digital divide either directly with consumer broadband applications or indirectly serving terrestrial operators with enabling capacity with dramatically
Q&A Isotropic....

John Finney, Founder of Isotropic

lower transport costs. That's a huge swathe of under-connected or unconnected individuals who live in remote locations, have low income levels, and have limited access to steady state power. The lower the cost to get a terminal to the service for the first time, the more customers you can service. But, if we can access that market, the volume is going to be vast. At Isotropic, we want to focus on the enablement of the business model for HTS, for all frequencies. It's about having comparable technology to the current phased array and flat panel antenna products, but at a tiny fraction of the price.

Question: What can you tell us about the technology behind Isotropic’s innovative antenna?

John Finney: The technology comes from the field of optics. Recent scientific advances have received a lot of attention in academic fields for the notion that you can manipulate light to appear invisible; we're literally talking about invisibility cloaks. Professors in this field say that you can theoretically have a lens which flips down in front of a surgeon's hands, and when they’re looking straight through this lens, the light coming from the hands, including the shadows, would be refracted away from the eye, allowing the surgeon to effectively see through their own hands during the operation. Another example is the ability to cloak a device, manipulating the way light passes through that device to make it invisible. It's all about the controlled bending of light to achieve very interesting optical effects.

In pursuing a solution that massively reduces the price of current technology to address the lower sections of the pricing pyramid, we identified those recent scientific breakthroughs as a potential opportunity, because radio and light waves propagate in the same way. We spoke to the major players in those fields, and performed some very early stage research with academic institutions to establish the potential to use this science to create an antenna. That was a couple of years ago now, and we have made tremendous progress since. From there, we went into the product development risk reduction, and now we’ve progressed to advanced design and engineering. For example, we have now established that our technology can meet Federal
Communications Commission (FCC) specifications at extreme angles both in Ku and Ka-bands, and can handle the pointing accuracy required with relative ease. We have created an antenna which is essentially an optical beam forming array comprising of super element modules, which when combined allow us to control the way that the radio wave propagates. The net breakthrough of our technology is that we only use 20 percent of the number of parts compared to a phased array solution. For example, for a 65cm Ku-band phased array antenna, you’d probably have 4,000 radiating elements: We’d have less than 800.

That challenge with current phased array and FPA design is very simple; until now, there has never been a way for the existing technology to decouple the scanning performance of an antenna from the number of associated feeds and cost drivers required to create one beam pointed in any given direction. I’m really proud of the Isotropic team, they have taken away the Achilles’ heel of phased array and enabled us to offer a price point that is disruptive from the first unit to ship from our factory and not relying on volume over time.

Ultimately, the way our technology is put together delivers a massive price differential that we’re planning to bring to market, which addresses the high throughput segment perfectly.

**Question: Where are you right now in terms of technology development and funding?**

**John Finney:** If we’re speaking about technology readiness levels (TRL), we’re at levels 4-6 right now for different parts on our system; some parts are on the eve of going into TRL 7. That means that we’re about to produce some of our first proof of concepts. We’ve already done proof of concepts at 10GHz to check the performance of our design in terms of the main lobe, the side lobes, the scanning performance and the characteristics that we’re looking for. Now what we’re doing is adapting an array, which is to conform with satellite requirements focusing on Ku-band. We have an optical proof of concept that is undergoing final testing and we are working towards and end-to-end demonstration of the transmit/receive chain by the year-end.

We’re funded for Ku-band right now, but we’re also talking to a number of operators about their plans for Ka and higher bands. If we decide to prioritise Ka-band, it’ll either be because we’ve gained new funding to enable us to do that, or because of increased participation from some of the players that have a vested interest in our technology.

One of the great things about the timing of our business is that satellite operators are currently in a planning and construction phase for HTS global systems, so we’re perfectly positioned to get into that straight off the bat as the timing of our first product release [2H 2019] meets the arrival of those systems.

The feedback we’re getting so far is that, if we do everything we say we’re going to do, in the timescales we say we’re going to do it, we’re going to be classed as a strategic enabler for the satellite industry. It’s very clear that the price of the terminals to distribute that capacity is critical to our potential customers’ business case. The HTS business case relies heavily on the beam fill rate and system overall fill rate and with so much capacity coming online, our role will be to help those
operators achieve accretive returns for shareholders by providing customers with much much lower cost infrastructure on the ground.

**Question:** Which end user applications do you expect to provide the greatest opportunities for Isotropic?

**John Finney:** We expect that our technology will be used across all of the pricing pyramid, from super yachts and aeronautical at the top, the mobility market as a whole, through to connected cars, IoT and the digital divide at the bottom.

Consumer broadband in the non-GEO HTS space is going to be a big opportunity for us; we’re talking about very low-priced terminals that can be placed in homes, schools, wherever. A significant number of terminals are expected to be deployed as a result of the recent boom in non-GEO filings. In fact, NSR doubled their forecast in terminal numbers between the first and second editions of their market report because of the number of planned and funded non-GEO satellite systems announced. An extra two million terminals are expected as a result over the next ten years. Since that second report, even more filings have been made, and more projects have been funded, so the opportunities are only going to increase, and it’s important to recognise that those systems rely almost entirely on electronically steered antennas rather than motorized tracking.

In addition to the consumer broadband segment, there is the connected car market, which although currently very early in its life, is going to expand rapidly very soon. There are 120 million cars being built every year, so even though the role of satellite is arguably going to be very low, it’s a major opportunity for Isotropic to participate in that market because the numbers are so large even if the role of satellite captures a very low market share.

Our antenna apertures are going to be a big selling point, spanning 20cm to 1.5m on a practical level, whereas most of the current electronically steered antenna systems have severe limitations in scaling beyond 70cm. Because of our price points, there will be a good number of customers who want to exploit that technology to go to much higher apertures because they can afford to do so, while there will be others that want to take advantage of the fact that we can have a very small antenna at low cost. Our unique ability to have multiple links with the same antenna, but without any added cost, is another major selling point that differentiates us from alternative technologies. With phased array antennas, for example, if you want to have another beam from the same antenna, you basically have to increase the array in a linear way and your cost increases in line.

**Question:** Do you have any plans for partnering with satellite operators, integrators or resellers in the future?

**John Finney:** We will of course have strategic partnerships, but since the overall objective is to offer price disruption, we have to be careful of agreements that narrow our ability to sell to the universe of customers that are out there in the very long term.

Right now, what we’re doing is what all good start ups do; focusing on developing the technology and making sure that we’re funded to do that, whilst creating a truly great place to work as we are continuously hiring.

**Question:** What do you anticipate the biggest challenges going forwards might be?

**John Finney:** Scaling up the organisation is always a challenge, as is the case for any start up. We’ve hired tremendously well, so we have a great team, and we want to keep the quality of that team as we grow. All of the critical risk reduction is behind us, so what we’re looking at now is about how well we execute as a company, making sure that our planning is well thought-out. It’s really about how the company is managed and how we evolve.

**Question:** What plans do you have in line for the rest of 2017?

**John Finney:** Our focus is to prove the optics beyond dispute. When we get to our next funding milestone towards the end of this year, we’ll be wanting to put devices in the hands of customers to connect to their own satellites, to enable them to further evaluate our technology for themselves.

We will secure a significant amount of funding to make sure we can do everything we need to during that phase. We’ll also need to have a confirmed roadmap for the first and second generation products, in which we’ll need to confirm our strategic alliances in terms of contract manufacturing and components manufacturing. Most of all, we will continue our passion for leaving behind the notion of flat panel antennas and race towards the next generation of ‘high throughput terminals,’ an entirely new class of antennas pioneered by Isotropic Systems, designed to match the performance of high throughput satellites.

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**Q&A Isotropic....**

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Advancing space traffic management

In March 2017, the Space Data Association (SDA) and Analytical Graphics, Inc. (AGI) entered into a long-term agreement to launch an upgraded Space Data Center (SDC) Space Traffic Management (STM) service. SDC 2.0 has a highly accurate, independently generated catalogue of space objects which will expand to include objects larger than 20cm in and traversing the GEO arc, and will enable transparent and actionable collision warnings for all SDA members. Amy Saunders met with Mark Rawlins, then Chairman and now Director of SDA, and AGI Vice President Paul Welsh to find out more about the development and capabilities of SDC 2.0.

The Space Data Center (SDC) was launched in 2010 by the SDA to provide much-needed information on GEO satellites in orbit. AGI designed and delivered the software system for the SDC, and has been working closely with the SDA ever since in a technology advisor role as well as a service provider.

Rawlins: In 2010, we put into place a system which allowed us to ingest member data into the SDC, and we were then able to compare the location and manoeuvre plans of member satellites to detect any potential risk for collision. In addition to member data, we’ve got feeds from the US Government, from the Joint Space Operations Center (JSPOC), which is added to the data for comparison. In the period since 2012, we’ve been developing the system further. The strengths included the quantity of data we had from our members, but we also had weaknesses; principally, we didn’t have a catalogue of debris objects, and we didn’t have full precision of member satellite data.

Welsh: We were combining data from a lot of different systems, and that lead to inter-system biases. Also, there were problems regarding the uncertainty information: If I’m a satellite operator like Intelsat or Eutelsat, and I’m getting 100 warnings a day, that’s not good - I need to know a manageable number so I can act on those. The accuracy of the overall system needed to be tightened up.

Rawlins: Satellite operators operate...
in an environment that is vulnerable and hostile, and they need to know as much about it as possible to ensure they can protect their investment in space, and that the services that they sell are available to their customers. The actionable warnings that Paul mentioned must be directly linked to the accuracy of the information that is being provided into the system. The precision of spacecraft locations that we have is in the tens of kilometres. If you imagine that we're trying to warn ourselves of a collision, you have to put an imaginary ball around your satellite; if anything is likely to enter that ball, then you have to generate a warning. So, the bigger that sphere is, the more warnings you're getting from the system. If we can reduce the size of those spheres by improving our knowledge of the spacecraft, then we create a system where we really do have to think about doing something because there is a real risk to our infrastructure. We're not having our teams sift through all the warning data to try to identify the real from the suspected.

There was a clear need for a more comprehensive system, with increased accuracy to improve usability, and greater capabilities in terms of debris. The SDA and AGI decided to act on that, developing the SDC 2.0 to improve many aspects of the system.

**Rawlins:** Today, we've got better information and an independent catalogue. We've been working with the US Government for a long time now, and they require us to have a continuously available system. However, the J SPOC data is not a complete catalogue; some spacecraft aren't included for security reasons, while in terms of debris, nothing smaller than 1m is accounted for. This is a problem, since if something even half that size hits your spacecraft, it's going to cause a lot of damage, and will probably destroy it. As such, the other objective for SDC 2.0 is to have a system that can track smaller objects, as small as 20cm. We'll be working on that with AGI.

**Welsh:** SDC 2.0 isn't just about protecting satellites operators, there's a green story here as well. We really don't want to create more debris in space; once there's so much up there, you really can't recover from that. The operators are forward looking and saying that it's an important environment to protect. In 2010, when the SDA was formed, they wanted to take proactive measures to protect all of that, and now we're just cranking it up to the next level based on the three Bs:

- **Bombs:** This debris is of sufficient size to cause a catastrophic collision and generate very high levels of debris.
- **Bullets:** If they hit a spacecraft, they might not necessarily generate a debris field, but it would probably end the spacecraft mission.
- **Ball bearings:** These are objects that, if they were to go through a spacecraft, they would cause lesser amounts of damage, and could destabilise the spacecraft in orbit.

**Rawlins:** We tried to look at what we could reasonably do, what was realistic. That's how we set the benchmark for where we wanted to go. We have a unique set of resources with the SDC, because when we were putting this together, we brought together a lot of expertise; engineers who think about what needs to happen to keep the satellites safe in position. I think that last year, we had the world's leading experts in the field, all in one room.

As well as cataloguing satellites and debris in orbit, the RF domain was another important concern for the SDA. As such, SDC 2.0 also includes functionality to combat RF interference, including both geolocation tools and a Carrier ID database.

**Rawlins:** Just like we did for satellite position and debris engineers, we also brought in the experts who work every day with RF interference functions, to bring their knowledge and experience on geolocation to work out what we needed to help our companies work more efficiently.

When you perform a geolocation, you're looking to identify whereabouts on the surface of the Earth an interferer is located. To do that, you usually have to use two satellites working at the same frequencies and coverages. To calculate which satellite would work with the one you're having a problem on is quite complicated, because you might have to solicit three or four different competitor satellites. Even if they're cooperative, it's not always easy to get the information when you need it; it can take days to get a good response.

The new system is going to take all the manual work out of it. We'll be able to set up links with each of the different geolocation systems in each of the satellites. So, in the case of an interference event, operators will be able to input the satellite with a problem into the system, and instead of having to do the work manually, the information is processed by SDC 2.0, and a list is returned with all the options. There's much more to it than just selecting which one will work; SDC 2.0 will provide a breakdown of the best to worst options, and tell you which will deliver the greatest degree of accuracy. It's a highly intelligent system which will reduce the time it takes to resolve interference.

**Welsh:** The key takeaways are that we'll have better results; we're feeding these geolocation systems with better information, and that allows geolocation with more accurate results, and also the knowledge of the uncertainty of that result. In addition, we'll be achieving those better results faster; it's not down to making phone calls and waiting for
information, it's all machine-to-machine. There will be more results, and those results will be better.

**Rawlins:** We’ve spoken for many years about Carrier ID, and we’ve come a long way with that idea to the point now where it’s a standard that is being rolled out. The part that’s missing today is the ability to identify a Carrier ID. For example, if I identify an interference on my system that has a Carrier ID that is not on my own database, then I need a means to find out from other operators who it belongs to. We’re now putting together a database that will allow me to enter an unknown Carrier ID, and the system will direct me to whoever holds that Carrier ID. It will allow us to get to the source of a problem. Once we have the Carrier ID database in place, it’ll be up to the satellite operators to fill it with the information, and once that’s done, it’ll be a great resource available to our members. That’s about 15 months away.

It hasn’t all been smooth sailing for the creation of SDC 2.0 — far from it. But with the development of a system like this, there are a lot of considerations to be made, and many parties to collaborate with; the challenges are likely to be many and varied.

**Rawlins:** Getting to this point has been a challenge. It’s definitely been tough to get where we are today, to understand the environment, to have the experts analyse all the information that’s been available, then to come up with an agreed set of requirements. It’s taken us a long period of time. SDC 2.0 represents a major achievement, and the rest should follow on like clockwork. It’s not going to be perfect, but we’re looking at a downhill stretch now.

**Welsh:** This really represents a proactive activity, and we’ve been up against the buffering of day to day priorities and everything else. Mark is right, this represents a lot of hard work, but most of it is behind us now.

**Rawlins:** Putting it into place is going to be the next challenge, and integral to that is having 100 percent of the GEO satellite operators on board with what we’re setting out to do. We’re going to be addressing all these people over the next few months. The MEO operators are already covered under SDC 2.0, and as for LEO, we’ll be pulling in the data from SDC 1.0, but we don’t have the same capability for the observation network. That aspect is still ongoing. Next, the SDA and AGI will be setting up a strategic advisory board where we will assemble a panel of experts from the industry to review what we’re doing. They’re going to meet probably twice a year to look at what the system is doing, what the environment is doing, see what we’re doing right, and steer us in the right direction going forwards.

What’s critical, and, in my opinion, the most interesting in this whole project, is making sure that we address the safety aspects; ensuring the safety of our satellites in space for operations. We believe that we’re doing a very important thing for the industry.

**Welsh:** And for the world! The world’s economy relies on the services delivered by these satellite operators, so preserving that is an important mission.

**Rawlins:** It’s about setting a standard for concepts of operations, and this is one of the links in the chain.
Caveat emptor: Five things that buyers of maritime connectivity need to know

With so many maritime service providers on the market today, it can be difficult for ship owner and manager buyers to know where to turn. Not all satellite connectivity services were created equal, and there can be a very large disparity between different service levels. Here, Trevor Whitworth, Senior Vice President Sales & Marketing at Globecomm Asia Pte Ltd, outlines everything maritime connectivity buyers need to consider before making a decision.

In common with other sectors of the shipping industry, suppliers of maritime communication services have felt their share of pain during the near-decade long slump in vessel earnings. For some, the answer has been to retrench, for others to consolidate, but despite these trends, the number of providers in the market remains as high as ever.

A combination of low barriers to entry and a diverse maritime market has traditionally seen a large number of providers competing in the market. As a result, while headline $/MB costs to end users have fallen, the ability of these providers to deliver on a sustainable basis is coming into question.

The delivery of satellite communications these days extends across ship and shore all the way to the boardroom. Issues of which network to choose, what it will deliver, how secure it will be and how to manage business and crew channels mean this is a conversation in which price is just one component.

So, important are these issues that Globecomm has put together a list of five questions any potential buyer of communications should ask their vendor before they decide which service to buy. While no two shipping companies are exactly alike, these questions provide a foundation for understanding whether or not you should be doing business with that company.

1) The first point to consider is how secure the service provider’s operations are and whether they can help protect the owner’s assets from cyber threats.

Cybersecurity is not hype, not a new Y2K, or just an excuse to buy more services, and all owners and managers need to be aware of the threats to their business and take steps to protect themselves.

The industry association BIMCO has already produced industry guidelines that cover ship and shore-side operations, but buyers should be aware that the weak links in their defences are as likely to be human as digital. A service provider should be able to mitigate cyber risk by hardening defences, managing the threats from hacking and conventional virus attacks, and they must also convince the buyer that they have their own cyber strategy and have put it into practice.

2) The second issue to consider is whether the provider can segment, prioritise and manage crew access without intervention from ship or shore. Crew communications makes good business sense – but is a more complex subject than it appears.

As the evidence from multiple surveys and research shows, crew increasingly see the provision of Internet access as a deciding factor in their choice of employer.
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The rapid expansion of crew services – both connectivity and content – presents a real challenge for the master, owner, manager and superintendent. Access needs to be hands-off for the master, but subject to priority controls for business traffic. It should be Wi-Fi-enabled for privacy and accessible via a dedicated app. It should be separate from the ship’s data plan so that crew can manage their own accounts, regardless of whether the ship owner or the crewman is paying.

3) Next, does the vendor offer a blend of connectivity and hardware services at a range of price points? A common complaint we hear from ship owners is that the cost of satellite communications is too high – but the response of the network operators is that the cost per bit has never been lower. The truth lies somewhere in between.

VSAT can be a game-changer in terms of business efficiency and applications, but don’t assume that bigger is always better. Paying the right amount for your business communications means understanding clearly what you want to achieve and which system can best deliver it. VSAT certainly provides an upgrade from L-band systems, but be sure of what you are getting – and whether you really need it.

4) Prospective buyers also need to make sure they understand their vendor’s business model. This may sound counter intuitive, but the provision of satcoms services to ships is a challenging market to be in at present, and the impact of market conditions is being felt by all providers.

This makes it more important than ever to undertake due diligence to ensure the financial viability of a company before they are contracted. There are a great many vendors in maritime – especially in VSAT – and it makes no sense to risk upfront investment in three to five years of equipment leasing if there are any doubts about their sustainability.

If packages offering hardware, connectivity, installation, content and support at very low prices sound too good to be true, then apply common sense. As communications become more mission-critical, the importance of support increases. Low costs quickly become high if the vessel misses a change of orders, so support must be 24x7x365 and multi-lingual.

5) Finally – and perhaps most importantly – a buyer needs to be sure that the vendor has an eye on the future of maritime communications. There is understandable excitement about the approaching wave of new communications technologies and the potential they offer for new applications and ways of working.

As HTS services start to become available, they bring a fresh perspective to the questions that every buyer should be asking their provider about the evolution of bandwidth, speed and capacity.

How much of each of these a buyer will need for their business and crew is likely to change over time. Ship owners have much to consider when planning how to get from the present to the ‘future of shipping,’ including whether their connectivity provider is committed to the market for the long term.

It has been our consistent position that ship owners and managers need to gain a broad view of the options available to them, and understand which solutions best meet their needs. That may not always be the cheapest available – and it may not be the most expensive – but our experience shows that if prices are too low, buyers quickly understand that the risks can outweigh the benefits. Above all, the principle of caveat emptor always applies.
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In the satellite sector, the emergence of a new generation of low Earth orbit (LEO) constellations has been a noteworthy and much debated topic. How will LEO networks transform satellite communications? And what are the market opportunities for the Asia-Pacific region? Ronald van der Breggen, Chief Commercial Officer, LeoSat Enterprises, looks at the requirements for data communications and explains that with the significant advantages provided by low Earth orbit constellations - the time is now right for LEO.

It is widely recognized that the world is increasingly data-driven, cloud-based and trans-national, creating an ever-growing demand to move large quantities of data quickly and securely around the globe. In the last 10 years data usage has exploded, with more data created in the past two years than in the entire previous history of the human race. In 2015, global networks for the first time carried more than 1 zetta Byte of traffic globally, and this is forecasted to grow exponentially. What is evident is that the creation and consumption of all this data is fast outpacing the infrastructure needed to carry it.

In addition, a new generation of technologies such as IoT and M2M, and a cultural shift toward data-driven decision making and automation continue to drive our dependency on Big Data, and fast and resilient communications networks. Bandwidth requirements are also rising with the demand for always-on connectivity, and businesses are increasingly looking at how technology and connectivity can improve operational efficiency.

With the ever-increasing dependency on Big Data and cyber security this will have a lasting impact on the satellite sector. So, can satellite remain relevant?

Traditional satellites not designed for data
It is true to say that satellite has up until now been viewed as a last resort or gap-filler for data transport as traditional satellite networks operating in geostationary orbit (GEO) suffer from high latency and typically provide little throughput.
Satellite Sovereignty....

While only annoying for voice and video applications, for data communication it is truly a limiting factor in reaching the desired performance or simply a showstopper for certain applications to work. So, whilst GEO remains strong in video, true data-driven applications such as 4G and 5G backhaul, remote management and enterprise connectivity, require a fundamentally different satellite architecture that can solve the issues of latency, throughput, reach, mobility and security. For when data is delayed, even the best algorithms in the world become useless.

Latency matters
Let’s look at latency and why it is so important in data transport. Network latency is defined as how much time it takes for a packet of data to get from one designated point to another. Ideally in the world of data, latency needs to be as close to zero as possible in order to create a smooth user experience. For satellite networks, the closer you get to earth, the less latency there is. With LEO satellites orbiting the earth at around 1,500km, that’s 25 times closer than GEO satellites (36,000km) and five times closer than MEO satellites (8,000km); the case for using LEO for data networking becomes compelling. These low Earth orbit (LEO) satellites bring latencies down from 500+ms to less than 20ms, and in doing so they can now measure up to the latencies typical for terrestrial infrastructure.

Adapting to a changing connectivity landscape
In addition to the issue of latency, as we move to a more data centric world, the traditional satellite architecture of ‘bent pipe’ is very much showing its limitations. Bent pipe means that whatever is transmitted to a satellite needs to come down straight away. While this has worked well to connect our continents back in the 1960s and 1970s, and still works well for DTH video applications, it does not work well for data. Using that type of technology for data requires the use of many Earth stations with antennas that are connected to terrestrial infrastructure to carry traffic to its final destination and/or beyond the reach of the satellite. This is suboptimal to say the least, and comes with a great amount of expense and operational requirements. So, while LEO as such will solve latency issues typically associated with satellite, the real game-changer for data will be achieved by stepping away from traditional ‘bent pipe’ and taking satellites to the next level, to what we call ‘spatial networking’.

A new satellite architecture for data
There are a number of new LEO systems in development which will have a positive impact for data communications. Each of these forthcoming systems, be it OneWeb, SpaceX, Boeing, Telesat, bring different capabilities and opportunities for broadband communications. One such system in development is LeoSat, a new network solution with more capacity, but more importantly, also offering new routing and switching capabilities on board the spacecraft, leading to new applications which are not possible using traditional satellite networks.

LeoSat’s network consists of a constellation of 78 satellites which form a fully-redundant meshed network interconnected through laser links – effectively an MPLS network of routers in space. This new ‘spatial network’ is capable of delivering data approximately 1.5 times faster than fibre networks. Data is transferred from satellite to satellite without having to come down to Earth as is required in a bent pipe system. This way, traffic can be sent from where it originates all the way across the globe to where it needs to terminate without touching anything on the ground until it reaches its destination. As obvious as this architecture may sound from a networking perspective, up until now it has not been available for high speed data in the satellite communication industry.

In addition, traditional satellite design only allows for modulation of data in RF, posing limitations for integration with terrestrial networks. In order for satellites to be seamlessly interoperable with terrestrial networks, either MPLS, IP or whatever other standard, the satellites need to support full duplex, and they also need to have routing and switching capabilities, similar to their terrestrial counterparts. With on-board processing (OBP) and MPLS networking as integrated features of the new LEO systems, they will be able to operate as a full-duplex, spatial extension to terrestrial networks that can carry traffic to any place on Earth, from pole to pole and from land to sea. With LEO bringing all of the above advantages to the satellite market, allowing satellites to go beyond their traditional role of ‘gap-filler’, LEO systems will actually start to become a technology of choice for data communications.
**Opportunities for the Asia-Pacific**

What can a new LEO data network offer Asia? In sectors such as telecommunications, multi-national enterprise, government services, maritime and energy, LEO systems can solve essential communications and connectivity issues and meet the ever-growing demand to move large quantities of data quickly and securely around the world. For a typical Fortune 1000 company, just a 10 percent increase in data accessibility will result in more than US$65 million additional net income. The key attributes of a system in low Earth orbit can be used for a number of applications, for example, to provide 4G and 5G satellite backhaul to the cellular industry, give banks secured networks with their foreign offices, provide enormous uploading bandwidth required for oil and gas exploration, or allow Internet access to passengers on cruise ships. LEO will not only provide a competitive advantage in the existing satellite services market, it will help to expand these markets by enabling new opportunities through previously unavailable levels of performance with true worldwide reach.

**Increased capacity for cellular backhaul**

As cellular protocols become more and more sophisticated and cellular use accelerates, there is an ever-increasing need to transport cellular signals for long distances, at high speeds, in high volumes and in its native form. These growing backhaul needs are not being met by current terrestrial networks, and existing and planned satellite networks are too slow and the bandwidth too limited. For existing and emerging market telecom operators, LEO offers significant advantages as its latency, timing and transport are in compliance with the network standards of the newer 4G, 5G and LTE cellular systems. And with the continued growth in Internet use, streaming media, Smart phone use, mobile apps and the IoT, the low latency of the LEO systems will become an increasingly attractive alternative to the high latency of GEO systems.

**Secure, high-throughput, resilient network for governments**

Governments are increasingly looking to the commercial satellite sector and next-generation satellite constellations to provide the innovative and resilient communications infrastructure they need. The military and government sector relies on a number of key attributes when it comes to communications networks. Critical operations require bandwidth intensive applications, near real time command and control and advanced sensor capabilities. The proximity LEO satellites have to the Earth translates into lower latencies and better data rates. Security and resilience are also key attributes and with a ‘touchless architecture’ – taking traffic in its native form and carrying it from any point on Earth to any other point on Earth without touching the Earth’s surface in between, and therefore completely isolated from any terrestrial infrastructure – this is an enormous advantage to the military. And for embassy communications, rooftop-to-rooftop without any terrestrial touchpoint in between, means an ultra-secure, resilient communications network.

**Seamless, global connectivity for maritime communications**

Maritime operators face significant problems getting adequate broadband networks to interlink ships to each other and to a main office and to serve the ever-increasing data and Internet needs of passengers and crew. On cruise lines, passengers are demanding more and more bandwidth to power consumer devices and for Internet access. Existing satellite systems, most of which can only illuminate limited portions of the Earth from GEO or MEO orbits, cannot satisfy these needs. A LEO system with interconnected satellites can bring ships ‘on-net,’ regardless of their global position, just as if they were a local network node enabling operators to leverage the new ‘Smart Ships’ digital infrastructure where cloud-based operations will reduce average load of the ships and improve efficiency, operational effectiveness and safety as well as providing new business opportunities.

**LEO and GEO - A perfect partnership**

With the increasing rise of data traffic and the continued globalization of business, low Earth orbit systems can be viewed as a new way to expand the traditional satellite market by filling the space between satellite and fiber. And with these new LEO solutions come a host of new opportunities for the data and mobility markets in Asia and around the world. From government applications to corporate networks, and from cellular data solutions to the maritime sector: All markets present the need for fast, secure, low-latency communications.

With companies such as LeoSat combining the speed of fibre with the ubiquity of satellite, a new communications paradigm is created, shifting the perception of satellites from a last resort option to a first choice for data transportation. In this light, there is a growing trend whereby FSS operators, looking to complement and expand their capabilities are partnering with LEO/MEO satellite operators to provide combined GEO/LEO/ MEO data services that cannot be supported by GEO alone. (SES/O3B, Intelsat/Oneweb). Most recently SKY Perfect JSAT in Japan has invested in LeoSat, and can now offer the market enterprise grade, low-latency, extremely high-speed and secure data services worldwide.
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