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Asia-Pacific Satellite Communications Council

HIGH THROUGHPUT SATELLITES

The Future of High Throughput Satellites

HTS: Opening Up the IFEC Market

INTERVIEW

Pierre-Jean Beylier, CEO, SpeedCast

FOCUS ASIA

Will HTS Bring SatCom to IP-World Growth Rates?

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1st Quarter 2016 . Volume 22 . Issue 1 . ISSN 1226-8844

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MESSAGE FROM THE PRESIDENT

In today's world, demand for connectivity continues to accelerate at a rapid pace. With terrestrial fiber or wireless technologies not universally available across a market, connectivity via High Throughput Satellites (HTS) represents the only feasible solution.

HTS gain their advantage over the broad single beam of Fixed Satellite Services (FSS) satellites through frequency reuse that is enabled by the use of multiple spot beams. The narrower beams (with higher G/T and EIRP) and the ability to reuse frequency increases the effective bandwidth the system provides. It can result in 10-20 times higher throughput than a traditional FSS system ultimately driving down the cost per Megabit/second.

With these advantages operators are turning to HTS to provide not just consumer broadband, but also services across traditional satellite sectors such as telecoms, government, maritime, oil & gas and broadcast services. HTS are also enabling new exciting sectors such as mobile connectivity to passenger aircraft and Unmanned Aerial Vehicles (UAVs).

According to research, 2016 will be the year in which HTS goes mainstream. Numerous satellite operators have launched or announced HTS platforms ranging from single-satellite regional coverage to ambitious multiple satellite constellation global coverage. 2015 reports predict that by 2024, demand for HTS bandwidth will be more than 3 Terabits/second worldwide, with over $13.6 billion US in total revenue.

The connectivity demands in Asia are projected to increase exponentially over the next decade. Patchy terrestrial fiber connectivity in rural areas and diverse geography make HTS essential towards connecting the region with affordable services.

With HTS on the forefront of satellite news and technology, it is both timely and appropriate for HTS to be the focus of this issue of the APSCC newsletter.

Paul Brown-Kenyon
President, APSCC

The Future of High Throughput Satellites

Nile Suwansiri, Chief Commercial Officer, Thaicom

IPSTAR 1 Broadband Satellite

The satellite market has changed significantly since the emergence of High Throughput Satellites (HTS) more than a decade ago. The systems have proved their worth and made it clear that they are here to stay, but have HTS reached their full potential? Is there more yet to come?

Emergence

The impact of HTS tends to be summed up by a few frequently-seen phrases: more throughput, lower cost per bit, multiple narrowly focused spot beam technology, increased efficiency, vast payback, a threat to conventional satellite operators, etc. Of course, describing them in this arguably limited way does not do justice to the game-changing innovation HTS have proved themselves to be.

With the launch of the first system – Thaicom's IPSTAR – in August 2005, a massive shift in our industry and in satellites' capabilities was kick-started. Designed for high-speed, two-way broadband communication over an IP platform, IPSTAR provides coverage over most of Asia-Pacific via multiple narrowly focused spot beams. As is typical of HTS, IPSTAR is capable of maximizing the available frequency for transmission and increases bandwidth by a factor of twenty when compared to traditional Ku-band satellites, resulting in more efficient operations.

With this new technology came new capabilities, revolutionizing service providers' respective offerings. The provision of broadband is a prime example of this. Whereas before connectivity could only be provided to urban areas, HTS have enabled previously underserved and unserved areas to receive the same sort of high-speed broadband as urban areas. Meanwhile, the satellite manufacturing landscape has been transformed, with traditional equipment manufacturers competing with their previous customers by becoming satellite operators and satellite service providers.

THAICOM

8

THAICOM 8

Launching 2016

THAICOM 8 will launch in 2016 on a mission to strengthen our video channel platform at 78.5 degrees East and enlarge our footprint over high growth South Asia, Southeast Asia, and Africa markets. Carrying a 24 Ku-band transponder payload, THAICOM 8 will offer a full range of data, media, and telecom services tailored to the communication needs of the entertainment and media industries. THAICOM has been serving the Asia Pacific region with innovative end-to-end satellite services for more than twenty years. Since 1991, we have helped our customers break new ground and serve their audiences better. **For more information, contact sales@thaicom.net.**

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Architecture

Fast-forward to 2016, and HTS have proven their staying-power with widespread use in consumer broadband applications. As the systems grew in popularity, the debate over the effectiveness of the so-called 'closed' and 'open' business models has continued, with the industry yet to agree a defined architecture for HTS. This is no bad thing, with constant discussion often spurring innovation. Currently, systems take the form of either 'closed' or 'open' architecture, with the former giving satellite operators complete control over the entire chain of service to sell almost directly to the end customer, and the latter providing a greater degree of personalization and flexibility for the end customer, with VSAT providers being able to package the space segment with the terminal hub and equipment of their choice. In the future, we believe we will see even more variation on infrastructure as different technologies continue to emerge.

The different variations of HTS architecture has seen the range of applications it is used for begin to expand. Traditionally, broadband via HTS was targeted at consumers in rural and remote areas. While this remains a key area, the last few years have brought about an increasing trend of HTS being used to provide connectivity in schools, on trains and buses and even for maritime crews and airline passengers.

With HTS having grown so popular, then, the question on industry experts' lips now is this: Have these satellites now reached their full potential or will the satellite market continue to be influenced further by the technology?

Unlocking Potential

In short, the latter seems more likely. According to a 2014 Euroconsult report, 'High Throughput Satellites: On Course for New Horizons', the use of HTS will continue to increase, with global capacity usage on HTS systems expected to grow from 107Gbps in 2014 to more than 1,300Gbps in 2023. This is, in part, due to satellite operators' continued quest to reduce OPEX, meaning that a satellite being used to deliver just one service is being seen far less frequently. For HTS, this means an even greater broadening of horizons to move beyond consumer broadband and into new applications.

IPSTAR service for communication recovery in the aftermath of 2011 Great East Japan Earthquake

IPSTAR Maritime Broadband Services for Crew Welfare

According to Euroconsult's report, additional applications which offer the most potential for HTS use include Civil Government and Enterprise Networks, Cellular Backhaul and Trunking, Milsatcom and Video Services. The exponential increase in mobile services in recent years and the opportunity for satellite operators to move into the Cellular Backhaul market, for example, has come as a result of increased use of 3G and 4G cellular technologies which require higher bandwidth backhaul channels to support traffic. Furthermore, even markets like the Oil & Gas industry, which require high capacity but also highly reliable services, can benefit from HTS' lower bandwidth costs combined with high capacity but smaller terminals.

Cellular Backhaul over HTS

In addition to the increased use of 3G and 4G cellular technologies, the growth in demand for Cellular Backhaul services has also come as a result of pressure faced by mobile operators to extend their services in rural areas, especially due to Universal Service Obligation (USO) programs being put in place by governments now willing to bridge the digital divide.

Consequently, the focus of the mobile industry is now shifting to underserved areas. Mobile handset vendors are continuously developing low cost phones specifically targeting the low-income rural areas. Semi-smart phones with built-in social networking applications are being manufactured by vendors to target these developing markets. Even though such low cost handsets are now widely available, the fact still remains that it is not cost-effective for operators to extend their reach into remote areas using terrestrial based fiber and microwave networks.

Cellular Backhaul over HTS has the potential to make a major impact, especially in many rural and remote areas still lacking service coverage. In fact, we predict that by this year, the number of subscribers to mobile services will reach four billion – in the Asia Pacific region alone. This expectation is supported by the 2015 GSMA report 'The Mobile Economy Asia Pacific 2015' which states the Asia Pacific region dominates the global mobile industry, already accounting for half of the world's unique subscribers and connections. The report predicts that the region's subscriber growth will continue at a faster pace than the rest of the world, adding 600 million new subscribers by 2020.

Along with mobile services, data services have also increased in recent years, mainly thanks to the popularity of social media. This demand puts tremendous strain on the existing mobile networks and technologies. At the same time, competition among mobile network operators is increasing in markets which are seeing ever shrinking Average Revenue Per User (ARPU). Mobile operators need to expand their coverage and target new subscribers, while keeping their CAPEX and OPEX within profitable limits.

Providing access to broadband services will play a key role in bridging the Digital Divide through health services, rural schools, distance education programs, SME's and agriculture, and other community services. However, providing this kind of coverage to remote and rural areas cannot be done the traditional way because the distance between cellular base stations makes it cost-prohibitive to use terrestrial means. Instead, this vision of broadband services in rural areas can be realistically implemented using existing broadband satellite backhaul technology.

While 4G services will be limited to urban centers where fiber is readily available, for the foreseeable future mobile operators will continue to extend 3G services to even more remote areas, making a broadband High Throughput Satellite like IPSTAR ideally positioned to support the backhaul of 3G data services now as well as 4G backhaul in the future. IPSTAR can provide diverse solutions for mobile operators for backhauling from their remote nodes to their core network. IPSTAR supports various cellular technologies such as GSM, CDMA, and 3G. Depending on the type of backhaul link in deployment, either E1 or IP and the total backhaul bandwidth required, different end modem solutions can be used, such as fiber or small ells. This provides them with service diversity which they can deploy according to requirements – thus targeting services based on population density, coverage area required, and ARPU of the region. IPSTAR has already tested different end modems and ground systems which can be selected according to bandwidth capacity required by the telco.

Haldon Station School, Canterbury, New Zealand IPSTAR User

On a Total Cost of Ownership (TCO) comparison based on a 1 Mbps link, there is no doubt that fiber is the best medium for distances less than 15 Km from the base stations. For backhaul nodes located within 15-40 Km, microwave backhaul would be the preferred solution. However, microwave has limitations due to strict Line-of-Sight (LoS) requirements, limited availability of spectrum, and possibility of interference. For base stations located at distances further than 40 Km, a broadband satellite like IPSTAR is the optimum solution.

Small cells are ideal for penetrating rural areas and providing cellular voice as well as broadband Internet services. A small cell is a cellular base station originally designed to be used in residential or small business environments, where the mobile network's coverage is weak or non-existent. It was designed to connect to the mobile network using broadband ADSL or any other type of IP-based Internet connection. A small cell typically supports eight or 16 concurrent voice calls, as well as access to data service. Small cells from different telecom vendors are currently available for 2G, CDMA and 3G technologies—service providers can easily integrate them into their existing networks. When a 3G small cell is chosen for deployment, it can easily provide the broadband speeds required for today's needs and applications.

In addition to providing coverage to rural and remote areas, Cellular Backhaul over HTS can also be very effective for interim solutions/temporary coverage and emergency communications and network coverage recovery during disasters.

What's next?

Cellular Backhaul is, of course, just one example of markets where HTS are beginning to be used, with markets like Maritime, Mobility, Government and Oil & Gas also providing interesting opportunities for operators. Looking at these opportunities it is clear that even after ten years, HTS continue to represent the next generation of satellite services, providing cost-effective models and higher service levels. In the future, demand for these qualities will only increase, with service providers increasingly looking to run more than one service over the same capacity and new technologies continuing to emerge to support this and HTS.

So what is next? Unsurprisingly, the answer – thanks to the aforementioned demand for more broadband – is Ultra-High Throughput Satellites (UTS).

According to the Northern Sky Research (NSR) article 'Financial Impact of a Capacity Explosion', published in Nov. 2015, the up-and-coming trend among satellite operators is to build much bigger HTS payloads than ever before. Along with this trend, satellite operators are moving towards vertical integration business processes – where everything is done under one roof, no outsourcing, no middle man – through building lasting partnerships or acquisitions.

NSR claims that – if correctly leveraged – UTS could have a tremendous impact through providing comprehensive coverage at lower costs, eventually becoming the most viable business case. To make this happen, however, and with the increasing demand for Internet connectivity acting as the driving force, satellite operators must provide compelling end-to-end solutions and increase their offerings.

A focus on Quality of Experience is paramount in today's satellite communications landscape

Furthermore, a 2015 report from Arthur D. Little predicts that these future HTS systems will impact the satellite communications industry, helping to expand footprints and significantly increase the total capacity available – ultimately meeting the demand for satellite data transmission.

Conclusion

Despite being a decade on from the first launch it seems the HTS story is far from over. HTS, it seems, are nowhere near reaching their full potential just yet, with the current market expansion signaling the beginning of a new era for the technology and new advancements already on the way.

Indeed, in many ways this is just the beginning for HTS. Our fast-paced satellite industry and increased demand for data and anywhere, anytime connectivity show no sign of slowing down anytime soon, signaling a very bright future for HTS – both for the next ten years, and beyond.

Patompob (Nile) Suwansiri is currently the Chief Commercial Officer (CCO) of THAICOM Public Company Limited and has over 24 years of experience in the satellite industry. He is responsible for the overall marketing, sales, and business development activities of THAICOM.

Nile has been with THAICOM since its inception in 1992 and has worked in many aspects of the company. He held positions of Satellite Engineering Manager and Satellite Control Manager before moving to the IPSTAR project. He was also the VP of Sales and Marketing for the Southeast Asian markets.

Nile was involved in the development and implementation of the IPSTAR project since its inception in the year 2000 and has over a decade of experience in the High Throughput Satellite (HTS).

HTS: Opening Up the IFEC Market

Geoffroy Stern, Senior Consultant, Euroconsult

In-flight connectivity (IFC): A fast-growing market

Passengers' connectivity expectations have risen along with the significant increase in the number of Personal Electronic Devices (PEDs). Whether on the ground or in the air, most travelers want to remain connected. As a result, more airlines are adopting technologies that allow passengers to remain connected during flights. Euroconsult estimates that at the end of 2015, 72 airlines had already installed or announced plans to install passenger connectivity systems on board, and the number of connected commercial aircraft had increased by 21% compared to the end of 2014.

With more airlines opting for cabin connectivity, companies that have not yet made a decision will be increasingly pressured to offer such services to match their competitors. Euroconsult anticipates the number of commercial aircraft offering cabin connectivity will grow from around 5,300 at the end of 2015 to more than 23,000 by 2025, accounting for 62% of the global fleet, implying a 10-year Compound Annual Growth Rate (CAGR) of 16%. In the more mature business aviation market, 34,000 active terminals are expected to be in service by 2025, representing a 10-year CAGR of 6%. As a result, Euroconsult sees total revenues from passenger connectivity services growing from $700 million in 2015 to nearly $5.4 billion by 2025, a 23% CAGR over the 10-year period.

Upcoming HTS capacity to further drive growth

The launch of High Throughput Satellites (HTS) in both Ku-band and Ka-band is expected to be a game-changer for the in-flight connectivity (IFC) market. HTS systems will not only tremendously increase data speeds to the plane compared to regular satellite systems, but will also significantly lower costs, thereby further driving the adoption of IFC services.

All regions will see a strong increase in available HTS capacity supply over the next three years. Total Ka-band HTS supply will increase threefold to 1,500 Gbps and Ku-band HTS supply will increase fivefold to 285 Gbps by 2018. While Ka-band HTS capacity has been widely available in North America and Europe since 2011, this capacity has been primarily targeted to the consumer broadband market. Ku-band HTS capacity will only be available in these regions starting in 2016, and it will remain a small subset of total HTS capacity supply. Other regions, such as Latin America and Asia-Pacific, have only recently seen the introduction of Ka-band HTS capacity supply. Total HTS capacity over oceans is expected to grow from 50 Gbps in 2015 to 115 Gbps in 2019.

Clearly, not all HTS capacity is well-suited to the connectivity market. However, an increasing number of operators are specifically designing the footprints of their new HTS systems to cover the busiest airline routes.

For instance, Intelsat will launch its first two Epic satellites in 2016 as part of its HTS Ku-band constellation. Intelsat-29e was successfully launched in January 2016, and Intelsat-33e is expected to be launched in the second half of the year. At the end of 2015, Inmarsat had its three GX satellites in orbit, and commercial service started in early 2016. ViaSat, which operates the high-capacity Ka-band ViaSat-1 over North America, plans to launch ViaSat-2, which will cover North America, Latin America and the Atlantic Ocean with 140 Gbps (in Ka-band) by the end of 2016.

Beyond 2018, an even larger volume of capacity is expected in the IFC market. Panasonic announced that it is currently in the process of contracting a new generation of satellites that would offer extremely high throughput capacity. ViaSat announced at the end of 2015 that it intended to launch a global Ka-band constellation named ViaSat-3 relying on three geostationary satellites, each with a capacity of up to 1 Tbps, with the first one expected to be launched in 2020.

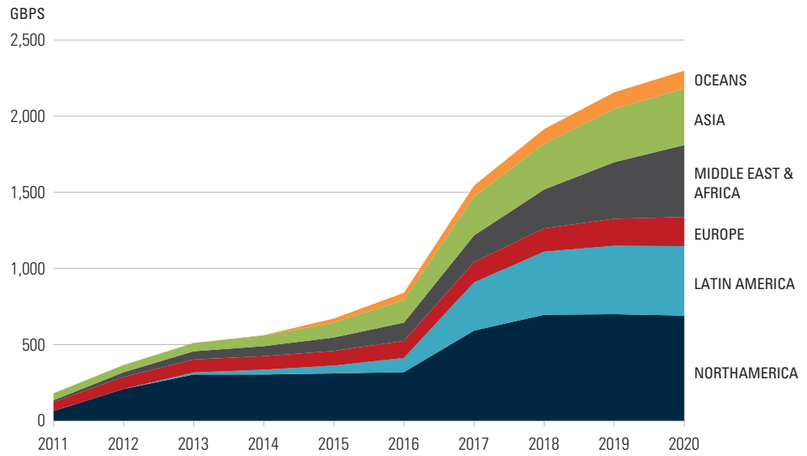
With the expected increasing penetration of HTS, the VSAT market in commercial aviation is expected to outgrow the Air-To-Ground (ATG) market, with the former's market share reaching 58% by 2025. In the business aviation market, the share of VSAT solutions is also seen increasing dramatically, as the largest service providers on the commercial aviation market, such as Panasonic and GEE, announced plans at the end of 2015 to address this market. Overall, Euroconsult estimates that VSAT bandwidth will grow from 2.0 Gbps in 2015 to 120 Gbps in 2025.

A highly concentrated service provider market…for now

With regard to service providers, all of them were ready, at the end of 2015, to offer HTS services, either in Ku-band or Ka-band. For instance, Gogo, SITA OnAir and Thales are all resellers of Inmarsat GX. Gogo is also building its own Ku-band network by leasing capacity from different operators, including HTS capacity from SES and Intelsat Epic. Similarly, GEE signed large capacity commitments with SES for both regular and HTS capacity. As part of Panasonic's strategy to focus on Ku-band, it also contracted capacity on Intelsat Epic in addition to its large volume on the Eutelsat 172B satellite over the Asia-Pacific region. Thales, through the acquisition of LiveTV, is already leveraging its Ka-band HTS capacity.

Tremendous changes are expected in the service provider landscape. Six players currently offer cabin connectivity services for commercial airlines, namely Gogo, Panasonic, GEE, Thales, SITA OnAir, and ViaSat. However, competition is set to intensify with some equipment manufacturers and satellite operators moving down the value chain and new entrants set to penetrate the market by 2017. Service providers are currently facing high operational costs and are struggling to be profitable. Connectivity services require significant upfront commitment and investment in satellite capacity and ground infrastructure. Given this operating leverage, an increase in the installed base and a better utilization of satellite capacity commitment are crucial for service providers hoping to increase their gross margins.

HTS CAPACITY SUPPLY IN BOTH KU-BAND & KA-BAND, BY REGION*



** Excludingnew LEO constellations, suchas OneWeb, etc*

Prospects for In-flight Entertainment and Connectivity © Euroconsult 2016 – Unauthorized Reproduction is a copyright violation

In 2015, the average annual revenue per commercial aircraft (ARPA) ranged from $125,000 to $135,000 for both Gogo and GEE. Key industry players have already indicated that the ARPA could reach $250,000 to $300,000 in the next three to five years, mainly driven by higher take rates and increased bandwidth delivered to planes, enabling passengers to significantly increase their data consumption. When adding the potential stemming from operational services, the ARPA could even surpass $300,000.

IFC equipment manufacturers highly tied to service providers

The IFC hardware market for the commercial aviation segment is primarily driven by the success of individual service providers who generally act as equipment solution integrators and the primary link between end-users such as airlines. While the space segment (capacity) is unquestionably an important facet of IFC services, service providers are increasingly relying upon equipment, notably antenna technology, to differentiate their offerings. From only four players active in 2015 (Panasonic, ViaSat, Aerosat, and Tecom), the antenna manufacturer market is poised for fragmentation as no fewer than a dozen players are seeking to position themselves in the commercial aero segment. At the modem level, the commercial aviation market is extremely concentrated, with three players on the market (iDirect, Hughes and ViaSat).

The smart plane concept taking shape

Beyond cabin connectivity, the smart plane concept is taking shape. Thanks to the growing implementation of connectivity on board aircraft and to technological innovations in various aspects of avionics, airlines today have a major opportunity not only to offer new services to passengers but also to optimize flight operations. Connected aircraft or smart planes are a new generation of aircraft that are considered to be nodes in a very wide network of interconnected systems. Original Equipment Manufacturers (OEMs), such as Boeing and Airbus, are increasingly involved in the process to collect, host and generate data analytics from the aircraft.

HTS CAPACITY SUPPLY IN BOTH KU-BAND & KA-BAND, BY REGION*

72 Airlines offering or planning in-flight connectivity

21 of them in Europe

22 of them in Asia

17 of them in MEA

9 of them in North America

22 of them in Latin America

$12.5 ARPU per session

6.2% take rate by passengers

19,700 connected business jets

6 major service providers

4 different technologies / frequencies

2,900 commercial aircraft connected by satellites

2,400 commercial aircraft connected by ATG

81% of connected business aircraft use MSS services

120 Gbps of bandwidth capacity by 2025 for commercial and business markets

5,300 commercial aircraft connected in total

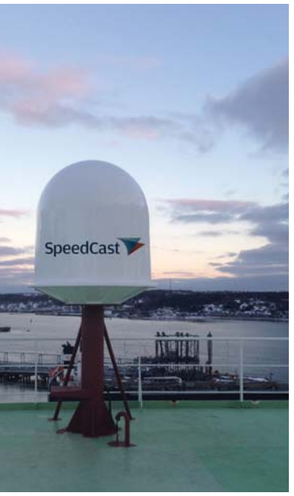
** All figures are for year end 2015*

Prospects for In-flight Entertainment and Connectivity © Euroconsult 2016 – Unauthorized Reproduction is a copyright violation

While currently in its infancy, the smart plane concept is expected to develop further in the near future, and this should create untapped new opportunities for a wide range of players.

Geoffroy Stern is a Senior Consultant of Euroconsult based in Paris, France, with expertise in economic, strategic and financial analysis, with a particular focus on due diligence assessments for project financing and M&A transactions in the satellite communication sector. Geoffroy is also the Editor of the recently published research report: Prospects for In-Flight Entertainment & Connectivity.

Interview with Pierre-Jean Beylier, Chief Executive Officer, SpeedCast



Q Looking back at 2015, how would you describe the year for SpeedCast?

A The last 12 months saw SpeedCast expand its horizons to become a truly global player as the group experienced growth, and continued to be the major market consolidator. The company substantially expanded during 2015 and now has approximately 450 employees throughout 31 offices around the world, while experiencing growth in operational infrastructure, geographic reach and a solid increase in customer number and diversity. In terms of our global reach, we significantly extended our ability to provide services to customers all over the globe with the acquisitions of six companies that enhance our capabilities in important regions and verticals: Geolink Satellite Services, Hermes Datacomms, NewSat, SAIT Communications, ST Teleport, and Newcom International.

SpeedCast's operational infrastructure significantly expanded with the acquisition of two world-class teleport facilities in Perth and Adelaide through the acquisition of NewSat, both of which support classified networks for the transmission of vital and sensitive military and government information for clients, and are recognised as highly secure Global Access Points. Through the acquisition of Hermes Datacomms, ST Teleport and Newcom International, we have expanded our global infrastructure with five additional teleports in the United Kingdom, Singapore, Kazakhstan, USA and Peru. These additions mean that we now have a truly global infrastructure to meet our customers' needs with maximum flexibility and responsiveness, wherever they are, thus driving operational excellence.

Our incredible global expansion in 2015 increased not only the number but also the diversity of our customers. SpeedCast now boasts international customers in the maritime, energy, enterprise, Government, NGO, media and telecom markets spanning the six major continents of the Americas, Asia, Africa, Europe, and Australia.

Mitsubishi Electric's satellite platforms deliver exceptional quality and reliability.

Mitsubishi Electric is one of the world's leading names in the manufacture and sales of electrical and electronic products and systems. In particular, we are proud of our extraordinary heritage in the space industry, having participated in numerous satellite and space exploration programs in Japan and around the world since the 1960s. Furthermore, our company developed the first-ever Japanese-made standard satellite platform, DS2000, which allows us to flexibly respond to the ever-changing needs of our customers.

Satellites in Mitsubishi Electric's DS2000 series are not only utilized to support Japan's social infrastructure, but are also delivered to overseas satellite operators for commercial use. We actively seek out new business partners, participating in international competitive bids with our flagship DS2000. The DS2000 series also has a track record of zero claims for in-orbit failure, and this high level of reliability and quality means that some of the lowest insurance premiums in the world can be applied to the series.

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Q What were some key contracts awarded to SpeedCast in 2015?

A SpeedCast won some large international contracts and expanded its customers' portfolio significantly around the world in 2015.

The maritime market continued to grow strongly, and so did SpeedCast's commitment to this industry as symbolized by a few high profile wins:

- SpeedCast was awarded by Gearbulk, a specialist in high quality shipping services, a multi-year communications contract for mission-critical and social communications on 50 cargo vessels across the world. The new Ku-band satellite service provided Gearbulk with unrivaled, high-performance broadband connectivity, taking the fleets' communication capabilities into a new era of connectivity.

- SpeedCast was selected by international company, Vroon to provide a Ku-band satellite service to facilitate high-performance broadband connectivity with multi-megabit speeds and a "hotel-like" user experience for its clients aboard three of its vital accommodation vessels with over 195 passengers combined.

We also continued to build up our capabilities to serve the energy market in Houston and globally, resulting in some initial market share gains. It has been exciting to see our vision to be a major global player in servicing this industry, starting to materialize:

- SpeedCast was awarded a landmark deal, one of our largest ever satellite service agreements, in the energy sector. SpeedCast was selected from a field of top global telecommunications and satellite services providers, by one of the most prestigious global oil and gas services companies, to provide satellite services in over 20 countries for both onshore and offshore sites in Asia Pacific and Africa. This contract win further raised SpeedCast's profile in the upstream energy sector and significantly advanced our goal to become a leading supplier to the energy industry worldwide.

- SpeedCast was selected by ConocoPhillips in a multi-year, multi-million dollar contract, to significantly increase the primary satellite communications services provided to the ConocoPhillips operated asset located in the Bayu-Undan field in the Timor Sea. The expanded services enable critical communications between the Bayu-Undan field operations and the regional headquarters in Perth, Australia.

- An additional deal worth noting in the energy sector was when SpeedCast was selected to provide InterOil Corporation with a range of field connectivity solutions to their 12 locations, including base camps, construction sites and remote rig sites located in the Gulf Province of Papua New Guinea. The solution utilises both Ku and C-band frequencies, including containerised satellite and voice communications units, network services and mobile satellite services, and provides the highest level of availability and redundancy.

2015 has also been a productive year for our Enterprise and Emerging Markets business unit, as the team has pursued new business and new markets. Highlights include:

- SpeedCast continues to provide innovative cellular backhaul solutions allowing GSM operators to extend their services further into remote rural areas and also increase capacity in suburban or semi-rural areas, fuelling our growth in the GSM market. A major deal for SpeedCast in this sector was to supply a significant part of a mobile operator's backbone in Myanmar as they roll out 3G services in that country.

- In the broader Telecoms vertical, SpeedCast has experienced a string of successes supplying satellite services to major ISPs and Telcos in the Pacific. SpeedCast also supports global telecom operators' enterprise customers' needs across the world.

- We have seen positive developments in both the NGO and Media verticals that have also contributed to SpeedCast's success in 2015.

Finally, in Myanmar, in response to the growth of our business, we have established a new legal entity in anticipation of opening a new office in 2016.

Q SpeedCast acquired six companies in less than 12 months. Could you tell us more of what is behind this rapid acquisitive growth?

A During the year, the Company made six strategic acquisitions, targeted at either strengthening our capabilities to serve target priority verticals or to fill gaps in our geographic presence and thus to establish SpeedCast as a truly global player:

- **Geolink Satellite Services** – With the acquisition of Paris-based Geolink Satellite Services, SpeedCast significantly enhanced its capabilities to serve and support its customers in the African market, a key area of operations for our Asia-Pacific based customers. The African continent continued to be a growth spot for VSAT services in 2015 and therefore represents a new potential source of growth for SpeedCast. In addition, the Geolink acquisition added to SpeedCast's growing leadership in providing services to the maritime sector.

- **Hermes Datacomms** – The acquisition of Hermes Datacomms two months later opened up capabilities in an additional 54 countries representing 92% of the world's oil & gas reserves and an extensive portfolio of blue chip energy customers. The combined entity can now offer significantly enhanced capabilities to serve and support energy customers worldwide, with a highly skilled staff located in the primary energy markets around the world.. This acquisition followed the opening of our Houston office in late 2014 and the recruitment of Keith Johnson to head our Energy division.

- **NewSat Satellite and Teleport Service**s – The acquisition of NewSat's Satellite and Teleport Services augmented SpeedCast's already well established Australian network with NewSat's infrastructure assets and customer base. NewSat's state-of-the-art teleport infrastructure and highly experienced operations and engineering team further improved SpeedCast's ability to serve customers in Asia-Pacific, thus strengthening our leadership position in the region, while giving us additional capabilities to provide services into Middle East and Africa.

- **SAIT Communications** – SAIT Communications joined the Group in August 2015 and expanded SpeedCast's maritime business through SAIT's long term customer relationships with large Greek shipping companies, a strong L-band expertise, and an innovative portfolio of value-added services. With this transaction, SpeedCast acquired a strong foothold in Southern European countries, in particular in Greece and Cyprus, which host many large ship owners and fleet managers.

- ST Teleport - to further strengthen the Company's position in both the maritime and energy sectors in Asia-Pacific, SpeedCast acquired ST Teleport, a leading satellite communications services provider based in Singapore. Together with ST Teleport's world class teleport facilities, this acquisition enables SpeedCast to remain, more than ever, the partner of choice for satellite communications in the Asia-Pacific region.

- Newcom International - In the latest chapter of a busy and successful year, and to establish a strong presence in South and Central America, SpeedCast acquired Newcom International, a leading satellite communications service provider in that region, which is an important market for all of the Group's existing verticals and for a number of existing SpeedCast customers. Along with diversifying into a new and important market, with this acquisition SpeedCast further expanded its strategic infrastructure by adding two Teleports in Miami, Florida and Lima, Peru, serving our customer base throughout the Americas.

Q A What will 2016 bring for SpeedCast?

2015 has been a truly transformational year for SpeedCast across all aspects of our business and 2016 is set to be another exciting year. Building on the solid foundations of our unwavering commitment to deliver fast and reliable communications, we will continue our strong global organic growth.

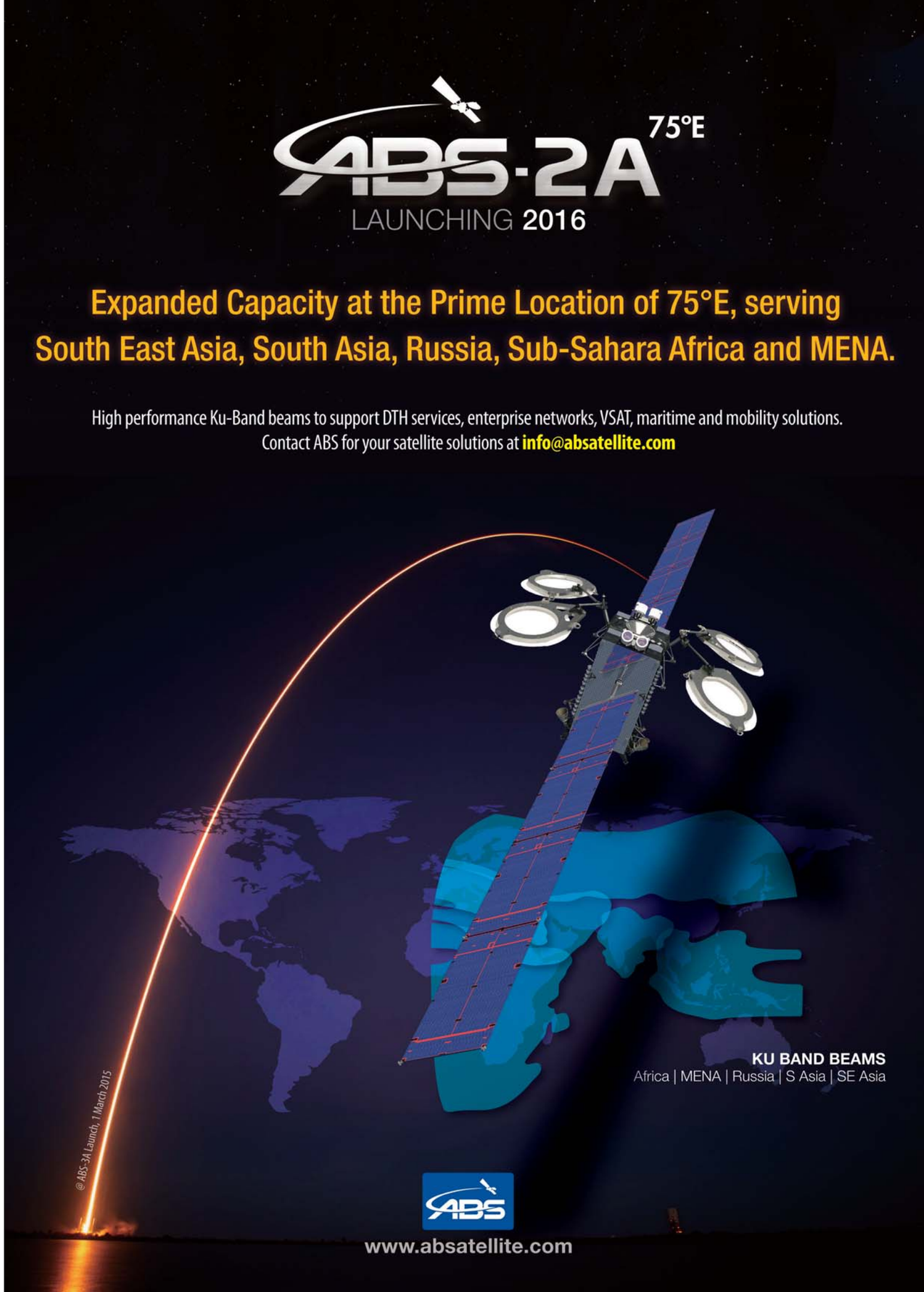
We will continue to integrate the acquired companies at a fast pace, thus maximising cost and revenue synergies. In that integration process, we are investing significant resources to build a common performance-based culture around four common values:

This is a project that is close to my heart and that will contribute to enhanced performance across the Group.

Throughout the coming year, I am confident that you will hear exciting stories and new developments from the SpeedCast camp across the whole business, based on our commitment to drive operational excellence for our customer wherever they are.

Pierre-Jean ("PJ") Beylier joined SpeedCast in 2000 as Head of Sales and Marketing. He was appointed Chief Executive Officer of SpeedCast in 2004. PJ has been instrumental to the success of SpeedCast, having managed the transition to its current technology platform and guided the development of SpeedCast's strategic focus.

PJ has over 20 years of experience in international sales and marketing across Black and Decker in France, and at Rhodia, a French manufacturer of specialised industrial chemicals where he held a number of roles including export sales manager for one of the divisions, responsible for Southern and Eastern Europe, Middle East and Africa, and then managed key e-business projects in the Group.



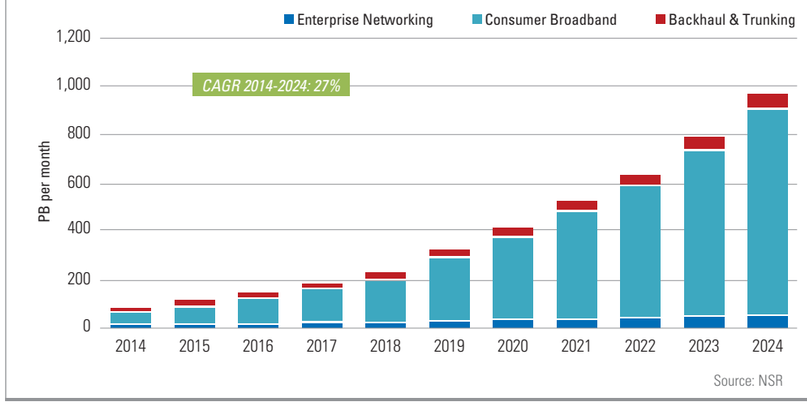
Will HTS Bring SatCom to IP-World Growth Rates?

Lluc Palerm-Serra, Analyst, NSR

Growing at a CAGR of 11.8% (2010-2015), the Satellite industry has done fairly well in the last 5 years in terms of demand growth. However, if one puts this figure in context with the global developments in the Telecom industry, it is obvious that SatCom has lost ground in favor of other technologies. According to CISCO, global IP traffic grew at a 29% rate from 2010 to 2015. These diverging trends have rendered Satellite IP traffic share to a mere 0.15% of global IP capacity demand. Can HTS open new markets and opportunities and propel the Satellite industry to grow at IP-world rates?

NSR forecasts an explosion in Satellite Fixed Broadband Data demand over the next 10 years. The vast majority of this growth will come from HTS architectures, GEO and non-GEO, growing from a Broadband market share of 54% to just above 95%. Any operator that wants to stay relevant in Broadband markets needs to incorporate an HTS offer. Most of this growth will stem from high-volume low-value Consumer Broadband applications but premium applications like Backhaul & Trunking or Corporate Networking would also present interesting opportunities.

Satellite Fixed Bradband Data Volume, 2014-2024



Source: NSR

In many aspects, Asia-Pacific has been at the forefront of innovation for HTS. Not only is IPSTAR the first big success story for HTS satellites, it has also proven the value of this new technology in a wide variety of verticals. Consumer Broadband, backhaul for 3G services, Enterprise connectivity or digital divide programs have proven the value proposition of the architecture. Furthermore, remote islands in the Pacific have turned to be the key launch customers for O3b and it is clear that one of the regions where LEO constellations will focus the most is in Asia.

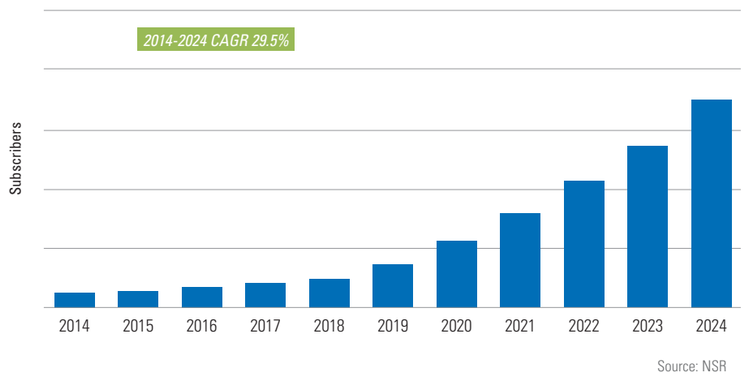
Stepping into mass markets – The Consumer Broadband opportunity

Before the emergence of HTS, Satellite internet was a very niche application with prohibitive costs and poor data services. However, the new satellite architecture has created the conditions for satellite operators to enter the mass market of internet provisioning. Satellite internet is not made for heavy OTT consumers, but offers combining acceptable data caps at affordable costs for middle-income households have attracted large amounts of customers from remote or underserved locations. With several Satellite internet suppliers close to or surpassing the 1 million subscriber mark, Consumer Broadband is a proven business model today.

In particular, Asia presents tremendous opportunities in this vertical. With ample percentages of the population living in rural locations and ground network footprints still underdeveloped, and where around 30% of the Asian population still lives outside any Broadband coverage from ground infrastructure (mobile or fixed), the potential addressable market in the region is massive.

Again, the Asia-Pacific region is one of the key innovators for the success of the HTS model. IPSTAR proved very early after its entrance into service that the poor ground infrastructure in the region was creating attractive levels of demand for Satellite Operators. With several tens of thousands of subscribers from different countries, it is the best proof of the latent demand in the region. The year 2015 saw the launch of the first HTS national satellite. The Australian NBN program targets connecting 200,000 rural and remote homes and businesses that would otherwise stay outside internet reach.

Asian Satellite Broadband Subscribers



Source: NSR

However, despite the huge potential addressable market, there are still several issues restraining growth in the region. Outside the NBN program, NSR saw very few new initiatives in the region to create growth in the short term. Countries like Indonesia, Malaysia or the Philippines could show interesting growth. However, other markets like India or China will likely present slow development in the next 12-24 months as Hughes' SURYA program faced opposition from the Indian government and China's first Ka-band HTS satellite will not get to orbit earlier than 2017.

A common issue for Consumer Broadband programs in developing regions has been the cost of CPE. Even if the end-customer perceives the value of an internet connection and is willing to pay the recurrent costs of an entry-level service, upfront investment in CPE costs is in many ways slowing the adoption of the solution. In another front, the regulatory environment in the region, including access to landing rights, service licensing or requirements of local teleports for internet traffic, are increasing the costs or even precluding satellite services. All in all, the fastest evolution of the market is forecasted to take place after 2018, when several programs are expected to enter into service, including non-GEO HTS.

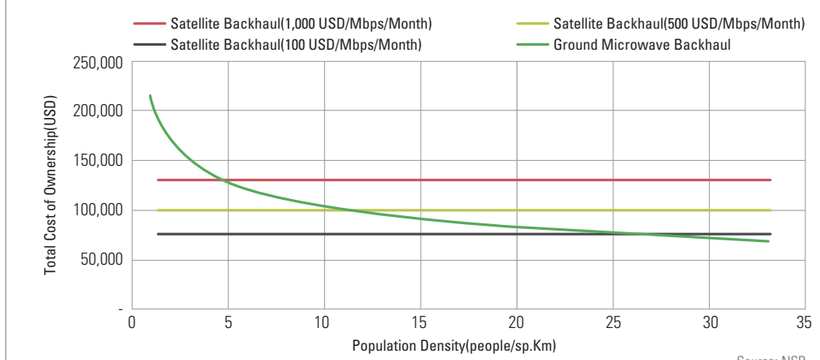
From Service Obligations to Facilitating Data Services in Remote Locations

The Asia-Pacific dominates the global mobile industry, accounting for half of the world's connections. Far from stagnating, it is expected that the mobile industry in the region will continue to grow faster than the rest of the world. This fact combined with the challenging geographies of the region, the limited financial capacity to invest in expanding ground infrastructure and the speed of development all set the perfect conditions for satellite Backhaul and Trunking to thrive.

Universal Service Obligations were the traditional source of demand for Satellite Backhaul services. The high costs of capacity and the limited bandwidth associated with FSS satellites relegated Backhaul through satellite to a very niche position where there was no other alternative. However, HTS is really changing how satellite integrates with ground infrastructure and Mobile Network Operators are increasingly considering Satellite Backhaul in their Business Plans.

Once the ground network serves a mobile site with an adequate level of bandwidth, it is very rare that satellite comes in and takes that site. But Asia still has very large areas without any sort of mobile Broadband coverage. As the cost per Mbps of satellite capacity declines with HTS, the population density at which a satellite solution is more cost effective than expanding the ground network footprint increases. HTS is clearly expanding the addressable market of satellite solutions by making satellite backhaul the most cost effective alternative in many instances.

Total Cost of Ownership for different Backhaul Technologies & Population densities



Source: NSR

What is even more interesting is how HTS is making data services in remote locations economically feasible. The focus for MNOs has turned towards data services, where they can extract greater margins. With HTS, backhauling 3G and even 4G at reasonable bandwidth still renders enough margin for the mobile operator to have a positive and attractive ROI. NSR believes this will turn out to be the key growth driver for Backhaul services in the future.

In terms of the Trunking segment, fiber has grown rapidly in the region. Projects like the Palapa Ring, a 35,000 km backbone network laid along the major islands of Indonesia, have put pressure on Trunking services. Despite this fiber encroachment, there are still remote islands in the Pacific or inland regions that still lack fiber connectivity. It is also worth considering that in many places, the reliability of the fiber is very poor and it is not strange to find satellite backup services. All in all, NSR foresees Trunking sites to progressively migrate to fiber services but there will still be demand for newly developed urban regions, remote locations and back-up services. Particularly remarkable is the case of O3b, which in just a couple of years of operation has a contracted capacity in the Pacific region amounting to 6 Gbps.

NSR forecasts that the number of sites for Backhaul and Trunking will remain in the tens of thousands of sites, one or two orders of magnitude lower than Consumer Broadband sites. However, the very high levels of demand of capacity for 3G and 4G services combined with the high standards for Quality of Services makes this vertical very interesting for Satellite Operators and Service Providers looking into low-volume high-margin services.

Internet Everywhere and Operation Efficiencies Driving Growth for Corporate Networks

Corporate networking is also being transformed by HTS. As the need for internet connectivity becomes universal, many of the sites that traditionally run on Narrowband services are now migrating to Broadband connections driven by the lower cost of capacity. As governments are increasingly aware of the benefits of the Internet, digital divide programs are becoming more popular. HTS is the tool for these programs to really make internet services available everywhere.

Despite the general challenges in the Energy and Commodities industry, satellite is still a very important tool for remote sites. From internet connectivity for crew well-being to Video streaming for complex remote maintenance missions or Big data information transmission, the bandwidth allocation per site is increasing every day.

The Challenges of the New Paradigm

No one can deny how HTS is creating new opportunities for the Satellite industry by expanding the addressable market. Any operator that wants to remain competitive in the Broadband markets needs to add an HTS payload to its offering. The transformation triggered by HTS is very profound and it certainly raises a number of challenges for incumbent players.

Satellite Operators are used to very stable levels of pricing matched with long-term contracts. Pricing is under pressure from multiple angles. The large amount of available capacity is forcing operators to decrease pricing to attract more customers. The pricing instabilities are shortening the contract length further increasing the downward trend in pricing. New technologies like electric propulsion or ultra-HTS satellites are reducing the cost per available Mbps which allows new satellites to be priced at very competitive rates. The downward pressure on pricing is here to stay, and Asia will not be an exception with multiple operators already voicing concerns on the issue. Looking into this trend from an external perspective, Deloitte Shift Index tracks global bandwidth cost trends from 1999 through today finding an average decline in bandwidth costs of 27% per year. If the satellite industry wants to stay competitive in mass markets like Consumer Broadband or Mobile Backhaul, price declines of this range should be expected.

Business models need to change in many aspects to adapt to the new opportunities offered by HTS. Customer acquisition and servicing needs to radically change to fit the changing paradigm of a formerly B2B-centric industry migrating to B2C services. Mobile Network Operators are beginning to abandon their satellite know-how and are increasingly outsourcing their network operations, creating opportunities for managed services. With diverging peak vs. average usage patterns and statistical demand aggregation to alleviate data bursts, fill rates are a very poor measure of success and new metrics must be considered to optimize performance. From customer relations to cost structure or performance optimization, Satellite Operators must re-think their business plan.

In any case, HTS is accelerating the pace of change of the industry and technology is evolving faster than ever. Flexible capacity allocation, high frequencies, advanced ground terminals, electric propulsion or large payloads are just a few examples of the technological changes the industry is witnessing. In this rapidly transforming industry, only the fittest will survive.

Bottom Line

The global SatCom industry has grown at healthy rates during the last 5 years, however, the global IP world has boomed at much higher levels. The satellite industry has been unable to follow this explosive growth track, which has led to the industry being relegated as a niche solution within the IP ecosystem.

Yet, with ground infrastructure reaching the limits of what can be served economically and HTS significantly improving the cost equation for satellite solutions, there is potentially a bright future and new opportunities being unlocked. Consumer Broadband should create the highest levels of demand for satellite Broadband capacity where HTS is opening the doors of mass markets with subscribers soon to be counted in the millions.

The drive for Backhaul services is changing from USO programs to economical return. The decline in satellite capacity price is making investments in 3G and 4G services via satellite financially attractive. Despite the number of sites remaining relatively small, the boom in bandwidth consumption by end users should create large levels of capacity demand for Backhaul and Trunking services via satellite.

A lot of new opportunities are emerging around HTS, but the competitive environment is also changing at a fast pace. New technologies, new markets, new value chains… all these put pressure on the industry that needs to adapt very rapidly in order to stay competitive. Asia will once again be a key battleground market as the volume of IP traffic has, is and will remain the highest in the globe.

Lluc Palerm joined NSR as an analyst in 2015. His primary areas of work are satellite capacity supply and demand as well as applications with a particular focus on emerging opportunities. Palerm contributes to several multi-client reports while engaging in customized consultancy projects. Prior to joining NSR, Palerm worked at Zero2Infinity in technical and business roles. While involved in the startup, he worked in the mission analysis for the company's microsat launcher project and leaded the development of a rocket engine prototype successfully tested. He also contributed to the project's business plan with market research and financial assessment. Lluc undertook fund raising efforts and built the relation with customers.

The Key to Success: A Robust Toolset

Steve Good, Vice President, Marketing, Comtech EF Data

The satellite communications market is undergoing a drastic change as satellite operators' different High Throughput Satellite (HTS) strategies come to life, moving from concept to launch to commercial availability. While these new innovative satellite designs provide significantly improved performance levels, they will not be the proper fit for all applications due to the small spot designs that frequency reuse techniques leverage. Service providers across different verticals will need to continue to leverage a mix of spot and wide beams moving forward, selecting the coverage options and performance levels that best serve the requirements of their end users. These hybrid solutions will allow service providers to offer the lowest possible cost per bit delivered to end users by intelligently maximizing resource allocation while providing the highest Quality of Experience (QoE) possible to end users. This will benefit service providers by reducing their cost structure within the markets served today and allowing them to pursue new markets and revenue sources by matching satellite performance levels and coverage options to a particular network's needs. However, with this opportunity for commercial growth comes increased solution complexity and significant challenges that can only be overcome with a robust tool set that can be leveraged across an entire service provider's network.

The need for an upgraded toolset on the ground is being driven by a significant spike in traffic demand by end users that are requiring enhanced services with significantly more throughput to support a different application mix – one dominated by multimedia content requiring ever-increasing bandwidth. This demand is being driven by medium and high resolution video in both directions teamed with remote applications-aware networks that require the performance levels provided by terrestrial alternatives. Unfortunately, many ground equipment toolsets designed for a low-end market will not be able to support these higher throughputs. Likewise, many high-end solutions are not tooled to provide the economics that are required by a growing "middle market". Solutions that will succeed in a hybrid environment must be equipped with a single set of tools that allow a single solution to be used in a wide beam environment for a geographically disperse network while being optimized for localized spot beam environments.

A service provider's ground equipment toolset starts with the modulation and coding options that are available in a platform. Higher order modulation and coding methods can be leveraged to take advantage of the increased performance that HTS spot beam designs offer. For wide beam operations, these aggressive tech-

some people just love satellite

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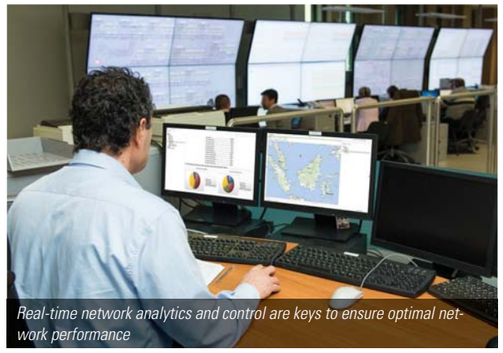
niques must be leveraged to keep per-Mbps pricing competitive in lesser performing regions or areas. Service providers must arm themselves with a platform engine that leverages higher order modulations and more powerful coding teamed with decreased carrier rolloffs and near Shannon Limit physical layer performance. The higher the modulation and coding a platform can achieve, the lower the cost per bit delivered becomes through higher Mbps to MHz spectral efficiencies, which is what has historically been referenced as the efficiency of a satellite link.

The media access techniques used by a ground platform plays a very important role in determining the overall effectiveness of a solution. A multimedia application mix that requires always-on connectivity at dedicated throughputs is best supported by a Single Channel per Carrier (SCPC) link that maximizes pure spectral efficiencies through the strongest modulation and coding possible and, where appropriate, bandwidth reuse techniques. Alternatively, an application mix that does not require this type of always-on connectivity can be supported by a platform that leverages a shared outbound carrier that is received by all remotes teamed with a shared inbound mechanism that allows bandwidth to be allocated to remotes on an as-needed basis. In this case, a single outbound link is sized to support all remotes on the network and typically leverages Adaptive Coding and Modulation (ACM), which provides the appropriate raw spectral efficiencies from central site to remotes based upon dish size, beam location and weather conditions of each individual site.

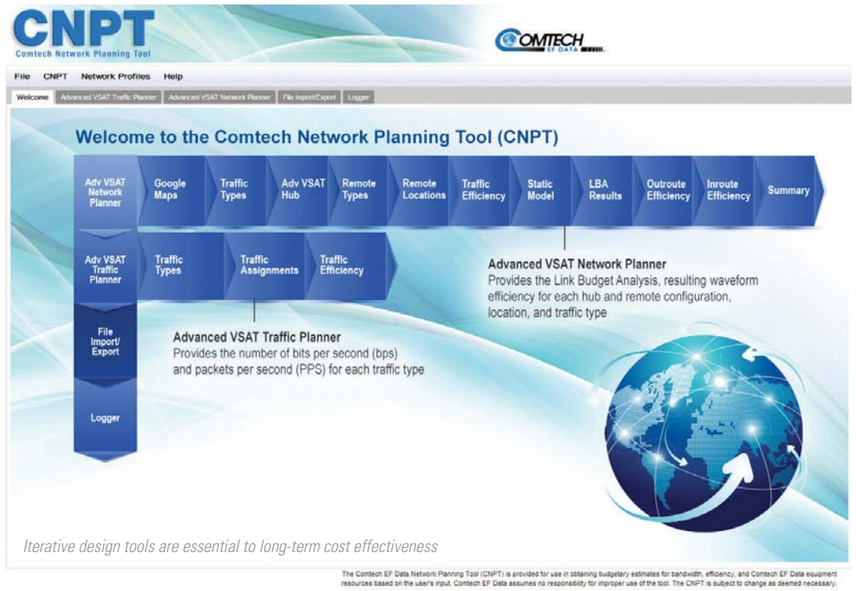
Inbound sharing techniques vary from multi-channel per carrier Time Division Multiple Access (TDMA) links that group remotes into modulation and coding combinations based upon worst case sites to individually optimized and dynamically sized single channel links. The use of ACM on dynamically assigned single channel inbound links provides significant benefits through optimization on a site-by-site basis, based upon the remote's dish size and beam location.

For certain markets, aggressive modulation and coding techniques on their own are not enough to drive per Mbps prices down to the "sweet spot" of the underlying application. In this case, a bandwidth sharing mechanism, which dynamically allocates bandwidth is required. The use of these tools drives effective spectral efficiencies per site up dramatically, which allows satellite to remain viable in competitive markets. Teaming higher order modulation and coding capabilities with dynamic resource allocation can quickly reduce what would be a $1,200 per Mbps service in a dedicated environment to a $600, $300 or even $200 per Mbps per site service, depending upon traffic type and end user service level requirements. For spot beams, this sharing is useful but will be limited to remotes within a small geographic area. Wide beam designs offer a larger potential for sharing across a much larger area, which typically provides for a higher sharing ratio. Historically, asymmetry ratios of outbound to inbound data rates for networks were typically in the 20:1 or 10:1 ratio but due to

A focus on Quality of Experience is paramount in today's satellite communications landscape



Real-time network analytics and control are keys to ensure optimal network performance



Iterative design tools are essential to long-term cost effectiveness

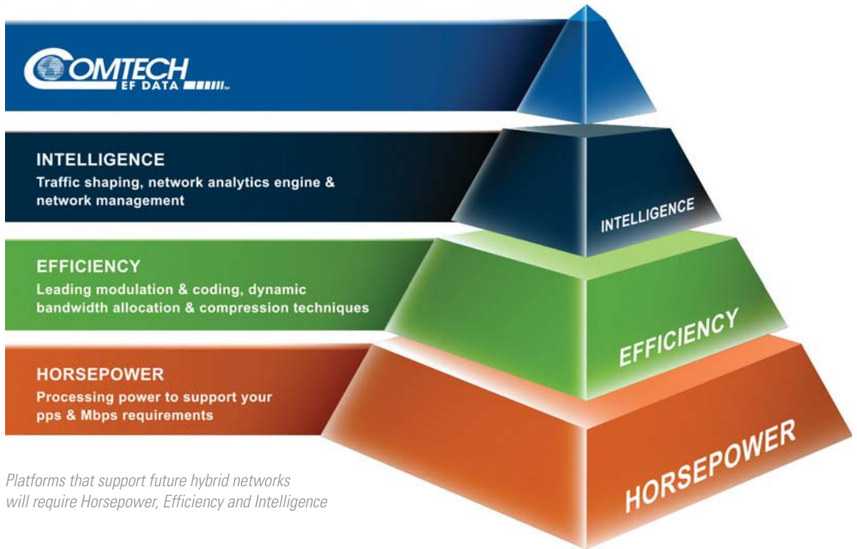
increasing demands for remotes to send large amounts of information to centrally located hub sites, the industry is seeing a decrease in these ratios. Ratios of 5:1, 4:1 or 2:1 are now common, which increases the need for dynamic bandwidth allocation (along with much higher bandwidths) in the inbound direction.

New spacecraft designs provide the ability to transmit significantly higher throughputs for a given connectivity. These designs allow the delivery of hundreds of Mbps at a time through a single channel while dynamically sharing bandwidth through intelligent traffic handling at these extremely high speeds. Ground equipment solutions designed to leverage these larger bandwidth beams must have the ability to process and optimize traffic flows of different priorities at these significantly higher data rates to ensure maximum resource utilization. A highly intelligent traffic handling engine is essential here to ensure that end users are provided the levels of service that they require. Different protocols must be handled intelligently, with more important traffic flows being given priority over others. In addition, lossless compression techniques further maximize the total net efficiency of each link.

The increased uplink performance of spot beam designs enable a user to significantly increase the number of Mbps that can be transmitted through a given antenna and amplifier size. Due to the fact that spot beam satellite antennas receive much less ground noise from earth (the "T" in a satellite's G/T parameter), significantly more Mbps can be transmitted with the same signal level towards the satellite. Care must be taken, however, to ensure the chosen remote ground equipment is capable of handling this fourfold or eightfold increase in Mbps and packets per second. A remote platform selection that is not tooled with the required processing engine to leverage this increase will render a remote site throttled down, prohibiting revenue growth, lowering customer QoE and/or requiring a site visit to each remote location to upgrade equipment.

Network efficiencies can be further increased through intelligent multi-layer header compression concatenated with lossless payload compression, which maximizes the LAN bits (bits sent through the local network LAN port) to WAN bits (bits sent through the satellite link) ratio. Teaming the higher order modulation and coding capabilities with concatenated compression ratios of, say, 35%, the $1,200 per Mbps service referenced earli-

er can be reduced even further, down to less than $800. Adding in a dynamic bandwidth allocation mechanism that results in a 2:1, 4:1 or 6:1 oversubscription ratio could bring the resulting per Mbps per site rate down to less than $150, certainly a price per Mbps that could open up new markets. Care should be taken, however, to ensure that a ground platform is capable of performing these compression and traffic shaping techniques at the throughputs that are possible with new spot beam designs. Again, a platform with the wrong tools could leave money on the table for the service provider in terms of limited addressable market and/or an upset customer base.



Platforms that support future hybrid networks will require Horsepower, Efficiency and Intelligence

For shared networks, load balancing in both directions of a satellite network is performed via an intelligent centralized network management system, which allows bandwidth costs to be shared across sites depending upon the individual requirements of each remote. Also, during network implementation and steady state operation, whether the access technique be dedicated or shared, a network management tool that gathers real-time resource loading and traffic analytics allow the service provider to quickly react and reassign resources to maintain these per Mbps price points while proactively addressing conditions that may negatively impact an end user's QoE is key.

The spot beam designs of new spacecraft have increased the complexity of all elements of management, including the control of network configuration, performance and faults within the network. As networks will evolve to include both wide and spot beams, this complexity will increase even further. In this case, network information and control are keys to success, whether this control be over a portion of a network that leverages a series of always-on dedicated connections or the shared portion of the network. Network management and real-time network analytics across the entire solution suite via a single workstation are essential to maximize resource utilization and minimize downtime. In addition, interference mitigation becomes a much higher priority within an HTS environment due to the fact that frequencies are being highly reused and improper remote equipment access as a network expands can quickly decrease the overall capabilities of a small spot beam design.

Never has accurate network design and sizing been as important as it is in today's satellite communications environment. There are now more options available to a service provider in terms of space segment options and ground equipment platforms than ever before. To properly price a new two-year or three-year service, it's important to have a solid grasp of the anticipated network performance along with an estimated resource requirement. Not being able to do so will add to the risk involved in providing a price to an end user as the final solution may require significantly more bandwidth and hardware resource than originally assumed, rending the entire project unprofitable. Alternatively, over estimating the total underlying cost elements of a solution may generate a price per Mbps delivered to an end user that is not competitive.

An absolute must for any new satellite project is a powerful network design tool that allows a service provider to analyze anticipated traffic loads over different wide beam and spot beam satellites, each with different performance characteristics, to quickly predict overall network performance and underlying cost elements. This iterative tool provides the service provider insight into the best satellite platform solution to meet a given set of requirements and offers instant analysis on dedicated vs. shared options, along with the resulting price per Mbps rates. Understanding the total costs of ownership over a two or three year project is key to ensuring that a proper application-based per Mbps price can be offered to an end user. The tool must be iterative and allow changes to be made throughout the network in the design stage to hone in on the most optimal design. Once these steps are taken and an optimal design is reached, it must be able to export this configuration into the platform during network implementation.

Lastly, a satellite solution must be able to expand gracefully, with remotes being commissioned into the network easily and skillfully with minimal interference being generations at each remote. New wide beam coverage may need to be added for a large geographically disperse network or to increase the scope of the network. Four new spot beams may need to be added to increase the throughput capabilities of remotes in a particular region of focus. This expansion must be able to be done quickly and economically as a failure to do so will result in either reduced network performance or follow-on site visits to remedy issues.

In summary, platforms that are to be leveraged across a mix of spot beam and wide beam options must be equipped with the proper tools to enable growth for the service providers. Ground platforms start with higher order modulation and coding teamed with different media access techniques and dynamic bandwidth sharing to get to the economics that are required. These platforms must have the inherent processing capabilities to optimally handle the high throughputs that end users require and new HTS designs enable. In addition, traffic shaping and compression must be performed at these high speeds and network analytics must be provided to ensure the highest QoE possible. Design tools and graceful network expansion are required to keep both initial and growth network costs to a minimum. Only through the selection of a platform with the proper toolset will service providers be able to find success in the new world of satellite communications and succeed.

Steve Good is Vice President, Marketing for Comtech EF Data, where he leads divisional marketing functions, objectives and initiatives. Prior to Comtech, he held senior management, marketing, product management and engineering positions with Intelsat, Verestar, Viacast and Hughes Network Systems. Good previously held the position of Vice President, Sales Engineering for Comtech EF Data.

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SKY Perfect JSAT Corporation

SPI Space Partnership International

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ViaSat

ZODIAC DATA SYSTEMS

Satellite-Telco Convergence: Are We There Yet?

At the PTC annual conference in January, APSCC held a session themed "Satellite-Telco Convergence: Are We There Yet?" to deal with the issue of satellite-telco convergence in the rapidly evolving satellite industry.

Satellites now stand at the cusp of a new era of higher bandwidth, lower cost and improved offerings, and the broader telecom industry has taken notice. Whether through HTS capacity or enhanced managed services offerings, satellite technology is no longer a niche and is now seen as a viable platform for global, low cost connectivity.

Moderated by Christopher Baugh, President of NSR, the session was joined by four satellite industry experts including Dani Indra Widjanarko, Executive Vice President of Pasifik Satelit Nusantara, Imran Malik, Regional Vice President of O3b Networks, Richard Swardh, Vice President of Comtech EF Data, Jacques-Samuel Prolon, General Manager of Kacific Broadband Satellites. Also, to share insight from the telco sector, Roy Hall III, Marketing Manager of American Samoa Telecom Authority also joined the session as a panelist.

The session paired satellite companies and telcos together to explore the offerings, requirements and applications jointly enabled and the panelists shared their experience and cases on satellite-terrestrial convergence with the audience.

Imran Malik, Richard Swardh, Jacques-Samuel Prolon, Dani Indra Widjanarko (from lfet to right) (photos courtesy of PTC)

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High Throughput Satellites (HTS) will play a pivotal role in growth across Asia with the need for connectivity to increase exponentially over the next decade especially for data, and expansion. It is also reported that GEO-HTS projects together will bring about 300 Gbps of HTS supply to Asia by 2020.

CommunicAsia2016 Summit has invited key satellite and network operators to share their case studies, successful HTS deployment strategies as well as how to monetise the HTS business models with innovative solutions.

Key Topics Include:

- Investment Strategies and Successful HTS Monetisation Business Models
- The HTS Showcase: Opportunities Challenges, Investments Across this New Space
- Customising the Spot Beams and Frequency Reuse to Deliver Lower Cost per Mbps and Increase ARPUs

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Lockheed Martin Awarded JCSAT-17 Satellite Contract from SKY Perfect JSAT Corporation

February 3, 2016 - SKY Perfect JSAT Corporation (SJC) has awarded Lockheed Martin a contract for JCSAT-17, a satellite based on the A2100 common design. JCSAT-17 is an S band satellite that will operate well in excess of 15 years. The satellite will include a flexible processor that will allow SJC to redirect capacity to concentrate on disaster relief efforts or other high-volume events. The modernized A2100 is built on a flight-proven bus that is the foundation for more than 40 satellites in orbit today. Through an internally funded, multiyear modernization effort, Lockheed Martin enhanced the spacecraft's power, propulsion and electronics, while also adopting the latest advanced manufacturing techniques to decrease production costs and timelines.

Satellite Launched to Augment GLONASS System

February 7, 2016 - A Glonass-M navigation satellite, designed and built by Information Satellite Systems – Reshetnev Company, was launched on February 7, 2016 from the Plesetsk cosmodrome. The Glonass-M №51 was put into orbit aboard a Soyuz-2.1b rocket with a Fregat upper stage. According to the telemetry data received from Glonass-M №51, the satellite is in good health. With all its mechanical subsystems successfully deployed, the satellite completed Earth and Sun acquisition. The Moscow-based System Control System and ISS-Reshetnev's Information and Computation Center have already begun satellite's performance check-out. Based on the GLONASS system's stable operation, there has been no need of launching new satellites to augment the system. The most recent launch of a navigation satellite was performed back in 2014. There are eight ready Glonass-M navigation satellites currently stored at ISS-Reshetnev Company waiting for launch.

Arianespace to Launch Two ViaSat High Capacity Satellites

February 9, 2016 - Arianespace and ViaSat have contracted for the launches of ViaSat-2 and a ViaSat-3 class satellite. Both ViaSat-2 and ViaSat-3 class satellites are geostationary satellites and operate in the high capacity Ka-band frequencies. ViaSat-2 and ViaSat-3 will each weigh approximately 6,400 kg at launch, and will be injected into geostationary transfer orbit by the Ariane 5 ECA, respectively, during the first quarter of 2017 and by late 2019/early 2020. Boeing Satellite Systems is the build partner on both satellites. ViaSat is focused on providing affordable, global, high-speed broadband internet with competitive advantages on the ground, in the air, and at sea – as compared to other satellite and terrestrial alternatives. The ViaSat-2 satellite system is expected to improve speeds significantly, reduce costs and expand the footprint of broadband services across North America, Central America, the Caribbean, a portion of northern South America as well as the primary aeronautical and maritime routes across the Atlantic Ocean between North America and Europe. An ultra-high capacity satellite platform, ViaSat-3 comprises three ViaSat-3 class satellites plus advanced state-of-the-art ground network infrastructure, enabling the first truly global high-speed broadband service.

RSCC Begins Communications and Broadcasting Services Using the New Express-AMU1 Satellite

February 10, 2016 - The Russian national satellite communications operator RSCC has begun communications and broadcasting services using Express-AMU1, its latest heavy satellite, positioned at 36 degrees East. The new satellite has been commissioned for service after successfully completing flight tests. The Express-AMU1 satellite opens up new opportunities to provide high-quality services to users in the European part of Russia, Central Europe, and in sub-Saharan Africa. The satellite is intended for DTH involving Russia's largest TV platforms, as well as for broadband data and internet access, mobile, and other state-of-the-art satellite services in the Ku- and Ka-bands. The Express-AMU1 satellite was manufactured on orders of RSCC under the Federal Space Program of the Russian Federation for 2006 – 2015. The building of the satellite was funded using extra-budgetary sources based on credits from Gazprombank JSC. The satellite will have a 15-year service life expectancy.

Cobham Launches World's Smallest Solution for Tactical UAVs

February 15, 2016 - Cobham SATCOM has developed the world's smallest and lightest Inmarsat UAV satcom solution – the 1.45kg AVIATOR UAV 200. Redefining UAV satcom connectivity by integrating all components into one compact lightweight unit, the new system delivers Inmarsat Class 4 SwiftBroadband services in a low-SWAP package which is 76 per cent lighter than existing comparable products on the market. The AVIATOR UAV 200 has been introduced by Cobham to significantly enhance a Tactical Unmanned Aerial Vehicle's (TUAV) performance, range and payload capability by enabling operators to take advantage of the higher speed connectivity from today's satellite networks. A cost-effective solution, the AVIATOR UAV 200 delivers greater operational flexibility for TUAVs in a number of applications, including military, border security enforcement, public safety, commercial use and scientific research.

Airbus Defence and Space Develops New Partnerships for Military Satcom Services in Asia Pacific Region

February 16, 2016 - CopaSAT is a new Airbus Defence and Space channel partner for Skynet 5 satellite communication services in the Asia Pacific Region. Airbus Defence and Space is working with local service providers to develop new partnerships to deliver highly resilient Skynet military satellite communication services to the Asia Pacific region, following the successful completion of Skynet 5A satellite move from 6° East to 95° East to provide global X-band and UHF coverage in this region. Airbus Defence and Space has signed an agreement with CopaSAT, to become a new channel partner for Skynet services, primarily using the relocated Skynet 5A satellite. CopaSAT will be offering Skynet services as part of a proven and assured portfolio to their US customers delivering innovative network services that combine the affordability, operational utility and scalability required to meet the complex scenarios experienced in global security and humanitarian operations. Last year, Airbus Defence and Space worked with CopaSAT, and its terminal partner Tampa Microwave, to conduct a series of successful network tests using the Skynet 5A X-band satellite. CopaSAT teams, using CopaSAT's teleport infrastructure and Tampa Microwave's remote manpack and fly-away terminals, as well as various other small terminals, conducted end-to-end testing to confirm operation of an entire network and the performance of Skynet 5A at the new orbital slot. Airbus Defence and Space completed the move of the Skynet 5A to 95° East over the Asia Pacific region in September 2015. The relocation was initiated to extend the Skynet constellation's coverage and services from 178 West to 163 East, including the Indian Ocean and Western Pacific region. The Skynet network now offers global military coverage, expanding core service reach for the UK military and augmenting coalition capabilities in the region.

SoftBank to Provide High-Speed LTE Services Using Gilat's Satellite-Based Cellular Backhaul Technology

February 16, 2016 - SoftBank Corp. and Gilat Satellite Networks Ltd. announced that SoftBank intends to provide high-speed LTE services using Gilat's satellite-based cellular backhaul technology following a successful field trial. This technology makes it possible for SoftBank to cost-effectively offer high-speed mobile communication services in remote areas where it is difficult to install fixed-line facilities and base stations. SoftBank expects to offer commercial services in Japan, based on this technology, within 2016. SoftBank has already succeeded in providing cost-efficient 3G mobile communications in Japan, where it is difficult to build facilities for fixed-line and mobile communications, by using satellite communications as backhaul. SoftBank contributed to the development of Gilat's SkyEdge II-c high-speed satellite communications platform early on, and conducted verification work along the way. The latest trials demonstrated FTP downlink rates of up to 100Mbps using actual mobile handsets, which until now have been very difficult to achieve.

Launch Success of H-IIA Launch Vehicle No. 30 with X-ray Astronomy Satellite (ASTRO-H) Onboard

February 17, 2016 - Mitsubishi Heavy Industries, Ltd. and the

Japan Aerospace Exploration Agency (JAXA) successfully launched the H-IIA Launch Vehicle No. 30 (H-IIA F30) with the X-ray Astronomy Satellite (ASTRO-H) onboard at 5:45 p.m. on February 17, 2016 (Japan Standard Time, JST) from the Tanegashima Space Center. The launch vehicle flew as planned, and at approximately 14 minutes and 15 seconds after liftoff, the separation of ASTRO-H was confirmed. The success marked the 30th milestone launch of the H-IIA, and the launch success rate reached almost 97%. In addition, the last 10 launches lifted off on time (except for some launch delays due to weather factors), and that has proved the high reliability and quality of the H-IIA Launch Vehicle.

NEC and Gazprom Space Systems Successfully Test Digital Signal Transfer of 4K

February 18, 2016 - NEC Corporation announced that its subsidiary, CJSC NEC Neva Communications Systems (NEC Neva), with CJSC Gazprom Space Systems has carried out successful tests on the transfer of television signals in the 4K high resolution format via satellite "Yamal-401". As a result of the test, the companies confirmed it is possible to broadcast in 4K Ultra-High Definition (UHD) format through Gazprom Space Systems' Yamal satellite network, using NEC's solution for encoding and transfer of the 4K UHD video signal. During the tests, the TV signal was encoded by NEC's VC-8150 encoder, broadcast via the satellite of Gazprom Space Systems, and decoded by NEC's VD-8100 decoder with a time lag of no more than three seconds. To compress the digital video signal, NEC used the high efficiency video coding (HEVC) standard, which doubled the efficiency of data compression in comparison with MPEG-4 technology, and increased the image quality by a factor of four in comparison with the HD high definition television format.

Inmarsat and Actility Partner to Deliver Single, Global Platform for Internet of Things (IoT)

February 19, 2016 - Inmarsat announces its partnership with Actility, the industry leader in Low Power Wide Area Networks (LPWAN), and a founding member of the LoRa Alliance, to enable an end-to-end IoT solution to connect assets over public and private networks, anywhere in the world. This partnership combines Inmarsat's global connectivity with Actility's ThingPark™ IoT management platform to deliver an integrated solution for IoT, linking connectivity, services and IoT devices from a single application and service management point, to connect objects deployed anywhere on the planet, even in the most remote and hostile locations. Inmarsat recently announced its membership in the LoRa Alliance, a non-profit organisation that promotes the connectivity standard LoRaWAN for Low Power Wide Area networks (LPWAN). This partnership means that assets that use the LoRa standard can now be connected over Inmarsat's global networks for seamless integration and interoperability, even in areas where cellular or terrestrial coverage is unavailable or unreliable. This new partnership brings with it new capabilities and a global reach to IoT network solutions, leveraging the explosive growth in highly capable and affordable IoT sensors and applications.

Qantas Taps ViaSat for Highest-Speed, Highest-Quality In-Flight Wi-Fi and Streaming Internet Services

February 22, 2016 - ViaSat Inc. signed a memorandum of understanding (MOU) agreement with Qantas Airways, Australia's largest domestic and international airline, to bring the fastest and highest-quality in-flight internet connectivity to Qantas passengers on its domestic flights. The agreement with Qantas is significant to ViaSat, as it represents the broadband company's first Asia Pacific airline to select its in-flight internet service, as well as the first airline in the region to choose its single, hybrid Ku/Ka-band antenna – which will keep Qantas aircraft connected to the best available satellite network. The new service expects to feature speeds that are up to 10 times faster than traditional global ground-based in-flight internet services, allowing Qantas customers to stream movies, TV shows, news and live sports. Additionally, by using ViaSat's hybrid Ku/Ka-band antenna, the internet service will operate across both ViaSat's global Ku-band network and nbn's Sky Muster™ high-capacity Ka-band satellites, keeping Qantas passengers connected virtually everywhere they fly.

CALENDAR OF EVENTS

MARCH

7-10	**Satellite 2016** • Washington DC, USA • www.satshow.com
8-10	**CABSAT 2016** • Dubai, UAE • www.cabsat.com
14-15	**Oil and Gas Telecommunications** • London, UK • www.smi-online.co.uk/2016oilandgas-comms1.asp
20	**CASBAA India Forum 2016** • New Delhi, India • www.casbaa.com/event/india-forum-2016/

APRIL

7-8	**Space Innovation Congress** • London, UK • www.spaceinnovationcongress.com
11-13	**Broadband TV Connect Asia 2016** • Jakarta, Indonesia • https://broadbandtvconnectasia.com/
16-21	**NAB 2016** • Las Vegas, NV, USA • www.nabshow.com
19-20	**EXPO COMM RUSSIA** • Moscow, Russia • www.expocomm.ru
27-28	**In-flight Connectivity Technology Conference (ICT2016)** • Beijing, China • http://iricht.com/ict2016/index.htm

MAY

2-5	**Arab TV & Radio Festival & Convention** • Hammamet, Tunisia • www.asbufestival.com
16-20	**14th International Conference on Space Operations (SpaceOps 2016)** • Daejon, Korea • http://spaceops2016.org/
17-18	**Australasia Satellite Forum** • Sydney, Australia • http://talksatellite.com/
26-27	**MilSatCom Asia 2016** • Singapore • www.smi-online.co.uk/defence/asia/milsatcom-asia
31-3	**CommunicAsia2016** • Singapore • http://communicasia.com
31	**SatComm2016** • Singapore • http://communicasia.com/conference/

JUNE

28-29	**MilSatCom USA** • Arlington, Virginia, USA • www.smi-online.co.uk/defence/northamerica/conference/MilSatCom-USA

JULY

20-22	**VIETNAM ICT COMM 2016** • Hanoi, Vietnam • www.adpex.vn/ICT/En.htm

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APSCC is a non-profit, international regional association representing all sectors of satellite and space related industries. APSCC membership is open to any government body, public and private organization, association, or corporation that is involved in satellite services, broadcasting, manufacturing, launch services, risk management or associate fields such as datacasting, informatics, multi-media, telecommunications, and other outer space-related activities with interests in the Asia-Pacific region.

APSCC aims to exchange views and ideas on technologies, systems, policies and outer space activities in general along with satellite communications including broadcasting for the betterment of the Asia-Pacific region. Conferences, forums, workshops, summits, symposiums, and exhibitions are organized through regional coordination in order to discuss issues that affect the industries and to promote and accelerate the efficient introduction of outer space activities, new services and businesses via satellites.

In order to disseminate industry related information, APSCC publishes a quarterly satellite magazine as well as a monthly e-newsletter, which are distributed worldwide to members and others. The quarterly magazine and other publications are available on the Web at www.apscc.or.kr.

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APSCC Newsletter is a publication of the Asia -Pacific Satellite Communications Council. It is published quarterly in March, June, September and December. The contents of this publication may not be reproduced, either in whole or in part without, prior written permission from the editor. The views and opinions expressed are those of the authors and are not necessarily supported by APSCC.

Design and Printing by Design CRETA
Tel: +82-2-454-2022 / Fax: +82-2-458-1331 / Website: www.designcreta.com