Satellite Executive BRIEFING

Vol. 12 No. 7 September 2019

SATELLITE Markets & Research

Industry Trends, News Analysis, Market Intelligence and Opportunities

The Evolving Broadcast Market

by Elisabeth Tweedie

It will come as no surprise to anyone in this industry who is paying attention to what has been happening over the last few years, to hear me say that the industry is in a state of flux. This is hardly news, but the pace appears to be accelerating and things that have been talked about for the last several years, are either reality or now very close to be becoming so.

On the content side, we are beginning to see new alliances and strategic moves as the balance of power starts to shift. Over the Top (OTT) services have steadily been increasing their penetration and share of viewing time (although globally linear still retains the lion's share of this). Historically, the traditional content providers have been happy to participate in this growth by licensing their content to Netflix, Hulu, Amazon and other OTT providers, but this is changing. As mentioned in an article earlier this year, Disney is launching its own streaming service and starting to pull back content from other OTT players. In the UK, ITV and the BBC are also venturing down this path with the launch of BritBox. This is described as a joint venture between the two organizations, but initially ITV will own 90% of the venture, although the BBC's share could increase to 25% in the future. Many, but not all of the programs shown on the BBC and ITV will move to BritBox, after been shown first (OTA) and then on the broadcasters' own catch-up services: iPlayer and ITV Hub. In the future, content specifically made for BritBox will be included. However, the budget for

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EDITORIAL

Witnessing a Satellite Launch

I have worked in the satellite industry for over 25 years, yet I must admit I have not actually seen a *successful* satellite launch until last month when I had the privilege of witnessing the successful launch of Spacecom's Amos-17 satellite. I've been to several launches that were scrubbed at the last minute, but not a successful launch. I have to say, a successful satellite launch is one of the most magnificent things I have ever seen and I highly recommend it.

The launch of Amos-17 satellite from Cape Caneveral, Florida last August 6 has special significance for Israel-based operator Spacecom. Amos-17 is replacement satellite for Amos-6 which was lost in a pre-launch accident three years ago. Another Spacecom satellite, Amos-5 was lost to an on-board failure a year before that. So, there was a lot riding on the successful launch of Amos-17. Manufactured by Boeing, AMOS-17 is 6.5-ton high-power, high throughput satellite designed specifically to meet Africa's fast-growing communication demands. It was a collective sigh of relief when Amos-17 was finally lifted into orbit by Spacex' Falcon rocket on that balmy summer day in Florida.

View the video of the Amos-17 launch at:

www.satellitemarkets.com/amos-17-launch

You don't have to be a journalist or a satellite operator's client to view a satellite launch. I do urge anyone who has the opportunity to witness one. You will certainly be awed by the spectacular display of technology.

Virgil Labrador

Virgil Labrador
Editor-in-Chief

Satellite Executive BRIEFING
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Satellite Executive Briefing is published monthly by Synthesis Publications LLC and is available for free at www.satellitemarkets.com
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Broadcast Market

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this is reported to be in the "tens of millions of pounds." A drop in the ocean, compared to the US$15 billion Netflix is reported to be spending in 2019. BritBox launched in the US in 2017 and now has 650,000 subscribers. Again, small fry compared to Netflix's 60.1 million US subscribers. BritBox will launch in the UK this autumn with a monthly price of £5.99 (US$7.27 at current exchange rates) for HD viewing on multiple screens. This is cheaper than Netflix's HD subscription for two screens which is currently priced at £7.99 (US$9.70). The value proposition however, is very different. Netflix is delivering a tranche of new and original programming as well as older movies and TV shows. BritBox with its relatively small programming budget will largely be showing old TV shows. Furthermore the "recently old" shows will previously have been available for free on catch-up services: the BBC's iPlayer and the ITV Hub. Currently both these catch-up services have very limited viewing windows, but the BBC is petitioning Ofcom (the UK regulator) to be allowed to leave content on the iPlayer for up to a year. It is widely expected that this permission will be granted. So the question is, how many viewers will want to pay to watch old content, or content that until recently has been available for free?

"...On the content side, we are beginning to see new alliances and strategic moves as the balance of power starts to shift ..."

However, while the BBC and ITV are launching a service to compete with Netflix and Amazon Prime, they are also collaborating with them for certain productions. For example the BBC partnered with Amazon to produce "Fleabag" and ITV partnered with Amazon to produce "The Widow." Meanwhile, in a different strategic move, Netflix has hired Jackie Lee-Joe, formerly Chief Marketing Officer (CMO) for the BBC to be its CMO.

Streaming Services

The UK is not the only country in Europe, where broadcasters are launching their own streaming services to compete with the likes of Amazon Prime and Netflix. In Germany, ProSiebenSat.1 has launched a streaming service with Discovery, known as Joyn. Initially Joyn will be advertising funded and will include approximately 50 channels. At the end of this year, a premium Video-on-Demand (VoD) subscription service will be launched to compete with the entrenched OTT services. In France a similar joint venture between broadcasters to launch a streaming platform known as Salto, is facing opposition and at the time of writing its launch is far from certain.

Looking to the future, it seems unlikely that there will be such a thing as a pure linear broadcaster. One way or another hybrid delivery will become the norm as broadcasters look to OTT to further monetize their content, and attract viewers that are moving away from linear viewing. This change is not only occurring in delivery to the consumer, it is also taking place at the enterprise level. Companies that we traditionally associate with satellite distribution are already there, working with content producers to create and distribute their content in multiple formats. Globecast for example, recently formed GCVN (Globecast Virtual Networking). Using GCVN media event producers and content creators in the B2B space will be able to deliver streaming, file transfers, Wi-Fi, 4K, 8K and 360-degree live content using native IP-based satellite transmission from remote locations via a guaranteed high-bandwidth solution.

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"...Until Versatile Video Coding reaches its target potential and becomes widely available, bandwidth will continue to be an issue for high resolution content. As we all know, there are no bandwidth constraints when satellites are broadcasting content to multiple viewers..."

Battle for C-Band Spectrum

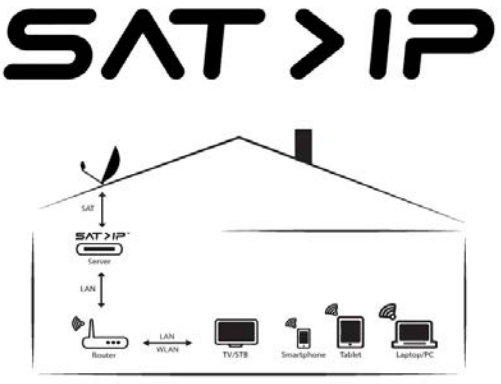
Another issue confronting the content producers and satellite operators alike, is the proposed change in available spectrum. The C-Band alliance is focused on relinquishing 200MHz of C-Band spectrum in the US. This spectrum is primarily used for content delivery networks. The potential loss of this spectrum is causing concern, not only in the US but around the world, as other operators fear that harmonization will win the day and that that same spectrum will be allocated to 5G in other regions as well. Fears center around the cost of repointing antennas, knowing where all the affected antennas are located, and whether with the increasing bandwidth requirements of video, there will be enough spectrum available for future content delivery.

Crystal, a technology company that has been following this issue, has taken the preemptive step of being acquired by LTN, a video transport company whose primary business is delivering content over the internet. According to Roger Franklin, former President and CEO of Crystal, and now General Manager of Crystal, a division of LTN Global: "LTN have a "secret sauce" that enables it to avoid all the bottlenecks in the internet. This means that it can consistently deliver content extremely reliably and with extremely low-latency, something no other company can do." Roger said that he had been studying the impact that the loss of spectrum would have, and recognized that many video distributors are going to need an alternative to

satellite distribution. Fiber, Ku and Ka-Band and even the LEOs are also possible solutions, but they all come with additional challenges. The expense and unreliability of fiber; although far better than it used to be, rain-fade can still be an issue for Ka and Ku-Band, and of course new antennas would be needed; and the new LEO constellations have yet to prove their viability. Therefore, reliable, low-latency internet delivery offers the best alternative. Combine this with Crystal's technology to insert regional and local advertisements into a feed, and broadcasters now have an alternative to delivering multiple feeds to local affiliates. They can now deliver one feed, to the LTN network, which will be regionalized so that each local affiliate will receive its own tailored feed.

Ultra HD

On the technology side, the move from standard definition to high definition (SD to HD) continues, as does the more limited move to Ultra-High Definition (UHD) also referred to as 4K. Both of these require more bandwidth than the previous standard. This is already causing distribution issues. The increase in streaming services has been accompanied by a corresponding decrease in purchases of physical media such as Blu-ray disks. This means that that most HD and 4K content is delivered OTA, via satellite, cable or over the internet. In most parts of the world, the latter two are not easily able to



provide the requisite bandwidth for large numbers of simultaneous viewers watching HD or 4K content. Compression can go a long way to solve this issue, but as the bandwidth required increases, compression standards need to improve in parallel. High efficiency video coding (HEVC) is fundamental to the adoption of 4K, but for 8K which is already waiting in the wings, (NHK already has a commercial 8K service), and virtual reality, a fundamental improvement is needed.

The Joint Video Experts Team and MPEG are working on a new standard known as Versatile Video Coding (VVC). The target is to improve the compression efficiency of HEVC by 50%. In early trials it has achieved a 35% improvement over HEVC when used for 4K. However, as well as the technical hurdles there are also commercial ones to be overcome. There are fears that the licensing costs will severely hinder its deployment.

Until VVC reaches its target potential and becomes widely available, bandwidth will continue to be an issue for high resolution content. As we all know, there are no bandwidth constraints when satellites are broadcasting content to multiple viewers. The issue is, how to make this attribute relevant in the age of streaming, where the traditional sight of a family sitting together in the living room watching television, is being replaced by each family member watching "their" content on their screen.

SAT>IP, first developed by SES and which became a European standard in 2013, is one way of addressing this. SAT>IP as would be expected from the name, was originally conceived for satellite, but has since been further developed to take cable and terrestrial signals as well, so it now supports all DVB broadcast standards: DVB-T/T2, DVB-S/S2/S2X and DVB-C/C2. In 2017 the SAT>IP alliance entered into an a liason agreement with the DVB Project, and DVB is now the organization working on future technical developments of SAT>IP. Last year it set up a working group (DVB CM-HB) that is defining the commercial requirements towards a next generation in-home distribution standard.

SAT>IP essentially takes the

video content, as it enters the home and distributes it to multiple devices.

As Thomas Wrede, VP Technology and Standards at SES and President of the SAT-IP alliance says: "A high-quality service is possible irrespective of what internet bandwidth is available, which is hugely beneficial for delivering a great TV experience wherever you are in your home. This is particularly important for streaming live sports events where delays and buffering can lead to significant backlash from viewers." According to Speedtest.net, of the 177 countries it surveys, 47 of them have average fixed broadband speeds of over 50Mbps, so many would argue that SAT>IP is only relevant in developing countries and rural markets. However, in many countries, while internet speeds may easily test out at 100Mbps during the day; at peak viewing times, with multiple users in a household, terrestrial signals can drop way below this to the point that buffering is making a reappearance. With the move to 4K content and maybe 8K in the future, it is easy to envisage how SAT>IP could have a role to play in urban as well as rural areas.

Elisabeth Tweedie is Associate Editor of the *Satellite Executive Briefing* has over 20 years experience at the cutting edge of new commmunications entertainment technologies. She is the founder and President of Definitive Direction (www.definitivedirection.com), a consultancy that focuses on researching and evaluating the long-term potential for new ventures, initiating their development, and identifying and developing appropriate alliances. During her 10 years at Hughes Electronics, she worked on every acquisition and new business that the company considered during her time there. She can be reached at etweedie@definitivedirection.com

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FEATURE

Looking for a Strategic Manufacturing Partner?

by Peter Galace

Outsourcing the manufacturing of your products is a very important decision for your company that can have a major impact on your bottom line. Outsourcing can undoubtedly have key benefits for your company. The most tangible benefit is the cost savings in terms of labor costs and capex. It also eliminates all the headaches of dealing with manufacturing processes and labor issues, so you can focus on research and development and marketing your products.

However, outsourcing can also be fraught with challenges. Ensuring quality control of your products as well as the security of your proprietary technology and intellectual property are very important considerations in choosing a manufacturing partner. Many countries offer various advantages for manufacturing your products. It's important to consider the economic and legal environment in the country you plan to outsource and also consider the pedigree and experience of the company you will be entrusting the manufacturing of your product.

"Best Country to Invest In"

The Philippine electronics industry is now the top performing industry in the Philippines. In 2018, the Philippines exported US$37.57 billion worth of electronic products, which accounted for 57.2% of the country's total merchandise exports.

The Semiconductor and Electronics Industries in the Philippines Foundations, Inc. (SEIPI) is projecting a 3% growth in its electronic shipment in 2019 to US$48.841. In contrast, the global industry growth is projected at only 2%, primarily caused by weak exports due to decreased global demand as a result of trade tensions between the United States and China.

China's trade war with U.S. are forcing many electronics manufacturers to look for alternative production bases in Asia to relocate or diversify their production. Unlike Vietnam, Indonesia or Myanmar, the alternative production bases in Southeast Asia that can boast cheap labor, the Philippines' comparative advantages and opportunities lie in its English-speaking skilled labor, and management capabilities, notes Hong Kong Trade Development Council. The Philippines also lies in the mid-range among ASEAN countries in terms of manufacturing gross value added, surpassing Malaysia and way ahead of Vietnam.

For Multi-National Corporations (MNCs) operating in the Philippines, the country's robust economy has made it remarkably resilient to external shocks. In addition, the country's enduringly strong macroeconomic fundamentals make the Philippines the best investment destination in Southeast Asia.

The Philippines registered strong economic growth of 6.8% in 2016, 6.7% in 2017 and 6.2% in 2018, ranking it among the fastest-growing economies in the world. This momentum is expected to continue, with projected annual growth of more than 6.3% over the next five years.

The U.S. News and World Report holds a similarly high opinion of the profitability and viability of the Philippines as the top investment destination. It named the Philippines the "Best Country to Invest In" in 2018. "In contrast to declining inflows of foreign direct investment, or FDI, to Southeast Asia as a whole, the Philippines continued to perform well, according to United Nations data," wrote the respected media and research firm in its global 2018 Best Countries report.

As a result, The Philippines has become a magnet for foreign direct investments in Asia on account of its liberalized and business-friendly economy. It allows 100% foreign ownership in almost all sectors and has been enhancing its global exposure via trade and inward investment promotion.

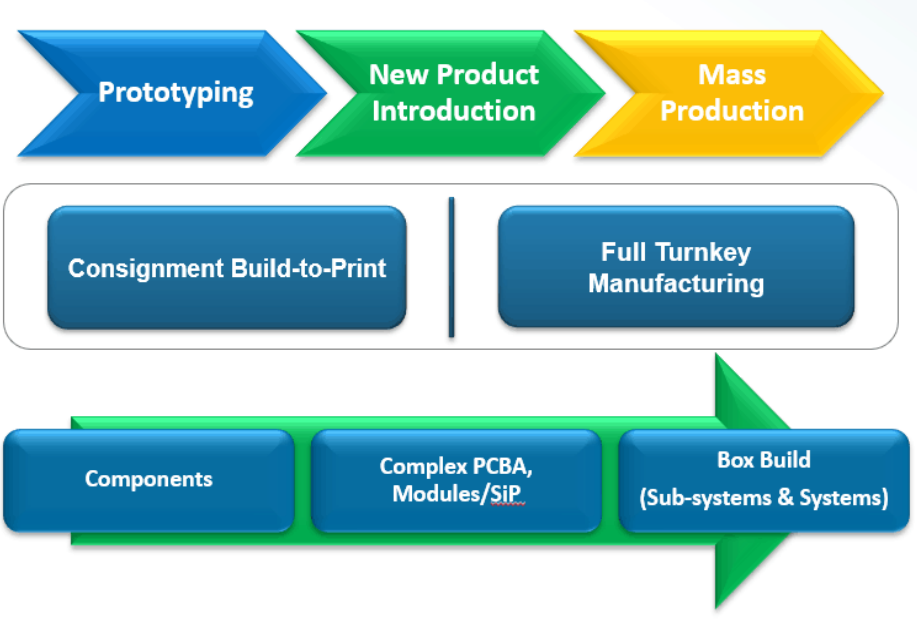
Special Export Processing Zones

To stimulate foreign investment and promote its manufacturing and export sectors, the Philippines has formed Special Export Processing Zones (SEPZ) which are essentially enclaves outside of the country's "normal customs territory." SEPZs concentrate firms focusing on the export market in special zones. These zones have a high standard of on-site and off-site infrastructure, and companies locating in the zones are granted fiscal incentives. Goods, materials and capital inputs are allowed in the zone to come in and out free of duty and exchange controls. There are over 300 SEPZs operating in the Philippines today.

Automated Technology Philippines, Inc.–Your Strategic Manufacturing Partner

One contract manufacturing company that has thrived in one of the Philippines' SEPZ is Automated Technology Philippines, Inc. (ATEC) located at the Light Industry and Science Park in Cabuyao, Laguna - about 30 minute drive from the Philippine capital of Manila's International Airport.

Starting out as a provider of semiconductor assembly and test services in 1996, ATEC has evolved as a strategic contract manufacturing company for many of the world's leading technology companies. It now has developed a unique expertise in multi-chip manufacturing techniques and has diversified its capabilities in voice and data communications, including satellite communications, as well as in automotive application packages and optoelectronics. ATEC has over 1,600 employees in two plants with another plant being planned for operation in 2020.



ATEC Phils. Inc. prides itself on being a one stop shop where they can take care of all aspects of production, testing and shipping. It uses the IPC 610-A and MIL-STD-883 electronics manufacturing standard and is IS0 9001 certified.

ATEC Phils. Inc. Capabilities

ATEC Phils., Inc. has two main divisions: Semiconductor and Connectivity. ATEC Semiconductor provides a full array of semiconductor assembly and test services, ranging from discrete to complex multichip packages, from low volume, quick turns to high volume production.

The second division, ATEC Connectivity, has over 20 years proven track record and experience in manufacturing high technology Radio Frequency (RF), microwave and millimeterwave products for existing and emerging Original Equipment Manufacturers (OEMs) and Original Design Manufacturers (ODMs). Backed by ATEC's extensive experience in outsourcing electronics manufacturing services, with its pioneering "captive line" concept and its world-class production facility, ATEC Connectivity is providing cost-effective, high-quality manufacturing solutions for complex products with frequencies ranging from DC to 90 GHz.

A vertically integrated manufacturing company, ATEC produces from components, modules, sub-systems, and up to system level products including RF Test and Tune, complex PCBA, hybrid assembly and ATE developments.

ATEC Connectivity provides SMT/PCB assembly, MIC/thin-film assembly, complex box build assembly, RF, microwave and millimeterwave, testing (modules, sub-systems and systems) and supply chain management. Its plant has a total land area of 56,000 sq.m. (604,000 sq.ft.) with total production and office area of 30,000 sq.m. (323,000 sq.ft.).

ATEC Connectivity has the resources to expand upon the demand of its customers.

Security

As mentioned earlier, a key consideration when outsourcing abroad is the security of your intellectual property (IP). The Philippines adheres to the Paris Convention for the Protection of Industrial Property Rights, the Patent Cooperation Treaty, the TRIPS Agreement, among others. In this light, intellectual property such as copyright, trademark, patent, utility model, industrial design are protected in the Philippines. The governing law is Republic Act No. 8942, otherwise known as the Intellectual Property Code of the Philippines.

ATEC is very mindful of protecting its customer's IP. The first thing they do even with potential customers is sign Non-Disclosure Agreements (NDA). All documents provided its employees do not mention the client's name.

Quality Control

ATEC Phils. Inc. has earned ISO 9001:2015 / IATF 16949:2016 and ISO 14001:2015 quality certifications. It uses the IPC 610-A and MIL-STD-883

AUTOMATED TECHNOLOGY (PHIL.) INC.

"We provide a one stop shop solution with excellent cost-competitive manufacturing and test services for our customers."

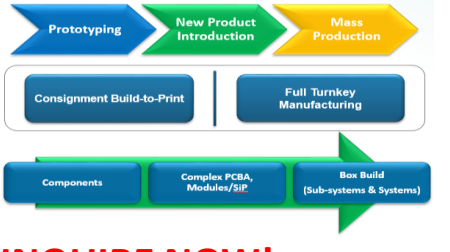
ATEC is private company in the Philippines with more than 20 years of experience in outsource electronics manufacturing services with more than 300,000 sq. ft. of production and offices in a world class facility.

We are situated in the Philippines, just about 40 kms south of Manila and operating in a Special Export Processing Zone having different clean room facilities (1K, 10K, 100K) with ESD controlled manufacturing environment, ISO 9001/IATF16949 and ISO 14001 certified.

ATEC offers a one stop shop solution for customers and a vertically integrated manufacturing company covering various products such as components, modules, sub-systems and system level products. Currently, we have 2 divisions, namely;

- **ATEC Semiconductor**, a semiconductor manufacturing partner
  - Captive Line/Open Line business model
  - Assembly & Test of Semiconductor Devices
  - Semiconductor Partial Process/es Services

- **ATEC Connectivity**, an electronic manufacturing (EMS) partner specialized in RF, Microwave & Millimeterwave with over 160 years of cumulative experience of key management staff
  - We provide services from consignment to full turnkey business and from prototype to NPI to mass production phases
  - Capabilities includes PCBA, Hybrid and Chip-on-Board, Module, Test/Evaluation Boards and Box-Build assembly
  - Assembly and testing of high frequency microwave & millimeterwave devices, integrated circuits, discrete components and Printed Circuit Board Assemblies.
  - System level integration and testing of telecommunications, satellite communications, and various wireless products



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ATEC has heavily invested in state of the art manufacturing equipment.

electronics manufacturing standards and has quality assurance and control procedures in every stage of the manufacturing process. "One thing we emphasize is the quality of our products. The products we manufacture in our facility actually are fully tested. They are exposed to all kinds of extreme weather conditions. We have a very stringent quality control system that ensure that the products we manufacture for our customers are of the highest quality," said Domingo Bonifacio, Executive Vice-President and General Manager of ATEC Connectivity.

One Stop Shop

ATEC Connectivity is a complete electronic manufacturing solutions provider specialized to RF, microwave and millimeterwave electronic manufacturing services. It provides services from consignment to full turnkey business and can work in different stages of the product life cycle from prototype to NPI to mass production. Its capabilities includes complex PCBA, hybrid and chip-on-board, module/System in Package (SiP), test/evaluation boards and box-build assembly. It assembles and tests high frequency microwave/millimeter wave devices, integrated circuits, discrete components, IoT devices, and Printed Circuit Board assemblies. It has system level integration and testing capability of telecommunications, satellite communications, aerospace and various wireless products.

"We are actually a one-stop-shop. We are an integrated manufacturing facility. We cover consignment to full turnkey business and we can engage with customers in all phases of the product life cycle from design verification, prototyping, new product introduction, pre-production to mass production and up to direct drop shipment to end customers and repair management. All you need to do is give us the specifications and design of the product and we will take care of everything including shipping your products directly to your end-customers," said Bonifacio. "We are not just your manufacturer, but your strategic partner," he added.

Outsourcing might be one of the most important business decisions a company can make. There are many options, but in the final analysis, you are better off with choosing not just a contract manufacturer but a strategic partner for your business.

View a video tour of ATEC Connectivity's facilities in the Philippines at:

www.satellitemarkets.com/atec-2019

Peter I. Galace is the Associate Editor of Satellite Markets and Research. He writes extensively on telecommunications and satellite developments in Asia and other regions for numerous publications and research firms. He can be reached at: peter@satellitemarkets.com

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Flat Panel Antennas

by Bernardo Schneiderman

Flat Panel Satellite Antennas (FPSAs) are one of the most anticipated technical innovations in the satellite industry for its potential to provide connectivity in mobility applications for aeronautical, terrestrial and maritime applications. However, we have yet to see FPSA take off. Historically the defense market invested in development of **the first models but commercially it is not yet feasible for enterprise and other applications because of high price of the antennas. The push to develop smaller and more economically priced FPSAs is the main target for the last three years with the new wave of High Throughput Satellite (HTS) and new satellite constellations focus in mobility and** residential low-cost solutions.

Currently several companies are investing in developing feasible solutions for the market with a few already implemented. NSR report a forecast cumulative FPSA equipment sales to reach approximately US$ 11 billion by 2028. NSR **finds aeronautical equipment will drive revenue growth for manufacturers, while fixed broadband applications on Non-GEO satellites will be the main volume market. The complexity of staying connected on the move is expected to keep antenna prices and revenues high over the next decade, with NSR forecasting 94% of all revenues to come from mobile applications. Leading the way will be the increasingly competitive aeronautical market, well-established government land-mobile vertical, and the fast-growing, high-potential, commercial land-mobile sector.**

Satellite Executive Briefing invited executives from the main manufacturers of the Flat Panel Satellite Antennas to **participate in a virtual roundtable and we received responses from the following companies: Mustafa Buelbuel, Bus. Development Manager, ALCAN Systems; : Bill Awada, Chief Technology Officer, C-COM Satellite Systems**; **David Helfgott**, CEO, **Phasor**; **Bill Milroy**, Chairman and CTO, **THINKOM**. Follows are excerpts of the **exchange:**

Satellite Executive Briefing (SEB): Give us an update on your Flat Panel Antenna product?

ALCAN Systems: ALCAN Systems is currently at development stage. Thus, there are no products available at the market right now. We expect to launch our first product within the next year.

C-COM: C-COM is making good progress on its development for Ka band flat panel Phased Array Antenna. We are at the "Proof-of-concept" stage where the main intelligent 4x4 subarray modules or "building blocks" have been fully tested and are now used to build larger size subarray panels. The 4x4 (16 elements) Tx and Rx modules were used to develop and test a 16x16 subarrays (256 elements) and 32x32 (1024 elements). Our next step is to have a full flat panel antenna made out of 4000 elements for Tx and Rx which is equivalent to a 70cm parabolic antenna. We hope to achieve this objective over next 12 months and then start our commercialization phase.

PHASOR: Phasor is working towards commercial introduction of its 'Release One" technology-based products – (Flat Panel Antenna systems/Electronically Steered Antenna systems). These systems are designed for enterprise-grade SATCOM mobility markets in the commercial Ku band, and are undergoing extensive testing today. We are very far along our "commercialization" process and look to release products early next year, dependent upon the timing of completion of our testbeds. Phasor will release product for maritime and Land-mobility first, followed by aeronautical.

THINKOM: I'll start with a brief background by way of introduction. ThinKom Solutions, Inc. was founded in 2000 and received our first major U.S. government contract for K/Q-band airborne antennas three years later. In 2011, we developed the first low-profile antenna for high-speed Ka-band and EHF communications on a U.S. military wide-body aircraft. In 2013, Gogo selected our flat-panel antenna for inflight connectivity, and the following year Gogo launched its 2Ku IFC powered by ThinKom's Ku3030 phased-array antenna. The Ku3030 received FCC blanket worldwide regulatory approval in 2015.

As of this writing, our Ku3030

antennas are operational on over 1,300 aircraft, with more than 10 million cumulative hours of service proving industry-leading reliability, with measured antenna Mean Time Between Failure (MTBF) greater than 100,000 hours.

During the last two years, we have also made substantial progress with our new family of Ka-band aero antennas. The Ka2517, introduced in 2016, has completed DO-160 certification and the antennas are now in service aboard a fleet of U.S. government command and control aircraft, and entering IFC service on commercial aircraft (airlines) in the very near future. Multiple ground and in-flight demo trials have been conducted with the Ka2517 over LEO, MEO and GEO satellite networks with extremely high data throughput.

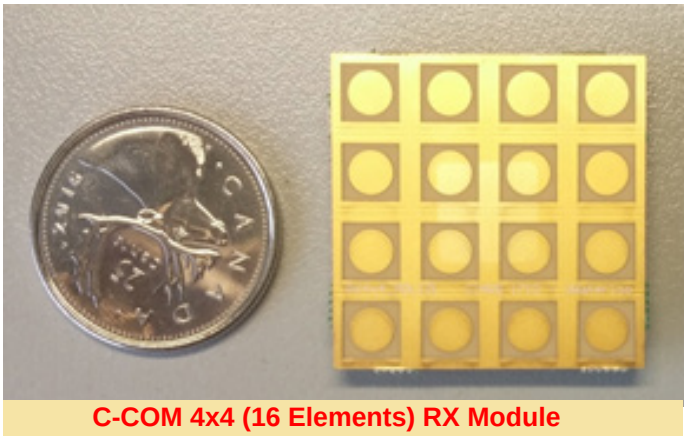
We are also continuing to build our terrestrial satellite communications business with the same flat-panel phased-array technology. We work with major third-party integrators and prime contractors to supply X-, Ku-, K-, Ka-, and Q-band systems for mobile, man-portable and fixed antenna solutions for military, homeland security, disaster recovery, emergency management, law enforcement and broadcast/media applications.

ALCAN Systems' Flat Panel Antenna

This year, we unveiled our concept for using our phased-array antenna technology to create a new generation of satellite gateways, replacing the large "dish farms" of cumbersome, heavy parabolic antennas with a compact, reconfigurable "array of arrays." We are also continuing the product development of fixed user terminals to support the next generation of LEO and MEO satellite broadband services.

SEB: Is your antenna Mechanically-Steered, Electronically-Steered or Hybrid (Mechanical and Electronic - Steered)? Describe what is the main advantage of your solution and what frequencies will the antenna be?

ALCAN Systems: ALCAN Systems is developing a fully electronically steerable flat panel antenna. The main advantage of the technology is the use of liquid crystal within the antenna. This enables us to design a product which has very low costs and is able to perform with low power. The focused frequency bands are Ka and Ku, other bands are possible.


C-COM 4x4 (16 Elements) RX Module

C-COM: We are aiming to develop a fully electronically steered phased array Ka band antenna which can be used to replace the mechanically steered parabolic antenna of 70-75cm. The advantages of the underlaying technology is that its modular which can be scaled to any size of antenna depending on the requirements and applications. It's also conformal and can follow the shape of the surface it's intended to operate from. Another big advantage of Phased-array technology is that it allows for multiple beam forming which would be capable to operate seamlessly over traditional GEO and Non-GEO (LEO/MEO) satellites and track multiple satellites at the same time electronically.

PHASOR: Phasor technology is solid-state with no mechanical/moving parts. Phasor's ESA uses a unique and patented ASIC-based beam-forming technology, and a sophisticated software-defined/controlled systems approach which allows for very high performance, very low profile and a scalable, modular aperture to accommodate aperture sizes of various di

mensions.

THINKOM: Our underpinning patented phased array technology is called VICTS, which stands for Variable Inclination Continuous Transverse Stub. VICTS delivers all the benefits of conventional mechanical and electronically steered phased array antennas without their well-known drawbacks and limitations. Our technology uniquely provides gap-free pole-to-pole coverage, high beam agility for network flexibility, a low-profile antenna radome producing near-zero drag in flight, low prime power consumption and in-

stallation flexibility, as well as the IFC industry's highest spectral efficiency (2X to 8X higher efficiency than our various competitors.)

Let me just point out that while electronically steered arrays (ESAs) are still not widely available on the market, our VICTS antennas are fully proven with over 5,000 daily commercial flights on 1300+ commercial aircraft today.

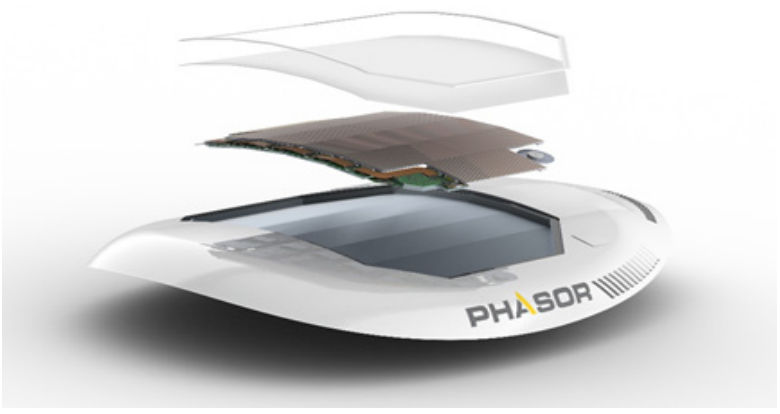
SEB: What markets are you planning to address with the FPSA (GEO, MEO or LEO) and what verticals (Defense, Aviation, Maritime, Terrestrial or others)?

ALCAN Systems: ALCAN Systems is planning to address all major satellite markets (GEO, MEO and LEO) as well as the upcoming 5G technology. The planned verticals are enterprise, maritime, landmobile and aviation.

C-COM: C-COM will focus on land mobility markets since we have well established channels and resellers network in different market verticals worldwide. However, the antenna technology can easily be extended to other markets including aviation, marine, defence, space, 5G and many others.

PHASOR: Phasor is focused upon enterprise-grade commercial and government broadband mobility markets where high performance, very low profile and more efficient form-factors are vital. Phasor ESAs will work with satellites in any network configuration, from traditional Geosynchronous regional beam systems (GEOs), to newer High-throughput, spot-beam-based data-centric satellites (GEO HTS), available today. In additional, the same Phasor ESA will also interoperate seamlessly with new Non-Geosynchronous constellations in Low and Medium Earth Orbit (LEOs and MEOs). In this way, the Phasor solution derisks the coming heterogenous SATCOMs market for service providers and end-users alike.

PHASOR Aero poc Electronically Steered Antenna



THINKOM: Our VICTS phased-array flat-panel antennas are totally interoperable with LEO, MEO and GEO satellite constellations. We believe that users and providers of satellite connectivity should not be compelled to gamble their futures on an "either-or" compromise choice when it comes to satellite orbits. Our vision for the future is a truly integrated, multi-constellation solution, in which the satellite antennas switch seamlessly back and forth between LEO, MEO and GEO services (and without any performance compromises,) providing truly global pole-to-pole, all-constellation, connectivity. Essentially a best-in-class solution for today…and tomorrow.

The key requirements for functioning on LEO or MEO satellites are broad channel bandwidth operation, high efficiency over scan, and high beam agility, to ensure minimal handoff times between setting and rising satellites in the field of view. Our VICTS phased array antennas currently support re-steer times of <800 msec, depending on satellite-to-satellite geometries, which is faster than ping times (delays) associated with applications on GEO systems today. We have conducted successful on-air tests of our Ka2517 antenna on MEO and LEO satellites validating extremely high data-throughput rates and rapid beam agility.

We are currently working under a collaborative agreement to develop a Ka-band enterprise user terminal for Telesat's planned LEO satellite constellation. Initial tests have already been successfully completed using the Ka2517 on Telesat's Phase 1 LEO satellite.

SEB: What are your plans in the next few years in regards to use and pricing for mass market/vertical

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"...ThinKom's approach uses multiple, tightly arranged, phased-array antennas, which are coherently combined and reconfigurable on demand. The antenna units work together to track multiple LEO, MEO and GEO satellites simultaneously with look angles between 5 and 90 degrees in elevation and full 360-degree coverage in azimuth. The software-defined system is reconfigurable in that a single array is capable of supporting multiple links, modifying the number of beams and radiation properties dynamically to meet the link budget and throughput demands of the ever-changing number of satellites in view..."

--Bill Milroy, CTO, ThinKom Solutions

markets?

ALCAN Systems: Our five-year plan consists of the market launch in the enterprise vertical and the extension of our products to other verticals. We aim to provide an enterprise solution for $10,000 and a consumer solution for $1,000.

C-COM: We plan to start the commercialization phase by the end of 2020 targeting commercial Ka-band land mobile applications for GEO, LEO and Cubesat/SmallSat constellations. We hope to see pricing equivalent or less than the cost of our presently manufactured on the pause motorized auto-pointing parabolic antennas with the added benefit of delivering full mobility over LEO/MEO constellations in additions to GEO.

PHASOR: Over the next five years, Phasor will introduce broadband mobility products across all uses cases (sea, air, land) in the enterprise-grade commercial and government SATCOM services markets. This will include several new technology releases and new SATCOM frequencies.

THINKOM: While I cannot comment on specific product development projects in the works, I will briefly identify some of the important themes and trends we believe will shape the future of flat-panel satellite antennas.

The first is the proliferation of LEO and MEO constellations, which has driven us to more flexible "future-proof" designs in which acquisition, tracking, inter-and intra-satellite handoffs and polarization diversity requirements will be of key importance. We are already there with a range of flat-panel phased arrays that have been successfully demonstrated across LEO, MEO and GEO platforms.

The second is frequency coverage. We foresee a continued push into higher frequencies for satellite communications, including Q-, E- and even W-bands. We've already built and tested VICTS antennas as high as W-band with excellent results.

The third is in the area of production scalability. Our antennas are uniquely well suited to commoditized production materials. We will soon announce some significant "breakthroughs" in terms of size, performance and market pricing for fixed LEO and MEO, full-duplex user terminals that are 40% smaller than traditional dish solutions with 2x to 8x higher efficiency than competing ESAs, without the high-power consumption and poor scan efficiency.

Bernardo Schneiderman is the Principal of Telematics Business Consultants. He can be reached at: info@tbc-telematics.com

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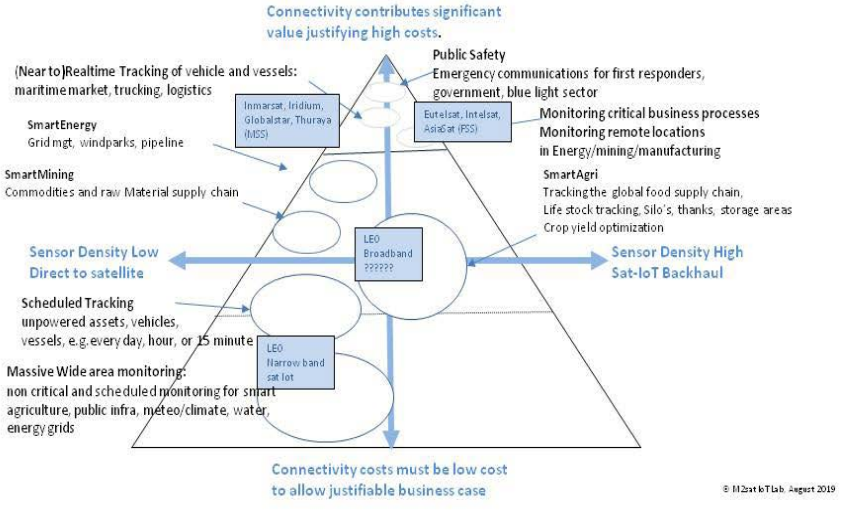
Satellite IoT: A Game Changer for the Industry?

by Hub Urlings

How New Space and Old Space are moving into the new IoT era

A number of highly visible new space initiatives, backed by some of the worlds internet billionaires, are challenging the existing satellite industry. Their marketing is great, American style, but is it really a game changer for the satellite industry? For rocket and satellite manufacturers maybe, but the business cases for the satellite operators are not very convincing yet.

When looking for a transition in the satellite industry there is no better place as in the satellite Internet of Things (IoT) market. Where satellite voice, broadband IP connectivity and broadcasting are suffering from heavy competition, lower prices and dwindling margins, the satellite IoT market shows healthy profits and the prospect of strongly growing revenues in the coming five years.



IoT Market Model

A recent update on the satellite-IoT market shows that the hype on IoT and the satellite based IoT connectivity market has not faded and that its forecasts are still looking strong:

The global market for IoT-focused satellite services, focused on end-device connectivity hardware and the annual connectivity fees charged, is forecasted to grow to US$ 5.9 Bil. in 2025, after taking off in the 2021-2022 period.

This implies a massive tripling or quadrupling of satellite IoT/M2M devices and applications in the next 5 years. By 2025, some 30.3mn Satellite IoT devices are expected to be deployed globally, growing at a CAGR of just under 40%. It is clear that satellite IoT will bring a massive change over the coming years to the world in general, the IOT industry and to the satellite industry in particular.

Trully global IoT connectivity, something that only satellite can offer, will change environmental monitoring, agriculture, public infrastructure management and anything related to wide area remote sensing. The availability of low cost, low power global connectivity will increase the total number of connected sensors and with that data-points in a variety of global environmental, societal , industrial, agricultural and logistical applications increasing the accuracy of data-based forecasts and trends.

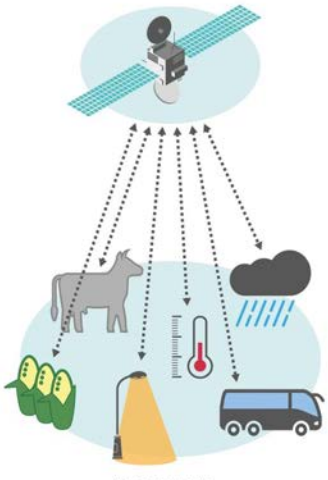
This will cause the satellite industry to change as well. Incumbent satellite providers will be pressured by a new wave of startups that are leveraging the recent advances in smaller satellite technologies providing low cost, low power connectivity. Incumbent

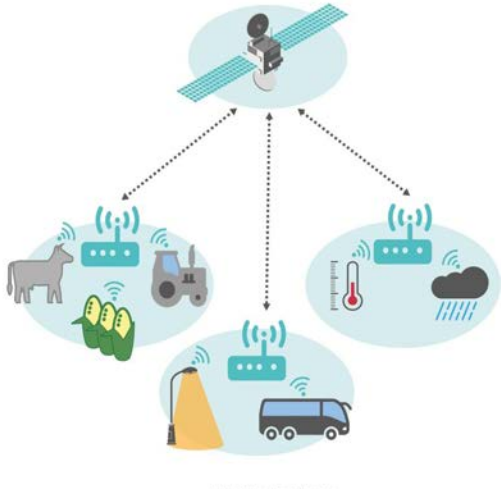
satellite providers are in a good position though to meet that challenge, with their networks up and running, and IoT-focused customers could be a nice way to improve their margins, especially when compared to the increasingly cut-throat broadband and broadcast satellite market. For that they might even absorb one of the new Leo players.

In this article we will look both at new and old space satellite players, the services they offer and how they are preparing for the satellite IoT boom.

Satellite IoT Playing field : Old vs New Sat-IoT Players

Let's start with a look both at the 'old' players in the satellite IoT arena and look how they are doing. Incumbent satellite providers have their satellites already up in space and their investments in the space and ground segments are already made. Traditional Mobile Sat Systems (MSS) like Inmarsat, Thuraya, Iridium, Globalstar have been dominant in the M2M/IoT market, using their L-band spectrum with a focus on mobile and maritime applications. In the last 10 years they realised 3.5 - 4 million satellite IoT terminals in the field.


Direct to satellite


Satellite via gateway

Fixed Sat Systems (FSS) like Eutelsat, Intelsat or Asiasat have developed M2M and IoT services over using Ku or Ka band over the past years as well. Examples are the Ka-sat based Telemetry service from TooWay/Eutelsat, and the recent development of the ASAT-8200 unit by Spacebridge. With their higher bandwidths they are very well suited for Satellite IoT and in particular for backhaul services connecting terrestrial local area IoT networks (eg. NB-IoT, Lora, Wifi, BT) from high density sensor networks to the internet.

For the NewSpace industry, and the dozen nano satellite IoT startups, the satellite IoT market is a hugely lucrative opportunity as they don't have to take on anywhere near the level of capex burden that the incumbent satellite network operators have been saddled with. New satellite players take advantage of the new cubesat technology (using a range of UHF, VHF, S-band, and Ku-band services) to bring down their service costs, while the Low Earth Orbit allows the use of low power modems to connect the ground sensors. NewSpace companies active in this market include Astrocast, Myrioata, Lacuna, Kineis, Kepler Communications, Swarm technologies and Hiber. Their service features, low cost, low power, low latency, makes them well suited for Direct-To-Satellite services for terminals that are spread widely over geographic areas.

Satellite IoT Service Typology

Combined the satellite industry is responding to the IoT market demand with two types of satellite IoT connectivity service.

Sat-IoT Backhaul Service

Comparable to the GSM or Wifi Backhaul service, the IoT Gateway Backhaul over satellite emerges as a new SATCOM application segment. The IoT market is currently experiencing the advent of ultra-low cost terrestrial radio transmission standards for IoT such as LoRa™, Sigfox™, LTE-M or NB-IoT targeting less than US$ 5 per radio transmitter. These networks com with low cost localized gateways to concentrate larger numbers of IoT devices in their vicinity, even thousands. For the satellite industry connecting these gateways is leading to a new satellite application segment.

Direct to Satellite services

This type of service, especially the low cost and low power variety as promised by the NewSpace Sat-IoT players, is ideal for wide area sensor network with sensors dispersed over wide geographical territory.

The low power feature is important as they are mostly deploying in remote areas, and the low cost will enable massive networks with new data-points around the world to feed the data-analytics servers in a wide range of industries. On the vertical axis costs are the main driver, combined with latency and reliability. The horizontal axis looks at sensor density per square meter.

In the top of the pyramid we see a lot of high value IoT services like tracking, tracing, logistics, insurance, and performance monitoring for remote assets. This market is already covered by existing Sat-Iot providers. Below there we see the Industry 4.0 applications like in process monitoring but also grid management in the energy sector or asset management in the mining sector. On the bottom of the pyramid a range of wide area monitoring applications like public infra structure monitoring, smart agriculture and every application that monitors the impacts on food, water, environment and security. This will benefit from the low costs, low power Sat-IoT connectivity the new cubesat based Sat-IoT networks are working on. In particular the governmental and public sector will benefit from this type of satellite IoT connectivity. (More on this in a follow up article.)

Challenges for the Satellite Industry

The growing variety of sat-iot connectivity will trigger the global proliferation of the IoT industry into the 90% of our globe without terrestrial networks. This will lead to the same effect like how ubiquitous broadband internet and mobile cellular brought along the "Connected Society", the shift now going from Internet-of-People to Internet-of-Things.

We see the satellite industry responding to the IoT connectivity demand both with low cost/low power Direct To Satellite connectivity as well as with various combinations of terrestrial (cellular and LPWAN) IoT access networks and satellite backhaul.

Will this be a game changer for the satellite industry? We like to think so. In the next 5 years IoT will lead to the equivalent of a new industrial revolution and with that a new Satellite Communications revolution.

During that revolution a number of challenges have to be met however. To benefit from the growing opportunities sat-iot connectivity is offering customers, satellite operators and their IoT value chain partners will need a thorough understanding of the various components of IoT applications. This goes much further then the connectivity part (modems, antenna's, satellites, teleports), and also includes the data-analytics and data -visualization part and how to integrate the use of IoT dashboards in corporate IT infrastructure and organization. Satellite operators and their partner eco-structure will have to evolve from capacity (connectivity) providers to service providers, offering full end-to-end solutions.

Due to this complexity, it looks as the classic customer - vendor relationship (satellite service providers and system integrators together with satellite operators) is changing into a partnership where opportunities of Sat IoT solutions are explored together and in an iterative way.

It looks as the Sat-IoT industry is going through a paradigm change indeed.

Hub Urlings was one of the pioneers of Satellite M2M as Product Manager Inmarsat-C at the famous KPN Station 12. The success of this "small data" satellite service, its global coverage and reliability made that the service was used for a myriad of applications: from sending messages, to truck fleet management, to pipeline monitoring and bringing back data from all types of sensors. At that time satellite was the only type of network that was able to offer global coverage for what we would now call IoT services. Now, 25 years later he is again involved in the development of a new generation of Sat-IoT services. He can be reached at: urlings@m2sat.com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World Summit on Information Society and AI for Good

by Roxana Dunnette

Two events — the World Summit on Information Society (WSIS) and AI for Good Global Summit — made their marks this year at the International Telecomunication Union (ITU) in Geneva, Switzerland.

Although not related, the two events had a lot in common. The two summits are both making headway in their solutions to achieve the United Nations' 17 Sustainable Development Goals (SDGs) through new Information and Communications Technology (ICT), particularly on how a new series of cheap nanosatellites will help connect the unconnected.

This year's WSIS was chaired by Mustafa Jabbar, Minister of Post and Telecommunications from Bangladesh, an icon in his country for developing the Bangla language software for digital education system. The summit gathered more then 3,000 participants from 120 countries composed of ministers, CEOs, members of the academe, and representatives of non-government organization (NGOs) and the private sector.

The program consisted of 250 sessions divided in open consultations, workshops, debates on various subjects like ICT for good, education, agriculture, cyber security, gender equality, health, infrastructure, innovation, and business opportunities.

Some special tracks for the summit included:

- ICT and Sports: on how to enhance the sport experience, using ETPS – Electronic Performance and Tracking System, Ultra Definition Video and Virtual Reality;
- Youth and ICTs: to continue to attract young entrepreneurs to present their own projects and ICT-based solutions for development in their own country;

WSIS and Accessibility: a whole day event to inform attendees how ICTs help people with disabilities integrate in society and lead a normal life. The day focused on five issues — security, communication, mobility, education and emergencies.

One interesting innovation was presented by young entrepreneurs from Esquela Politechnica de Ejercitio of Quito, Ecuador who were eventually awarded with the WSIS Champion Prize.

HandEye is an inclusive technology start-up that developed a pin/button that can be attached to the shirt or around the neck. The device allows children with visual impairments to walk alone and avoid obstacles. It is now deployed in schools, not only in Ecuador, but also in Latin America.

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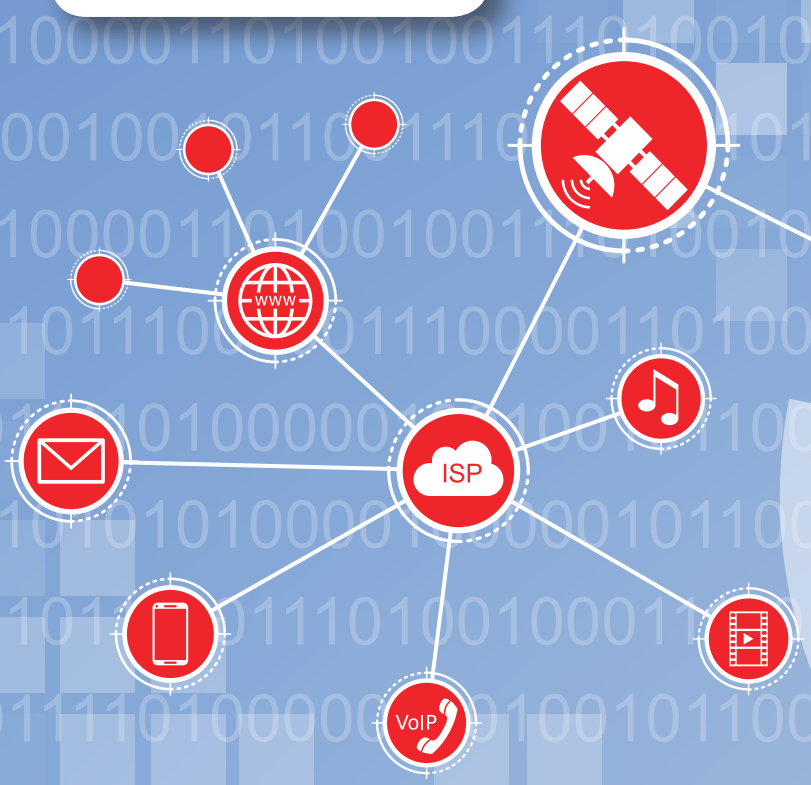

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The exhibition was small but one start-up caught the attention. SatRevolution, a real time Earth Observation Satellite System from Poland that is also helping UN achieve the SDGs. Established in 2016, SatRevolution is a constellation of 1,000 cubesats to be positioned in low Earth orbit (LEO) between now and year 2026. The aim is to attain 50 cm resolution and 30 min refresh time. The weight of each satellite will be 10 kg and will have "on board image processing" based on AI Machine Learning. The first satellite was scheduled for launch in July 2019.

Nanosatellites are now in demand for collecting data, mapping the Earth, and for use in various other applications aligned with SDGs. There are also new applications in agriculture, mining, health, environment, climate change, remote control, IoT and to bridge the digital divide.

WSIS this year exceeded the expectations with the number of projects supporting SDGs.

AI for Good Initiative

Launched three years ago, AI for Good is a global initiative to use Artificial Intelligence (AI) to develop positive impact projects worldwide. It is primarily aimed at putting AI at the service of social innovation by supporting UN's 17 SDGs through concrete ICT and AI solutions.

AI for Good Initiative lead by ITU, X Prize, Association for Computing Machinery (ACM) and 34 sister organizations now promote the use of AI to adress the most pressing global challenges such as poverty, education, health care, and environment.

Houlin Zhao, Secretary General of ITU, urged participants to "balance technological progress with social progress"

UN is working to keep AI development the central piece of the so-called "Fourth Industrial Revolution" to be inclusive and transparent and to make sure that AI helps all segments of society equally.

This year AI for Good Global Summit was well-attended with 2,500 participants from last year's 700 attendees. This year's summit identified practical opportunities of AI to accelerate progress towards achieving SDGs.

One of the most difficult issues tackled was the establishment of a standard digital format that could be accepted by the whole international community. That's where ITU gets into the picture. Data needs to be shared via a common format using a standard that is robust, transparent, and stable and to ensure that data from hundreds of sources uses the same format.

Testing and model approval are the first steps for adoption. It is for this reason that ITU and the World Health Organization launched a project to develop a framework to allow a standardized and transparent evaluation of AI methods. Afterwards, the model could be "certified" by entities in each country and rolled on the market.

A long process is required to ensure that AI benefits ALL and it is really for the GOOD of everyone.

This event attracted a very diverse crowd. AI experts from industry and academia, global business leaders, heads of UN agencies, NGOs, inventors, and even world chess champions, world racing champions, musician and technologists attended.

The show floor was dynamic with live demos of apps like Watson Live Debater, Fusion Exoskeleton, RoboRace, a self-driving racing car, social robots for the care of the elderly, and AI inspired performances.

IBM already gave us spectacular demos of man vs machine in playing games like Deep Blue (Chess computer), Watson (Jeopardy), AlphaGO (go game advantage AI). One of the more interesting demonstration of AI presented live was Watson's Project Debate "Speech by crowd."

The Debate Technology goes far. The algorithm captures the notion of an argument; collects arguments from more than 100,000 people (social media and other sources) and then generates a comprehensive narrative.

With applications in sales and marketing IBM's "Speech by crowd" will be released in few months to companies interested to use it.

Although there has been no common consensus on what AI is, or if the name is even correct at

all, everybody agrees that AI has the potential to alter our lives to a great extent. The summit agreed that the time to talk, to establish some rules and structures, and to prevent that the next industrial revolution is not becoming a "Winner takes-it-all event" is NOW!

The crucial factor for managing societal changes induced by AI, IoT, machine learning is TIME. But do we still have time?

As a matter of urgency, experts at this summit proposed to rethink education, health, environment, social safety issues, relationships between individuals, state, and the corporate sector, and inequalities induced by technical progress.

The work of the conference was divided into five tracks: AI for education; AI for health; AI for space; Scaling AI for Good; AI and Human dignity and inclusive society.

For a life of multiple careers and skills, people need an education that prepares them for a life-long process of training and retraining. Not easy as humans hate insecurity.

Two projects in education were launched here:

- AI for Families – to educate communities, parents, educators, and children about AI.
- AI Mentoring – a hands-on program to help industry professionals in their reflection and AI goal setting.

Erickson and UNESCO have already launched a new global AI education program to create opportunities that scale up skills development in AI and develop digital skills of young people.

AI for Health founded a focus group last year and work is in progress to develop a standardized framework for the early detection of outbreaks of diseases, and benchmarking of diagnosis, drugs and much more.

AI for Human Dignity, Inclusive Society, Accountability and Privacy is not an easy task as we do not have a rule book and today's regulatory laws are outdated.

There are issues to be considered like protection of minorities and vulnerable people; to make sure that data, coding and system strategists come from a diverse and inclusive environment. Also an important consideration: that AI does not interfere with human rights and that AI will not exacerbate the digital divide.

UNICEF and UNESCO are leading some projects on AI and human dignity regulations, AI and children's rights, and AI and digital identity.

AI for Space, Satellite Imagery

It is no secret that since 2017, it's been possible to capture an image of the entire Earth's surface every day.

Satellite Imagery and AI have the potential to map poverty, schools, recreational areas, crops, and to start adequate development projects linked with SDGs for a real global AI positive impact. Spacecraft health caring can be a new application of AI and this is promoted by the European Space Agency (ESA). There is also the AI "Personal Assistant" that control space missions.

A special Interest Group has been set up to study how data generated from a space mission can be used with AI to generate machine data models.

The Summit recognized that AI has the ability to shape the world for a better future, but key concerns remain on what can be achieved.

But there are so much more lingering questions and issues. These require us to 'Think differently.'

Houlin Zhao, Secretary General of ITU, urged participants to "balance technological progress with social progress." He said "unprecedented collaboration among all stakeholders is needed to achieved safe, trusted and inclusive AI to accelerate progress towards the Sustainable Development Goals."

Roxana Dunnette is a correspondent of Satellite Executive Briefing based in Geneva, Switzerland. She is Executive Director, R&D MEDIA, Switzerland. She has had an extensive career in Broadcasting and media including senior management positions at Worldspace, CBS and PBS in New York and international telecommunications regulatory work at the UN in New York and ITU in Geneva as US government representative. She accomplished many development projects in Africa based on satellite technologies, broadcasting, Internet and accessibility. She can be reached at: rdmedia@bluewin.ch

PRODUCTS & SERVICES MARKETPLACE

A guide to key products and services to be showcased at IBC 2019,

September 13-17, RAI Exhibition Center Amsterdam, the Netherlands

Advantech Wireless Technologies
Booth Hall 5 # 5.B28
www.advantechwireless.com

At **Advantech Wireless Technologies**, we design, manufacture and deploy networking for broadband connectivity, broadcast solutions, video contribution and distribution and mobile backhaul, using satellite and terrestrial wireless technologies. Our revolutionary technologies include world-leading GaN technology based high power amplifiers, SSPAs, block-up converters (SSPBs), frequency converters, deployable antennas and terrestrial microwave radios.

Amos Spacecom
Booth Hall 1 # 1.C65
www.amos-spacecom.com

More Coverage. More Throughput. More Services. Across the Middle East, Europe, Africa and Asia. **Spacecom's AMOS** satellite constellation, consisting of AMOS-3 & AMOS-7 co-located at 4°W and AMOS-4 at 65°E, provides high-quality broadcast and communications services across Europe, Africa, Asia and the Middle East. With the successful launch of AMOS-17 at 17°E , Spacecom will further expand its reach, reinforcing its position as a leading satellite operator.

ARABSAT
Booth Hall 1 # 1.B38
www.arabsat.com

Founded in 1976 by the 21 member-states of the Arab League, **Arabsat** has been serving the growing needs of the Arab world for over 40 years, operating from its headquarters in Riyadh-KSA and two Satellite control stations in Riyadh and Tunis. Now one of the world's top satellite operators and by far the leading satellite services provider in the Arab world, it carries over 500 TV channels, 200 radio stations, pay-tv networks and wide variety of HD channels reaching tens of millions of homes in more than 80 countries across the Middle East, Africa and Europe—including an audience of over 170 million viewers in the Middle East and North Africa (MENA) region alone tuned into Arabsat's video "hotspot" at 26°E.

AvL Technologies
Booth Hall 5 # 5.A45
www.avltech.com

AvL Technologies is celebrating 25 years in the satellite communication industry, a milestone for the company. AvL's very first antenna – serial number 001 – is a 1.8m SNG antenna still in operation today, and operates from its third uplink truck at PacSat.

In our booth, we will have on display:

AvL Model 1258KFD Mobile Broadband Transportable Antenna

- A 1.2m, 3-piece segmented reflector, motorized Fly&Drive antenna that fits into a small case making it easy to transport. This antenna can be mounted on to a pick-up truck, SUV or box truck.
- A 1.2m fully-integrated auto-deploy network terminal with a 6-piece carbon fiber reflector, removable boom and band-configurable weatherproof electronics enclosure.
- The newest tripod configuration – 2.4m 2020T motorized transportable flyaway. This easy-to-assemble tripod base with enhanced wind stability operates in C-Band, X-Band, Ku-Band or Ka-Band. This antenna can be assembled by two persons in 15 minutes.
- Our 2.0m ultra-light axi-symmetric antenna with a 12-piece carbon fiber reflector and RF package that consists of a 55W Ku-band BUC, which is located behind the hub.
- The Family of Integrated Terminals in aperture sizes – 0.75m, 0.98m (motorized) and 1.35m. This line of user-configurable and IATA-checkable carry-on terminals are ultra-compact, ultra-lightweight and ultra-high in performance.

C-COM Satellite Systems Inc.
Booth Hall 5 # 5.C55
www.c-comsat.com

Visit **C-COM**'s booth at IBC2019 to see the latest in auto-pointing antenna technology AND to learn more about our electronically steerable phased array antenna progress. Highlighting the latest in C-COM design is the iNetVu® MP-80-MOT, a fully motorized, auto-acquire, 80 cm carbon fiber manpack antenna. This robust and lightweight system will point to any pro-

grammed satellite with just the push of a button on the NEW iNetVu® 8020 Controller. Highly portable, the multi-segment manpack can be easily hand-carried by one person and assembled in less than 10 minutes without any tools.

In addition C-COM will show off the latest in its Driveaway technology. The iNetVu® Ka-75V is our New Generation 75cm, auto-deploy, vehicle-mounted Driveaway antenna that has been "Authorized for use on ViaSat Exede® Enterprise and on KA-SAT NEWSSPOTTER NEWSGATHERING service by Eutelsat." The system is fully automatic and configured with the iNetVu® 7024 Controller to provide fast satellite acquisition within minutes, anytime anywhere.

Configurable with the iNetVu® 7710 Controller, the fully automatic and transportable 98cm Ku-band Flyaway iNetVu® FLY-981, will also be on display. Stop by our booth to learn more!

Comtech EF Data Corp.
Booth Hal 1 # 1.C55
www.comtechefdata.com

For 20+ years, **Comtech EF Data** continues to be the premier supplier of bandwidth-efficient satellite modems, VSAT networking solutions and RF products to MNOs globally in diverse and challenging environments. With infrastructure equipment supporting >60 Gbps of mobile backhaul over GEO, HTS and MEO, we have the experience and product diversity to facilitate value-added and efficient deployments. We closely monitor market trends and have designed our solutions to deliver true benefits to MNOs – the performance needed to reduce required satellite bandwidth, drive down the total cost of ownership, improve quality of experience and deliver the industry's highest KPIs.

COMTECH Xicom Technologies
Booth Hall 1 # 1.C55
www.xicomtech.com

Comtech Xicom Technology provides a broad product line of KPAs, TWTAs, SSPAs and BUCs for worldwide satellite uplink covering C-, X-, Ku-, DBS-, Ka-, Q-band, Tri- and Multi-band with power levels from 8 to 3,550 watts and available in rack-mount and antenna-mount ODU packages.

Comtech Xicom has led in the design and production of millimeter wave TWTAs. Xicom has been shipping high power Ka-band amplifiers since 1997. We have shipped more than 2000 Ka-band amplifiers to military and commercial customers around the globe. We can offer CW amplifiers for TT&C as well as peak amplifiers for multi-channel communications. We offer both outdoor mounted and indoor products to meet our customers' needs

Es'hailsat Qatar Satellite Company
Booth Hall 1 # 1.B49
www.eshailsat.qa

Es'hailSat, the Qatar Satellite Company, is a communications satellite operator headquartered in Doha, Qatar. Es'hailSat was established in 2010 with the goal of managing and developing Qatar's presence in space. The company provides independent, high-quality, advanced satellite services to broadcasters, businesses and governments in the MENA region and beyond.

With the aim to be a truly global satellite operator and services provider, Es'hailSat started the operation of its first satellite Es'hail-1 at 25.5° East in 2013 supporting key broadcasters in the region, beIN SPORTS and Al Jazeera Media Network. Es'hail-2, the company's second satellite was launched on November 15, 2018 and entered in commercial service early 2019 at the 26° East orbital position.

Gazprom Space Systems
Booth Hall 1 # 1.A21
www.gazprom-spacesystems.ru

Gazprom Space Systems (GSS) is a Russian non-governmental satellite operator providing high quality Yamal capacity all over the world. Yamal satellite fleet consists of four satellites positioned between 49E˚ and 183E˚.

Yamal-202 (49°E) has a wide coverage over the Eurasian continent, in particular over Middle East and North Africa. Soon it will be replaced by Yamal-601.

Yamal-402 (55°E) satellite provides Ku-band coverage over Russia, CIS countries, Europe, Middle East and Sub-Saharan Africa.

Yamal-401 (90°E) is dedicated mainly for the Russian market. The satellite is equipped with C- and Ku-band payloads.

Yamal-300K (183°E) has a wide contour fixed Ku-band beam covering the Far East, Pacific Ocean waterways and western coast of North America. The satellite is popular for aeronautic and maritime connectivity.

Hispasat/Hispamar
Booth Hall 1 # 1.A39
www.hispasat.com

The **HISPASAT Group** is composed of companies with a foothold in Spain as well as in Latin America, where its Brazilian

affiliate HISPAMAR, sells its services. The Group is a leading Spanish- and Portuguese-language content broadcaster and distributor, including over important direct-to-home television (DTH) and high-definition television (HDTV) digital platforms.

Mission Microwave Technologies
Booth Hall 5 # 5.A62
www.missionmicrowave.com

Mission Microwave Technologies is developing revolutionary Solid State Power Amplifier BUCs to support ground-based, airborne, and space-based applications. Utilizing the latest in semiconductor technology, we have optimized the size, weight, and power (SWaP) for these critical applications while delivering the best possible reliability. Mission Microwave currently offers advanced GaN BUC products at X-Band, Ku-Band, and Ka-Band from 12W to 400W, and sets the "new standard" for performance and reliability.

ND SatCom
Booth Hall 1 # 1.C37
www.ndsatcom.com

At IBC 2019, **ND SatCom** will be highlighting its **SKYWAN 5G** product which features: One compact device for all applications and network roles; Smallest hub on the market; and supports all kinds of topologie.

The SKYWAN **5G** satellite router is a reliable, flexible and versatile satellite communication platform for customer centric networks. It is a bi-directional MF-TDMA plus DVB-S2X system that supports voice, video and data applications in the most bandwidth efficient manner combined with unrivalled real-time performance.

Newtec
Booth Hall 1 # 1.A49
www.newtec.eu

Newtec is specialized is specialized in designing, developing and manufacturing equipment and technologies for satellite communications. We have been an industry pioneer since 1985, setting standards with the most efficient, scalable, and economical technology solutions. Newtec is dedicated to creating new possibilities for the broadcast, consumer and enterprise VSAT, government, cellular backhaul and trunking and mobility, offshore and maritime markets. We are focused on the delivery of the connectivity mix of the future, enabling new technologies that will benefit from the unique capabilities of satellite such as 5G and OTT. We are ready for a future where HTS and new constellations in LEO will play a much greater role in satellite connectivity. New challenges and customer needs offer opportunities to explore new boundaries. This empowers us to work even harder, helping customers to perform at their best. Together, we can make the world a safer, more informed and connected place.

RF Design
Booth Hall 1 # 1.F45
www.rf-design-online.de

RF-Design is specialized in developing, manufacturing and marketing high quality RF equipment, RF distribution and RF-over-Fiber solutions for the international Satellite-, Broadcast- and Broadband communications market. Our product portfolio includes a wide range of Switch Matrix systems, RF-over-Fiber solutions, Splitters/Combiners, Switches/Redundancy Switches, Line Amplifiers, RF/DVB Signal Quality Analyzers and LNB-supply/control systems...perfectly suited for applications in Teleports, Satellite Earth-Stations as well as for Broadcast- and Broadband RF distribution infrastructures. We also have strong capabilities to design and to manufacture custom-made products and solutions for your individual needs. All our products are developed, manufactured, tested and approved in our own facilities in Lorsch/Germany and characterized by high quality, reliability and superior RF performance.

At IBC 2019 we will demonstrate our new Quad RF-over-Fiber system "QLink" along with our new "FlexLink K4 32:32 Switch Matrix" and the innovative "HQ amplifier series" available as single, quad or 1:1 redundant amplifier. We look forward to welcoming you and to talking about your individual RF equipment requirements.

RSCC
Booth Hall 1 # 1.B31
www.rscc.ru

Russian Satellite Communication Company (RSCC) is the Russian GEO satellite operator with global coverage. RSCC provides a full range of communications and broadcasting services via its own terrestrial telecom facilities and satellite constellation; e.g. video distribution and contribution, DTH, DSNG, broadband Internet access, IP trunking and cellular backhaul, maritime mobility, SCADA, enterprise networks connectivity and other. The company operates various regional satellite TV distribution networks and corporate VSAT networks for fixed and mobile customers.

SatService GmbH
Booth Hall 1 # 1.F47
www.satservicegmbh.de

At IBC, **SatService** will be highlightig its sat-nms product. The sat-nms SMU is the unit you were always looking for in your satellite ground station or satellite head-end. It enables you to perform all kind of signal management in one simple to use and flexible unit.

Up to five of the following modules can be hot plugged into one chassis to handle different applications:

•sat-nms LDCI an adjustable line amplifier and DC inserter with L-Band input level monitoring designed for receive applications like LNB DC Insertion.

•sat-nms TMPS is a Transfer Multipurpose Switch with integrated DC inserter, IF input level monitoring, Waveguide switch drivers and automatic switch functionality for applications like LNB redundancy switching.

•sat-nms UMPS is a highly sophisticated Universal Multipurpose Switch with integrated DC inserter, IF input level monitoring and automatic switch functionality designed for satellite receive applications or signal backup switching.

•sat-nms CS24 is a passive splitter/combiner that provides 2 times 1:4 splitting/combining.

Spacebridge
Booth Hall 1 #1.A57
www.spacebridge.com

SpaceBridge Inc. is an established supplier and global market leader in broadband satellite communications technology. The company develops and provides satellite network equipment and services, VSAT HUBs, Terminals for Point-to-Point, Point-to-Multi-Point, and Mesh typologies, as well as SCPC broadcast modems for GEO & NGSO satellite constellations and Cloud-Based managed services.

Terrasat Communications
Booth Hall 1 # 1.F61
www.terrasatinc.com

Terrasat Communications presents the latest state-of-the-art IBUC for Fly-Aways & COTMs; the IBUC 3. The latest in Terrasat tech is now ultra-lightweight, super compact, available up to 40W & comes with a 3-year warranty. All IBUCs allow the operator to customize configurations & manage alarms & sensors for real-time network management and control. IBUC reliability is baked into the IBUC 3 design and verified through intensive individual unit testing.

UHP Networks
Booth Hall 1 # 1.A91
www.uhp.net

UHP Networks is a leading global manufacturer of advanced VSAT networks and systems. Headquartered in Montreal, Canada, the company has over 400 networks and over 40,000 remote terminals in-stalled in 50 countries. Among its cus-tomers are Fortune 500 corporations, major broadcast networks, top-tier US Mobile Network Operators and government agencies. UHP has the industry's first software-defined VSAT router, offering unparalleled processing capability (packets per second, Mbps, TCP sessions) per W of consumed power and superior bandwidth efficiency owing to the industry's most sophisticated TDMA protocol and DVB-S2X signalling. The company won the 2018 VSAT Stellar Award for Best Ground Segment Technology.

Walton Enterprises
Booth Hall 1 # 1.A62
www.de-ice.com

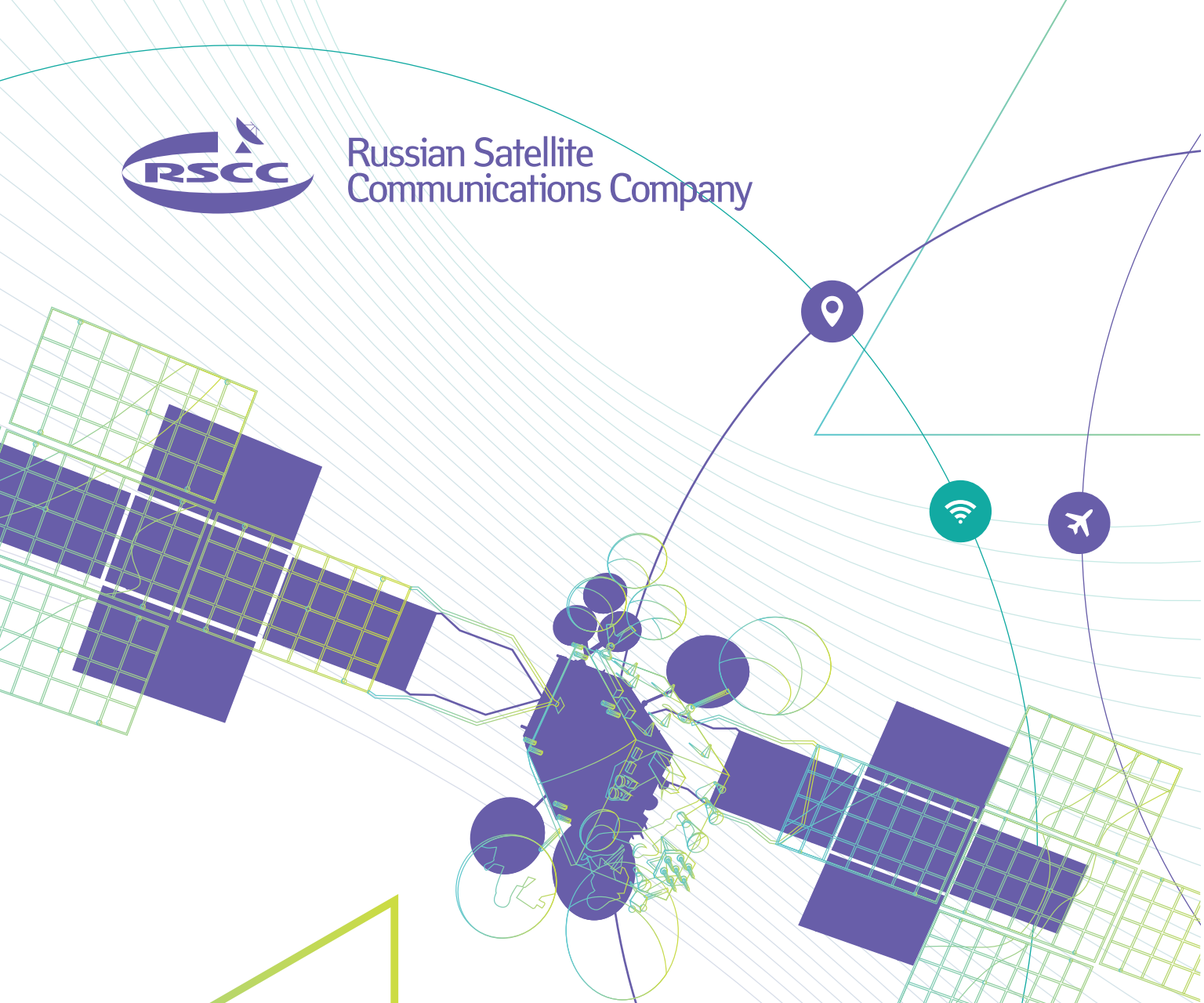
Walton De-Ice, the world's leading designer and manufacturer of satellite earth station antenna (ESA) weather protection solutions, will showcase its all-new Walton ADC-4000 Antenna De-Icing Control System at Satellite. The Walton ADC-4000 makes the operation of Walton hot-air de-icing systems more accurate and efficient than ever, offering potential savings in management and labor overhead for satellite broadcast and head end facilities.

The ADC-4000 Antenna De-Icing Control System adds a new method to actively control the heat within an antenna de-icing enclosure thus allowing for improved control of the antenna surface temperature

Work Microwave
Booth Hall 1 # 1.C51
www.work-microwave.com

WORK Microwave's 3-channel, V-band block upconverter will be on display at IBC. By offering support for higher frequencies, between 47.2 to 51.40 GHz, the upconverter optimizes the use of Ultra High Throughput Satellites (UHTS). Perfect for early laboratory testing, it has already been requested by global satellite operators to support secure, high-performance communications projects. V-band support is available for WORK Microwave's entire range of frequency converters, including IF, block, and tracking. As one of the industry's first SatCom solutions providers to support the full V-band spectrum and the market leader in frequency converters, WORK Microwave leads the industry in helping satellite operators expand their capacity to keep pace with the demanding communications requirements fueled by bandwidth-intensive broadcast and data service.

Russian Satellite
Communications Company



FUTURE SATELLITES FOR DIGITAL FUTURE

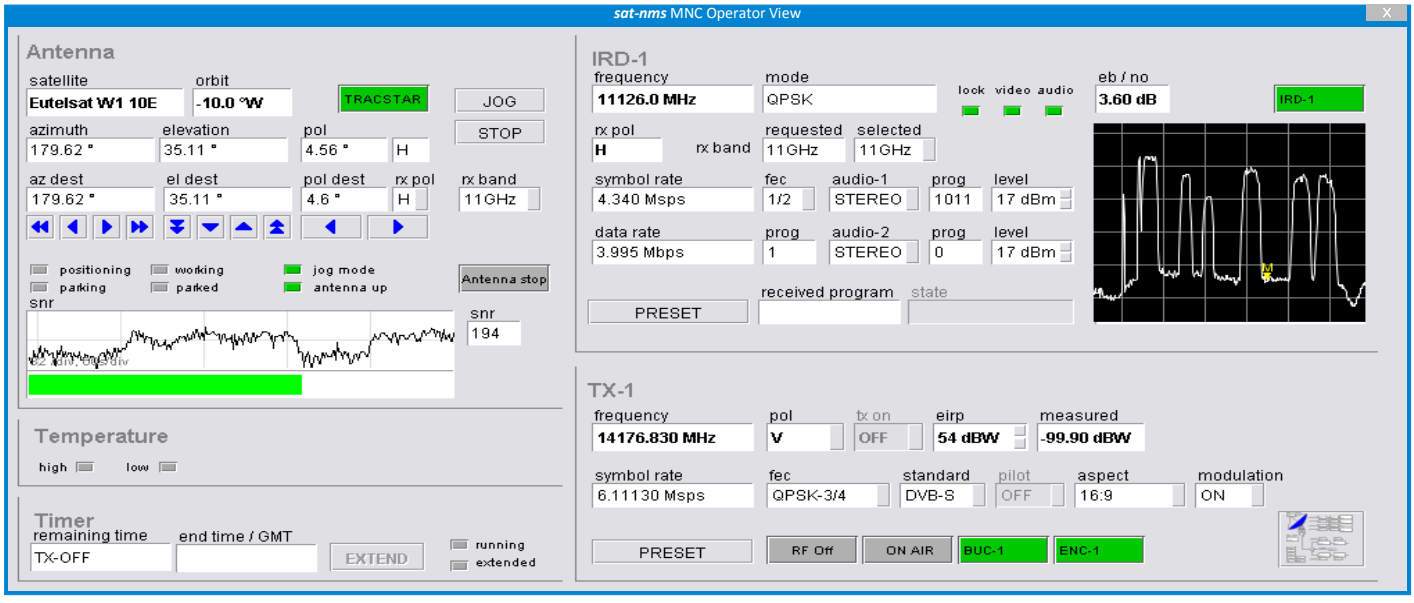
Visit RSCC at IBC

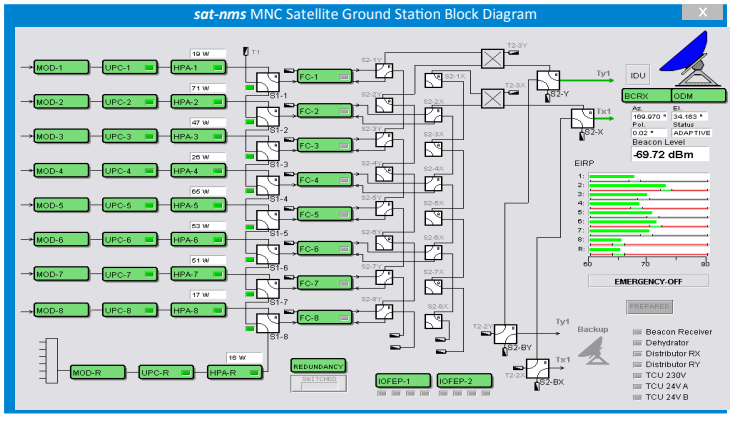
13–17 September, 2019

RAI Amsterdam, stand 1.B31

OPERATORS DO NOT WANT TO SEE BLOCK DIAGRAMS...

... BUT ENGINEERS DO !





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Angels, Arianes and English Roses

by Lou Zacharilla

The uncomfortable co-existence among science, technology and religion is a few centuries old. For a long while the three disciplines tried to stay in their own lane and tried to avoid swerving into the others' lane. But a collision was inevitable. The crash has given us a toxic political and social climate at times, and made us mistrust each of the three disciplines. But it has finally occurred to us – or is at least occurred to those of us in the satellite industry - that we are all on the same road and irreversibly headed in the same direction.

As is typically the case, however, someone needed to create the narrative – or the music – to reveal this.

It was the space and satellite industry.

I never understood why people lower their heads when they pray. Looking up to the heavens seems to be pointing the brain where the real action and joy are residing. Studies show that having your head down, buried in a device, can cause depression and anxiety while raising it can, well, make you feel better.

So that the intention when SSPI launched its "Better Satellite World" campaign www.bettersatelliteworld.com. To enable our industry and those who show the promise to be a part of it to look up and see the Good.

SSPI's UK chapter, with the help of Milbank Law, supported the idea to host a dinner to give visibility to the happy collision of business and social altruism by identifying satellite companies, personalities and organizations whose work literally makes the world a better place.

Mission accomplished.

Through this program and the UK dinner we have allowed the better angels of our nature to stop ducking every time an Ariane whizzes by. We accept that we have the technology that can do mighty good in a world that is often mightily in need of something good.

The benefits to humanity were articulated wonderfully by Karen Bhatia, an executive with New York's Economic Development Corporation during Google's celebration of the Apollo 11 mission in July. At this star-studded event, which included María Fernanda Espinosa Garcés, the president of the UN General Assembly, astronauts Dr. Yvonne Cagel, New York's own Charles Camarda, Overview Effect author Frank and XPRIZE CEO Anousheh Ansari and many, many others, Ms Bhatia eloquently scrolled down a long list of technologies that have emerged from the Apollo 11 program and subsequent NASA missions. The short list includes camera phones, wireless headsets, scratch resistant lenses, CAT scans, LEDs, water purification systems and smoke detectors. Although in the field of economic development for America's largest city, Karen said that her greatest inspiration to do her current work came after she shook hands with astronaut Buzz Aldrin, the second of our species to step on the dusty lunar surface.

SSPI was given an Achievement Award that night for our campaign for its work. I accepted on behalf of SSPI's board of directors, members, chapters and management.

The night was reminiscent of the evenings in London when we celebrate our Better Satellite World Award recipients each December. It is rare that an industry has a mission that by its nature includes making the world better.

In the Catholic tradition in which I was raised there was a mandate that was both stated and implied. It was to try to leave the world, which somehow has "fallen," with the tools and inspiration to rise again. To make it better by a millimeter or two than we found it and to create a path for others to ascend.

It's a big ask but Creation works in mysterious ways. It is satellites and the new manifest destiny of all of us reaching out into the universe by way of a commercialization and innovation that is guiding us on this most unusual marriage of the angels and the Arianes, Falcons and New Shepards.

Making the world better also implies a mandate to make it more beautiful. And the same instincts are at work through innovators of all kinds. I am thinking of the great British innovator David Austin.

"Who," you ask, "is David Austin?"

The English will know that he is the great horticulturist who spent most of his 92 years chasing the creation of a better world through the ideal rose. Along the way this self-taught founder of David Austin Roses created over 200 hybrids of the world's flower of romance and affection, distinguishable by their broad color range, fragrances and blossoms.

Mr. Austion died in 2018 but once said something that, like Buzz Aldrin's handshake with Karen, has been planted in me like his Charles Darwin yellow cupped bloom hybrid.

"I was never influenced by what other people said or thought. I'm slightly dyslexic and I think I make connections that others do not."

I can think of no better phrase to describe our efforts, as an industry, to enable this preposterous notion that we can continue to make a better world by joining the poetic to the technical.

"...I was never influenced by what other people said or thought. I'm slightlydyslexic and I think I make connections that others do not..."

-David Austin

English Horticulturist

NOTES:

You have until September 30 to send in your nomination for the Better Satellite World awards. https://www.sspi.org/cpages/better-satellite-world-awards-dinner-demo

And do register for the 2 December dinner in London. See https://uk.sspi.org/events/the-better-satellite-world-awards-2018 for details.

And if you are in New York on September 27, please come on board the Intrepid Air & Space Museum (at no cost), for the first of a series of panels on "Innovators." Yours truly has been invited to moderate a panel on how our industry and New York is becoming "the New Houston." https://www.sspi.org/events/innovators-new-york-the-new-huston

Lou Zacharilla is the Director of Innovation and Development of the Space and Satellite Professionals International (SSPI). He can be reached at: LZacharilla@sspi.org

FEATURE

A Holistic Approach to Teleport Services

by Virgil Labrador

In the competitive and rapidly changing teleport business, one company is making waves and gaining substantial market share in a relatively short time through its holistic approach to providing services. iKO Media Group (iKOMG) is a boutique end-to-end media service partner for broadcasters and content owners. They provide tailor-made solutions focused on customer needs through dedicated service to a wide range of global and local networks and a keen ability to offer the best SLA for mid-size networks. The company provides a single, complete-end-to-end solution or as scalable service offering.

iKOMG operates an automated, high-capacity facility for content management services. Their services enable their customers to easily expand the number of channels they broadcast. They offer customers flexible packages, which they deliver with a high degree of redundancy and availability.

This approach allows iKOMG to deliver effective solutions customized to specific budgets and requirements without compromising on quality of service. As a trusted partner to dozens of global and local networks, iKOMG is identified with expert knowledge, dedicated service and professionalism. iKOMG is committed to operating its business with the goal of creating value for all stakeholders. The company's sustainability strategy focuses on social, environmental, and economic responsibility.

State-of-the-Art Facilities

iKOMG operates a state of the art teleport in Rome, Italy containing over 20 satellite dishes for receiving/transmitting, ranging in size range from 0.9m-4m in diameter that uplink/downlink from major satellites in orbital positions span from 80°E-45°W. I had the privilege of visiting their facility and was impressed with how the teleport was fully automated and interconnected. The gtt POP with main facilities for fiber and power management is located in the very next building on southeast side of their offices. Cable duct are are provided between the three areas (gtt POP/iKO indoor/iKO outdoor).

"iKOMG has been fastidious in the way it has responded to the specific requirements of each individual customer and designed solutions that are bespoke and deliver to those needs. The company is unique in that it offers the benefits of reliable distribution using all major satellites with a boutique approach to customers' needs and our unique value added services approach," said David Treadway, Chairman of the Board of iKOMG.

To differentiate itself from other teleports, iKOMG offers a suite of value-added services to its customers ranging from simple to bespoke playout solutions, complex content management, OTT and streaming services and using the latest technologies and platforms to reach specific audiences. "No other media and broadcast services company can match the range and competitive propositions that iKOMG offers. It's not just about distribution but about how the content is delivered and on which platforms," added Treadway.

iKOMG

DELIVERING YOUR CONTENT GLOBALLY

A Complete Suite Of Services To Meet Your Needs

We provide innovative and dedicated broadcasting and content distribution solutions that deliver real-time value to customers around the globe.

sales@ikomg.com

www.ikomg.com

Playout Solutions

One of the innovative services that the company provides is iKOFLiX--an OTT platform for media distribution distribute their clients' audio, video and other media services directly to their customers over the internet via streaming media as a standalone product.

iKOFlow is another service they provide to customers to ensure a back up of their clients' networks. With iKOFlow, clients can upload five hours of c TV channel content with the with logo and playlist – which can be updated anytime. Accessible from anywhere and any device (PC, Phone, iPad), iKOFlow takes only five minutes to setup.

iKOMG also collaborates with ViXi to provide customized ViXi TV themes which are like WordPress or WIX themes, just for TV. Each theme is customized for every TV screen with any remote control navigation. Pick a theme, place your content and publish and done – you are live in less than a hour! iKOMG sorts out all device complexity such as remote control adaption, different browser behavior and high performance UX.

Customized Solutions

When a world renowned French music channel group needed a solution to launch an existing channel for the Latin American market earlier this year and another channel for Brazil later this year, iKOMG provided them with a cost-effective solution. Both channels are HD channels of 5.5mbps each. The chanels are encypted using Viaccess 6.0. The channels are picked up by fiber from Paris to iKOMG's teleport in Rome. from where they areuplinked to the IS 11 satellite to cover Latin America. iKOMG provides iKOFlow solution to secure the source of the playout in case of failure coming from Paris.

A key to iKOMG's success is the approach they take in serving their clients. "iKOMG believes that it is not enough just to offer uplink, capacity and downlink services. Channels need more than simply point to point distribution and the suite of services that we offer our customers allows them to take advantage of the full market opportunity in video services delivery. But those services are tailored to the customer's needs so that they maximise their channel and audience opportunities and potential," said Treadway. "Teleports are a gateway to distribution and audiences but it is as important to offer solutions that address the end platform and how the channel and content is consumed as it is to get it there. Traditional broadcast focused teleports are usually associated with distribution via satellite, but in today's marketplace this is just one means of distribution and customers often now require hybrid solutions both for distribution and delivery to specific platforms. It is important to be able to offer the range and breadth of services that meet those customer requirements. We believe that we have to be flexible and innovative to stay competitive and are highly confident of our ability to continue to deliver business growth by doing just that," he added.

The antenna farm of iKOMG's state-of-the-art teleport in Rome, Italy.

Virgil Labrador is the Editor-in-Chief of Los Angeles, California-based Satellite Markets and Research which publishes a web portal on the satellite industry www.satellitemarkets.com, the monthly Satellite Executive Briefing magazine and occasional industry reports called MarketBriefs. Virgil is one of the few trade journalists who has a proven track record working in the commercial satellite industry. He worked as a senior executive for a teleport in Singapore, the Asia Broadcast Center, then-owned by the US broadcasting company CBS. He has co-authored two books on the history of satellite communications and satellite technology. He holds a Master's in Communications Management from the University of Southern California (USC). He can be reached at virgil@satellitemarkets.com

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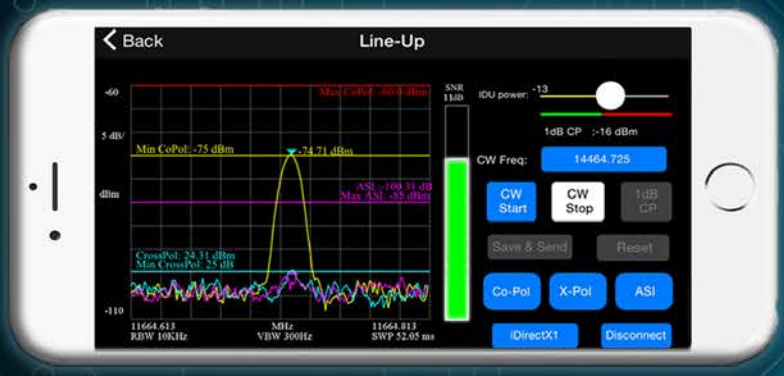

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The Pacific Endeavor HADR Training Imperative

by Martin Jarrold

I sit down to write this column within days of having returned from a GVF mission to the South Pacific, to Papua New Guinea. There, we – Riaz Lamak, Lead in GVF's Benchmarking, Validation and High Availabilty Disaster Recovery (HADR) initiatives, and I – were hosted by both the United States Department of Defense Indo-Pacific Command and the PNG Defense Force under the 'Multinational Communications Interoperability Program' (MCIP). Port Moresby, PNG's capital, was the latest location to hold the annual MCIP event Pacific Endeavor, focusing on disaster response preparation and humanitarian assistance delivery by the military, as first responders, in HADR situations. (First responder communities typically comprise military forces as well as United Nations Agencies and NGOs.)

The role of satellite communications in HADR is not limited nor confined to news reporting, or to broadcasting appeals for monetary aid. It is an integral and mission-critical foundation to the work of organizing and delivering humanitarian aid and resources, whether in the first 24-48 hour period of a response – supporting supply logistics, providing urgent medical care and coordination of relief efforts – or over the longer-term period of post-disaster recovery and re-building. Satellite communications are key to the success of assistance programs in bringing communications to remote areas – which are so often the most badly affected by disasters – or bringing effective functional communications to replace other communications technologies and platforms that have been rendered ineffective or even destroyed.

I intend to cover details of the 2019 event in a later column, but here I offer an overview of previous Pacific Endeavor programs, those in the event cycle which have featured, within the overall program, a highly detailed "information sharing" track called Satcom Endeavor. These tracks – the most recent featuring in the 2017 Pacific Endeavor held in San Jose, California, and next to feature in the Colombo, Sri Lanka, program in 2020 – are dedicated to extending the understanding of, and broadening the experience of directly using, the latest satellite communications systems and solutions amongst the military first responders of the 27 nations of MCIP.

The Satcom Endeavor element – highly successful in extending the facilitation of collaboration between military first responders and leading providers of satellite communication systems and services – of the Pacific Endeavor 2017 program was a key opportunity for "Senior Communicators" – typically senior ranking officers from army, navy and air force, the key decision-makers from communications and signals divisions, and other officials – from participating nations to experience the latest technological solutions and familiarize themselves with systems, products, and services offered by the satellite industry – specifically GVF Members – thereby enhancing their knowledge and building organizational capacity to strengthen disaster preparedness through the use of space-based broadband solutions.

Pacific Endeavor 2020 will be the next important opportunity for GVF Member organizations to bring their solutions and presentation of example case studies and best practices before the MCIP audience of "Senior Communicators". The program for Sri Lanka is subject to MCIP decisions at future preparatory meetings prior to the Colombo gathering next August, but the activities which may be proposed by GVF will potentially include a combination of: Hands-on practical sessions & presentation of new technology along with selected unique solutions which are key to HADR preparedness; and, a field-training exercise; together with Mentored online training,

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and Classroom-based training.

As a result of Riaz Lamak's efforts directing all previous Satcom Endeavor programs, there is now a rich resource of GVF Training-certified officials in each of the MCIP countries, and MCIP has created a registry of these skilled human resources. This database is available to each of the nations for augmenting their resources and to facilitate quick deployment of disaster relief initiatives.

The mechanism of Pacific Endeavor is just one example of how the GVF's training resource portfolio and capacity building is addressing the needs of the humanitarian assistance and disaster response community. GVF Training is developing a range of disaster preparedness training courses to enhance its already highly developed catalog of essential satcoms training certification. These training resources are recognized as the de facto global standard for the humanitarian assistance and disaster response programs of all the United Nations agencies that deliver recovery efforts into the field. Students undertaking these courses learn, practice, and are evaluated on their knowledge and skills with online, self-paced, interactive, simulator driven training modules.

Providing augmented capacity building to the training content – the interactive simulations which are created and administered online by SatProf, Inc. – are classroom sessions with students working on the online courses and mentored on-site by Mahdi Bagh Computers Private Limited (MBC) under the supervision of an instructor or facilitator who can assist with the learning process, and also provide the Hands-on-Skills-Tests (HOST) required for final trainee certification. Further classroom sessions – managed by Riaz Lamak of MBC – provide Advanced Satcoms System Engineering Mentored Classroom Training.

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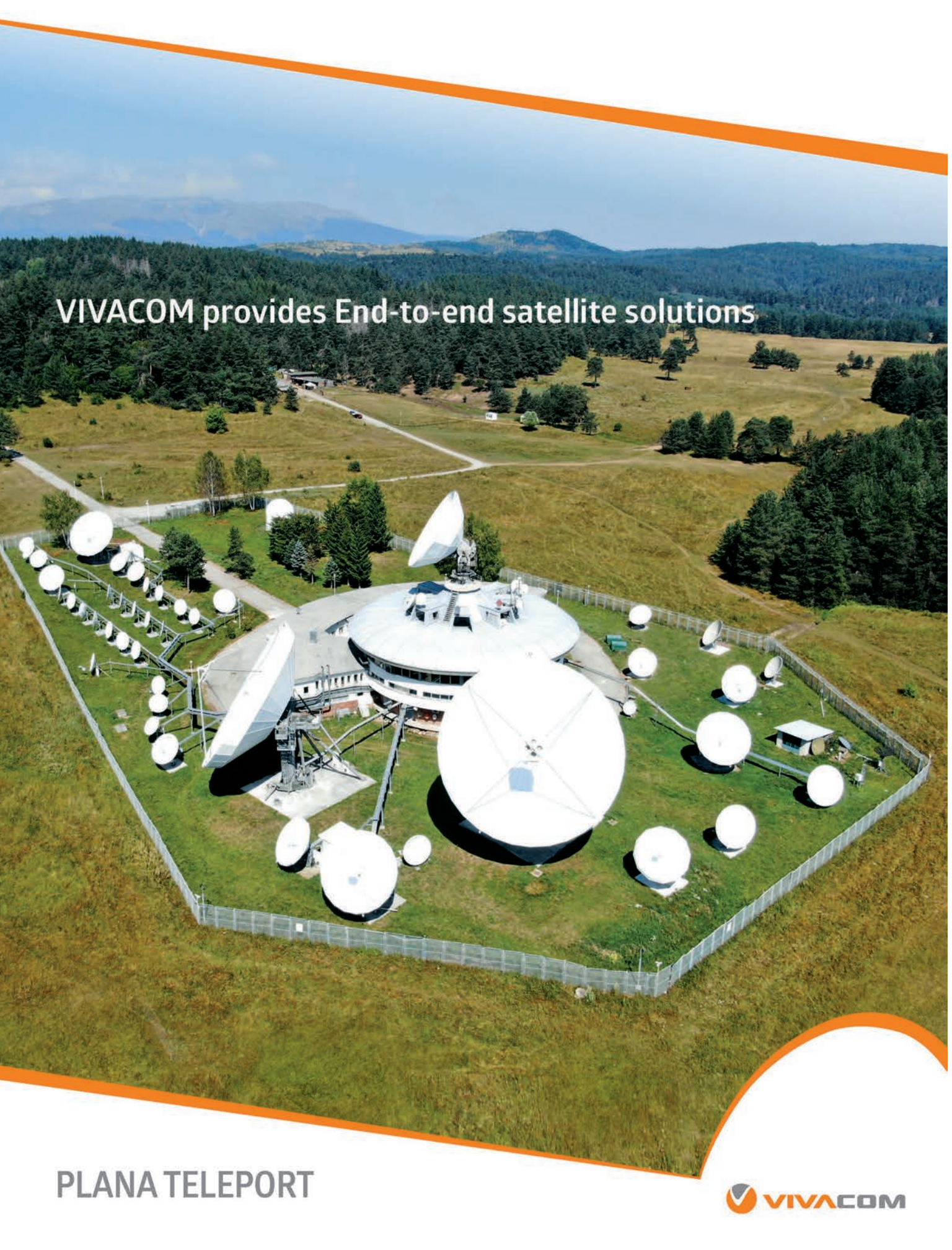

PLANA TELEPORT

VIVACOM

EXECUTIVE SPOTLIGHT

Vladimir Rangelov, Senior Manager Broadcast Services, VIVACOM

The teleport business is changing rapidly. To a get an insight on the dynamics of this vital segment of the satellite industry, *Satellite Executive Briefing* spoke with Vladimir Rangelov, Senior Manager, Broadcast Services at VIVACOM--Bulgaria's largest media company that operates a teleport, among its other businesses.

How is your location in Bulgaria beneficial to your clients? What advantages and benefits can you offer?

Bulgaria is on the crossroads between Europe and Asia. The geographical location of Plana Teleport allows us to provide uplink and downlink services via GEO satellites from 40° West to 90° East. We provide access to one of the most popular satellite positions covering Europe, Africa, Asia and Latin America. VIVACOM has pointed antennas to satellite positions and beams which are not accessible from Central and Western Europe and Americas. We can easily add new uplink or downlink carriers and provide the signal at our major PoP's in Europe like Frankfurt, London, Paris and many others.

The ground station is located in an especially selected area with minimal rainfalls and excellent protection against electromagnetic interference. This is extremely important for the growing Ka band transmissions, so we're in excellent position to offer best location for such Earth stations and gateways. But the most important advantage is that we're providing the right service fast, on time. We exceed our customer expectations and we deliver more, at optimized cost for our clients with undoubted service reliability.

The teleport business is a very competitive sector, what differentiates your company from other teleports?

Three points – fast reaction, excellent customer support, reliability. Customers optimize their costs using our services. We invest long term in satellite business and we have excellent relationship with our partners and clients. We're constantly analyzing the market and we know exactly where to invest and how to develop our service portfolio.

VIVACOM has more than 40 years' experience in satellite communications and we have dedicated highly motivated team developing and supporting the business.

What do you see as the key opportunities for your company and how do you plan to make the most of these opportunities?

Currently our main teleport business is media broadcasting and a lot of major media groups like Disney, FOX, Viasat and Viacom has already recognized VIVACOM as

a reliable and trusted partner. VIVACOM uplink more than 200 TV and radio channels for Europe, Africa and Latin America. We also provide Play out solutions as bundle with the satellite transmission services.

As some big projects in LEO and GEO are coming, we decide to invest in acquiring additional land for antenna hosting, we also upgraded the power supply and connectivity of the teleport. We have been selected by Eutelsat for hosting one of their new Ka band gateways. VIVACOM also invested in DVB-S2x iDirect hub providing regional Maritime VSAT coverage, where we see growing demand.

VIVACOM also hosts S/X band LEO earth station for nano satellites for our partner Endurosat – a Bulgarian company, manufacturing cubesats. Together, we're providing End-to-End LEO Ground Station Services so we are prepared to face the future. There are a lot of projects that are expected to be completed in the next couple of years and Plana Teleport is the perfect location for hosting the LEO gateway stations.

What are your targets in the next few years? How would you like to see you company in the next few years?

It's the seventh year of growth for our wholesale satellite business. Last year we have 15% year on year revenue increase which is very satisfying result. We'll continue to provide high quality reliable services to our customers and we'll continue to invest in the right projects in the challenging satellite business. Our team is passionate doing that.

Board and Management Changes at Speedcast

London, UK, Aug. 26, 2019 — Speedcast is implementing board renewal process and management changes. Russell Reynolds was appointed by the board of Speedcast in July 2019 to undertake a formal global search process for additional non-executive directors as part of Speedcast's board renewal process.

As part of this process, the company has determined that two current non-executive directors would resign and four new non-executive directors would be appointed. In line with this approach, the company announced the following initial changes to its Board:

John Mackay has resigned as chairman, effective immediately but will remain on the board as a non-executive Director until 30 September 2019 to ensure an orderly transition to the new chairman

Stephe Wilks has been appointed to the board and elected chairman, effective immediately.

It is anticipated that another director will retire from the board once a suitable appointment is made.

In addition to the Board changes, Speedcast also advised that Clive Cuthell, the company's chief financial officer, has resigned by way of mutual agreement. Cuthell will continue as CFO until the end of this year to allow for the orderly transition to a new CFO.

Theiss Named VP of Space Mission Company

Albuquerque, New Mexico, Aug. 20, 2019 — Metis Technology Solutions has named James Theiss as its first vice president, Space and IRAD Programs. Theiss, age 49, is a former U.S. Air Force officer who is driving the successful performance of this fast-growing space mission support company.

James Theiss

Theiss currently manages Metis work at several NASA centers and at the U.S. Air Force Material Command and the Air Force Research Laboratory (AFRL). He also oversees the company's research and development activity at its Albuquerque, New Mexico facility, which is performing innovative software projects for cybersecurity and flight safety funded by both the U.S. Department of Defense and NASA.

Jim was previously space division manager for Metis, which he joined in 2016 after retiring as a Lt. Colonel in the U.S. Air Force. As division manager he provided day-to-day management of three NASA projects which provide support at the NASA Jet Propulsion Laboratory, NASA Ames and for the NASA Goddard Space Flight Center at its White Sands Test Facility. He also managed two projects for the U.S. Air Force including support for Air Force Material Command KC-46 Aerial Refueling Tanker, and AFRL Space Vehicles Directorate Engineering and Integration.

Theiss, who is an AIAA senior member, has a Bachelor of Science degree in Aerospace Engineering from Embry-Riddle Aeronautical University and a Master of Arts in Military Operational Art from Air University.

Fernandez-Campon Promoted to Tedial CTO

Malaga, Spain, Aug. 14, 2019 — Tedial, an independent MAM technology solutions specialist, has announced that Julian Fernandez-Campon has been promoted to chief technology officer, effective immediately.

In this new role, Fernandez-Campon will be responsible for overseeing R&D, operations and customer support, working closely with the CSO/CMO (chief sales & marketing officer), and CFO (chief financial officer) to ensure that the company's strategy aligns with industry changes and market trends.

Fernandez-Campon

Fernandez-Campon has been with Tedial since it was founded in 2001 where his contributions have had a major impact on all aspects of the company's products, solutions design and platform architecture.

Fernandez-Campon's strong background in Computer Science and his master's degree in Telecommunications and Robotics serve as the foundation for his continuously expanding knowledge base and expertise in new technologies.

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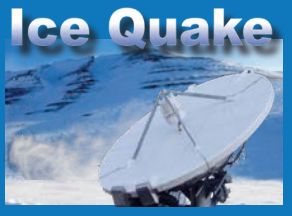

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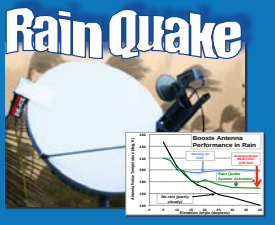
Rain Quake



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The Satellite Markets 20 Index™

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Eutelsat Communications S.A.	ETL.PA	15.95	14.80	23.11
APT Satellite Holdings Limited	1045.HK	2.65	2.47	3.80
Inmarsat Plc	ISAT.L	608.00	355.00	612.60
SES S.A.	SES.F	13.78	12.52	20.81
Satellite Manufacturers				
The Boeing Company	BA	354.42	292.47	446.01
Maxar Technologies	MAXR	7.28	3.83	37.71
Lockheed Martin Corporation	LMT	384.69	241.18	386.93
OHB SE	OHB.DE	31.95	28.50	38.20
Honeywell International Inc.	HON	163.53	123.48	178.47
Equipment Manufacturers				
C-Com Satellite Systems Inc.	CMI.V	1.45	0.99	1.96
Comtech Telecommunications Corp.	CMTL	26.51	20.95	36.94
Harris Corporation	HRS			
ViaSat Inc.	VSAT	77.73	55.93	97.31
Gilat Satellite Networks Ltd.	GILT	7.97	7.60	10.74
Service Providers				
DISH Network Corporation	DISH	32.85	23.22	44.66
Globalstar Inc.	GSAT	0.38	0.29	0.73
Orbcomm Inc.	ORBC	4.53	4.42	11.25
Sirius XM Holdings Inc.	SIRI	6.16	5.23	7.25
Speedcast International	SDA.AX	1.16	0.68	4.97

The Satellite Markets 20 Index™ is a composite of 20 publicly-traded satellite companies worldwide with five companies representing each major market segment of the industry: satellite operators; satellite manufacturers; equipment manufacturers; and service providers. The base data for the Satellite Markets Index is January 2, 2008 - the first day of operation for Satellite Markets and Research. The Index equals 1,000. The Satellite Markets Index™ provides an investment benchmark to gauge the overall health of the satellite industry.

INDEX	Index Value Sept. 3, 2019
Satellite Markets 20 Index™	2,645.76
S & P 500	2,906.27

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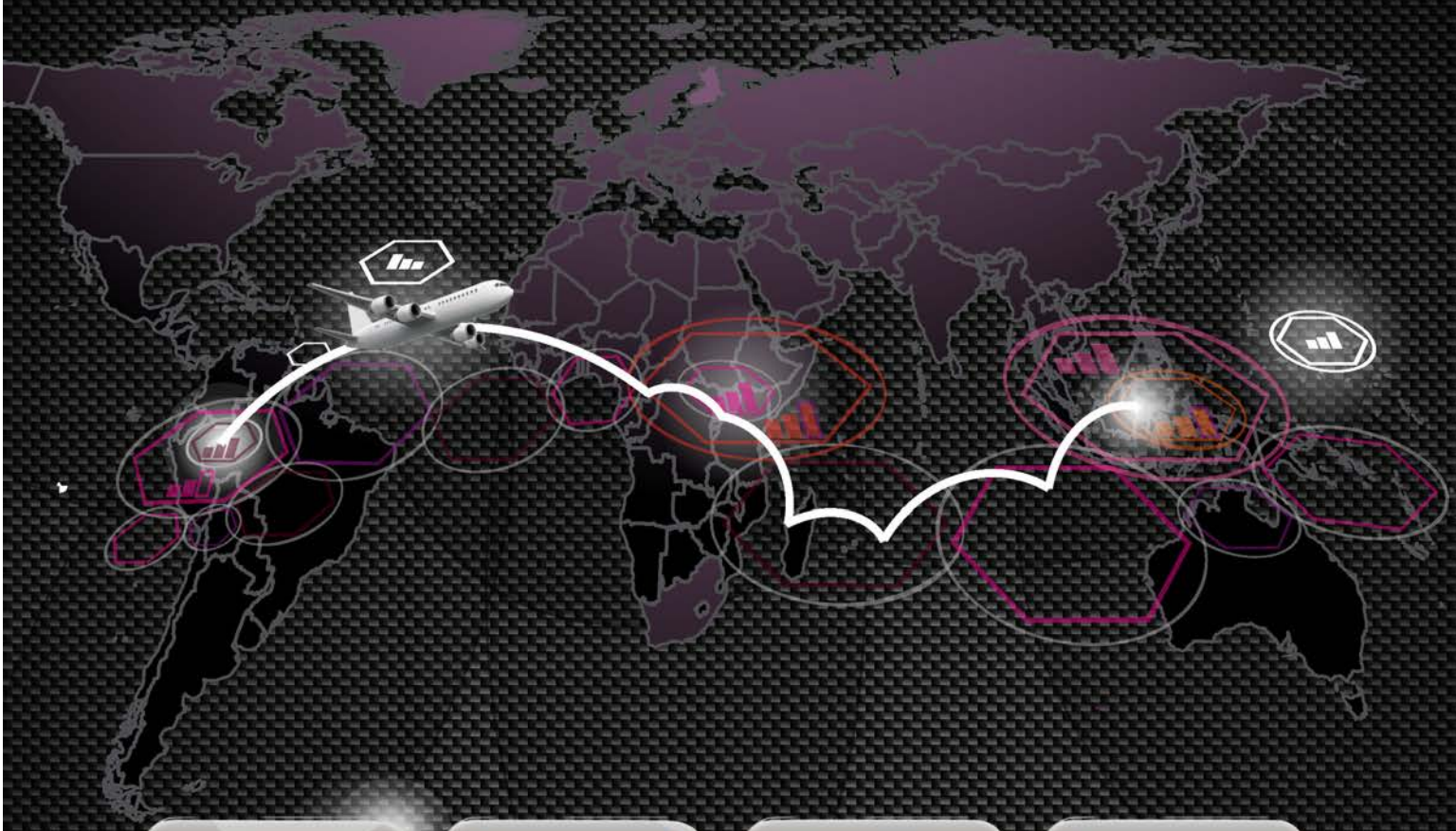

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