

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

The African Satellite Market

by Peter Galace

During the past ten years, Africa, the second-largest continent in terms of size and population after Asia, has made great strides in improving its telecommunications infrastructure through submarine fiber cables landing on both the African Eastern and Western coastlines. Today, there are at least 14 operational, major submarine cables in sub-Saharan Africa, providing about 70 Tbit/s of design capacity and over 5.825 Tbit/s of lit, fully available capacity. This is more than double its international bandwidth of only 3 Tbps mark in December 2014. What's more, a number of new submarine cables are expected to



land later in 2018 and into 2019, with local hubs at Djibouti, Angola and Nigeria, further increasing Africa's capacity.

According to the Africa Telecom Transmission Map published by Hamilton Research the volume of intra-regional traffic backhauled to submarine cables increased to 248 Gbps in December 2016, a 65% growth compared to 150 Gbps in 2015. The continued expansion of terrestrial transmission networks is bringing additional countries, regions, cities and towns within reach of fiber networks for the first time. It added that in June 2017 the amount of operational fiber optic network reached 820,397-km, compared to 412,729-km in

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The African Market



We are nearing the end of the year and our trade show circuit goes full circle when we attend Africom in Cape Town, South Africa this month. Every year, we go to every continent and cover the key developments and trends in the global satellite industry in every region from North and South America, Europe, the Middle East, Asia and finally Africa. We really live the maxim of thinking global and acting locally.

The African market continues to grow as expounded in our cover story this month by our Associate Editor, Peter Galace. Despite the challenges and competition from terrestrial services, satellite companies are still expanding their presence in the region. Not the least of which are upcoming LEO and MEO constellations which will have a strong footprint in Africa. Demand is growing for services, particularly in cellular backhaul, broadband and mobile applications. It's a region rife with opportunities.

See you all at Africom in Cape Town from November 13-15.

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African Satellite Market

... from page 1

2012. In June 2017, 52.1% of the population in Sub-Saharan Africa (522 million) was within a 25-km range of an operational fiber optic network node.

But while coastal countries of Africa like South Africa, Kenya, and Namibia are benefitting largely from the ongoing deployment of more submarine fibers, existing communication infrastructure in African hinterlands remains grossly inadequate. ITU sees the need to develop national, regional and sub-regional carrier of carriers and digital links with cross-border inter-connectivity, which satellites can easily provide. Out of Africa's 55 countries, 16 of them, such as Botswana, Burkina Faso, Burundi, Central African Republic, Chad, and Ethiopia, are landlocked, posing a big challenge in connecting them to the world. Thus, there will continue to be a big demand for a robust infrastructure built in and around African landlocked countries to address the large unmet demand for ICT services that could be brought via communications satellites.

The efforts aimed at increasing the use of ICTs and developing broadband penetration are crucial to augmenting Africa's economic productivity and GDP growth. In March 2013, Africa was identified as the world's poorest inhabited continent: Africa's entire combined GDP is barely a third of the United States' GDP. However, the World Bank expects that most African countries will reach "middle income" status (defined as at least

US\$1,000 per person a year) by 2025 if current growth rates continue. World Bank forecasts economic growth in Sub-Saharan Africa to recover steadily and is forecasted to pick up to 3.1% in 2018 and to firm to an average of 3.6% in 2019–20, due largely to the anticipated recovery in the oil sector and continued challenges in the non-oil industrial sectors, especially in Nigeria.

Positive Outlook for Africa

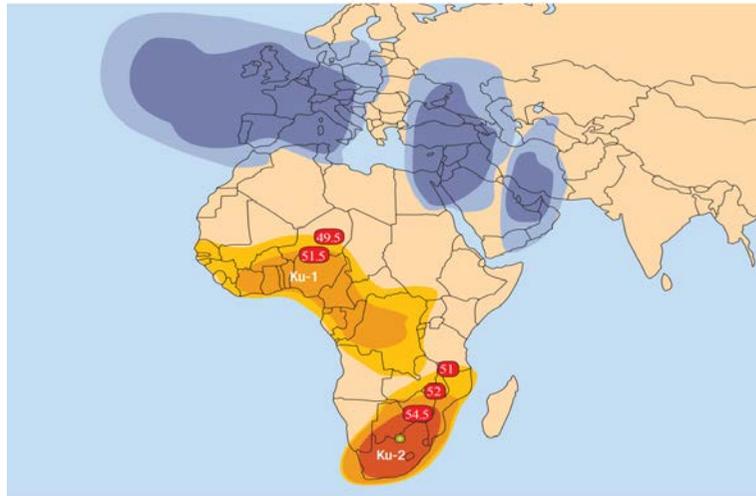
Even as Africa's telecom infrastructures are growing, it's connectivity to the world remains grim, but this also means plenty of room for growth.

Today, Africa only has 35.2% Internet penetration, or roughly 453 million of its 1.25 billion on the Internet; or roughly 797 million without Internet. Mobile adoption in the region has grown rapidly in recent years. Overall subscriber penetration reached

44% in 2017, up from just 25% at the start of this decade, but still way below the global average of 66%. According to gsma.com, the subscriber base in the region totaled 444 million, equivalent to around 9% of subscribers globally. The regional subscriber base will grow at a CAGR of 4.8% for the period 2017-2022, more than the global growth rate over the same period.

Africa and the Middle East (AME) pay-TV household penetration is expected to outpace all other major regions between 2017 and 2022, increasing from 16% in 2017 to 23.2% in 2022, says GlobalData, a data and analytics company. According to its report: 'Pay-TV Market Trends and Opportunities in Africa & the Middle East', the AME's pay-TV market is relatively underdeveloped but is growing rapidly and its pay-TV penetration in 2017 fell substantially below the

AMOS 17 / Africa Ku-band Beams



Spacecom's AMOS-17 is scheduled to be launched in the second quarter of 2019. It will be a state-of-the-art multi-band high-throughput satellite, utilizing Boeing's advanced digital processor platform. It will have a combination of broad regional beams and high throughput spot beams to maximize throughput and spectral efficiency. Credit: Spacecom



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global average of 54.4%.

Because of these trends, there is indeed a large potential for growth. Baker McKenzie's Global Transaction Forecast, developed in association with Oxford Economics, mergers and acquisitions in the tech and telecoms sector in Africa and the Middle East was valued at US\$1.2 billion in 2017. This is predicted to increase to US\$5.9 billion in 2018 and a further US\$5.9 billion in 2019, before decreasing to US\$3.9 billion in 2020.

The report says a more positive global economic outlook, the expansion of technology across industries, investment from emerging markets, and strong corporate balance sheets are the key factors in driving investment in tech M&A around the world, including in Africa.

"Africa's growing telecoms infrastructure and access to online services and platforms continue to improve access to the online economy. Increased local demand for innovative products, services and solutions drives offshore telecommunications and technology companies to target opportunities in Africa," says Darryl Bernstein, head of the Technology, Media and Telecommunications (TMT) Practice at Baker McKenzie in Johannesburg, South Africa.

Fueling Africa's growth is the continued surge in commodity prices, promising great returns for Africa's oil producing nations, such as Nigeria, Angola, Algeria, Egypt and Libya. The recovery of the oil industry in the third quarter of 2018, as well as continued diversity and geographical expansions in oil and gas, banking,

mining and government networks will, therefore, continue. Africa's long-term growth is seemingly assured as reflected in interrelated social and demographic changes that create new domestic engines of growth. Key among these are increasing urbanization, an expanding labor force, and the rise of the middle-class African consumer, which all require improved infrastructure services from all fronts. No wonder, demand for better telecom services continues to rise rapidly.

Thus, mobile and satellite traffic will continue to soar, requiring even more bandwidth. Future growth could also be attributed to the transition to digital TV, which has barely begun in some countries. New enterprise hot spots are evolving, particularly in East and West Africa, in addition to historically strong VSAT markets like South Africa, Nigeria, Angola, Kenya and Tanzania.

All these developments will also mean High throughput satellites (HTS) that offer better broadband access for consumers and enterprises, and provide trunking opportunities for landlocked countries where fiber is limited and unreliable.

But the challenge is not solely in connecting large portions of the African population. Getting infrastructure to parts of Africa is a daunting physical challenge because of the wide differences in geographical terrain. Also, Africa's 634 million people are without electricity, the majority of whom live in sub-Saharan Africa, and literacy rate is only pegged at around 64.3%, meaning more than 1 in 3 adults cannot read. Then, there is the regulatory hurdle to contend with.

Satellite Operators Expanding in Africa

"Africa is still a growing market. We see opportunities in cellular backhaul, mobility and even in broadcasting services," said Jacob Keret, Senior VP of Amos Spacecom. Spacecom will be launching AMOS 17 in early 2019. It will be a state-of-the-art multi-band high-throughput satellite, utilizing Boeing's advanced digital processor platform, that will provide reliable and flexible satellite solutions and offer a significant competitive advantage for our customers. It will have a combination of broad regional beams and high throughput spot beams to maximize throughput and spectral efficiency. The combination of the inherent flexibility of the digital platform with the mix of fixed and steerable beams ensures fast response to changing customers' needs.

Intelsat is operating 24 satellites in Africa with three of the four satellites it launched in the last year cover the continent. Brian Jakins, the satellite operator's regional VP for Africa, reports in the Intelsat website, that the demand is there with Africa seeing a "huge upsurge" in the telecoms market as a whole over the last few years.

"There are a host of applications and services used in the African market. From a broadband perspective there is a lot of growth from a cell backhaul perspective, where mobile networks are trying to offload a load of traffic from their network to maintain their voice services, putting data on a separate route. That's one of the biggest areas we see in the African market.

“Consumer broadband is also growing significantly, and then trunking. Obviously, that is declining with the advent of under-sea cables, but you still have your traditional voice telephony in remote locations and then you also have corporate networks. It is a tried and tested method in remote locations,” Jakin says.

In September this year, Intelsat and Azercosmos, the national satellite operator of Azerbaijan, successfully launched Intelsat 38 and Azerspace-2 satellite aboard an Ariane 5 launch vehicle from the Guiana Space Center in Kourou, French Guiana.

Intelsat 38 is a Ku-band satellite to be placed at the 45°E orbital location and will replace Intelsat 12 and host Direct-to-Home (DTH) platforms for Central and Eastern Europe as well as the Asia-Pacific region. Intelsat 38 will also provide connectivity for corporate networks and government applications in Africa. It will provide fast, resilient and redundant broadband. Intelsat 38 and Azercosmos-2 are expected to enter into service in the first quarter of 2019.

Azerspace-2 will help Azercosmos meet the growing demand for DTH television, government, and network services in Europe, Central and South Asia, the Middle East and Sub-Saharan Africa. The satellite will also provide high power Ku-band connectivity to the African continent from 45 degrees East. Azerspace-2 is ideally designed for smaller antennas and will deliver cross connectivity between East Africa, West Africa and Central Africa, Europe and Central Asia.



Again in October this year, Intelsat launched Q-KON, a multiple high-speed broadband services to rapidly deploy high-quality broadband that enables new services and applications for smaller businesses throughout Botswana, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

Q-KON's offering will incorporate services from Intelsat 33e, one of Intelsat's next generation high-throughput satellites, and utilize IntelsatOne Flex for Enterprise, a managed wholesale service that removes the complexities and improves the economics of network expansion.

Another leading satellite operator, SES, says it provides coverage over Africa via more than 10 GEO satellites and the entire O3b fleet of MEO satellites. The company has offices in Johannesburg, Accra, Lagos and Addis Ababa, and provides local teams on the ground provide satellite communications solutions to internet service providers, mobile and fixed network operators, businesses and governments across the continent.

On March 9 this year, SES successfully launched four new

Satellite operators see opportunities in cellular backhaul in Africa, among others.

O3b Medium Earth Orbit (MEO) satellites from the Guiana Space Centre in Kourou, French Guiana. The new Ka-band satellites join the existing O3b constellation of 12 satellites to offer the world's only low latency, fiber-like connectivity to people and businesses in the growing mobility, fixed data and government markets.

Positioned at approximately 8,000 km, the O3b satellites are approximately $\frac{1}{4}$ of the distance from the earth than traditional geostationary (GEO) satellites. The lower altitude greatly reduces latency, decreases response times, improves voice and video quality as well as enables an array of cloud services.

With those four new satellites, SES Networks will continue to help bridge the digital divide by providing access to mobile broadband to underserved areas, and help mobile operators address the increasing demand for bandwidth as the number of 4G/LTE subscribers is set to jump from 1.6 billion in 2016 to 3.8 billion by end 2020.

Not to be outdone, Eutelsat also launched its Konnect Africa broadband service in June last year starting in Benin, Cameroon, Kenya, Lesotho, Nigeria, South Africa, Swaziland, Tanzania and Uganda.

Konnect Africa is initially using capacity on Yahsat's Al Yah 2 satellite (16 Ka-band spotbeams) with expansion supported by a further 18 spotbeams on the Al Yah 3 satellite that is scheduled for launch by the end of 2017. Konnect Africa aims to cover most of Sub-Saharan Africa by 2019.

Laurent Grimaldi, CEO of Konnect Africa, said "Connecting Africa means changing the way people live, study, perform business, and transforming daily life. We aim to take broadband further and closer to multiple development sectors such as the healthcare system, education, agriculture or SMEs."

Eutelsat already has a multi-year agreement with Yahsat, the Abu Dhabi-based international satellite operator, to provide high-performance commercial Ka-band capacity for broadband services across Sub-Saharan Africa.

According to the terms of the agreement Broadband for Africa will use capacity on up to 16 Ka-band spotbeams on the Yahsat 1B satellite in order to roll out broadband services during the first half of 2017. Further expansion will be supported later in the year using capacity on 18 spotbeams on Yahsat's Al Yah 3 satellite, scheduled for launch in early 2017. Both Yahsat 1B and Al Yah 3 are equipped with high

power spotbeams with Sub-Saharan African coverage, ideal for community and Direct-to-User Internet access using affordable, off-the-shelf customer premises equipment.

4G/5G Deployment

4G deployment in Africa is still at a very early stage, at only less than 10% of population. As at 1Q17, 84 of Africa's 217 mobile operators ran a 4G-LTE network, according to research firm Ovum, and the coverage was limited to selected urban areas. By end-2016, Africa had 14 million LTE subscriptions, which accounted for 1.4% of Africa's mobile market. South African operators combine 58% of the continent's LTE subscriptions with LTE network from market leader Vodacom covering 70% the country's population by end-2016. In the fixed segment, Africa had 2 million LTE subscriptions representing 13% of broadband connections. Ovum says LTE remains a high-end technology that is pushed, with broadband access as the main growth driver. In comparison, the global mobile share of LTE subscriptions was 25% by end-2016.

Ovum adds that slow regulatory processes are delaying technology transition in Africa. The deployment of 5G will, in a great part, depend on spectrum avail-

ability in Africa. Lengthy regulatory processes have delayed 3G and 4G launches in Africa. 5G looks very likely to face the same fate as 4G, for which suitable spectrum is still yet to be auctioned in Africa. Southern Africa is expected to lead the 5G race. South Africa, Namibia, and Mauritius are expected take the lead, favored by proactive operators and vendors, as well as a larger high-end addressable market.

Based on the early-2017 African telecoms landscape, Ovum forecasts 5G to make its debut on the continent around 2022, with launches essentially concentrated in North and Southern Africa. The potential early adopters will include early new technology adopters who have pioneered 4G in the region. In Southern Africa, these early adopters are operators such as Vodacom, Telkom, and MTN in South Africa, MTC in Namibia, or Orange and Emtel in Mauritius. Northern African countries such as

Morocco or Tunisia, which have higher broadband penetration rates than the continent's average, also have the potential to be on the list of early 5G adopters, adds Ovum. However, lengthy regulatory processes could hamper operators' projects. Kenya's Safaricom is forecast to lead the race in East Africa. 



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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A Fourth Industrial Revolution in Africa

by Roxana Dunnette

ITU TELECOM WORLD 2018
Durban, South Africa,
10-13 September 2018

The key trends characterizing the Fourth Industrial Revolution — Artificial Intelligence (AI), the Internet of Things (IoT), and the Fifth Generation Networks (5G) — were the focus of the ITU Telecom World conference and exhibition in Durban where global leaders in government, technology, policy development, academia and entrepreneurship met to discuss the best way to manage this revolution in Africa.

This ITU event, organized by South's Africa Department of Telecommunications & Postal Services, welcomed 3,100 participants from 94 countries and 200 leaders, including 33 ministers, from 74 countries. The event also included 125 SMEs as well as national pavilions.

South African President Cyril Ramaphosa reminded the audience at the opening ceremony of the importance and the opportunity for Africa's voices to be heard in global ICT debates, especially this year as the country marks the 100th birth anniversary of Nelson Mandela, where a year-long celebration is taking place in South Africa.

"UBUNTU" the spirit that Madiba (a title of respect for Mandela) had, is expected to prevail so that no one is left behind as the world changes, and to ensure that the benefits of this revolution are as

inclusive as possible was the conference's uniting theme. The first ITU Africa Telecom took place in Johannesburg in 1998 in the presence of Mandela.

ITU Secretary General Houlin Zhao believes that Africa's tech sector has boundless potential in the further development of AI, smart devices, and smart cities. South Africa, being a hub for vibrant start-up sector and major strategic initiatives, is the ideal location to have such discussions.

So what promises do AI, IoT, and 5G offer?

AI is expected to provide more efficiency for many processes performed by people at work. While some fears that AI will take people's jobs, it will mostly replace repetitive tasks.

AI can transform African health and agriculture. Farmers can receive maps and crops data via satellite and smartphone users can enjoy remote medical examinations and health information.

"Since connectivity is an essential part of the Fourth Industrial Revolution, it will be important that everyone is connected," said Cyprian Cwele, South Africa's minister of Telecommunications & Postal Services.

The deployment of 5G networks that allow speed 20 times faster than 4G will change the game. We will see enhanced mobile broadband services like virtual reality or augmented reality or ultra-high



South African President Cyril Ramaphosa addressing the ITU Telecom World convention in Durban.

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definition streaming. Applications like driverless vehicles (demo for agriculture seen at the Chinese pavilion), industrial automation, robotic remote surgery or repairs, just to name a few, will now be possible.

On 12 September, the Broadband Commission for Sustainable Development issued its report showing that at least 15 African governments have strategies in place for AI, IoT, Big Data, and 5G.

Next generation satellite technology will also permit the delivery of digital services for agriculture, climate, disaster relief, education, and health faster, even to the most remote areas of Africa.

For Africa, advancing funding for the implementation of 5G infrastructures is an advantage, as most countries do not have to overcome outdated networks and regulations.

The AI and 5G will work well in integrating IoT enabling machines and infrastructures to be monitored and operated remotely.

The Forum's discussions also covered topics like investment, partnerships, innovation, Spectrum needs, policies and regulations, and how to bridge the digital divide and achieve Sustainable Development Goals (SDGs).

Women and youth are asked to play a central role in the future digital world. ITU, UN Women and African Union Commission launched a new initiative to equip girls and young women in Africa with digital skills.

The African Girls Can CODE initiative is a 4-year training program in 14 coding camps across Africa that will teach girls and women 17-20 years old how to become programmers, creators, and designers.

Several MoUs, partnerships have been signed in Durban during this event.

South Africa established an AFRICAN Digital Transformation Center that will support entrepreneurship and will work on the Forth Industrial Revolution.

CSAIA (China Satellite Application Industry Association) signed a MoU with ICDO (International Civil Defense Organization) for satellite applications for emergency communications.

FRONTIS (Republic of Korea) signed with South Africa, Zimbabwe, Azerbaijan, and Nigeria for provision of virtual/augmented reality content and VICTONY (Korea) will provide to Burundi's Innovation Hub e-education content.

Since 2015, ITU has encouraged Small and Medium Enterprises (SMEs) to participate in the ITU Telecom events to facilitate their business relationship with governments and the private sector.

SMEs are identified as the source of smart, young, and innovative ideas. This year, 125 SMEs showcased digital solutions for health, agriculture, government services, finance, satellite automotive remote repairs, drowns detection, robotics, and intelligent cyber security.

Some SMEs had independent stands as part of national pavilions.

ITU awards the best every year and this time the Global SME Excellence Award went to PULEGO Communications, South Africa which also received the Award for Greatest Social Impact.

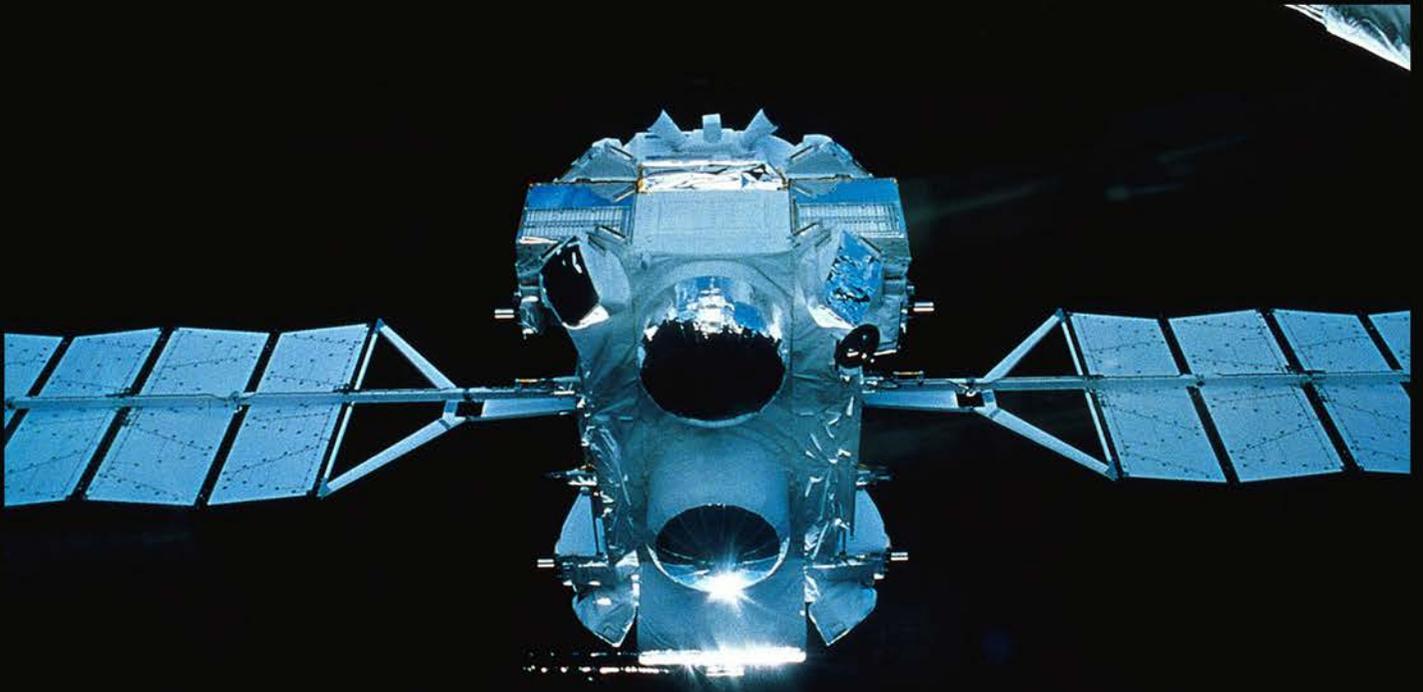
ITU Telecom World 2018 concluded on a very optimistic note, everybody being pleased with the inspiring showcases, shared visions, knowledge of technology, the commitment to connect the unconnected, and with a precise way forward for Africa allowing governments, businesses and regulators to adapt to the changing world.

"ITU Telecom World provides a guide and in some ways a compass to the future," said President Ramaphosa. "What we are talking about here has a bearing on the future of our economies as well as the well-being of society and humanity." 

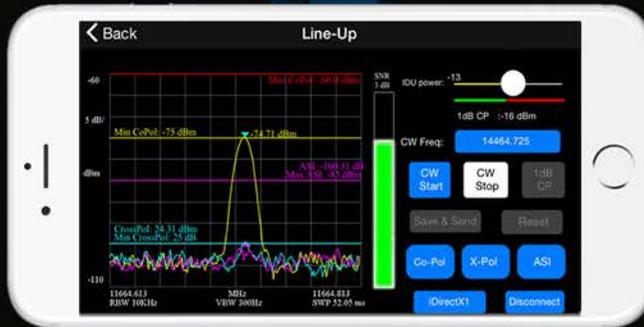


Roxana Dunnette is a correspondent of Satellite Executive Briefing based in Geneva, Switzerland. She is Executive Director, R&D MEDIA, Switzerland, has had an extensive career in Broadcasting and media including senior management positions at Worldspace corp., Washington, CBS and PBS in New York and international telecommunications

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At the ITU Telecom World in Durban, Satellite Executive Briefing correspondent Roxana Dunnette spoke with INGRID PONI, Chief Director, Multilateral Trade and International Unit of the Department of Telecommunications and Postal Services, Republic of South Africa.

How significant is this event especially that it is being held on Nelson Mandela's 100 year anniversary?

Ingrid Poni (IP): It is very special to us because this is the first time it is taking place in Africa, at a time when we are dealing with lots of new technologies with the onset of 4th Industrial Revolution. As you are well aware, we are now looking at the deployment of so many new technologies, including 5G. Also for the second time, we have a lot of SMEs participating, and the youth are also involved.

As we can see Small and Medium Enterprises (SMEs) have central role here. What is the impact of South Africa's SMEs in the global picture?

IP: The SMEs have a hard time getting noticed due to limited resources. ITU is leading their involvement and as we go forward, new partnerships are being formed. We do not want to have only big companies and monopolies, but we are encouraging diversity of players through SMEs. This is important in growth and innovation because SMEs have a lot of fresh ideas but many times, they do not have a space where they can showcase their technologies. So ITU is offering them a venue and a platform to display their skills.

In our country, we recently passed a legislation to empower SMEs. In Busan, the government sponsored many SMEs and they did well and they even got some awards, like this time.

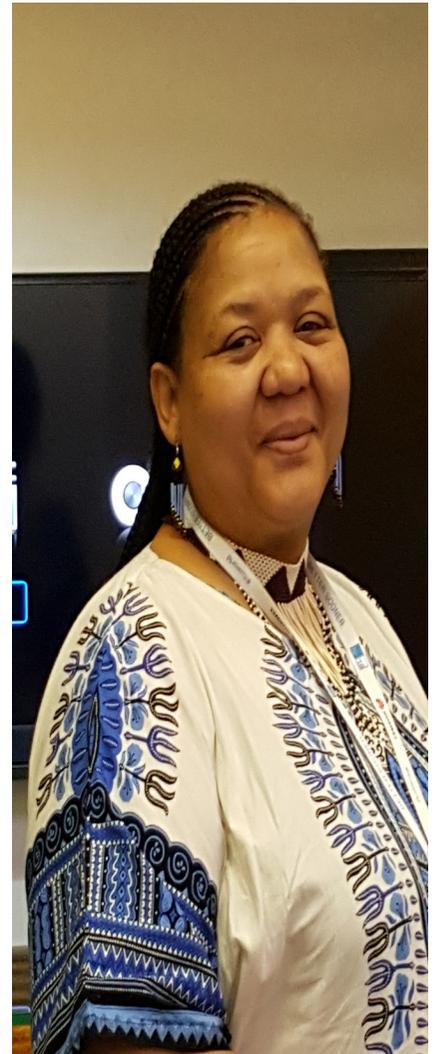
South Africa is a leader in ICT implementation and a continental service provider. Do you rely mostly on terrestrial or satellite transmission to provide connectivity?

IP: We rely mostly on terrestrial technologies for connectivity, but because we see that there are a lot of challenges, we are also thinking of using satellites. A few years ago we launched our own satellite and we are now exploring new technologies to provide connectivity to everyone. We need to diversify our sources of connectivity and now we have numerous available technologies that could provide new and better solutions.

In this event we had a session on 5G and the satellite role was discussed.

For remote and rural areas do you have specific plans?

IP: In our country we have a strategy for rural areas that involve private-public partnerships. We provide incentives to companies going to rural areas. In terms of our laws, we give priority to those who include rural areas in their deployment of technologies. Companies have to include rural areas in their overall strategy.



We are very proud that this event was very widely supported by our brothers and sisters. Eighty percent of the exhibitors were from Africa and we had the largest number of ministers attending.

The public showed a lot of interest and we had the support at the highest level. 

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Is there anyone *ELSE* up there??

Upstate New York is developing as a hub for “Astropreneurship”

by Lou Zacharilla

A man walking along a cliff feels the ground give way beneath him. He manages to clutch at a root extending from the face of the cliff, which saves him from falling 1,200 feet onto jagged rocks in the surf below. But as he hangs, on he cannot

You can interpret that a lot of ways, especially when you factor in the puns from the space and satellite industry. It is the question we asked when we were planning the first Astropreneurship Day in New York, which took place on November 1st. We

ically “up there.” And most New Yorkers know little about them. The joke is that there are but two seasons in Upstate New York: winter and the Fourth of July. It ain’t necessarily so. Summers and Autumns are splendid, and the universities in that part of the



climb back up. He shouts, “Is anyone up there!?”

A voice fills the sky! “Have faith. If you have faith you can let go and you will fall light as a feather, landing unhurt on the rocks below.” He looks down at the rocks and crashing surf, thinks about it, looks back up and shouts, “Is there anyone ELSE up there?”

were specially thinking about all of the players who have started to emerge in Upstate New York.

Those New Yorkers who live in the five boroughs of the City tend to refer to other parts of the state as “upstate” or “up there.” Up there is a cluster of once great post-industrial cities, such as Buffalo, Rochester and Syracuse. Relative to Manhattan and Brooklyn, they are geograph-

state bring the light of science to thousands from around the globe daily. Each has engineering programs that are among the best in North America. And the lacrosse teams kick ass!

The region would seem to be a perfect place for a new space commercialization ecosystem. And it is. Groups like the New York Space Alliance and Ithaca’s Cornell University and the University

of Buffalo have active programs that are beginning to nurture talent. There you find people like former NASA Chief Technologist Mason Peck, who are teaching, ramping up startups and mentoring the community and region as it inches toward a new era.

The new era is best represented by the super team of Adam Maher and Derek Edinger, two former SSPI Promise Award winners, who left Space Systems Loral to start their own business up there in Ithaca. Ursa Space <https://www.ursaspace.com/> has been the pride of entrepreneurial space ventures “up there.” Successful rounds of financing have given early proof of concept to their exceptional geospatial analytics model.

Ursa Space is not alone there. There are others. Marrying them to the venture capital sector in New York City did not seem to be a hard lift. Add to this the momentum from a new feeling among economic development officials about the future potential of space to create jobs and you have got yourself an entrepreneurial moment.

Thanks to the work of groups like NYSA, New York Economic Development Corporation and the Intelligent Community Forum, the idea that space businesses can trigger prosperity, which is a foundation for economic and social stability seems logical. Why not? The big boys are all over this concept. ULA, Blue Origin and others are proclaiming a poetic sounding “CIS Lunar Economy” to be shining down on us. Call it economic growth in the time of “Moonstruck.” What it really is, we think, is another

age of discovery and exploration. Think NASA in the ‘60’s and Columbus in the ‘90s – Christopher Columbus in 1492 that is.

So SSPI, with the support of Hogan Lovells put together an event that brought together the players of this rich New York ecosystem. SoftBank, RRE Ventures and legendary industry brains like Hoyt Davidson and Armand Musey were gathered for a day of dialogue on what astropreneurship in New York might be.

In true SSPI fashion, three companies who represent the best of what is “up there” were given awards:

- GLADOS (Glint Analyzing Data Observation Satellite), the first satellite designed and built by a team at the University of Buffalo’s Nanosatellite Laboratory. <http://ubnl.space/> A succession of graduate & undergraduate student teams have worked for over five years, on behalf of the USA Air Force Research Lab, NASA and Moog, to develop a new satellite, from conception to launch next year, on a cubesat. Its mission will be to study light data and to classify space debris from “glint events.” Waste management gets a new image!

- Ragnarok Industries, the best new business in Williamsburg, Brooklyn – a hotbed for

tech startups – built a nanosat company to deliver polar broadband service via its Hiemdalr satellite. <http://www.ragnarokindustries.com/working/> The project is being watched closely by the engineering community for its special design electrical propulsion (non-volatile and non-energetic) as it plans for propulsion toward lunar orbit.

- Will Porteous, General Partner & COO, RRE Ventures. RRE is a New York-based venture capital firm. RRE has a reputation for embracing independent perspectives. Will and his team at RRE Ventures have invested in a range of high risk ventures that cover the entire ecosystem of our industry. You will recognize some in their portfolio, such as Spire, Spaceflight and the aforementioned Ursa Space. These have become category defining ventures, which stimulate investment from others and build confidence among entrepreneurs and the cities in which they work. These are ventures that have changed the way people think about satellites and space.

So on November 1 things really were looking up in the Empire State, a place that is logically the next home many new industries of discovery. Will it happen overnight? Probably not. But... have faith. 



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

For more information about SSPI go to: www.sspi.org and www.bettersatelliteworld.com.

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December's Innovative Agenda and Year-end Plaudits

by **Martin Jarrold**

In my previous column I referenced the GVF's contribution to the forthcoming International Telecommunication Union's World Radiocommunication Seminar 2018 (WRS2018), December 3rd to 7th, which will take the form of a pre-Seminar Workshop Symposium, November 29th to 30th, focused on capacity building amongst the world's regulators. A number of organizations will be supporting and contributing to the Workshop Symposium, including (at the time of writing) Hughes and SES, together with other GVF members currently finalizing their inputs.

These companies will make presentations, to be afterwards uploaded to the WRS2018 database, and provide service and technology demonstrations to Workshop Symposium attendees, and in addition will be able to attend the WRS2018 Plenary sessions & networking opportunities.

The GVF's classroom-based capacity building content – delivered by MBC – is designed to provide information about the latest technology innovations in satellite communications, with the ob-



jective of creating a greater level of understanding of the nature of the rapid mobilization of satellite based communication links. The efficient operation of earth stations and user-level maintenance is also explained, along with trouble-shooting methodologies that ensure minimized down-times. These skills are key elements contributing to the reduction and mitigation of the causes of satellite interference. Participating attendees will also have the opportunity to enhance their understanding of the latest satellite communications service trends, as well as of regulatory, policy and spectrum coordination issues.

This will be the first time GVF has collaborated with the ITU World Radiocommunication Seminar series, a collaboration which goes beyond an already long-standing relationship with ITU in other areas. This includes GVF's membership of ITU-D, the Development Sector, and work-

ing with the Space Services Department in such other fields as challenging problems of satellite interference, as exemplified by GVF contributions to the series of International Satellite Communications Symposia on Space Interference, and also by the ITU providing keynote addresses at such events as the GVF Satellite Hub Summit @ CABSAT each year.

The 2018 event continues the series of Seminars which have previously been held in the Americas and in Asia, as well as in Switzerland to which the Seminar returns this year, located at the headquarters of the ITU.

Indicative of GVF's busy December agenda is that whilst WRS2018 is being held in Geneva, December 4th will see the latest program in the GVF-EMP portfolio, the HTS Roundtable 2018 - GEOs... MEOs... LEOs: Enabling a Brave New World (www.uk-emp.co.uk/current-events/hts-roundtable-2018/), taking place in London.

The HTS Roundtable 2018 draft program (as of October
Continued on page 22...

& PRODUCTS & SERVICES MARKETPLACE

A guide to key products and services to be showcased at Africacom 2018 in Cape Town, South Africa from November 13-15.

Advantech Wireless Technologies
booth # D1A (Canada Pavillion)
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 clients rely on Advantech Wireless to provide smart solutions that deliver fast, reliable and secure communications anywhere in the world. Our revolutionary technologies include world-leading GaN technology based high power amplifiers, SSPAs, block-up converters (SSPBs), frequency converters, fixed and deployable antennas, antenna controllers and terrestrial microwave radios.

Amos Spacecom
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www.amos-spacecom.com



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ARABSAT
booth # C67
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.

C-COM Satellite Systems Inc.
booth # D1A (Canada Pavillion)
www.c-comsat.com



Visit **C-COM's** booth at the Canadian Pavillion at Africacom to discuss the latest in COTP and COTM antenna innovation. On display will be the iNetVu® Ka-75 Driveaway, iNetVu® FLY-981 Ku/Ka Flyaway system and Ku-band iNetVu® MP-100 Man-

Pack. C-COM offers the world's premier commercial grade mobile VSAT solution for SNG, Oil & Gas Exploration, Disaster Recovery, Government / Military, Emergency Response, Cellular Backhaul, Mobile Banking & more.

COMTECH EF Data
booth # D70
www.comtechefdata.com



Comtech EF Data Corp. is a leading supplier of communications equipment with a focus on satellite bandwidth efficiency and link optimization. Our high-performance satellite communications ground equipment is deployed globally to support mission-critical and demanding applications for government, mobile backhaul, premium enterprise and mobility. Service providers, satellite operators, governments and commercial users wanting to optimize communications, increase throughput and delight customers leverage the performance and flexibility of the Comtech brand. The solutions are facilitating fixed and mobile networks in 160+ countries and across every ocean.

Gazprom Space Systems
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www.gazprom-spacesystems.ru



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Yamal-402 55E provides Ku-band coverage over Sub-Saharan Africa, Middle East, Europe and Russia. Satellite antennas form 4 fixed beams and one steerable.

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Integrasys S.A.

booth # F13

www.integrasys-space.com

 **INTEGRASYS** Integrasys is a privately owned company specialized on engineering and manufacturing Satellite Spectrum Monitoring systems in the telecommunication and broadcasting markets. Integrasys was founded in 1990 by a group of Hewlett-Packard engineers experts on Automated RF & Microwaves Test Systems and Software. Since then Integrasys has evolved towards today's company, offering a wide range of signal monitoring products for different telecom services.

Newtec

booth # F9

www.newtec.eu

 **Newtec** is specialized in designing, developing and manufacturing equipment and technologies for satellite communications. As a pioneer in the industry, Newtec is dedicated to creating new possibilities for the broadcast, consumer and enterprise VSAT, government and defense, cellular backhaul and trunking and mobility, offshore and maritime markets.

Our products and technologies can be applied in a wide range of single and multiservice applications from DTH broadcasting, video contribution and distribution and disaster recovery and backbones for cellular backhauling, to small and medium enterprises, SCADA and oil and gas networks, aircrafts and vessels.

ND Satcom

booth # A47

www.ndsatcom.com

At Africacom, ND Satcom will be highlighting its SKYWAN 5G router. 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.

Spacebridge

booth # C5B

www.spacebridge.com



SPACEBRIDGE INC., formerly known as Advantech Wireless Inc. is an established vendor and global market leader of broadband satellite communications systems. The company provides satellite equipment and services for deploying satellite communication networks: VSAT HUBs, VSAT Terminals in Point-to-Point, Point-to-Multi-Point, mesh topologies as well as SCPC and broadcast modems.

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As part of the significant revolution in the satellite market NGSO LEO/MEO satellite constellations takes off, SPACEBRIDGE INC. is working in close partnership with New-Space players, proactively participates in this change of the satellite communication landscape, developing VSAT systems which are capable of utilizing this capacity leap and deliver 4G, 5G backhauling, IIoT and many other applications to our customers.

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MARKET INTELLIGENCE

30th) is as shown below. The Roundtable this year is supported by our Corporate Sponsors – Comtech EF Data, Hughes, and Newtec – and Guest Sponsors – SES Networks, and Integrasys – and will kick-off with a brief introduction from GVF's new Secretary General, David Meltzer, who took-up his post at the end of August this year.

David's remarks will be followed by an opening Backdrop Presentation given by Stéphane Chenard, Senior Analyst with Euroconsult, who will provide an overview of the changing dynamics of satellite's expanding

SATCOM, Comtech EF Data, CVL, Effective Space Solutions, Euroconsult, Eutelsat, General Dynamics SATCOM, Gilat Satellite Networks, Global Eagle Entertainment, GoGo, GPS, Heriot-Watt University Institute of Photonics and Quantum Sciences, Hughes, Hunter Communications, Inmarsat, Inster, Integrasys, Intelsat, Intertel Nigeria Limited, Iridium, Isotropic Systems, Kratos, M&J Communications, Mobile Internet Ltd, National Space Centre Ireland, Navarino UK, Neuco, Newtec, Novelsat, NSSL Global, Obrecht Info Ltda, OneWeb, Paradigm,

introduce panelists Simon Gatty Saunt, Vice President, Sales, EMEA Fixed-Data, SES Networks; Rob de Poorter, Head of Sales, Broadband Services, ArabSat; Gordon Grant, Manager, International Sales Engineering, Telesat; Richard Wyrwas, Principal Engineer, Government Services, ViaSat; Ronald van der Breggen, Chief Commercial Officer, LeoSat; and Marco Mirante, Regional Sales Director, Hughes. This group of experts from the evolving satellite operator ecosystem will not only focus on their respective organizations' approach to a future operator

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1.1 Tbps in Ka

0.05 Tbps in Ku

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184 Gbps in Ka

126 Gbps in Ku

15 Gbps in C

markets, enhanced services, and evolving technologies. The program continues with four moderator-led sessions combining brief introductory remarks from each of a panel of speakers and Q&A-based interaction with the Roundtable audience.

This year the audience of pre-registered attendees will include AB5, Anver Ltd, Arabsat, Arqiva, Beaconseek, bigblu, British Telecom, C-COM Satellite Systems, CETel, CGI, Cobham

pei tel Communications, Pro-Brand International, Satcoms Innovation Group, Sematron, SES, Space Intel Report, Spacecom, SpeedCast, STFC-RAL Space, Talia, Telesat, Telespazio, Ten Cate Advanced Composites, Terrasat, Traville Group, ViaSat, VT iDirect, and Yahsat.

Opening the first Roundtable Session – 'The Operators... New Focus & New Orbits' – moderator Michael Pollack, Founder & CEO of the Traville Group, will

market within which the GEOs, MEOs, and mega-LEOs will be either directly competitive or collaborative and complimentary, but also examine the implications of forecast growth in HTS orbital resources, capacity pricing trends, latency differences as a potential competitive divide, the Cloud and IoT markets, and trends towards competition down the value chain.

Better Satellite World Awards

Betty Bonnardel, CEO of AB5



The Fourth Annual Better Satellite World Awards Dinner to honor companies and disruptive innovators will be held in London on December 3. Photo Credit: SSPI.

Consulting, and chair of the UK's chapter of the Society of Satellite Professionals International, will moderate Roundtable Session 2. I note Betty's role with SSPI because just the evening before the HTS Roundtable, December 3rd, GVF's Secretary General will attend the SSPI's Better Satellite World Awards which were established to give recognition to companies and disruptive innovators that leverage the characteristics of an evolving satellite ecosystem to make the world a more prosperous, healthier, better-educated, more sustainable and more inclusive home for humanity.

The fourth Better Satellite World Award recipients were announced on October 25th and GVF, together with all the other signatories to the United Nations Crisis Connectivity Charter, has been recognized. The Charter, a mechanism created between the satellite industry and the wider humanitarian community and

designed to make satellite-based communications more readily available to humanitarian first responders and affected communities – thanks to pre-defined and pre-set solutions allowing immediate response at times of disaster – was developed by the EMEA Satellite Operator's Association (ESOA) and GVF and their respective members, in coordination with the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) and the Emergency Telecommunications Cluster (ETC), led by the World Food Programme (WFP).

When activated by the ETC, the Charter aims to foster more efficient cooperation between the satellite industry, local governments, non-government organizations (NGOs) and the broader humanitarian community in the initial stages of a disaster, allowing for better communication planning, increased connectivity

and support for emergency responses.

The Charter helps support increased coordination by prioritizing access to bandwidth for humanitarian purposes during disaster responses and by allocating pre-positioned satellite equipment and transmission capacity in high-risk countries; and provides training and capacity building for the humanitarian community around the world. The Crisis Connectivity Charter will help ensure the ETC and its partners can better leverage satellite-based technology to provide life-saving connectivity to humanitarians and affected populations when disaster strikes.

This will not be the first Better Satellite World Award presented to GVF. In 2016, GVF was previously recognized for its work over a period of almost 20 years to establish a more effective and sustainable paradigm for global disaster preparedness, includ-

MARKET INTELLIGENCE

ing coordination with partners throughout the disaster-response community – i.e., United Nations Agencies, humanitarian organizations, militaries, national administrations, inter-governmental groups, and others. At that time the focus of the International Award was on GVF having facilitated improved disaster preparedness and response efforts through its training portfolio and the certification of first responders, identifying qualified local technicians, coordinating satellite industry support, and educating governments on regulatory approaches that enable the use of ICT systems to save lives.

Returning now to the HTS Roundtable's second session 'The VARs... New Challenges in an HTS World'.

Michael Pollack, Founder & CEO, Traville Group returns to the dialog arena, this time as a panelist, and will be joined by Jack Beuchler, CTO, Quika; Yair Maor, Senior Director, Sales Europe, Gilat Satellite Networks; Sebastien Couvet, EMEA Sales Manager, Integrasys; Jo de Loor, Market Director, Multiservice HTS & Enterprise, Newtec; and Drew Klein, Director for International Business Development, C-COM Satellite Systems. Dialog here will encompass the transformation of the satellite broadband value proposition and the changing satellite Internet paradigm, as well as how the Cloud and the Internet of Things are bringing new opportunities to the Value Added Reseller proposition, and so evolving new dynamic markets, including in the mobile market.

The evolving dynamics of the

ground segment in the growing HTS environment will comprise the theme of Session 3. Moderated by Anver Anderson, CEO, Anver Consulting, the session will cover increasing levels of terminal deployment and the consequently changing dynamics of satellite interference, together with facets of trends in terminal cost and market scales, related to antenna size and form factors, and the technology shift from parabolic to flat panel/phased array. Also included here will be current developments in optical quantum communications in regard to enhanced cyber security.

Andy Lucas, Senior Vice President, Operator Vertical, Comtech EF Data; John Finney, Founder, Isotropic Systems; Mark Lambert, Vice President, Business Development, Kratos; Ross J. Donaldson, Royal Academy of Engineering Research Fellow, Heriot-Watt University Institute of Photonics & Quantum Sciences; Mark ter Hove, Director, Aeronautical Sales Europe, Cobham SATCOM; and Craig Bowley, Director of Sales, Europe, VT iDirect will make up Anver's panel.

The program concludes with Roundtable Session 4: 'Mobility, Mobility, Mobility' with me moderating discussion between Jags Burhm, Senior Vice President, Global Aero Mobility, Eu-

telsat; Javier Alexander Santos Wybenga, Business Development Engineer, Inster; Dan Rooney, Director, Maritime LoB, EMEA & Russia, Iridium; and Deepukrishnan Pillai, Senior Analyst, Strategy & Market Intelligence, SES. Discussion points to be raised here include what's next for HTS and mobility on land, on sea, and in the air, and in trunking and backhaul servicing satellite integration in the 5G mobile world, but not forgetting enterprise VSAT, government and military, and expansion in broadband, video, and other consumer applications.

After a full day program concluding at 5.30pm, GVF will then turn to its Annual General Assembly and election to five of the seven positions on its Board of Directors involving a ballot of the Forum's Full Members.

You can register free-of-charge for the HTS Roundtable 2018 - GEOs... MEOs... LEOs: Enabling a Brave New World at www.uk-emp.co.uk/current-events/hts-roundtable-2018/registration/ or you can contact me at martin.jarrold@gvf.org



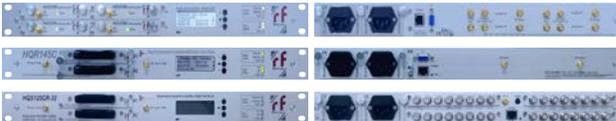
Martin Jarrold is the Chief of International Program Development of GVF. He can be reached at martin.jarrold@gvf.org.



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The 2018 China Commercial Aerospace Forum

by **Blaine Curcio**

Still more of the same but changing quickly

Late September saw the fourth edition of the China Commercial Aerospace Forum, held in Wuhan, in south-central China at the intersection of the Han and Yangtze rivers. As an American who has spent most of my adult life of China, the conference took place at a fascinating time for me, in the midst of a potential trade war between my home country and my adopted home country.

More importantly, though, the conference took place around nine months into the most fast-paced year in the Chinese commercial space industry that we have ever seen. The energy at the show was palpable. The attendees were predominantly Chinese companies, and indeed, the majority of the Chinese companies in attendance were state-owned companies, mostly under the umbrella of the China Aerospace Science and Industry Corporation (CASIC), the event sponsor and organizer. With that being said, there was a sizable foreign representation, as well as a large and growing number of private-sector Chinese space companies. When looking at this space conference from the perspective of the broader Chinese space industry, several key points emerge:

The Exhibition was mostly about the state-owned companies, and in some instances, the state itself.

The biggest booth at the conference by far was CASIC, with an enormous booth right at the front. CASIC, is a Chinese state-owned aerospace giant and defense manufacturer. The company was the centerpiece of this conference, given their recent investment of hundreds of millions of USD into the

Wuhan Aerospace Industrial Base. The industrial base is a project that has included the establishment of CASIC-owned but nominally private rocket company ExSpace and multiple LEO constellation-related companies in Wuhan. This is seen as one of CASIC's main strategic plays for establishing itself in the commercial space industry.

On the whole, this seems to be consistent with broader Chinese governmental policy to develop interior provinces diversifying regional economies. In the context of this conference, the importance of government more specifically was shown on the first morning of the 2-day exhibition. The exhibit hall was crowded and people had their phones ready for photo-taking. You could feel the anticipation in the air. The reason for all of this?

The arrival of Wuhan's Mayor (Wuhan: population: 10M, GDP: US\$180B, capital of Hubei province), and the Vice Premier of Hubei Provincial Government (Hubei: Population 60 million, 2017 GDP: US\$540B), with the city and province GDP being roughly the size of Greece and Sweden, respectively. The two leaders and their entourage of dozens of media, politicians, and netizens with cameras, were led around the exhibit hall by the head of CASIC, so they could be given a first-hand account of all the hi-tech jobs and companies that CASIC can bring, and has brought to Wuhan. It was by far the busiest period in the exhibit hall for the entire two days.

While the push towards commercial space in China is very real, the exhibition's first ~hour was a reminder that the government still has a big role to play. Private space companies in China now employ thousands of people. The big state-owned ones em-

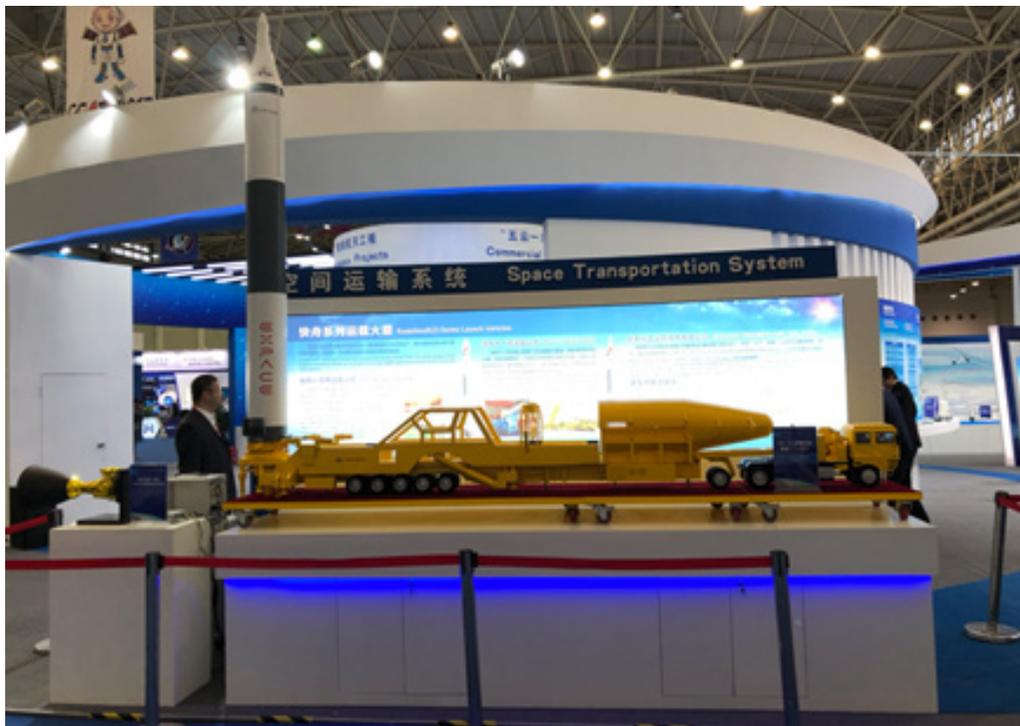
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ploy tens of thousands to over 100,000 people, and their decisions have a big impact on the industry. With provincial or municipal governments such as Hubei/Wuhan seeing space as an appealing growth industry for their local economy, it makes sense that government regulations and activity would encourage such an industry, and that these regulations and activity would be more focused on the state-owned space companies that employ far, far more people than private ones.

The above was followed by around hours of speeches given by high-level government and state-owned company officials in a very grand ballroom, with the remainder of the conference after these speeches occurring in two significantly smaller, though also very nice ballrooms. The key takeaway from the government/SOE speeches was that the government will continue to work to lessen barriers to the development of commercial space, while unveiling strategic initiatives to help spur the industry.

But the conference was quite different...

While the exhibit hall was clearly indicative of government companies' importance, the conference in the wonderful Intercontinental Wuhan Hotel—connected to the convention center for easy and convenient access I might add—was quite different. There were many more private companies, both in terms of speakers and attendees, and the dynamism coming from these private sector companies was apparent. The conference was quite full, and on the first day this was spread over two rooms of around 80-100 chairs each.



ExPace Mobile Launch Platform displayed prominently at CASIC booth.

During the conference coffee breaks, the networking was brisk and there were clearly a lot of ideas being exchanged, people meeting other people, and a certain degree of excitement among the attendees. The attendees were generally very well-informed about the space industry—both in China and in the west—and there seems to be a lot of optimism on the part of private companies more generally in terms of their business moving forward. Beyond this, compared to previous Chinese space conferences that I have attended, the level of English and degree of internationalization among the attendees was comparatively high, with this partially due to the fact that many commercial startup companies have CEOs with experience in the west.

Beyond this, there was a higher degree of diversity of companies, backgrounds, and there were some new faces, even for my business partner Tianyi Lan, who has been in the China space industry for many years. My impression from the conference, and from the private companies present, is that there is a lot of excitement among the private sector, a lot of optimism, and that these companies are moving quickly and have big ambitions.



The Ecosystem Is Starting to Develop

In addition to the many state-owned and private space companies, there were a number of unexpected companies attending the conference. This included a number of regional banks, such as Hankou Bank (based in Wuhan) and insurance companies. Given the fact that most lending to big, state-owned companies (like CASIC) would be done by big, state-owned banks, the presence of smaller, private or local government-owned banks indicates they are looking at private space companies as potential customers/companies with which to do business. Beyond the traditional financiers, there were a handful of VCs present, with this including representatives from Legend Capital (Lenovo's VC). The entry of VC into China's space industry has been a recent phenomenon, with activity accelerating over the past 12-18 months.

Additionally, the attendance of a larger number of foreign companies or representatives, ranging from think tanks to equipment manufacturers to consultants was an indication that, at least in a small way, that the Chinese space industry is starting to become more open, international, and globally relevant.

Conclusion

Overall, the China Commercial Aerospace Forum in Wuhan was an interesting event. 2018 has been a pivotal year for the Chinese space industry in terms of funding, technological advancements, and internationalization, and the excitement at this con-

Professor Wu Shufan of Shanghai Jiaotong University on the Chinese Commercial Space Ecosystem. Prof Wu is also a co-founder of Chinese smallsat manufacturer Mino Space.

ference was a reflection of that. While the industry remains largely dominated by state-owned companies, there is a real private sector that is starting to show significant signs of life. Moving forward, the state-owned sector is likely to remain dominant in the space industry for some time, especially for cutting-edge mega-projects (space station, moon missions, etc.) and traditional space industries. With that said, China's competitiveness in fast-growing, nascent industries such as smallsats, small-medium launch, etc., and in particular its competitiveness on the international stage, will likely be driven by the private sector. The 4th annual CCAF was indeed more of the same, but it also showed an industry that is changing quickly.



Blaine Curcio is the Founder of Orbital Gateway Consulting and a Senior Affiliate Consultant at Euroconsult. He's an expert on the commercial space and satellite industries with a focus on the Asia-Pacific region. He can

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Eutelsat Appoints Donnan as Chief Innovation Officer

Paris, France, Oct. 16, 2018 — Gary Donnan will join Eutelsat Communications as Chief Innovation Officer, reporting to Chief Executive Officer Rodolphe Belmer.



In this role, Gary is tasked with defining Eutelsat's innovation roadmap and the identification and cross-functional development of innovation initiatives across the Group. He will also focus on forging stronger links between Eutelsat and the external innovation ecosystem to step up the roll-out of emerging technologies throughout the company.

Donnan brings significant experience in cross-functional and collaborative management. He joins Eutelsat after eleven years at Technicolor where he conducted large-scale transformation projects and held several key positions in the fields of technology, research and innovation, gaining expertise in the broadcasting industry. As a member of Technicolor's Executive Committee, he was successively Executive Vice President (EVP) for Research and Innovation, then EVP for technology and standards. Prior to joining Technicolor, Gary held similar research and innovation positions at Alcatel, including research and development for the deployment of fibre, cable, radio

and satellite networks in various parts of the world. He is therefore well versed in telecom technologies as a whole.

Of Irish nationality, Donnan holds a degree in computer science and data processing and a postgraduate degree in distributed and parallel systems from the University of Ulster (United Kingdom).

Harmonic Appoints Clifford to Board

San Jose, Calif., Oct. 18, 2018--Harmonic announced it has expanded the company's board of directors with the appointment of Deborah Clifford.

Clifford currently serves as the vice president of financial planning and analysis at Autodesk, a leading 3D design, engineering and entertainment software company. Most recently, she has been a lead architect of Autodesk's transformation from selling perpetual licenses to becoming a SaaS provider. Ms. Clifford has held a variety of finance positions of increasing scope and responsibility during her tenure at Autodesk, partnering closely with product, marketing and sales leadership. Before Autodesk, she was director of financial planning and analysis at Virage, a video search software company, which she helped take public. She began her career in public accounting at Ernst & Young.



Clifford holds a Bachelor of

Arts degree in political science with a business specialization from the University of California, Los Angeles, and an MBA from the Stanford Graduate School of Business. She currently serves on the board of trustees of GeoHazards International, a non-profit organization dedicated to disaster prevention in the developing world.

Phasor Appoints Warren as SVP-Operations

Washington, DC, Oct. 18, 2018 — Phasor has appointed experienced electronics and ASIC executive, Michael Warren, to Senior Vice President, Operations.

Warren will lead the development and execution of Phasor's global supply chain and outsourced manufacturing strategy and will assume overall responsibility for terminal integration partnerships, including final assembly and testing of Phasor's products.

With nearly 30 years' successful experience in fabless semiconductor process, PCB assembly and product manufacturing operations, Warren has held several senior positions in organizations ranging from start-ups through to large multi-nationals, managing multi-functional, multi-site, international supply chain teams.

His most recent role was Vice President Operations at Frontier Smart Technologies, a fabless semiconductor and systems integrator company, where he oversaw all operational activities and relationships with suppliers. 

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Harris and L3 Technologies Combine in a Merger

New York, NY, October 14, 2018 — Harris Corporation (NYSE:HRS) and L3 Technologies, Inc. (NYSE:LLL) have agreed to combine in an all stock merger of equals to create a global defense technology leader, focused on developing differentiated and mission critical solutions for customers around the world. Under the terms of the merger agreement, which was unanimously approved by the boards of directors of both companies, L3 shareholders will receive a fixed exchange ratio of 1.30 shares of Harris common stock for each share of L3 common stock, consistent with the 60-trading day average exchange ratio of the two companies.

Upon completion of the merger, Harris shareholders will own approximately 54 percent and L3 shareholders will own approximately 46 percent of the combined company on a fully diluted basis.

The combined company, L3 Harris Technologies, Inc., will be the 6th largest defense company in the U.S. and a top 10 defense company globally, with approximately 48,000 employees and customers in over 100 countries. For calendar year 2018, the combined company is expected to generate net revenue of approximately \$16 billion, EBIT of \$2.4 billion and free cash flow of \$1.9 billion.

Harris chairman, president and chief executive officer, William M. Brown said the transaction extends the company's position as a premier global defense technology company that unlocks additional growth opportunities and generates value for its customers, employees and shareholders. "Combining our complementary franchises and extensive technology portfolios will enable us to accelerate innovation to better serve our customers, deliver significant operating synergies and produce strong free cash flow, which we will deploy to drive shareholder value. Integration planning is already underway, and from our extensive experience with integration, we are confident in our ability to realize \$500 million of annual gross cost synergies and \$3 billion of free cash flow by year 3," he said.

L3 chairman, president and CEO Christopher E. Kubasik commented that the merger creates greater benefits and growth opportunities than either com-

pany could have achieved alone. "The companies were on similar growth trajectories and this combination accelerates the journey to becoming a more agile, integrated and innovative non-traditional 6th Prime focused on investing in important, next-generation technologies. L3 Harris Technologies will possess a wealth of technologies and a talented and engaged workforce. By unleashing this potential, we will strengthen our core franchises, expand into new and adjacent markets and enhance our global presence," he said.

Verimatrix Acquires Akamai Identity Services

San Diego, Calif., Oct. 23, 2018 – Verimatrix, a specialist in securing and enhancing revenue for network-connected devices and services, has announced the acquisition of the assets that comprise the Akamai Identity Services (AIS) product from Akamai (NASDAQ: AKAM), the intelligent edge platform for securing and delivering digital experiences. Adding TV Everywhere (TVE) type service capabilities to the Verimatrix portfolio underscores the importance of a common authentication system to reduce friction within the content distribution workflow and ultimately support new ways to increase the value of the content chain on a global level.

"This acquisition fits perfectly with our roadmap to streamline content workflows via cloud-based technologies to connect global consumers with great content," said Mike Kleiman, COO, Verimatrix. "We are able to extend the value of these global identity services under our solution umbrella and provide a more flexible, yet standards-based alternative that will improve the experience for consumers and open new markets for content providers and programmers."

AIS enables content providers and video service operators to rapidly bring authenticated TVE services to market by providing a common framework for implementing and scaling proprietary provider-operator relationships. Verimatrix will offer the enhanced and rebranded authentication services as an integrated component of the Verimatrix Content Authority System and Viewthority, the newly launched connected content distribution platform, as well as a standalone solution in order to best match content providers' needs. 

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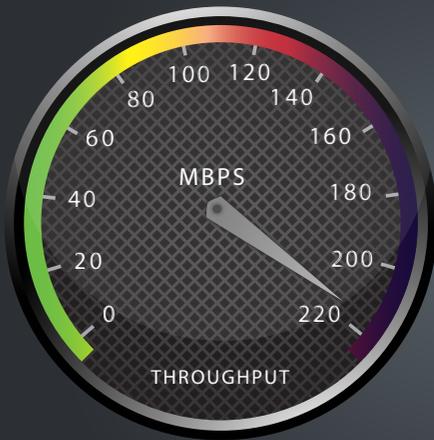
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Global TV Revenues to Grow to US\$ 265 Bil. in 2018

Global revenues from traditional pay TV and OTT TV episodes and movies will reach US\$ 265 billion in 2018; up from US\$ 254 billion in 2017 and US\$ 234 billion in 2015.

Simon Murray, Principal Analyst at Digital TV Research, said: “This growth comes despite pay TV revenues falling by US\$ 4.4 billion in 2018. OTT TV episode and movie revenues, including AVOD, will climb by US\$ 15.4 billion in 2018. So, OTT’s share of the total will double from 13% in 2015 to 26% in 2018.”

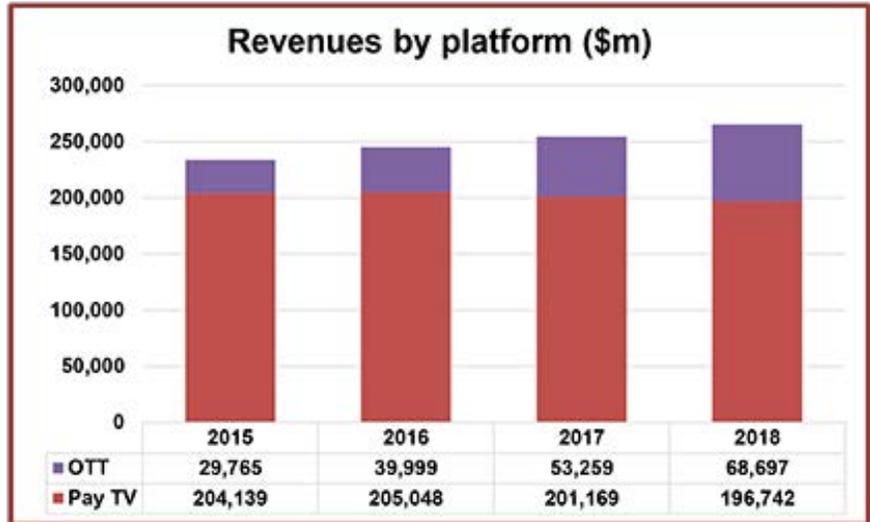
Despite pay TV revenues falling according to the TV Databook report, the number of subscribers continues to rise – reaching 1,032 million by end-2018, up from 922 million in 2015.

The total number of TV subscriptions will reach 1.51 billion by end-2018; up by 38% from 1.09 billion in 2015. SVOD subscriptions will climb by 304 million over the same period to reach 474 million. Therefore, SVOD’s share of the total will double from 16% in 2015 to 31% in 2018.

MSS Market to Grow at CAGR of 7.52%

The Mobile Satellite Services market is expected to register a CAGR of over 7.52% during the forecast period 2018 - 2023. According to the new publication of Research and Markets, which profiles the Data Service, Voice

nection density, quality and user experience, but also in terms of flexibility, efficiency, scalability and openness of the network that



Service providers of Mobile Satellite Services software, and service for various industries, 5G mobile networks with next-generation satellite capabilities will help the satellite operators become a major player in the emerging 5G ecosystem.

In the last few years, satellites have played an essential role in the growth of communications, media, and technology industries all around the world. Currently, satellites are being used for the various range of applications, including telecommunication, weather prediction, and navigation, military intelligence, and space exploration.

Markets and Research said 5G systems are expected to have built-in the new advanced mobile phones, thus allowing telecom operators to provide next-generation satellite capabilities. The Network evolution towards 5G will bring outstanding novelties and improvements not only regarding capacity, latency, con-

allow phone calls to be made and received anywhere in the world.

The growing demand for the communication devices which provide different services such as receiving and sending data from the remote location is the key factor that has been driving the market. Moreover, with the increase number of natural disasters and indefinite occurrence of events resulting in a complete breakdown of communication devices and services on land which results in the necessity to use of satellite communication devices to maintain connectivity at such places.

The moderate competition recognizes the market due to massive capital investment in these services. The competition is based on reliability, product features, performance, quality, and innovation. system, which is a prominent innovation in satellite technology.



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*Source: Saudi General Entertainment Authority (GEA) Announcement - Feb 2018

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Company Name	Symbol	Price Nov. 5	52-wk Range	
Satellite Operators				
Asia Satellite Telecommunications Holdings Li	1135.HK	5.40	4.62	7.49
Eutelsat Communications S.A.	ETL.PA	18.80	15.28	23.11
APT Satellite Holdings Limited	1045.HK	2.63	2.47	4.18
Inmarsat Plc	ISAT.L	464.80	334.30	646.00
SES S.A.	SES.F	19.11	10.64	20.81
Satellite Manufacturers				
The Boeing Company	BA	361.98	259.56	394.28
Maxar Technologies	MAXR	17.08	13.50	67.30
Lockheed Martin Corporation	LMT	303.21	291.52	363.00
OHB SE	OHB.DE	33.6	27.55	49.75
Honeywell International Inc.	HON	147.18	133.71	162.52
Equipment Manufacturers				
C-Com Satellite Systems Inc.	CMI.V	1.19	0.98	1.30
Comtech Telecommunications Corp.	CMTL	27.69	19.30	36.94
Harris Corporation	HRS	149.55	136.77	175.50
ViaSat Inc.	VSAT	69.35	59.16	80.26
Gilat Satellite Networks Ltd.	GILT	10.19	6.89	10.21
Service Providers				
DISH Network Corporation	DISH	30.97	27.54	52.53
Globalstar Inc.	GSAT	0.38	0.30	1.68
Orbcomm Inc.	ORBC	10.28	8.43	11.95
Sirius XM Holdings Inc.	SIRI	6.11	5.17	7.70
Sky plc	SKY.L	1726.00	893.42	1740.00

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 Nov. 5
Satellite Markets 20 Index™	3,405.50
S & P 500	2,901.52

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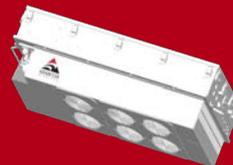
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