

# African Satellite Communications Yearbook 2020

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AFRICA

News, Insight & Industry Analysis

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**NIGERIAN TELEVISION AUTHORITY**

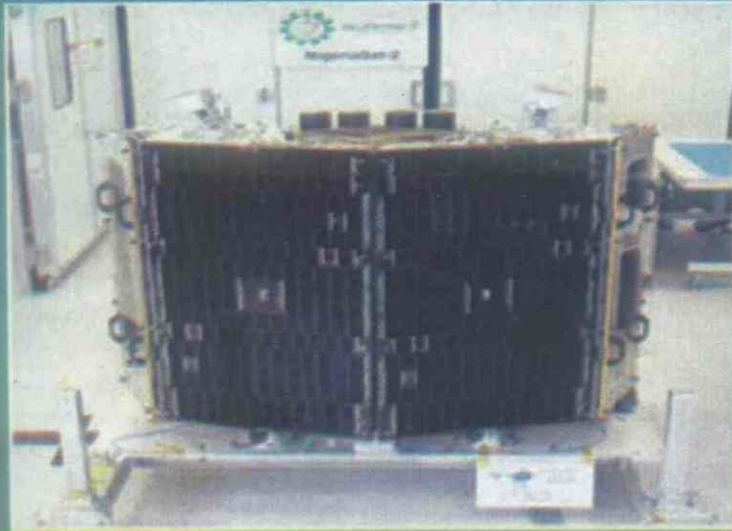
*...you can't beat the reach.*

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*NTA is broadcasting to USA, Canada and Europe. Viewers in Washington DC, USA, can receive NTA signals on MHz TV and COMCAST Cable and in addition via Satellite on INTELSAT America-5 (1.A-5). Viewer in other parts of USA and Canada can receive NTA via satellite on INTELSAT America - 5 (1.A-5). In Europe NTA can be received via Satellite INTELSAT 95.*

# NASRDA - IN SPACE TO KEEP THE PACE

*NigeriaSat-2 and NigeriaSat-X*



*NigeriaSat-2 Spacecraft*



*NigeriaSat-X Spacecraft*

NASRDA is irrevocably committed to the attainment of space capabilities through research, rigorous education, engineering development, design and manufacture for socio-economic development and for overall well-being of our people.

● *NigeriaSat-2, an earth observation satellite, is the most advanced small satellite. The Nigeriasat-2 sensor will provide imagery at 3 resolutions 2.5m panchromatic, 5m multi-spectral (RGB, NIR) and 32m multi-spectral.*

● *NigeriaSat-X is a training model (TM). The Nigeriasat-X sensor will provide 22m multi-spectral (RGB, NIR) imagery. swath 600km @ 8bits, High rate X-band downlink set to 20MBps, Low rate S-Band 8MBps and 2 x 2Gbyte data recorders*

## Potential Applications of N2 and NX

- Agriculture/ forestry, Land use and mapping
- Environmental monitoring and Disaster mitigation and management
- Geological mapping and Transportation
- Hydrology and water Resources, Population and Urban Development
- National Geospatial Data Infrastructure (NGDI)
- National Security
- Tourism

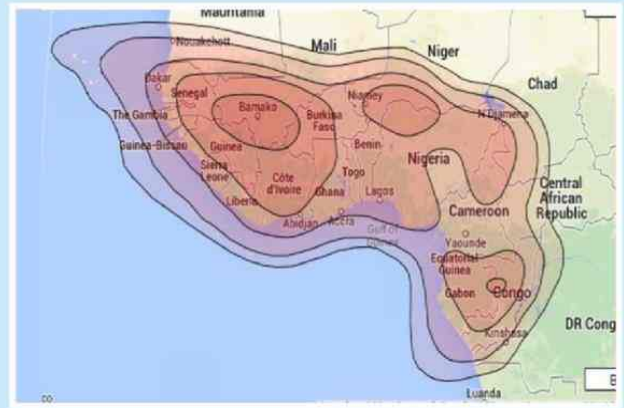
*...We are fully on course to actualize Nigeria State Agenda.*



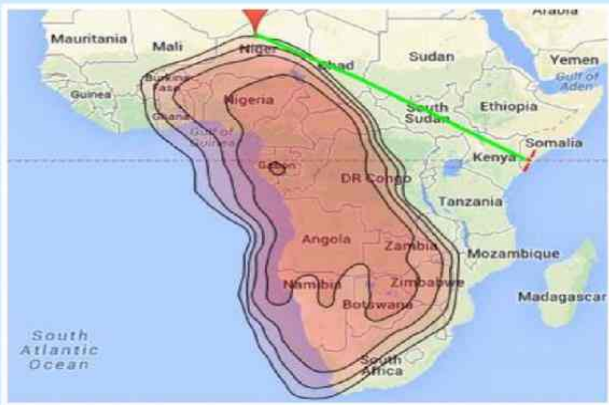
**National Space Research and Development Agency (NASRDA)**

Obasanjo Space Centre, Opposite Umaru Musa Yaradua Express Way, KM 17  
Airport Road, P.M.B. 437 Garki, Abuja, FCT.

# NIGCOMSAT - 1R COVERAGE AREAS



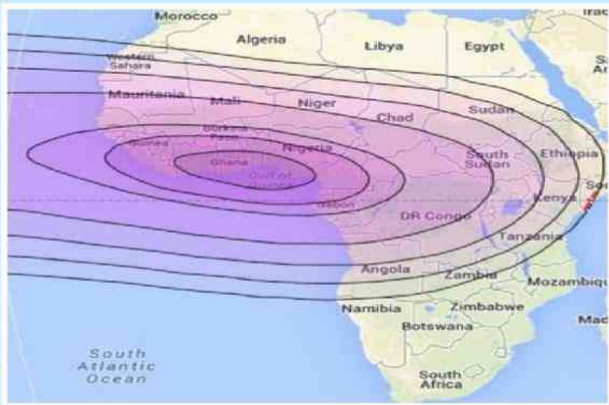
■ **KU-BAND PAYLOAD**  
Ku BAND ECOWAS 1 BEAM



■ **KU-BAND PAYLOAD**  
Ku BAND ECOWAS 2 BEAM



■ **KU-BAND PAYLOAD**  
Ku BAND KASHI BEAM



■ **C-BAND PAYLOAD**  
C-BAND BEAM



■ **KA-BAND PAYLOAD**  
KA BAND NIGERIA SPOT BEAM



■ **KA-BAND PAYLOAD**  
KA-BAND SOUTH AFRICA SPOT BEAM



■ **KA-BAND PAYLOAD**  
KA BAND EUROPEAN SPOT BEAM



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HEAD OFFICE  
Maritime House,  
4, Burma Road, Apapa,  
P.M.B 12861, G.P.O, Marina, Lagos, Nigeria.  
f @ t info@nimasa.gov.ng  
www.nimasa.gov.ng



# African Satellite Communications Yearbook 2020

**SpaceWatch:** Plot 2009, Awka Street, Area 10, Suite GF 10, Noble Complex,  
P.O. Box 1680, Garki-Abuja-FCT.

**Tel:** +234 803 647 1114, 905 248 1981, 802 449, 7730, 818, 688 5182

**Email:** [nigeriasatwatch@yahoo.com](mailto:nigeriasatwatch@yahoo.com)

**Website:** [www.spacewatchafrican.com](http://www.spacewatchafrican.com)

**Managing Director:** Aliyu Bello **Production Editor:** Tonia Genald

**Head of Design:** Marshal E.Akpan **Cartography:** Tope Ayomaya, Isaac Joshua

**Director:** Lukman Bello **Consultant:** Idowu Samuel **Marketing Manager:** Patience Irabor

## MESSAGE FROM SENATOR (PROF.) BOROFFICE ROBERT AJAYI



### SpaceWatch Africa, Accolades!

I congratulate SpaceWatch Africa, the publisher of African Satellite Communications Yearbook for the laudable commitment and sterling interventions towards the promotion and development of Space Technology in Africa.

The African Satellite Communications Yearbook is strongly recommended for it covers wide spectrum of issues affecting Satellite Communications in Africa.

Furthermore, the African Satellite Communications Yearbook brings industry operators and researchers to speed about satellite businesses and technological progression.

Space Technology remains very key to fasttracking socio-economic development and enhancement of National and Continental security in Africa.

In this light, countries in Africa are urged to cooperate and coordinate. Intra-continental partnerships is highly encouraged and African countries are urged to promote and patronise indigenous companies and agencies.

A handwritten signature in red ink, appearing to read "Boroffice", written in a cursive style.

Senator (Prof.) Robert Ajayi Boroffice, OON.  
Founding Director General/CEO,  
National Space Research & Development Agency  
Deputy Majority Leader of the Nigerian Senate  
Chairman, Senate Committee on Science & Technology  
National Assembly Complex,  
Three Arm Zone,  
Maitama, Abuja  
Nigeria, West Africa

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# 2020, COVID-19 and the satellite industry

For seven years, African Satellite Communications Yearbook has been the basic medium of the satellite companies, space organisations, associations, institutions and agencies in Africa. The comprehensive year in review that feature development in the industry in the past months, the African Satellite Communications Yearbook also presents over 10,000 addresses from the industry - always up-to-date, complete and with lots of additional information and current topics from the space, information and communications technology, broadcasting, geospatial and remote sensing industry. This and past edition of the Africa Satellite Communications Yearbook are available online obtainable from the website, (<http://www.spacewatchafrica.com>). This also include the hard print edition of the publication that will be circulated to industry practitioners across Africa, Europe, America, Canada, Caribbean, Asia and at every forum such conferences, seminars and workshop to participants free of charge. With this publication the "memory of the African space, activities, players and intellectual aspirations will be preserved for the future.

African Satellite Communications Yearbook, broadcasters, is a cost-effective way to reach your potential clients and business partners. The yearbook can bring your company or organisation to the attention of key industry personnel and academics doing business in the financial world or with satellite and space technologies, ICT & telecommunications and broadcasting industries. We offer you exclusive contact with people in the government, academic and industry sectors.

With African Satellite Communications Yearbook publication, corporate organizations, individuals, media players, academics and anyone interested in the satellite industry can find useful information, and a comprehensive addresses of companies as well as news and articles from the industry. The unique historical archive thus becomes a comprehensive online offer that is quickly and easily accessible to the entire industry. During the period of lockdown, television became even more important in the home, at first there was a lot of anxiety for news about the virus, how many people infected and how many succumbed to the virus. Throughout 2020, COVID-19 has affected the progress of the satellite industry. The COVID -19 pandemic brought about an unprecedented change in the lifestyle of people. There was the government

imposed lockdowns and restrictions on the one hand, as well the self – imposed personal safety measures adopted by many. For the first in living memory, everyone was expected to stay at home, school closed, offices closed and almost all economic and recreational activities shut down in Abuja, Lagos, and some other cities.

As the first quarter of 2020 progressed, the concerns and challenges of COVID – 19 started to unfold rapidly. The virus started to affect countries, people and supply chains in East Asia in January. The outbreak spread rapidly from East to West, increasingly affecting the European region in February and early March and eventually North America and elsewhere including Africa. Over the course of March, normal life as we know it parts of the world was disrupted within a matter of weeks. Globally, a slight majority (55%) of organizations started noticing the economic impact of the pandemic in March 2020, some business were temporarily shut down or continued operations at minimal capacity due to social distancing measures brought in place while supply chains slowed down or sometimes even completely halted.

As many business were forced to shut down or find innovative ways to continue operations (such as working from home, social distancing measures, introducing personal protection equipment (PPE) in the work place), supply chains started to slow down

After the initial period of anxieties, people seemed to come to terms with the prevailing situation and probably decided to keep busy with some entertainment and education on television. In April 2020, many channels gained viewership compared to March 2020 or April 2019; this was expected as people were home all day every day, however, almost all sports channels lost viewership. COVID – 9 being a global pandemic, all live sporting events was banned worldwide, consequently, all sports channels lost viewership across the country. Peak television viewing time which normally occurs in the evening between 7:30-10:30 pm daily is referred to as prime time. The concept of prime time was redefined during the COVID – 19 lockdown of April 2020; many channels had their "prime time" during day time, unlike the norm pre – COVID, in some cases, the viewership behavior changed radically. A typically example was Arcadia TV, an entertainment channel based in Lagos; the channel's traditional average peak time was changed from 9:30 pm to 4pm daily, however, in April 2020, the average peak time changed to around mid – day to late afternoon, this radical change in audience behavior was obviously influenced by the lockdown.

Television has become an integral part of people's lives thus viewership is directly affected by lifestyle, culture, and financial status. April 2020 was a unique month, jobs lifestyle and school were affected by the

lockdown and these changes promptly manifested in television viewership. People generally watched more television than previous month, there was a thirst for both local and foreign news as people wanted to follow the progress of the COVID – 19 virus as it ravaged the world. As places of worship were also closed, people had to perform their religious obligation at home or watch religious programmes on television.

Almost all religious channels increased viewership significantly in fact a secular channel in portharcourt which started broadcasting religious programmes in April increased viewership by an unprecedented 400 percent.

Last April, due to health concerns, and in cooperation with local health officials, the large Yuri's Night party planned in Los Angeles, CA, at the Kennedy Space Center in FL, and in London was cancelled. This is the same of many events around the world this year. Yuri's Night is the World Space Party. We hope to see you dream, explore, and celebrate with us at the hundreds of YN events held around the world each April. . . Yuri's Night is the worldwide celebration of the manned departure into space. Every year on April 12th, the young generation all over the world unites in a big party with music, art and dance to share the fascination of space. On April 12, 1961, Yuri Gagarin was the first person to orbit the earth in his spaceship Vostok 1. With his legendary flight he opened the gateway to the cosmos for mankind and sichas an immortal place in the history of the planet. So far, 517 Earthlings from 38 countries have followed Gagarin into space (as of April 2010):

Looking towards the next 24 months, industry professionals expect that health and safety, marketing and business development, and sales and account management will become more important in future investment strategies. This indicates that many organization will focus on reconnecting with their customers and competitors as they start picking up business, while also ensuring adequate health and safety measures are in place across the organization. Interestingly, R&D and technology development appear to become somewhat less of a priority at this time.

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**Ethiopia launches first satellite into space**

Ethiopian officials announced that the country had successfully launched its first satellite into orbit. The satellite, which was developed with engineers from China, marks the country's first foray into space and a milestone for its three-year-old space program, according to The Associated Press.

"This is a day we became one of the 70 countries in the world that operate a satellite from space," said Ahmedin Mohammed, an official at Ethiopia's Innovation and Technology Ministry, the AP reported. "The next step is to launch a communication satellite and also set up a space materials assembly and manufacturing facility here in Ethiopia." Development of the satellite reportedly cost \$8 million, with China covering \$6 million. Data provided by Ethiopia's satellite is expected to paint a fuller picture of the country's agriculture, forestry and mining resources and improve responses to flooding and other disasters.

The satellite was reportedly launched from China's Shanxi Province, while a control center directing the launch was centered in the outskirts of Ethiopia's capital, Addis Ababa.

**African aerial navigation safety group signs multi-territory agreement**

The Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA) and satellite systems company Aireon have come to an agreement regarding the use of space-based ADS-B for surveillance services.

The agreement comes into effect from 1 January 2020 within the six flight information regions (FIRs) of ASECNA: Antananarivo, Brazzaville, Dakar Terrestrial, Dakar Oceanic, N'djamena and Niamey. This follows nearly two years of collaboration on terrestrial surveillance.

Automatic dependent surveillance — broadcast (ADS-B) is a surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it,



enabling it to be tracked.

ASECNA is an international public institution. Its main mission consists in ensuring safety in air navigation. With this surveillance expansion, ASECNA will have 100 percent real-time air traffic surveillance over the entire 16.1 million square kilometres of its controlled airspace. As of July 2019, Aireon data currently reaches ASECNA centres in two different points, Dakar and Abidjan, and is then distributed via very small aperture terminal (VSAT) to all the other centres.

The announcement, say the partners, ensures 100 percent surveillance across Benin, Burkina Faso, Cameroun, CAR, Comores, Congo, Côte d'Ivoire, Gabon, Guinée Bissau,

Equatorial Guinea, France, Madagascar, Mali, Mauritania, Niger, Sénégal, Chad and Togo.

This service expansion over water also benefits ASECNA's operations over land. By connecting oceanic and terrestrial with the same space-based ADS-B data, the air navigation service provider (ANSP) will be able to safely reduce aircraft separation minima, adding more capacity and allowing preferred routes to airlines.

**NigComSat new appointments**

The Nigerian government has approved the appointment of Architect Yusuf Kazaure replaces Chief Dr George Nnadubem Moghalu as Board Chairman of the Nigeria Communications Satellite Limited (NigComSat). Before his appointment, Yusuf Kazaure was the managing director and chief executive officer of Galaxy Backbone, a state owned company established by the government to drive the goals of e-Government agenda through the provision of pervasive ICT infrastructure and services to public



institutions, underserved communities and other stakeholders

The government also announced the appointment of Dr Najeem Salam as the new director of Marketing and Business Development. His appointment was a replacement for Hon. Samson Osagie, who before now had held sway.

Also, Professor Abdu Ja'afaru Bambale was announced as a replacement for Kazeem Kolawole Raji who until now was the Executive Director of technical services of the Nigerian Communications Satellite Limited.

**Sudatel appoints new CEO as the company prepares for further expansion and growth**

Sudatel Telecom Group Board of Directors has appointed Mr. Sami Yousif Mohamed as CEO and Group President effective immediately. The appointment comes as Sudatel prepares to invest heavily in its operations in side Sudan and across countries West Africa.

MrYousif has worked for Sudatel since 2013 and was most recently the Executive Vice President for Financial and Administrative Affairs of the Group. Previously he was Director of Finance in The Arab Investment Company, which is owned by the Governments of 14 Arab states. MrYousif said "Of course, I am delighted and honoured to be leading a company that I greatly admire. I am working on a five year plan for Sudatel which will enable us to grow steadily and meet the demands of businesses and consumers

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across our footprint”.

## Nilesat-301 satellite to be built by ThalesAlenia Space

Thales Alenia Space, a Joint Venture between Thales (67%) and Leonardo (33%), announced today that it has signed a contract with the Egyptian operator Nilesat to build the Nilesat301 geostationary communications satellite, winning the contract against an international field of competitors.

Positioned at 7° West, Nilesat-301 will work with Nilesat-201 to provide Ku-band services for the Middle East and North Africa. Nilesat-301 will also help extend the company's provision of Ku-band communications and direct digital broadcasting services in two new large regions of Africa, while also providing broadband Ka-band connectivity over all of Egypt.

As prime contractor, Thales Alenia Space will be responsible for satellite design, production, testing and inorbit acceptance tests. Thales Alenia Space will also provide satellite control system for Nilesat in both Cairo and Alexandria. The satellite is based on the Spacebus 4000-B2 platform and will weigh about 4 metric tons at launch, which is scheduled for the first quarter of 2022. It offers a design life exceeding 15 years. Following Nilesat-201, Nilesat-301 is the second geostationary communications satellite built by



Thales Alenia Space for Nilesat. It is also the fourth payload developed by Thales Alenia Space for the Egyptian operator.

## ITU focuses on the role of emerging technologies in ICT accessibility

The role of emerging technologies such as artificial intelligence and the design of innovative digital solutions to improve the quality of life of persons with disabilities, were among the top takeaways from two major ITU events, which championed Information Communication Technologies accessibility in the Americas and Europe regions.

Through the Digital Inclusion Programme, ITU supports its members in their efforts to empower all people – regardless of gender, age, ability, or location – by promoting ICT accessibility to create a more equitable and inclusive digital society. ITU develops resources and strengthens the capacity of members to implement ICT accessibility for digital inclusion policies and strategies, which ensure that no one is left behind in the digital age.

“Delivering on the promise of the digital economy means to leave no one behind,” said Houlin Zhao, ITU Secretary-General. “We at ITU believe that the principles of universal design, equal opportunities to accessible ICTs and assistive technologies are key to building inclusive societies.”

“Promoting digital accessibility is part of our commitment to leaving no one behind,” says Doreen Bogdan-Martin, Director of ITU’s

Telecommunication Development Bureau. “With the world becoming ever more digital, accessibility to ICTs must be one of our most urgent priorities. These collaborative regional platforms bring together a



broad community of expert stakeholders from government, the private sector and civil society, and are an effective way of accelerating progress towards building a more inclusive information society.”

Key topics discussed during the two events included: the role of artificial intelligence; accessibility in education; the development of digital skills for work; ICT accessibility as a business opportunity; procurement and standards; digital innovation ecosystem for assistive technologies; web accessibility; women in ICT; and the future of accessible audio-visual media services.

## Liquid Telecom rolls out free Wi-Fi at colleges

Liquid Telecom has successfully rolled out free Wi-Fi across 48 higher and tertiary learning institutions in Zimbabwe as part of its long-term initiatives to equip citizens across Africa with Digital Age access and skills. According to the company's information, Liquid Telecom Zimbabwe said the service was offered through its edu-zones, a corporate social responsibility initiative to help students bridge the digital divide.

“From polytechnics to universities, Liquid Telecom's edu-zones empower and equip learning institutions with free internet in the form of Wi-Fi zones — typically in cafeterias, halls of residence and sports fields where students congregate,” the statement read.

“Since its launch 18 months ago, thousands of tertiary level students are enjoying free internet access through edu-zones located at 48 higher and tertiary learning institutions across Zimbabwe.”

The edu-zones' free Wi-Fi initiative is a real-world example of how Liquid Telecom is helping to build Africa's digital future by supporting the development of tech skills and improved digital literacy. This includes equipping students with 21CSkills – an online learning platform offering state-of-the-art skills training and development programmes on the latest technologies for African students, start-ups and developers, who are set to play a starring role in Africa's Fourth Industrial Revolution.

## Euroconsult forecasts a four-fold increase in satellite demand over the next ten years

In its latest analysis of satellite manufacturing and launch services, Satellites to be Built and Launched by 2028, Euroconsult projects that the satellite market will experience a radical transformation in the quantity, value and mass of the satellites to be built and launched with a four-fold increase in the number of satellites at a yearly average of 990 satellites to be launched, compared to a yearly average of 230 satellites in the previous decade. The market will reach \$292 billion over the next decade. This reflects a 28 percent increase over the previous decade which totalled \$228 billion in revenues.

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“Newcomers like OneWeb, SpaceX's Starlink or Amazon's Project Kuiper are becoming the largest owners of assets in orbit, challenging the satellite industry in many ways” said Maxime Puteaux, a Senior Consultant at Euroconsult.

According to report, Civil government agencies are projected to be the top drivers of satellite demand, accounting for 40 percent of the entire market value, ahead of both defense and commercial demand. This is a result of increasing interest in space science, exploration, and Earth observation. On the defense side, a new cycle of orders is beginning with new strategies and replacement satellites needed by the U.S., China, Russia, Japan, India and Europe.

### Facebook appoints Regional Director for Middle East, Africa and Turkey

Derya Matraş has been appointed as Regional Director of Facebook in the Middle East, Africa and Turkey. In this role, Derya will lead Facebook to serve businesses and communities and to grow the company's economic and social impact across the region.

“The fast-growing Middle East, Africa and Turkey region is an important market for Facebook. Derya's wealth of experience in emerging markets and her pioneering spirit will help us further drive impact and value in this uniquely diverse region, while maintaining our mission of bringing people together and building communities,” said Nicola Mendelsohn, Facebook's Europe, Middle East/Africa Vice President.



Derya spent most of her career in emerging markets and was previously the Facebook Country Director for Turkey. Prior to joining Facebook, she was Vice President of Dogan Media Group, the largest media conglomerate in Turkey. She has also held leadership roles in Management Consulting at McKinsey & Company, advising private sector and governments around the world, especially on the digital economy.

### SpaceX to launch Nilesat-301 in 2022

SpaceX will launch Egyptian operator NileSat's next communications satellite on a Falcon 9 rocket in 2022. Nilesat, having launched all three of its past satellites with Arianespace, is a first-time customer for SpaceX.

The Egyptian Satellite Company, Nilesat, is a joint-stock company operating under the Free Zone Law in 6th of October City, and the name of a series of Egyptian communications satellites. It was established in 1996 to operate Egyptian satellites, associated ground control stations and uplinking facilities. It has launched two satellites to the 7° West orbital neighbourhood (Nilesat 101 and Nilesat 102), and launched its second generation satellite, Nilesat

201 in August 2010.

SpaceX and Nilesat signed a contract in Cairo for the launch of Nilesat-301, an approximately 4,000-kilogram satellite that Franco-Italian manufacturer Thales Alenia Space is building.

Nilesat-301, according to a statement SpaceX sent to reporters announcing the launch deal, will carry Ku-band transponders for television broadcasting, and Ka-band capacity for internet connectivity. Thales Alenia Space is building the satellite based on its Spacebus 4000-B2 platform.



Nilesat-301 has an expected design life of 15 years and will cover the Middle East and Northern Africa. Thales Alenia Space received a manufacturing contract for the satellite in December.

Nilesat broadcasts around 700 TV channels, and over 100 digital radio channels uplinked either from Cairo, Dubai, Amman, Doha, Riyadh and Beirut and covering North Africa, the Middle East and the Gulf Region. Nearly 76 percent of the TV channels are free to air, the remaining channels are encrypted.

### British Government allows Huawei in its 5G roll-out

Victor Zhang, Vice President at Huawei, has said that “Huawei is reassured by the UK government's confirmation that we can continue working with our customers to keep the 5G roll-out on track. This evidence-based decision will result in a more advanced, more secure and more cost-effective telecoms infrastructure that is fit for the future. It gives the UK access to world-leading technology and ensures a competitive market, according to Huawei press release..

We have supplied cutting-edge technology to telecoms operators in the UK for more than 15 years. We will build on this strong track record, supporting our customers as they invest in their 5G networks, boosting economic growth and helping the UK continue to compete globally. We agree a diverse vendor market and fair competition are essential for network reliability and innovation, as well as ensuring consumers have access to the best possible technology.”

### SpaceX successfully sends 60 Starlink satellites to space

SpaceX, the rocketship company owned by Elon Musk, launched 60 more Starlink satellites into orbit, marking the second time this month it has sent satellites into space. SpaceX's Falcon 9 rocket took off from the Cape Canaveral Air Force Station in Florida. The launch had been delayed twice in recent days because of strong winds and rough oceans.

The launch is part of SpaceX's efforts to blanket the world with high-

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speed Internet. The company now has 240 satellites in its constellation. In order to provide minimal coverage it needs about 400 satellites and for moderate Internet coverage, 800 satellites, reported Space.com. The report noted SpaceX could begin offering minimal coverage as soon as this year with areas of the U.S. and Canada the first to receive it. The idea is to provide Internet coverage to far-flung corners of the world where it's impossible to bring Internet.

According to TechCrunch, SpaceX COO and President Gwynne Shotwell said the company wants to launch a least six more batches of satellites into orbit by the end of 2020. It had estimated it would take a total of 24 launches to provide internet service globally. The company is now the largest private satellite company in the world.

SpaceX was able to recover the Falcon 9 booster, continuing its success in that department. After separating from the payload, the rocket landed back on its ship floating in the Atlantic Ocean. SpaceX has been successful in recovering the rocket's boosters in previous launches as well.

A byproduct of SpaceX's satellite launches is concerns the artificial stars they create will interfere with astronomers' data calculations and pollute the night sky. To counter that SpaceX and the American Astronomical Society have come up with what they hope is a solution: a non-reflective coating on the bottom of the satellites.

## BBC News Arabic Launches Now in HD

BBC News Arabic television has inked another long-term agreement with Arabsat to launch exclusively their first Arabic news channel in high resolution to the region, onboard of Arabsat BADR-4 which covers the entire MENA region and most of Western Europe.

Starting January 1st, 2020, the HDTV FTA channel will join the same video neighborhood with her sister channel BBC News Arabic SD, and among other leading international and regional news channels, which can be received across the region with the minimum receive dish size. Sam Farah, Head of BBC News Arabic said: "I am very pleased BBC



audiences can now watch BBC News Arabic TV in high resolution across the Middle East, and elsewhere in Europe. It's never been more important for people to be able to turn to trusted, independent news providers, and it is very exciting that our audience can now tune into BBC News Arabic's award-winning journalism in HD quality."

Khalid Balkheyour, Arabsat President and CEO said: "This new agreement with BBC News Arabic will enrich the audiences experience in MENA region, and matches Arabsat strategy to continue being the leading HD neighborhood for Middle East & North Africa. BBC News Arabic is one of the pioneer channels to broadcast in Arabic language and we are delighted to be the first choice every time the channel wants to increase its presence across the region. Exclusively broadcasting in HD format, is something unique and significant to this strategic partnership".

## Liquid Telecom plans South Africa's first wholesale 5G network launch

Liquid Telecom is taking full advantage of being one of the only companies in South Africa to have access to the 3.5 GHz spectrum, launching their 5G network before many competitors can get their hands on a licence. The South African regulator, the Independent Communications Authority of South Africa (ICASA), has yet to announce a spectrum auction for 5G, creating an interesting dynamic for telcos in Africa's southernmost nation. Liquid Telecom has 56 MHz worth of spectrum in the 3.5 GHz band, which it is using for its 5G network rollout.

The only other players currently with a licence for this spectrum are state-owned Telkom, which has so far revealed nothing of its 5G ambitions, and rain South Africa, who launched a 5G network in Johannesburg and Tshwane but is only offering wireless access services so far.

As for other competitors, like MTN and Vodacom, they will have to wait for the allocation of the remaining 116 MHz of spectrum – presumably some time next year – giving Liquid Telecom a substantial advantage



in the nation's mobile 5G race.

## Hopster launches in African market

Award-winning pre-school education and entertainment digital platform Hopster is launching in Africa in partnership with South Africa's Vodacom and Congolese telecom provider MTN. Hopster is working with mobile & web application platform provider AfrikaStream that will deliver its video content in the Congo with telecom provider MTN. The service launched in October, but details have only now been released.

Nick Walters, Founder and CEO at Hopster said: "We are absolutely thrilled to have launched in Africa with both Vodacom and MTN. We see real potential for Africa to be a 'leapfrog' market – with a new generation of users moving straight to finding their favourite content mobile first, rather than on TV." MTN's mobile customers can access hundreds of Hopster's educational localised French preschool shows, books and music as part of its time-based data plan packages.

International characters including Pingu and Peppa Pig are presented alongside the much loved African animated series from Nigerian animator Adamu Waziri, Bino and Fino. Hopster is also working alongside South Africa's biggest telecom provider Vodacom, allowing its customers access to Hopster's video content via Vodacom's new Video on Demand Service, Video Play.

## ST Engineering iDirect enables Speedcast to respond to growing bandwidth demand

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ST Engineering iDirect, a company of ST Engineering North America, announced that Speedcast, the world's most trusted provider of remote communication and IT solutions, will deploy the Newtec Dialog® platform to provide worldwide satellite broadband services for its customers.

The deployment will enable Speedcast to respond to the exponential demand for high-speed connectivity on board cruise ships and may also be used for other vertical market segments with increasing bandwidth requirements, such as yachting, oil and gas and the enterprise market. This builds upon the long-term partnership that has been forged between ST Engineering iDirect and Speedcast, supporting mission-critical communications in the world's most remote regions.

The cruise market remains the biggest user of maritime satellite communications and is driving the sector with its increasing demand for connectivity. Cruise ships are essentially floating cities, and passengers and crew wish to experience the same connectivity at sea as at home. This supports the multiple devices that they have to keep in touch on social media and for their online entertainment needs. More essentially, connectivity brings about a plethora of operational benefits for operators, enabling them to manage their fleets and crew more effectively.

### Eutelsat 5 West B status

On October 24, 2019, Eutelsat announced an investigation into a malfunction of one of the two solar arrays on its EUTELSAT 5



West B satellite. Pursuant to this investigation, the loss of the satellite's South solar array has been confirmed. With the exception of the South solar array, the satellite performance remains nominal. EUTELSAT 5 West B satellite was launched in Q4 2019

According to report, the attendant power loss means c.45% of the capacity of the satellite can be operated. The satellite is now expected to enter commercial service later in January and is expected to meet the designed life time.

In FY 2019-20, Government Services revenues was projected to benefit from the contribution of the EGNOS payload on the EUTELSAT 5 WEST B satellite.

However, a number of mitigation actions aimed at assuring service continuity will be implemented, following the end of life in stable orbit of EUTELSAT 5 West A, for the largest possible number of customers. So far, the revenues generated in FY 2018-19 by EUTELSAT 5 WEST A, which EUTELSAT 5 WEST B is due to replace, amounted to circa €30 million. EUTELSAT 5 West B is fully insured against the eventuality of a partial or total loss by a launch-plus-one-year insurance for up to 173 million

euros.

The partial non-availability of EUTELSAT 5 West B will reduce Financial Year 2019-20 revenues for the Operating Verticals by 5 to 10 million euros. The one-off cost of mitigation, mostly related to the re-pointing of ground antennae will be between 0 and 10 million euros.

In consequence, Eutelsat's revenue objective for Financial Year 2019-20 is mechanically revised to between €1,270 million and €1,315 million for the Operating Verticals. All other financial objectives are



unchanged.

On the commercial front, a multi-transponder contract was secured for a new DTH platform on EUTELSAT 65 West As at 31 March 2019 the total number of channels broadcast by Eutelsat satellites stood at 7,021, up 2.0% year-on-year and by 3.0% stripping out the effect of the disposal of EUTELSAT 25B. HD penetration rose by 11% to 1,509 channels, implying a penetration of 21.5% of channels compared to 19.7% a year earlier.

### Entry into commercial service of EUTELSAT 7C

EUTELSAT 7C satellite has entered full commercial service and is ready to support broadcast customers across Africa, Europe, the Middle East and Turkey. Manufactured by Maxar Technologies, EUTELSAT 7C is a 3.4 tonne high-power all-electric satellite carrying 49 36-Mhz equivalent Ku-band transponders. Successfully launched from Kourou, French Guiana, on 20 June 2019, the satellite is co-located with EUTELSAT 7B at 7° East, increasing capacity at this dynamic neighbourhood by 19 transponders.

During the night of 27-28 January 2020, the Eutelsat teams migrated a number of services from EUTELSAT 7A to EUTELSAT 7C, including Turkish Pay-TV platform Digiturk, Turkish national broadcaster TRT, and Globecast UK for coverage across Europe and the Middle East. EUTELSAT 7A will be transferred to another orbital location as part of Eutelsat's fleet optimisation strategy.

### Ericsson predicts increased 5G uptake in Africa

Swedish multinational networking and telecommunications company Ericsson says more service providers in the Middle East and Africa (MEA) region will this year adopt 5G technology in their operations. Chafic Traboulsi, head of networks at Ericsson Middle East and Africa, says preparing for 5G opportunities is a must for service providers.

His assessment comes as there is general consensus the 5G market is developing much faster than the previous generation 4G LTE standard. In its Mobility Report published in November last year, Ericsson predicted 5G will be adopted faster than 4G LTE.

The IHS Markit 5G Economy Study, commissioned by Qualcomm, shows 5G sales enablement of \$13.2 trillion by 2035, an increase of \$1 trillion over the original forecast released in 2017 which estimated \$12.3 trillion. In SA, mobile data-only network operator Rain last September activated Africa's first commercial 5G network in SA. SA's

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big mobile operators, such as Vodacom and MTN, are unable to launch 5G services until more spectrum is licensed to them by the communications regulator, the Independent Communications Authority of SA.

In November last year, the telecoms regulator published the long-awaited information memorandum on the licensing process for the assignment of the International Mobile Telecommunications spectrum, or what is also referred to as high-demand spectrum.

### Eutelsat successfully launches Konnect satellite

The Eutelsat KONNECT satellite has been successfully launched into Geostationary Transfer Orbit by Arianespace using an Ariane 5 rocket that lifted off from the Guiana Space Center in Kourou, French Guiana.

“For the first Ariane 5 launch of the year, our heavyweight vehicle has once more performed flawlessly,” said Arianespace CEO Stéphane Israël, who provided his post-flight comments from the Spaceport’s mission control center. “Congratulations to all!” The separation of the all-electric satellite occurred after a 27-minute flight and the spacecraft systems checkout was successfully completed over a period of 3 hours.

Built by Thales Alenia Space, the EUTELSAT KONNECT communications satellite, features all-electric propulsion and operates in Ka-band. It is the first satellite to use Thales Alenia Space’s all-electric Spacebus NEO platform, developed under the Neosat Partnership Project conducted by the European and French space agencies. EUTELSAT KONNECT was produced by Thales Alenia Space as a new-generation high-throughput



satellite that will help bridge the digital divide by bringing broadband Internet across 40 countries in Africa and 15 countries across Europe. In Africa, EUTELSAT KONNECT also will – through the establishment of public Wi-Fi terminals – share internet access between several users, marketed in the form of coupons that can be paid via mobile phone.

EUTELSAT KONNECT will assure full or partial coverage for up to 40 countries across Africa and 15 over Europe. Offering total capacity of 75 Gbps, by next autumn this high throughput satellite will allow the operator to provide Internet access services for both companies and individuals at up to 100 Mbps.

Featuring all-electric propulsion and configured for operation in Ka-band, EUTELSAT KONNECT is the first satellite to use Thales Alenia Space’s Spacebus NEO platform, developed under the Neosat Partnership Project conducted by the European and French space agencies (ESA and CNES). It weighed an estimated 3,619 kg. at liftoff.

EUTELSAT KONNECT is the 34th Eutelsat satellite launched by Arianespace since its first mission for this operator. It also is the 163rd Thales Alenia Space-produced satellite orbited by the company to date.

### Telecoms contribution to Nigeria's GDP

### surges

The Nigerian Communication Commission, NCC, has disclosed that it witnessed impressive growth in the effective regulation of telecommunication under the leadership of its Executive Vice Chairman, Professor Umar Danbatta. According to the statement released by the commission, “telecoms contribution to Nigeria’s Gross Domestic Product (GDP) increased from 8.50 percent in August 2015 to 11.39 percent as at October, 2019.”

It explained that the feat was achieved due to effective regulatory environment created by the commissions’ helmsman, Umar Dambatta, NCC also revealed that telecommunications’ from August 2015 till date recorded high growth statistics.



According to data released by the commission, “Active mobile voice subscribers increased from 151,018,624 to 2015 to 180,386,316 during the same period while teledensity increased to 94.50 percent following its rebasing in early 2019.

“Internet subscribers increased from 90 million in 2015 to 123.5 million by October, 2019 while broadband penetration jumped from 8 percent to its current 37.87 percent, indicating a total of 72,289,389 Nigerian access data services on 3G and 4G networks.

### Thaicom migrates Thaicom 5 satellite customers

Thaicom Public Company Limited would like to update progress on the incident regarding a technical anomaly on the Thaicom 5 satellite resulting in technical limitations to monitoring the status of the satellite, as reported earlier by the company.

Thaicom together with the satellite’s manufacturer and a team of specialists have performed three attempts to recover the satellite system since the anomaly occurred. However, the system has not successfully been restored. Thaicom continues to work with the satellite’s manufacturer to recover the satellite system by using various alternatives for a certain period of time. In order to ensure the continuity of services for customers, it is necessary for Thaicom to migrate the customers from Thaicom 5 to other satellites.

Anant Kaewruamvongs, Chief Executive Officer Thaicom, commented: “During the attempts to restore the satellite, the Company has cooperated with all relevant customers in order to migrate to other satellites so that we will be able to continue providing telecom and broadcast services without interruption.” Anant added: “We would like to thank the Ministry of Digital Economy and Society and the National Broadcasting and Telecommunications Commission for their prudent decision to support and approve of the relevant process.”

Thaicom would like to emphasize that all key customers and television broadcast networks on Thaicom 8 and Thaicom 6, i.e., True Visions, Distance Learning Television (DLTV) and Must Carry Channels of Digital Terrestrial Television (DTT), have not been impacted by this incident.

### SADC countries to implement satellite sharing system

In Angola, the implementation of a satellite sharing system would

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boost the sustainable development of the African continent, according to the Angolan Secretary of State for Telecommunications Mario Oliveira. He said the system would enable African people to have quicker access to information, Oliveira said, adding that it would mark an important step for SADC members to enter the space industry.

SADC is a regional economic community of 15 Member States: Angola, Botswana, DRC, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe. SADC's vision is that of a regional community that ensures the economic well-being, improvement in the standards of living and quality of life, freedom, social justice, peace and security for the people of Southern Africa. Consistent with its vision, SADC's Mission Statement commits it: "To promote sustainable and equitable economic growth and socio-economic development through efficient productive systems, deeper cooperation and integration, good governance, and durable peace and security, so that the region emerges as a competitive and effective player in international relations and the world economy".

Oliveira also said Angola plans to resend a national satellite into orbit in the future, despite the failed launch of its first geostationary satellite the Angosat-1 in 2017. George Ah-Thew, SADC senior coordinator for science, technology and information, said SADC countries are drafting the policies for the satellite sharing system. SADC is a regional economic group established in 1992 made up of 16 member states, whose goal is to reduce poverty in and develop the economy of the southern Africa region.

At least, close to 50 satellites covering at least part of Africa with C-band capacity in 2014, out of around 72 satellites covering the region. Overall, satellite operators supply a total capacity of ~14 GHz in C-band in 2014 in Africa usually 50% of "regular" capacity supply in the region, excluding HTS proprietary military satellites.



### WiFi enabled 'Hello Hubs' brings internet to underserved communities in Uganda

With a vision of ending the education gap in Uganda, telecommunications company Roke Telkom has announced a partnership with Hello World to build fourteen solar-powered, outdoor, internet-connected hubs across Uganda.

"With sustainable, affordable, world-class education technology we can end the education deficit in Uganda once and for all," said Katrin McMilliam, Hello World Hubs CEO, in a press release. "We believe at Hello World that we have the perfect partnership with Ugandan-owned Roke Telkom to reach every child who currently goes without an education in Uganda."

In a YouTube video announcing the partnership, McMilliam explained how the nonprofit fully shifts ownership of the Hello Hub to the community by empowering them during the installation process.

"We don't build Hello Hubs," she says. "We partner with the community, and we teach them how to build their Hello Hub, all of it. From the solar paneling, to the server; they put the cement in; they learn how to do wiring and put in a grounding rod. In this way, the community makes an investment with Hello World and Roke Telekom in their Hello Hub."

### SES's and Gilat Telecom's resilient network restores connectivity in Africa

High-performance internet connectivity was restored in the Democratic Republic of Congo (DRC) within just four days after the West Africa Cable System (WACS) undersea cable cut, thanks to the



combined efforts of Gilat Telecom and SES, the companies have announced.

The recent cable cuts affected much of Sub-Saharan Africa, causing internet outages and slow speeds. The swift restoration to bring the service back to Gilat Telecom's DRC customers was achieved by leveraging unparalleled high-throughput, low-latency O3b Medium Earth Orbit (MEO) satellite capabilities.

"High-throughput, low-latency satellite solutions and applications enabled by SES have proved their reliability and performance, drastically changing the connectivity landscape in the DRC over the past years. It has now been the fifth consecutive year that we are delivering highly reliable seamless services thanks to MEO, reaching underserved and unserved locations where fibre cannot be deployed or has been compromised. This has been revolutionary for the MNOs we serve, who are now able to deploy services that require low latency," said Dan Zajicek, CEO of Gilat Telecom.

An O3b MEO system customer of SES since 2014, and the first in Africa, Gilat Telecom recently expanded its partnership with SES to provide more bandwidth to rural areas and extend services beyond Kinshasa and Lubumbashi, reaching unserved or underserved Kisangani, Mbuji-Mayi and Bunia, to customers such as Orange DRC. Under the new agreement, Gilat Telecom is using multiple Gbps of bandwidth on the O3b system and is now also adding services via SES's Geostationary Earth Orbit (GEO) satellites. The expanded capabilities enabled by SES's multi-orbit fleet will allow Gilat Telecom to deploy 4G/LTE networks and support cloud computing services, even in the remotest areas of the DRC.

### Nigeria seeks approval of \$500m loan to rejig NTA

Nigeria's Minister of Information and Culture, Lai Mohammed, has pledged to turn around the Nigerian Television Authority (NTA) to enable it compete with the likes of Cable News Network (CNN) if the \$500m loan the ministry requested is approved. He stated this when he appeared before Senate Committee on Local and Foreign Loans to defend the \$500m loan the ministry applied for from President Muhammadu Buhari's \$29.96b loan for funding critical infrastructure in the country.



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The minister explained that if the fund was approved, the NTA could be upgraded to enable it to send out signals that would be at par with CNN, "because we have the manpower and the technology." He explained that the creative industry was not just about Television alone, but film, music, fashion and photography, adding that there was no better platform to showcase Nigeria's talents than having a digital system.

He said the creative industry employs no fewer than one million young persons directly and indirectly, noting, "If this project is approved, there will be more visibility for our people in the music,



fashion and film industries.

"In 2014, we made \$23m from music alone and about \$53m in 2019 and we are looking forward to making \$83m in 2025. You can imagine the kind of growth we will have if only we digitise all the NTA stations in the country."

### EGNOS payload enters service on EUTELSAT 5 West B

Eutelsat Communications announces that the GEO-3 payload of the European Geostationary Navigation Overlay System, called EGNOS, a hosted payload aboard its EUTELSAT 5 West B satellite, has successfully entered into service.

EUTELSAT 5 West B is hosting the Eutelsat-procured EGNOS payload under a 15-year agreement signed in 2017 with the European Global Navigation Satellite Systems Agency (GSA). The contract also includes technical services and a European ground infrastructure, including two gateways installed at Eutelsat's Rambouillet and Cagliari teleports.

Yohann Leroy, Eutelsat's Deputy CEO and Chief Technical Officer, said: "Eutelsat is proud of the collaboration with its customer GSA, its partners including the European Space Agency, and its suppliers, culminating in the entry into service of this next generation technology of EGNOS on EUTELSAT 5 West B. We are delighted to host this payload, which will significantly enhance the performance of global navigation satellite systems across Europe, notably Galileo, in the coming years."

Pascal Claudel, GSA Acting Executive Director and Chief Operating Officer, declared: "With this new payload in service, EGNOS is moving towards the transition to its new generation. This has been done thanks to the constructive collaboration with Eutelsat. Delivery and continuity of satellite services are part of our mission as delegated by the European Commission. It is essential that we, at the GSA, ensure these services to support economic growth and that the European Union's citizens and companies can benefit from the latest GNSS technology."

### Eutelsat first half revenues in line with expectations, says RodolpheBelmer

The Board of Directors of Eutelsat Communications, chaired by Dominique D'Hinnin, reviewed the financial results for the half-year ended 31 December 2019.

Commenting on the First Half, RodolpheBelmer Chief Executive Officer of Eutelsat Communications, said: "First Half revenues were in line with our expectations with an improvement in trend in the Second Quarter versus the First and a stabilization in revenues quarter-on-quarter. Despite the revenue decline we EUTELSAT delivered an industry-leading level of profitability, with an EBITDA margin of 78%. In recent months we have made strong progress on the development of our future growth levers with the successful launch of EUTELSAT KONNECT, bringing new resources over Africa and Europe and marking a milestone in our Connectivity strategy, as well as the procurement of EUTELSAT 10B with firm commitments on a third of the HTS capacity, highlighting robust demand in the mobility market. Looking ahead, the remainder of the year will benefit from several revenue tailwinds, notably the EGNOS payload on EUTELSAT 5 West B and the availability of incremental capacity on EUTELSAT 7C, leading us to reaffirm our revenue target for FY 2019-20 as a whole. All other elements of the financial outlook are also confirmed, notably our FY 2021-22 cash-flow target providing ample dividend cover. Moreover, by FY 2022-23, the bulk of our capacity renewal cycle will be complete, giving us increased flexibility to support cash generation and attendant shareholder remuneration over the long term."

### Eutelsat selected by AfricaXP for DTH satellite



### services across Sub-Saharan Africa

Channel network and content distributor AfricaXP has signed multi-year agreements with Eutelsat Communications for Ku-band capacity on two Eutelsat satellites, positioned at 16° East and 7° East.

This capacity will enable AfricaXP to extend the reach of its DTH free-to-air TV platform, Premium.Free. Currently broadcast in West Africa, the platform will leverage the unparalleled coverage of Eutelsat's 7° East hotspot to roll out a regionally customized offer of 23 channels across Eastern and Southern Africa from mid-February. In addition, AfricaXP will launch an inaugural, 10 channel French language bouquet from Eutelsat's 16° East position with its powerful footprint over French-speaking African countries.

Craig Kelly, AfricaXP's CEO, said: "Premium.Free has been entertaining viewers in Anglophone West Africa for the past year by providing a pay-TV quality experience to the public free-of-charge as an unencrypted satellite service. Eutelsat's 7° East and 16° East positions offer us comprehensive geographic reach in Africa's key Western, Eastern and Southern markets where they serve large audiences. This has ignited a strong interest from our advertising partners."

Nicolas Baravalle, Director of the Sub-Saharan Africa region at Eutelsat, added: "Eutelsat is delighted to be supporting AfricaXP in

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rolling out this multichannel Free-to-Air model across Sub-Saharan Africa. Moreover, this partnership reinforces the strength and desirability of these two orbital hotspots for the Sub-Saharan region, which are becoming increasingly sought after by broadcasters.”

## Google announces US\$1 million African internet safety fund

In recognition of Safer Internet Day, Google has announced a \$1 million (R14.8 million) pan-African Google.org fund to support innovative ideas around privacy, trust and safety for families online across sub-Saharan Africa.

It also launched its landmark child online safety programme, Be Internet Awesome, in South Africa, the Netherlands and Nigeria. Be Internet Awesome seeks to help minors explore the internet safely and confidently, while the Google.org grant will provide funding to help develop further programmes that aim to do this –



for children and their families. Funding applications will be requested through an open call and the fund will be administered by a partner in South Africa.

“Google is committed to a safe internet for children. We are also passionate about the empowerment of organisations who share this commitment. The fund will be administered by a third-party partner on behalf of Google.org, and we will be sharing details on application criteria and deadlines soon,” says Fortune Mgwili-Sibanda, head of public policy and government relations at Google Africa. “We are excited to strengthen the work we have been doing with parents and children in the field of online safety, particularly in South Africa. In addition to Family Link, which allows parents to help their families develop healthy digital habits, we also launched Password Checkup, exactly one year ago, to empower users to check and strengthen online security settings for their Google Accounts,” he said.

## Intelsat introduces first-of-its-kind “flexmove” managed service for ubiquitous land mobile connectivity

Intelsat launches FlexMove, a new end-terminal managed service that makes it easy and affordable for people to connect to the Internet, private data networks and cloud services from virtually anywhere in the world, including while on-the-move, or on-the-pause at a temporary site. Businesses, first responders and humanitarian-aid organizations can now use this secure, reliable, “always-on” service to stay connected anywhere their jobs take them.

“Intelsat engineers and innovators are laser-focused on developing flexible, affordable managed services that help our

customers connect and communicate seamlessly, no matter where their business may take them,” said Intelsat Senior Vice President for Mobility Mark Rasmussen. “Our new FlexMove service provides a breakthrough in speed, convenience and affordability, ultimately enabling more companies and organizations to operate with confidence in even the most remote or challenging locations.”

There are many remote locations around the globe that fiber and terrestrial wireless networks can’t reach, and where ground infrastructure is at risk of disruption by natural or man-made events. That’s where integrated connectivity solutions, like those from Intelsat, prove invaluable. FlexMove is powered by Intelsat’s award-winning global Epic high-throughput satellite (HTS) fleet, the world’s largest fixed satellite network and the IntelsatOne ground network to provide users with a seamless global connectivity experience.

## Intelsat announces fourth quarter and full-year 2019 results

Intelsat S.A. has announced financial results for the three months and full-year ended December 31, 2019. Intelsat reported total revenue of \$517.0 million and net loss attributable to Intelsat S.A. of \$115.0 million for the three months ended December 31, 2019. For the year ended December 31, 2019, Intelsat reported total revenue of \$2,061.5 million and net loss attributable to Intelsat S.A. of \$913.6 million.

Intelsat reported EBITDA1, or earnings before net interest, gain on early extinguishment of debt, taxes and depreciation and amortization, of \$356.0 million and Adjusted EBITDA1 of \$371.3 million, or 72 percent of revenue, for the three months ended December 31, 2019. Free cash flow from operations1 was \$70.2 million.

For the year ended December 31, 2019, Intelsat reported EBITDA of \$1,012.8 million and Adjusted EBITDA of \$1,481.5 million, or 72 percent of revenue. Free cash flow from operations was \$38.8 million. Intelsat’s Chief Executive Officer, Stephen Spengler, said, “We delivered on our 2019 plan, exceeding our guidance for full-year revenue and Adjusted EBITDA. Our fourth quarter results reflect the contributions of our new satellites as well as growing revenue streams generated by our Flex



managed services, benefitting our network services business. Our media business signed a significant new direct-to-home television customer contract in Asia, while the government services business achieved important renewals that will support its stability in 2020. Spengler concluded, “The draft order issued by the Federal Communications Commission on February 7, 2020 was a major event in the C-band proceeding. Our near-term focus is on improving the draft order proposed by the FCC, obtaining changes that would allow us to quickly clear spectrum to support 5G deployments in the U.S. while protecting the video services on which nearly 120 million American homes rely.”

## Liquid Telecom and Internet Solutions partner on 5G

Liquid Telecom partners Internet Solutions to develop high-speed connectivity for businesses in order to fuel digital transformation. “Local businesses are adopting technologies like SD-WAN, IoT, and cloud computing, however, these technologies need network connectivity

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that provides high quality, increased capacity, and greater reliability to ensure optimum performance,” said ReshaadSha (pictured), CEO of Liquid Telecom South Africa. “Providing Internet Solutions with 5G wholesale services as an alternative to fibre connectivity, Liquid Telecom South Africa is highlighting how we are delivering on our commitment to the market to continue being the Best Business Network in South Africa.”

Through the collaboration, the two will provide wholesale 5G connectivity targeted at delivering enterprise services to their existing and new customer base. According to the two, 5G connectivity provides operators and internet service providers with faster speeds, lower latency and greater capacity, enabling businesses to deliver richer experiences to its customers.

“Internet Solutions has evolved its networking model to provide a high-performance Hybrid Network that aggregates multiple WAN transport services,” said DrSetumoMohapi, managing executive for Internet Solutions. “This enables clients to fully utilise all available bandwidth for high availability and total application performance.



The innovation, flexibility and range of 5G use cases that this offers for different industries such as agriculture, retail, manufacturing, logistics, etc. is boundless.”

### Vodacom plans South Africa 5G launch

Last December, Vodacom, South Africa's largest operator, signed a roaming agreement with Liquid Telecom, gaining them access to Liquid's 3.5 GHz spectrum. With this highly sought-after spectrum band now available to them, Vodacom has announced its intentions to launch 5G later this year.

“Having been the first network to commercially launch 5G in Africa through Vodacom Lesotho, we expect to be able to launch 5G services in South Africa this year,” said ShameelJoosub, Vodacom Group CEO. “This is possible thanks to a recent roaming agreement with Liquid Telecom, as 5G spectrum is largely unassigned in South Africa.”

Until now, both Vodacom and MTN have been running 5G pilots using spectrum which they are restricted from commercialising by the regulator. With the finalisation of this roaming agreement, Vodacom has seized the upper hand for now.

Vodacom has also announced it had revised its roaming agreement with domestic 4G provider Rain, which it hopes to use to expand its 4G capacity while they wait for the ongoing spectrum allocation delays to resolve.

Rain launched the first commercial fixed-wireless 5G network in parts of Johannesburg and Tshwane in 2019, but no company has launched a nationwide programme so far.

### Yahsat wins best company award from Tawteen

Al Yah Satellite Communications Company (Yahsat) has announced that it has won the prestigious Emiratisation Award from the UAE Ministry of Human Resources and Emiratisation (Tawteen) in three categories. Yahsat was conferred the coveted prize for Best Company of the Year in the Establishments

category, while two of its talented employees collected awards for Best New Emirati Employee and Best Emirati in a Supervisor Role.

Field Operations Engineer, Abdullah Essa Ahmed Sharif, won the Best New Emirati Employee award, which recognizes talented Emiratis who have taken up employment shortly after graduation. Yahsat's newly appointed Deputy Chief Technical Officer (CTO), Adnan Al Muhairi, was selected as the Best Emirati in a Supervisor Role. This award honours brilliant Emirati managers and section heads who are active in the private sector. All winners received their awards from His Highness Sheikh Mohammed bin Rashid Al Maktoum, the UAE Vice President and Prime Minister, and the ruler of Dubai.

Congratulating the winners, Yahsat's Chairman and Chief Executive Officer of Mubadala Aerospace, Renewables & ICT, Khalid Al Qubaisi said, “We are very proud of Abdullah and Adnan – this is an important recognition of their individual achievements as well as a testament to Yahsat's ongoing commitment to nurturing and developing National talent. Being recognized as Best Company of the Year is a true honor. As a homegrown Emirati company, at Yahsat we take it as our national duty to build and develop the unlimited and untapped potential of our young and future leaders and provide them with the right tools and opportunities to excel.”

### PanAccess' Nigerian broadcast bouquet now on AMOS-17 Ku-band

Spacecom, operator of the AMOS satellite fleet announced that it is providing Ku-band capacity from its AMOS-17 communication satellite to PanAccess, a leading German broadcast services company, for broadcasting to Nigeria. PanAccess' growing broadcast bouquet, originating in Germany, consists of dozens of channels and is broadcast free-to-air from the satellite located at the 17°E orbital position over Africa. PanAccess specializes in providing high-end one-way or two-way CAS and DRM security solutions around the globe. It offers a seamless service portfolio for consumers using any



device.

According to Roland Schlichting, PanAccess CEO, “We are thrilled with Spacecom's response speed that enabled us to be on-air quickly and efficiently. PanAccess views the growth of our broadcast base in Nigeria as an important market and we will continue to add more channels for these customers.” Spacecom VP Sales, EyalAltshuler commented, “Working in tandem with PanAccess, we succeeded in bringing their bouquet onto the air in less than 48 hours after we began designing their solution. AMOS-17 is an exciting satellite with its Ku, Ka and HTS C-Band capabilities. The Nigerian market is now experiencing services and communications from the most powerful, technically advanced satellite serving the region. Since the beginning of commercial operations in late 2019, the satellite is already boosting our business around the continent.

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## Viasat Visits Nigeria, updates the Commission on readiness to deploy broadband satellite services

For more than 30 years, Viasat has helped shape how consumers, businesses, governments and militaries around the world communicate. Today, the Company is developing the ultimate global communications network to power high-quality, secure, affordable, fast connections to impact people's lives anywhere they are—on the ground, in the air or at sea. Last month, Viasat visited the Nigerian Communications Commission (NCC) to give an update on its readiness to deploy satellite broadband services in Nigeria. The Viasat team was received by Engr. Augustine.



Nwalunne, Ph.D., Director, Spectrum Administration at NCC, on behalf of Prof. Umar Danbatta, the Executive Vice Chairman of the Commission. According to Nwalunne, the meeting with Viasat team was a sequel to an earlier meeting with the EVC, when Viasat came to discuss its plans to get regulatory supports for entry into the commercial satellite communications market in Nigeria.

At the meeting, Viasat sought the Commission's encouragement and approval to reserve and use the 28 GHz KA frequency band in the country to provide cost-effective Internet connectivity and high throughput satellite connectivity through its incorporated Nigerian subsidiary, Viasat Nigeria.

The company also informed the Commission of its plan to conduct a Proof of Concept (PoC) test in Abuja in 2020. Thereafter, Viasat plans to roll out in a community, and subsequently extend the services across a state and then proceed to extend its broadband satellite services nationwide by 2022.

Nigeria.

## Tunisia launches the Internet Universality Indicators assessment

Recently, the Internet Universality Indicators (IUIs) assessment was officially launched in Tunisia, breaking ground by making Tunisia the first country in the Arab region to initiate this assessment at national level. The launch was convened on the occasion of the first meeting of Tunisian Multi-stakeholder Advisory Board (MAB), participated by 11 prominent members of the Board.

"The Tunisian MAB endorsed the use of UNESCO's Internet Universality Indicators and the proposed methodology for the assessment in Tunisia and encouraged all other concerned stakeholders, on a voluntary basis, to support the national assessment of Internet development in Tunisia with the Internet Universality Indicators. Such engagement is crucial to formulating and implementing UNESCO recommendations that can help

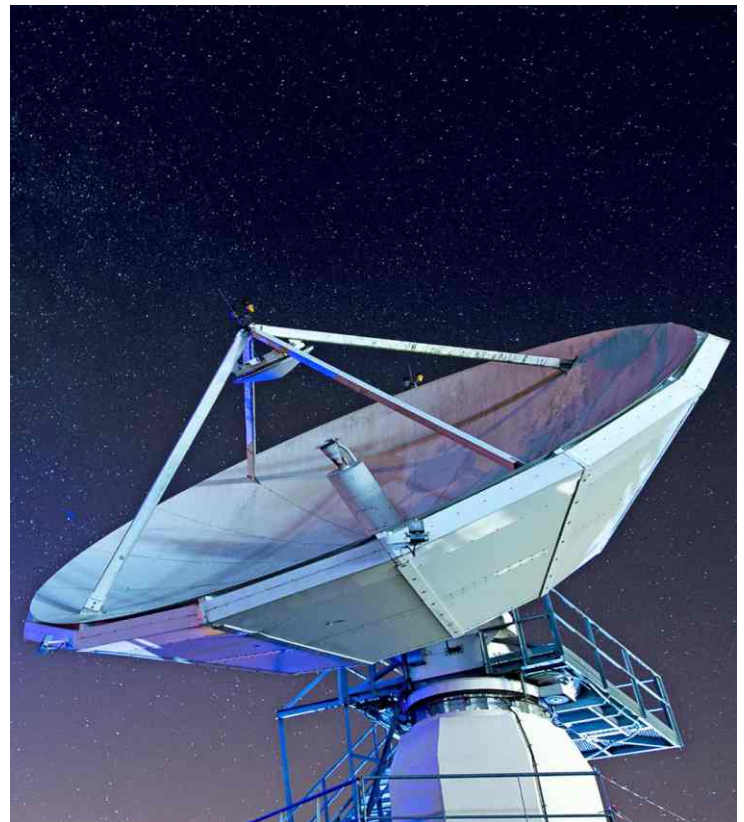
improve Internet development in the country", said Ms. Golda El-Khoury, Director & Representative – UNESCO Cluster office for the Maghreb.

The launch event highlighted the role of the newly created MAB, responsible for overseeing the research process through a truly inclusive and multi-stakeholder manner. The 11 MAB members are leading experts representing different groups and government branches including the Ministry of Communication Technologies and Digital Economy, the High Independent Authority of Audiovisual Communication (HAICA), the National Agency for Information Security (ANSI), Access Now, the Research and Studies Telecommunications Centre (CERT), University of Sfax, Forum DSI, and the National Telecom Regulator in Tunisia (INTT).

## Enabel partners SES to connect foreign aid projects in Africa via satellite

The Belgian development agency Enabel and SES, a leader in global content connectivity solutions, will deliver satellite-based communications for the development and foreign aid projects spearheaded by the Belgian and other European governments. Under the multi-year framework contract awarded following a public tender, SES will bring managed end-to-end connectivity infrastructure and services to over 130 sites to support Enabel and development projects in 20 countries across Africa.

The end-to-end connectivity solution delivered by SES will be supporting Enabel in its goal of providing partners with the right digital solutions and latest technologies. The connectivity will power Enabel's projects and activities, further reinforcing the agency's commitment to the 'Digital for Development' policy (D4D) of the Belgian Development Cooperation and of the European Commission, the Principles for Digital Development and the UN Sustainable Development Goals. As part of the solution, SES will provide antennae, installation, satellite bandwidth and end-to-end services to allow Enabel and its partners to upgrade the skills of African professionals, elevate the healthcare



system and improve the people's living conditions.

"At Enabel, we believe that digitalisation and the benefits it brings serve as a catalyst for development. Access to high-bandwidth connectivity is essential for our projects in remote locations as it allows us to deploy critically important tools. We are delighted to find in SES a

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reliable partner who shares these values and has the right expertise," said Jean Van Wetter, Managing Director of Enabel. "SES's ability to quickly deploy a high-performance communications infrastructure and service, and their track record of working with governments around the world, make them the best fitting partner to support the nations in achieving Sustainable Development Goals."

## Meteorologists to learn satellite monitoring skills



Meteorologists from across the Middle East have come to Oman to learn to spot weather patterns from satellites by learning about techniques such as remote sensing, tracking weather conditions and analysing satellite images.

The weather observers are being trained at the Public Authority for Civil Aviation in Muscat as part of the 15th Workshop on Satellite Applications, where they will learn to monitor satellites that provide data every five minutes, leading to faster updates and better preparedness against adverse weather conditions.

The event is being carried out by the Directorate General of Meteorology (DGMET) in collaboration with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT).

Practical exercises as part of this training programme will include "realistic examples from working environments and vivid examples of the Indian Ocean region," said PACA in a statement. "Besides that, there will be practical training, provided by specialists from EUMETSAT, international research centres, and DGMET on analysing the satellites imagery through real examples from work environments and other atmospheric phenomena that occurred recently.

"The World Meteorological Organisation, based in Geneva, Switzerland, chose DGMET to host the Seventh Centre of Excellence for Satellites Applications in the Sultanate, as it was chosen to establish and develop a training centre on the behaviour of air patterns and environmental satellites to meet the needs of the region and to sponsor research in meteorology. DGMET hosts qualified Omani cadres to deal with satellite information and develop its different applications, besides the distinct role it plays, and its useful contributions," added PACA.

## New multichoice managing director named

MultiChoice Africa has appointed Nancy Matimu as the MultiChoice Kenya Managing Director, effective December 2019. The appointment of Nancy to take up the company's senior-most leadership role in the country is expected to further strengthen the business to provide the best content on DSTv and GOtv and to ensure a great customer experience.

According to MultiChoice Africa Northern Region Director, MaharageChande, this appointment comes at a critical time for the video entertainment business and cements MultiChoice's market

leadership position as Kenya's most loved storyteller, committed to providing great entertainment and investing in the future of our people by harnessing the transformative power of media on society. "Our strategy is to continuously provide customers with more of their favorite content and thus providing unmatched value. This new appointment will play a major role in delivering the experience our customers deserve – and we are determined to put this at the center of our corporate culture and values," said Maharage. "We are also excited to welcome our first female managing director to head up our business and Nancy brings a wealth of experience to the role". Nancy has had an illustrious 15-year career having led and driven growth through transformation of businesses, capacity building in brand, products and innovation as well as sales & operational excellence. She has inspired high-performance teams to deliver extraordinary results in leading organisations in financial services and ICT.

## AMOS-17 partners Get SAT to establish mobile SatCom ISR

Spacecom and Get SAT have revealed that using AMOS-17's steerable KA-band HTS beams and Get SAT's miniaturized Micro-SAT satcom terminals, they have successfully tested and



demonstrated full mobile broadband satcom capabilities for Intelligence, Surveillance and Reconnaissance applications. Enabled by AMOS-17's powerful KA-band HTS beams and extremely small terminals at both ends, the team created a small footprint, high capacity true tactical solution for deployed units.

Get SAT's micronized efficient Micro-SAT terminal demonstrated a return channel of over 10Mbps, hence offering breakthrough Size, Weight and Power, SWaP for broadband communications required by various ISR sensors. By using a transportable 1.2m. Ka-band hub and the powerful capabilities of Spacecom's AMOS-17 digital payload, the team created an ideal configuration for Communications On-The-Move applications in the Middle East, Africa, Europe and Asia.

Kfir Benjamin, Get SAT CEO stated, "This news is incredible for a market that is starved for secure, nimble, mobile ISR. Get SAT's SWaP goes above and beyond current offerings. With AMOS-17's steerable KA-band HTS beams, Get SAT's miniaturized terminals produce extremely effective transmission and reception via a single small antenna. No longer does one have to seek miniaturized terminals for secure and reliable high data rates for tactical units using mobile platforms: we have them."

## Libya internet prices reduced by 50 percent

Libya's General Authority for Communications and Informatics announced a 50 percent reduction in the prices of subscriptions and internet packages provided by state telecommunications

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companies. The Authority said that the decision came after a series of meetings and discussions with specialists to ensure that the reduction does not cause any negative effects on the budgets of the companies concerned.

It explained that the decision to slash prices comes as part of the Authority's efforts to improve the level of communication and information services, to enable citizens to access internet services in the easiest way and lowest prices, to promote the culture of digital knowledge and to keep pace with the technological development of all age groups in Libya.

The huge price cut has come as a surprise to many experts in the field. Well placed telecoms sources in Libya told Libya Herald that the price reduction was too high. It presumes that Libyan telecoms companies are earning more than the 50 percent reduction in profits – which they insist they are not.



The sources put profits at no more than 30 percent and, therefore, they see the price cut as a new type of subsidy. This, they add, at the very time when the Libyan state is struggling economically and attempting to reduce inherited Qaddafi-era subsidies.

They predicted that the main state company supplying internet services would go bust soon if the cut was implemented. They doubted that the 50 percent would be implemented at a time when Libya's telecoms companies needed to implement huge investments to upgrade the internet service and quality in the country.

They see the decision as a political one taken unilaterally without even consulting Libya's internationally recognized government.

### NSR report: Smallcells a new key to unlocking \$39 billion in satellite backhaul revenue

NSR's Wireless Backhaul via Satellite, 14th Edition report, forecasts \$39 billion in 2019-2029 cumulative capacity revenues for Satellite Backhaul. With backhaul networks rapidly transitioning to 4G and the installed base continuously expanding, Mobile Backhaul via Satellite offers sizable opportunities in all regions. Smallcells will play an increasingly important role in this growth, as lower costs expand the addressable market to areas previously uncovered due to industry cost metrics.

"With Smallcells, it is now possible to set up a Base Station with CAPEX under \$20K. This translates into extraordinary new opportunities for satcom as MNOs can expand coverage into the most ultra-rural communities. Combining lower capacity prices, enhanced ground segment, and Smallcells, MNOs can now find positive returns even in these challenging deployments," states LluçPalerm, NSR Senior Analyst and report author. "Thousands of Smallcells are being deployed in Latin America and Africa alone."

The multiple M&As in the VSAT platform space are particularly relevant for the Backhaul market. The combination of Comtech/Gilat/UHP will create a very dominant actor in this market while iDirect/Newtec clearly sees Backhaul and 5G one of their

primary growth engines. Additionally, as MNOs are increasingly willing to outsource network management, multiple groups are moving into offering end-to-end services, including new entrants like Towercos

Demand for backhauling 5G networks will be modest in the first half of the decade. However, 5G is much more than just the next radio access technology; it represents a completely new way of conceiving networks and will have a transformative impact on the entire satellite value chain.

### Egyptian Space Agency to open first satellite assembly centre March 2021

Egypt will launch first satellite assembly centre in March 2021, CEO of Egyptian Space Agency Mohamed Al-Qousi said, noting that the agency is currently in the final stages of adjusting the subsystems of Tiba 1 satellite to be ready for operation. The assembly centre will be located in the under-construction space and satellite technology city in the Fifth Settlement. The space city, to be built on an area of 123 feddan, will also accommodate the African Space Agency's headquarters, a research and development centre, Space Academy, Space Museum, a planetarium, a library, a conference centre, and a hotel for foreign delegations.

"We have started working on the project three years ago. We



completed the construction works and the equipment installation and operation would begin in the second half of the year," Al-Qousi said. Egypt's planned satellite assembly centre will be the first of its kind in the region, he added. On a different note, Al-Qousi said China provided Egypt \$72m grant to launch a remote-sensing satellite on 8 September 2019.

With regard to the latest developments in the African satellite dedicated to measuring climate variables, Al-Qousi explained that specialists from Ghana, Sudan, Uganda, Nigeria, and Kenya will participate in the project.

### SES announces NHK WORLD-JAPAN joins growing TV channels on Ethiosat

The world's leading satellite operator, SES, has announced that NHK WORLD-JAPAN has launched on the Ethiosat TV platform, bringing the total channel count of the bouquet to 43. NHK WORLD-JAPAN, the international broadcast service of Japan's public broadcaster, NHK, provides the latest news, NHK NEWSLINE along with technology, lifestyle and entertainment programs such as great gear, Dining with the Chef, J-Arena, and Journeys in Japan. In addition, the channel offers an assortment of documentaries and specials including Asia Insight and NHK Documentary. The free-to-view Ethiosat platform, which already delivers a wide variety of popular

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local content, was launched in October 2019. It is Ethiopia's first dedicated TV platform, delivering a high-quality viewing experience for viewers across the country.

The introduction of NHK WORLD-JAPAN ensures viewers will have access to quality international programming as part of their Ethiosat experience. This growing offering of both local and relevant international content has been made possible by



agreements between the Association of Ethiopian Broadcasters (AEB), the Ethiopian Broadcasting Corporation (EBC) and SES. "International news is an important aspect of a channel package, and NHK WORLD-JAPAN is supporting the success of Ethiosat by joining the platform," said Abdikadir Awabdi, Regional Sales Manager, Eastern Africa, at SES Video. "SES continues to provide on-the-ground services to ensure the ongoing success of Ethiosat for viewer satisfaction. Included in these services is the training of local installers to correctly re-point household satellite antennas towards the Ethiosat platform."

## SANSA & NASA sign a Deep Space Communications study agreement

The South African National Space Agency (SANSA) and The National Aeronautics and Space Administration (NASA) recently signed an agreement to partner in a study activity that will be implemented shortly. The study agreement will see NASA and SANSA collaborate in conducting technical and environmental research on the potential to establish a ground station in South Africa that will support future near-Earth and deep space exploration, including NASA's planned Artemis mission to send the first woman and the next man to the surface of the Moon, as directed by the President of the United States.

Addressing the audience, Marcus Watkins, Director of the NASA Management Office, said, "Having worked with the South African government on numerous projects in the past, it is fitting to collaborate with SANSA on this study agreement, not only because of the geographical positioning of South Africa but more so the technical capabilities and the consistent quality of work produced by SANSA Space Operations over the years."

"This agreement will also provide educational opportunities for universities and their students, especially for those interested in space communications and navigation. Depending on the outcomes of the study agreement, long term projects could be implemented soon between SANSA and NASA," concluded Watkins.

According to Dr. Valanathan Munsami the Chief Executive Officer of the SANSA, "Continuous research and development are vital in any industry for it to thrive and at the rate and pace the space

industry is developing, it's appropriate for SANSA to partner with NASA on this study agreement."

## Orange, SES team up on O3b mPOWER, opening a new era for satellite connectivity

Orange, one of the world's leading multi-service telecommunications operators and present in 18 countries in Africa, will be the first telco to adopt the ground-breaking O3b mPOWER, SES's next-generation Medium Earth Orbit (MEO) satellite communications system, to exponentially ramp up its consumer and business services, starting in the Central African Republic.

O3b mPOWER is the world's only fully-funded non-geostationary orbit (NGSO) broadband system in development today. Positioned at only 8,000 kilometres away from Earth, the system will power low-latency high-throughput solutions that can be seamlessly integrated into existing terrestrial networks. When operational in 2022, O3b mPOWER will provide multiple terabits of throughput globally to drive digital transformation and cloud adoption virtually anywhere on the planet.

The highly flexible O3b mPOWER constellation comprises ultra-high-capacity, low-latency, high-power MEO satellites, each with up to 5,000 fully-shapeable and steerable beams that can be shifted and scaled in real-time to meet customers' demands. The system is ideally suited for domestic cellular backhaul and simultaneous international IP trunking applications.

Orange has been a customer and early adopter of SES's current



generation O3b MEO managed services since 2017. Orange is a strategic partner for SES with its large presence in Africa and the Middle East, and with satellite gateways in several countries on the continent. With O3b mPOWER, Orange will substantially increase its low-latency MEO-enabled capabilities to support the growth of its bandwidth demand, driven by the ever-growing customer base, the new digital uses and financial services. The revolutionary system will enable Orange to offer high broadband and seamless connectivity, while extending geographical reach.

## Thaicom 5 Satellite ends service

Thaicom Public Company Limited announced today the successful migration of its customers from the Thaicom 5 satellite to Thaicom 6 and other satellites. The Company has put in its best effort to resolving the technical anomaly in order to ensure the continuity of services to its customers. The migration and service restoration were completed on 20 February 2020. Meanwhile, the Company completed the deorbiting of Thaicom 5 on 26 February 2020 at 4.52 p.m. (Local Time).

On 17 December 2019, Thaicom 5 experienced a technical issue causing technical limitations to monitoring the status of the satellite. The

Company has performed several unsuccessful attempts to recover the satellite's technical incident ever since the anomaly occurred, resulting in the satellite manufacturer's opinion to deorbit the Thaicom 5 satellite. Thaicom 5 provided reliable satellite communication services for 14 years since its launch in May 2006. The Company would like to thank the Ministry of Digital Economy and Society (MDES) and the National Broadcasting and Telecommunications Commission (NBTC) for their prudent decision to support and approve of the relevant process

### IEC Telecom to introduce latest satcom solutions for humanitarian sector

Satellite communications specialist, IEC Telecom along with its partners has announced their participation at the Dubai International Humanitarian Aid and Development Conference and Exhibition 2020 DIHAD. The organization will be showcasing its solutions aimed at improving the efficiency of aid to the regional and international aid and development community.

When an emergency or a disaster strikes, a coordinated approach and time critical intervention by humanitarian organizations is imperative to enable fast and effective recovery. During these situations, telecommunications in general and satellite communications in particular are key contributors to the success of the humanitarian intervention and development activities.

At DIHAD, IEC Telecom plans to introduce OneGate Aid, an integral communications solution for humanitarian missions and e-camps. The satellite-based network management solution operating from a virtual platform is designed to efficiently manage crisis situation, enabled with monitoring and updating the communications network as rapidly as field demands. With an increased focus towards connecting the unconnected, the technology also provides different output and traffic type based on the requirements, such as to optimize workflow and divert costs, access and share high data volumes between remote and response teams, empower priority



communications by segregating networks for response teams and camp inhabitants. With an option to build special apps on demand, OneGate can be termed as one of the most agile and future ready satcom solutions for humanitarian industry, enabling the organizations to better utilize the technology and make a difference to the affected communities

### Globalstar announces 2019 fourth quarter annual results

Globalstar, Inc. announced financial and operating results for the fourth quarter and year ended December 31, 2019. Dave Kagan, Chief Executive Officer of Globalstar, commented, "In November,

we successfully refinanced our capital structure when we executed an amendment of our existing senior secured credit facility and raised a new second lien term loan facility led by Thermo and Echostar. This transaction significantly improved our balance sheet, provided us with extended runway and maintained the favorable interest rates of our existing credit facility. Our capital structure now positions us well to execute our plan for value creation from our spectrum and satellite assets." Mr. Kagan continued,

"As our 2019 financial performance reflects, we continue to capitalize on the IoT growth opportunities in front of us, with a 26% increase in Commercial IoT service revenue over 2018 as both subscriber count and average pricing increased. We have focused our product development efforts around Commercial IoT devices, particularly modules that can be integrated into the products of our partners, which should broaden our current reach. These modules offer enhanced



functionality in a very small form factor and competitive price point, which we think will be attractive to those needing data reporting capabilities in remote or harsh environments. Outside of Commercial IoT, 2019 was a transitional year in many respects. We believe we are back on the right track with the updates that we made to our consumer products based on the positive trajectory of SPOT subscriber additions following the release of SPOT X® with Bluetooth® technology late in the third quarter.

### ST Engineering iDirect' Newtec Dialog awarded WTA Teleport Technology of the Year

ST Engineering iDirect, a company of ST Engineering North America, has been presented with the World Teleport Association's 2020 Teleport Technology of the Year for its Newtec Dialog® platform at SATELLITE 2020

Giving operators the ability to offer a variety of mobile and fixed services through a future-proof system, the Dialog platform features a flexible licensing model and modular hub architecture that enables service providers to "pay-as-they-grow." It is easy to upgrade, with service providers able to add outbound carriers, return technologies, and throughput capabilities to address new opportunities and markets quickly and directly. The range of applications the platform addresses includes consumer and enterprise Very Small Aperture Terminals, government and defence, broadcast, aeronautical, land-mobile, maritime, cellular backhaul and trunking.

ST Engineering iDirect's Thomas Van den Driessche, President of the Executive Strategic Board & Chief Commercial Officer, was presented with the esteemed award during the 25th annual Teleport Awards for Excellence Ceremony and Luncheon, held during this year's SATELLITE Conference and Exhibition in Washington D.C.

### NOVELSAT, Gilat Telecom collaborate to restore internet connectivity in DRC

NOVELSAT announced collaboration with Gilat Telecom for quick restoration of internet connectivity following West Africa Cable System



(WACS) undersea cable cut. The severe cable damage caused internet downtimes and slow speeds affecting all internet providers in the Democratic Republic of Congo (DRC). Using NOVELSAT's high capacity connectivity solutions, Gilat Telecom was able to quickly restore connectivity, providing its MNO and ISP customers a resilient and stable satellite network with nearly uninterrupted service and better customer experience. "NOVELSAT delivered Gilat Telecom with high capacity satellite modems on very short notice," said Gary Drutin, NOVELSAT CEO. "This accomplishment is a testament to the quality of our operations team and of course our leading high-performance broadband technology."

### Liquid Telecom to provide free Wi-Fi to students, health workers

Leading communications services and solutions provider Liquid Telecom has come to the aid of tertiary students and health workers in the country by providing selected institutions and hospitals with free Wi-Fi. Liquid Telecom regional chief executive for Southern Africa Mr Wellington Makamure made the announcement at a press conference this afternoon. The telecoms company is partnering relevant Government ministries and the official launch date is yet to be set. They are targeting 13 major hospitals as well as 48 colleges and universities across the country. Seven hospitals have so far benefited.



### ST Engineering iDirect announces wideband global satcom certification of its Newtec MDM9000 satellite modem

ST Engineering iDirect, a company of ST Engineering North America, has announced that its Newtec MDM9000 modem has received the Wideband Global SATCOM (WGS) Certification. This expands its portfolio of WGS-certified solutions, which include the iDirect Evolution Defense platform, Tactical Hub, and 9-Series family of modems

Designed to support a wide range of fixed and mobile government and defense applications, the field-proven MDM9000 modem is now one of the most powerful DVB-S2X modems operating on the WGS constellation. Its flexibility and efficiency open up new capabilities for high-speed data links, complementing existing WGS-certified Evolution Defense solutions.

The MDM9000 is ideal for aggregating data – from sensor data to video footage – to be sent back to a central location, as well as any other applications requiring point-to-point, dedicated links. In addition, its bulk encryption module provides 256-bit AES link encryption on both content and management layers to provide the security that is paramount in military operations.

"Our latest WGS certification marks another significant milestone in our efforts to deliver military-grade communications solutions

which can provide the bandwidth, flexibility and security required by global militaries to carry out missions successfully and reliably," said Koen Willems, Head of International Government Satcom at ST Engineering iDirect. "We are proud that the modem has passed the stringent evaluation and testing of the certification process and can join our vast portfolio of accredited government and defense solutions."



### ABS consolidate relationship to serve customers in the MENA region

ABS, a leading satellite operator and TheAngle, a satellite network services integrator, has announced they have extended their joint activities in the MENA region, serving customers across the ABS' footprints at 75 degrees East.

The collaboration focusses on providing energy, enterprise and government customers with bespoke, cost-effective communication solutions including ground segment facilities and flexible bandwidth allocations on ABS-2 and ABS-2A satellites, co-located at the prime location of 75°E. Both satellites offer prime capacity over the Middle East, accessible also from Europe, as well as coverage of the African and Asian continents over multiple beams.

The satellite services demand in the MENA market remains strong, driven by traditional verticals such as oil and gas, maritime/mobility and governmental. Broadband, video contribution and video distribution are also key applications hosted on the ABS satellites.

Paolo Pusterla, MD of Europe and the Middle East for ABS said, "TheAngle has extensive knowledge of the regional market and its multiple services and applications. Our continued cooperation with TheAngle will reinforce our presence in this market and bring more viable bandwidth and introduce new services to more customers across the GCC countries. This collaboration is a major boost for both companies that will further enhance our respective businesses and accelerate the development of new opportunities with attractive and flexible offerings to more clients."

### COVID-19: Space Agency public events and tours temporarily halted

Following the announcement made on 15 March 2020 by the South African President, Cyril Ramaphosa, regarding the coronavirus (COVID-19) pandemic, the SANSA public tours, learner visits and the space talk public lecture series has been cancelled with immediate effect until further notice. These measures have been taken out of concern for the health and safety of the general public, learners, tourists and the staff and students at SANSA. SANSA will continue to monitor the developments around COVID-19 and will ensure that the public lectures and the public tours at the SANSA Hermanus facility are re-opened once the situation has stabilised. The SANSA team

apologises for any inconvenience this may cause and will do our best to provide more online solutions and content for our valued followers. This decision was not taken lightly and we assure all our stakeholders that it was made in the best interests of all involved. Thank you for your continued support of our tours, open days, public talks, holiday programmes and other public programmes and initiatives. The SANSAs team wish you well and look forward to welcoming you back to our facilities in the near future.

### Exolaunch to deliver UAE Space Agency's small satellite into orbit on Soyuz-2

Berlin-based Exolaunch, the leading launch services and deployment system provider for small satellites, announced that the launch of a 3U cubesat, MeznSat, for the UAE Space Agency will be performed aboard a Soyuz-2 rocket. The purpose of the satellite is to study and monitor the greenhouse gases, specifically CO<sub>2</sub> and Methane, over the UAE. MeznSat is a nanosatellite for climate observation, manufactured by Khalifa University of Science and Technology (KUST) in partnership with the American University of Ras Al-Khaimah (AURAK) and funded by the UAE Space Agency. The satellite's primary payload will be a shortwave infrared (SWIR) spectrometer that makes observations in the 1000-1650 nm wavelength range to derive atmospheric greenhouse gas concentrations.

The secondary payload on MeznSat will consist of a VGA camera for post-processing that brings increased precision and accuracy to the SWIR spectrometer data. The combination of visible and SWIR bands will make MeznSat a unique CubeSat mission, specifically designed to generate a rich dataset for exploring atmospheric correction algorithms.

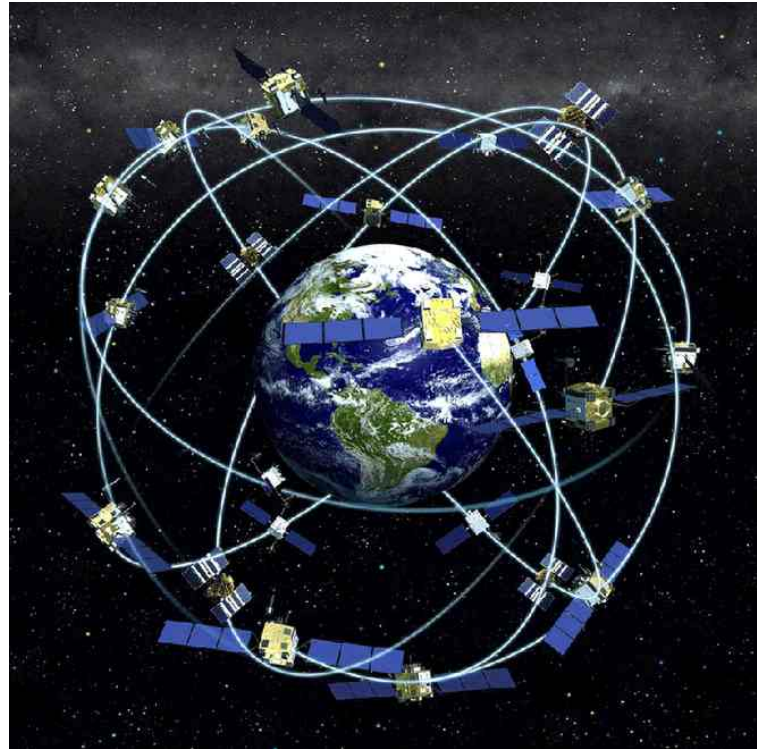
MeznSat is scheduled for launch in mid-2020. It is accommodated on one of the upcoming Soyuz-2 federal launches as part of the small satellite cluster launch contract between Exolaunch and Glavkosmos, the operator of international commercial activities for the Russian State Space Corporation Roscosmos. Glavkosmos has been a reliable partner for Exolaunch, and it is pleased that the partners from the UAE have chosen a Soyuz launch vehicle for delivering MeznSat into orbit.

### Russia-Europe Mars mission postponed to 2022, partly over COVID-19 fears



Also a joint Russian-European mission to Mars has been postponed for two years, according to the Russian and European space agencies, while citing the novel coronavirus and technical issues. "We have made a difficult but well-weighted decision to postpone the launch to 2022," said Dmitry Rogozin, head of

Russia's Roscosmos agency. The unmanned Exo Mars mission aims to place a robot on the Red Planet to find out whether life is present. It was scheduled to launch later this year after experiencing several delays. Officials at the European and Russian space agencies said they agreed to delay the mission until August or September 2022 to carry out further tests. Following recommendations by European and Russian inspectors, "ExoMars experts concluded that the tests necessary to make all the components of the spacecraft for the Mars adventure need more time to complete," the statement said. European Space Agency director general Jan Wörner said both sides wanted to be "100 percent" sure of a successful mission. "We cannot allow ourselves any margin of



error. More verification activities will ensure a safe trip and the best scientific results on Mars," he said in a statement that did not mention the virus.

### CABSAT is postponed

In light of the evolving global developments around the COVID-19 virus, CABSAT, the Middle East & Africa's leading event for content creation, production & broadcast and satellite & distribution has been postponed from 31 March – 2 April to 26 – 28 October 2020. Our decision came after much deliberation in consultation with the event's main participants and industry stakeholders, who have strongly endorsed our prioritisation of the collective interests of both the global exhibitors and the key buyers from the region. With the event now rescheduled to 26-28 October 2020, CABSAT shall facilitate greater participation across our global communities, enabling more inclusive access for all.

Dubai World Trade Centre has been closely monitoring the situation, particularly as it pertains to our key stakeholders and participating delegations from around the world across all our upcoming shows. Whilst the UAE remains completely safe for travel, and has deployed the strictest medical and hygiene protocols, we fully recognise that for some specific shows, we have a high majority of key participants significant to the event's programme that are unable to travel due to restrictions in their home countries. As such, we have been working closely to assure that our clients' needs are most effectively addressed, and the delivery of strong international participation considered, in these extraordinary times

## The NAB Show Is Off for April

The National Association of Broadcasters has also said that the organisation will not hold the NAB Show in April due to public health concerns about coronavirus. NAB President/CEO Gordon Smith made the announcement. "We are currently considering a number of potential alternatives to create the best possible experience for our community," Smith said. The show markets itself the world's "largest and most comprehensive convention encompassing the convergence of media, entertainment and technology." It drew approximately 91,400 people to Las Vegas in 2019, and featured some 1,600+ exhibitors.

In the interest of addressing the health and safety concerns of our



stakeholders and in consultation with partners throughout the media and entertainment industry, we have decided not to move forward with NAB Show in April. We are currently considering a number of potential alternatives to create the best possible experience for our community.

This was not an easy decision. Fortunately, we did not have to make this decision alone, and are grateful to our NAB Show community for engaging with us as we grappled with the rapidly-evolving situation. This Show is as much yours as it is ours, and it is important to us that we move forward together.

## Intelsat selects SpaceX to launch Intelsat 40e satellite

Intelsat has selected SpaceX as its launch partner for Intelsat 40e (IS-40e). The launch is planned for 2022 on SpaceX's American-built Falcon 9 launch vehicle. "We look forward to working with SpaceX to launch Intelsat 40e in 2022," said Intelsat Chief Services Officer Mike DeMarco. "IS-40e will join the Intelsat Epic high-throughput satellite fleet and integrated IntelsatOne ground network to provide our customers with the managed hybrid-connectivity they need in today's ever-changing world." "We are honored Intelsat, one of the world's premier satellite operators, has selected a flight-proven Falcon 9 to deliver its next geostationary communications satellite to orbit," said SpaceX Vice President of Commercial Sales Tom Ochirero.

Intelsat 40e is an advanced geostationary satellite that will provide Intelsat's government and enterprise customers across North and Central America with high-throughput, "coast-to-coast" services. The satellite's capabilities will support the growing number of customers that depend on Intelsat's managed services and solutions to easily integrate satellite into their overall networking and communications strategies.

## Satcom backhaul in remote areas for major

## African operator

There has been an announcement in recent days of a major backhaul delivery in Africa by SpaceBridge, though the customer name has not yet been revealed. The multiservice broadband satellite communications systems solutions provider has been a little coy about the customer name, simply saying that it has delivered large-scale cellular backhaul over a satellite platform to the largest MNO in Africa.

The solution, for 2G/4G mobile cellular backhaul over satellite, is for servicing unserved remote areas and will replace currently installed technology, says Spacebridge. The delivered satellite backhauling solution is equipped with SpaceBridge's WaveSwitch patented technology, offering VSAT stations that can quickly switch between SCPC, A-SCPC or MF-TDMA waveforms. The integration between the SpaceBridge satellite platform, eNodeB terrestrial equipment and the MNO allows the satellite band to adjust to cellular traffic growth.

Such flexibility, says SpaceBridge, will enable the population served (it is not precise about the area) to receive adequate service for years to come, at better transmission quality, providing faster Internet access for sending pictures, videos, texts and superior voice communications. While the areas served and the customer may not be precisely identifiable (though no doubt some readers will have a good guess), this deal underlines the continuing role of satellite in a continent where cellular coverage of remote areas remains a significant challenge.

## Airbus visits NIGCOMSAT, showcases services

Airbus, a European multinational aerospace corporation has paid a courtesy visit to Nigerian Communications Satellite (NIGCOMSAT) Ltd with the view to showcasing its capability and willingness to offer further engagement and related services in the communications satellite industry. Leading a team of experts to NIGCOMSAT complex



in Abuja, the Executive Vice President Marketing and Sales, Dr. Brenner Beruhard explained that Airbus has already established a presence in Nigeria with its local agency known as Airbus Nigeria 'We have ambition to develop our presence in Nigeria. We offer services on space telecoms, earth observation, cyber solution, defence intelligence, satellites building, sale and services', said Dr. Beruhard. The Marketing chief said they are in Nigeria and NIGCOMSAT Ltd in particular to showcase what they can offer and register their presence in a more competitive engagements of international standard for seamless services .Dr. Beruhard who came in company of Air Vice Marshal Victor Udoh

(Rtd) President, Airbus Nigeria and Rafa Gomax, was delighted to be in NIGCOMSAT Ltd to show Africa and Nigeria what his company can offer

Responding, the Managing Director AbimbolaAlale (Ph.D.) who was represented by Executive Director, Technical, Prof. Abdu Ja'afaruBambale, welcomed the team and commended Airbus of maintaining strong presence in the communications industry.

### SpaceX to launch next 60 Starlink internet satellites

SpaceX will launch 60 new Starlink satellites to join its ever-growing broadband internet megaconstellation. A SpaceX Falcon 9 rocket will launch the Starlink mission from Pad 39A at NASA's Kennedy Space Center in Florida. This is SpaceX's sixth launch of the year and the sixth Starlink launch to date. The mission will star a veteran Falcon 9 rocket that will do what no other Falcon has done before: launch and land five times. The booster, dubbed B1048.5, previously launched a bevy of satellites including part of the Iridium NEXT constellations, an Israeli lunar lander a communications satellites for Argentina and Indonesia, and a previous Starlink mission.

This is a major milestone for SpaceX. The upgraded version of their workhorse was introduced in 2018, launching the first communications satellite for Bangladesh. Company founder and CEO, Elon Musk said that the souped up booster would be able to fly ten times with little refurbishment in between. Sunday's flight marks the first time a Falcon has reached the halfway point.

To date, four Falcons have four successful flights under their belts,

### plan

Egypt is advancing its goals in space, following approval last week of a 10-year development plan for the Egyptian Space Agency (EgSA) established in August. The agency launched its first communications satellite last year, as part of a plan to ensure mobile and Internet services for all of Egypt as well as parts of neighboring countries. It was one of four satellites launched successfully last year, according to Space in Africa. The agency has two satellite control centers, one in Cairo and another in Aswan, and is host to the African Space Agency established by the African Union. Dr Mohamed ElKoosy, the EgSA CEO, says Egypt plans another two satellites in the next three years, and plans to build a NGeo



constellation similar to the Starlink project in the coming years. SpaceX signed a deal in January with Egyptian operator NileSat to launch a four-ton satellite in 2022 to support communications.

ElKoosy says Egypt's program is geared toward security, but also focuses on weather and climate change mitigation. Later this year, the Egyptian Space Agency plans training sessions for 20 participants from African nations who are part of a project to use space technology to better control greenhouse gas emissions.

Egypt partners with nations including China and France to develop its space program, signing a new cooperation deal in January with France's Center National d'Etudes Spatiales (CNES). Jean-Yves Le Gal, head of CNES, said the partnership will include satellite manufacture and space exploration.

### Konnect Africa to connect schools in the Democratic Republic of Congo with high speed internet

Konnect Africa announced a Memorandum of Understanding to connect several thousand schools across the Democratic Republic of Congo (DRC) to the Internet as part of the Schoolap project. It aims to provide schools with high speed internet connectivity, giving them access to a digital platform of officially recognized educational content and high quality teaching materials. The first stage of the project aims to connect 3,600 private schools over the next 12 months, leveraging Konnect Africa's satellite capacity and technical expertise, notably in terms of installation.

Each school will subscribe to a "Home Unlimited or plus" package, giving it access to a high speed internet service. At a later stage, it is planned to roll the project out to several tens of thousands more schools, thereby responding to the requirement for digital inclusion which is part of government policy.

Konnect Africa has been operating for over a year in the DRC, bringing broadband connectivity to unserved or poorly served areas, by delivering a solution that is affordable, flexible and available everywhere. Currently operating with limited capacity, Konnect Africa will see its in-orbit resources increase tenfold with the entry into service of the EUTELSAT KONNECT satellite in the autumn of 2020. With a total capacity of 75 Gbps, EUTELSAT



but this booster will be the first to launch five times. However, of those four, two were not recovered and will not fly again. One was intentionally destroyed during the company's in-flight abort test and the booster used in the latest Starlink mission before this one, it was lost after narrowly missing the drone ship.

SpaceX is a private company owned by management and employees, with minority investments from Founders Fund, Draper Fisher Jurvetson, and Valor Equity Partners. The company has more than 3,000 employees with its headquarters in Hawthorne, California; launch facilities at Cape Canaveral Air Force Station, Florida, and Vandenberg Air Force Base, California; a rocket development facility in McGregor, Texas; and offices in Houston, Texas; Chantilly, Virginia; and Washington, DC.

### Egypt advances space program with 10-year

KONNECT will be able to provide speeds of up to 100 Mbps with total or partial coverage of 40 African countries.

### Dan Zajicek outgoing CEO of Satcom, appointed CEO of Space Communications

Satcom Systems announces the appointment of Asaf Rosenheck as CEO of Satcom and the subsidiary Gilat Telecom. Dan Zajicek, the outgoing CEO of Satcom, will be leaving his position and is expected to start as CEO of Space Communications, the operator of the Amos satellite.

Rosenheck, who has served in management positions at Satcom for 10 years, will be appointed immediately as CEO.

Satcom Systems announces today the appointment of Asaf Rosenheck as CEO of Satcom and the subsidiary Gilat Telecom. Rosenheck has experience and knowledge in the many areas of operations of the Company, and is intimately acquainted with the Company's customers. As part of his previous positions at Satcom, Rosenheck served as VP Sales and VP Business Development, and he was responsible for handling the Company's business with



its strategic customers.

Over his years at Satcom he worked a great deal in Africa and especially in Liberia, Sierra Leone, Zambia, Ghana, Kenya, South Sudan and others. In his work he helped to advance and sign deals worth tens of millions of shekels, including service contracts, the supply of communications services, fiber optics and the supply of value added equipment and services.

### Mozambique plans roll-out of connectivity projects

FSAU, the Fundo do Servico de Acesso Universal, the Mozambique government's Universal Access Service Fund, has launched projects to improve connectivity in ten locations. The projects are in the provinces of Maputo, Gaza, Inhambane, Sofala, Zambezia, Nampula and Niassa. According to press reports the scheme will mean that broadband with speeds of at least 20 Mbps will be provided at each of the 27 sites that will be installed in the 10 districts. The country's regulator, the Autoridade Reguladora das Comunicacoes, has been quoted as saying that the deployment will benefit businesses, farmers, start-ups and other sectors of the community. The FSAU is financed by a one percent levy on operators' annual gross revenues.

A team recently visited a number of districts to carry out an initial survey of their potential and to hold meetings with representatives of district governments, as well as city officials and businessmen.

The government of Mozambique has been keen to show its commitment to expanding the telecom sector, injecting capital into the sector through FSAU, a fund that was created to finance telecommunication programmes and projects to ensure universal access to telecommunication services. Last year Mozambique's Permanent Secretary in the Ministry of Transport and Communications noted that the proportion of the Mozambican population reached by telecommunication services had expanded from 65 percent in 2014 to 85 percent in late 2019.

### UAE students-built satellite to launch in June

A satellite that American University of Ras Al Khaimah students are helping to develop, build and test is planned for launch on a Soyuz-2 rocket from Russia in June 2020, said Dr Abdul-Halim Jallad, Director and Assistant Professor, Center of Information, Communication and Networking Education and Innovation (ICONET).

The MeznSat Nano-satellite is designed to detect greenhouse gas concentrations from an orbit of 565 km above the Earth. The project has successfully passed the critical design review stage with the satellite currently undergoing the final stages of construction in the



purpose-built cleanroom at AURAK's Space Lab before it moves on to the testing phase in March 2020, a statement said.

The project is a collaboration between the UAE Space Agency, AURAK and Khalifa University of Science and Technology (KUST). MeznSat will be the first student-built scientific satellite in the UAE. The project aims at providing the UAE space industry with qualified well-trained graduates through hands-on experience, while at the same time opening windows for advanced space-oriented research relevant to the UAE.

The project has seen undergraduate students design and construct the MeznSat which will be used to collect and analyze data on carbon dioxide and methane levels around the UAE. The project seeks to realize the Space Agency's strategic goals of capacity development, promoting scientific research and coordinating national space sector activities.

### K-Net and Liberian regulator delivering rural towers

The Liberia Telecommunications Authority (LTA) has partnered with tower firm K-Net to deliver connectivity to one of the country's more remote regions. Officials from the regulator and K-Net have signed a MoU (memorandum of understanding) detailing their commitments under the agreement. The Daily Observer reported that K-Net won the contract by delivering a compelling proof of concept.

## Eutelsat selected by RCS Ghana for DTH broadcast

Eutelsat Communications (NYSE Euronext Paris: ETL) has secured a multi-year contract with RCS Ghana to provide capacity for the broadcast of its DTH bouquet bringing content to viewers in Ghana and beyond. RCS will use Ku-Band band capacity on EUTELSAT 7B to broadcast its fast growing free-to-air DTH bouquet comprising SD and HD channels to the Ghanaian market and over 40 other countries in Africa. The 7° East neighbourhood is a key orbital position for regional TV channels. Over 500 TV channels already broadcast from 7° East which has become a new DTH hotspot for Sub-Saharan Africa with some of the fastest growth rates in the region.

Mr Hamza Tanko, Chairman and CEO of RCS Ghana: "We are delighted to partner with Eutelsat for the broadcast of the RCS DTH bouquet, delivering exceptional content to viewers in Ghana and beyond, and enabling the broadcast of any channel in Ghana in high quality and at compelling rates. The 7° East position is ideal to serve the Ghanaian market and EUTELSAT 7B offers consistent coverage and signal power all over Ghana as well as complete Sub-Saharan coverage of over 40 African countries."

Nicolas Baravalle, Regional Vice President, Sub Saharan Africa of Eutelsat said: "We are proud to support RCS Ghana in rolling out this high quality content offering. This contract reflects the buoyancy of the Ghanaian broadcast market, the attraction of the unparalleled coverage of our 7° East neighbourhood and Eutelsat's expertise in the African market. We look forward to a long and fruitful collaboration"

## Public trials of SpaceX satellite internet service to begin within 6 months

If all goes according to plan, the public will have a chance to try out SpaceX's satellite internet service in six months. CEO Elon Musk mentioned the timetable in a tweet. "Private beta begins in ~3 months, public beta in ~6 months, starting with high latitudes," he said. In another tweet, Musk said the German market qualifies as high altitude.



Dubbed Starlink, the upcoming service is promising to bring fast and affordable internet to any location in the world. It'll be particularly appealing for people who live in remote areas or underserved markets with few options for home broadband. Expect download speeds of up to 1Gbps with a latency ranging between 25 to 35 milliseconds, on par with ground-based broadband services.

Although satellite internet is nothing new, SpaceX's network is designed to achieve faster speeds by using low Earth orbit (LEO) satellites. The plan is to have them fly around the planet from a distance of 200 miles to 700 miles above the surface while they ferry data between ground stations and internet users below.

To get the service up and running, the company has been securing approval from regulators to launch as many as 40,000 satellites in the coming years. On Wednesday, the company successfully

deployed another 60 Starlink satellites into space for a total of 420 currently in operation.

## SatADSL, YahClick partner to enhance satellite communications in Africa

Brussels-based satellite service provider, SatADSL has partnered with YahClick to enhance its connectivity offering across Sub-Saharan Africa. Through the partnership SatADSL is now a new Virtual Network Operator (VNO) partner to YahClick, a UAE-based broadband satellite services provider owned by Yahsat and its partner Hughes Network Systems.

As a result, SatADSL is able to combine the capacity purchased from YahClick with its cloud-based service delivery platform (C-SDP) to deliver a full range of flexible satellite services across Africa. "Working closely with SatADSL enhances the quality of our service delivery as we continue on our mission to unleash human potential through satellite broadband connectivity," said Farhad Khan, chief executive officer at YahClick.

"The agreement will provide our customers with the best



broadband solutions available, connecting them with the rest of the world through a fast and affordable service. In this uncertain period of enforced social distancing and self-isolation, we are delighted to help bring people together, supporting them to work, learn, and stay informed remotely."

For YahClick's part, it gains full access to the SatADSL's licensed partner network spanning 45 countries worldwide and boasting over 3,500 deployments, which gives YahClick opportunities to expand its distribution.

## Liquid telecom helps the Zimbabwean government launch emergency response to pandemic

Pan African telco, Liquid Telecom, has announced a partnership with the government of Zimbabwe, which will help the Southern African nation provide a dedicated national toll-free '2023' helpline and call centre to support citizens during the COVID-19 pandemic. The helpline will provide information and consultative services 24 hours a day, seven days a week, while safeguarding citizens against a backdrop of escalating fake news and misinformation in the region.

"Liquid Telecom has quickly and effectively responded to the 'COVID-19 Zimbabwe National Preparedness and Response Plan' (NPRP) announced by H.E President Mnangagwa on the 19th March calling on companies to contribute to the national cause. Maintaining connectivity is an essential requirement in responding to a crisis that has disrupted our routines and daily lives inconceivably. Reliable, up-to-date information, provided by qualified experts at the end of the national toll-free '2023' helpline is vital as the Government continues to provide support, especially to the most vulnerable in light of the pandemic." Said Wellington Makamure, CEO, Liquid Telecom Southern Africa.

Liquid Telecom Zimbabwe established the national toll-free '2023'

helpline and call centre in partnership with Innscor Africa and Kamba Technologies. Liquid Telecom's direct contribution includes set-up costs of the telecom infrastructure, which includes the provision of phone lines, call centre equipment and bandwidth via a 50Mbps dedicated link.

### South Africa releases emergency spectrum to service providers

We now not only know that the South African regulator has released emergency spectrum to a number of service providers, as requested by the government, but we also know who those service providers are. According to local news reports MTN Group, Vodacom and Telkom have all been granted additional mobile spectrum, while Liquid Telecom and Rain Networks were also granted additional spectrum for their fixed wireless access services.

The temporary licences grant emergency access to additional spectrum to ease congestion for the duration of the nationwide lockdown that is now in force to limit the spread of the coronavirus. A surge in connectivity has been the result of many South Africans working from home or simply using the internet more often while



unable to go out.

The licences were released late last week by South Africa's telecoms regulatory body, the Independent Communications Authority of South Africa (ICASA), to both mobile network providers and internet service providers.

These licenses were granted at no cost to the operators. However, they do come with a few conditions attached. Firstly, operators are obliged to facilitate access to remote learning initiatives and virtual classrooms. In addition they must not charge their subscribers for access to health-related websites specifically identified by the country's Department of Health.

### Vodacom increases the capacity of its South African network

South African operator Vodacom is to spend more than \$27 million to add network capacity during the lockdown that is in place while the country tries to manage the spread of the coronavirus. The company has said that it will spend the \$27 million over two months to add network capacity and increase network resilience during the lockdown period and to help cope with any possible load shedding. This includes accelerating the installation of smart

energy management solutions and supplementary network capacity.

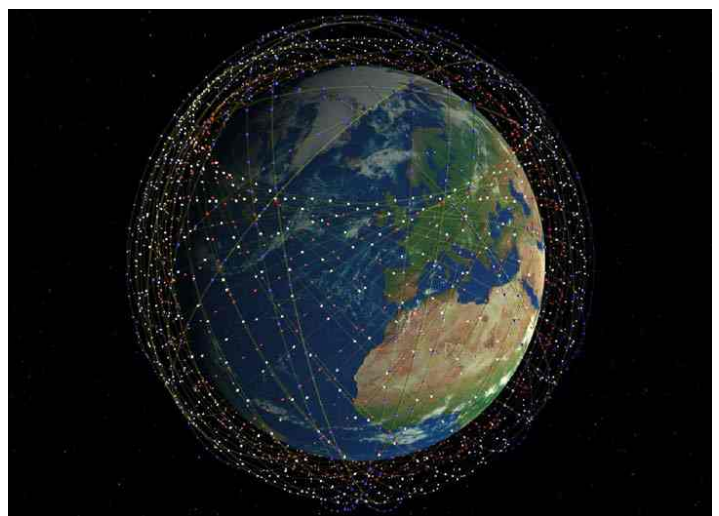
Vodacom says it has also secured permits from government to enable its field teams to continue performing their critical duties, such as repairs and upgrades to key communications infrastructure. Vodacom has also ordered spare parts needed for maintenance in advance. This initiative is taking place in the wake of traffic surges that are affecting most operators as more people work at home or simply use the internet a great deal more during the national lockdown.

It certainly seems necessary given that South Africa has imposed a five-week lockdown lasting until the end of April. Vodacom has said that it expects network traffic to increase even further as customers connect for longer after it implemented price cuts of up to 40 percent on its 30-day data bundles and launched a range of free essential services available through its zero-rated ConnectU platform on 1 April.

### SES delivers over 8,300 TV Channels to 367 million homes worldwide

SES has announced that the number of global TV households it reaches directly or indirectly via satellite has increased by 12 million to 367 million in 2019. Findings from the company's annual Satellite Monitor market research validates, once again, SES's position as the world's leading video content distributor via satellite and shows the important role that satellite continues to play in reaching the largest possible audience globally. Much of the increase in the 12 million TV households is attributed to the leading infrastructure of TV reception – satellite and cable – which grew by 9 million in 2019 to 153 million and 149 million homes respectively. Internet Protocol TV (IPTV) and terrestrial TV grew by a combined 3 million to 43 million and 21 million homes. The Satellite Monitor study also showed that SES's technical reach has increased across several continents, including Europe, Africa, Asia-Pacific (APAC), and Latin America (LATAM). Europe continues to be the strongest market for SES, with 168 million total households served by the SES fleet, up by 1 million from 2018, followed by North America at 69 million.

### Intelsat 901 Satellite returns to service using mission extension vehicle



Intelsat announced that Intelsat 901 has returned to service following the successful docking with the first Mission Extension Vehicle (MEV-1) from Northrop Grumman Corporation and the company's wholly-owned subsidiary, SpaceLogistics LLC, on February 25 – the first time that two commercial spacecraft docked in geostationary orbit. Since the February rendezvous, MEV-1 has assumed navigation of the combined spacecraft stack reducing its inclination by 1.6° and relocating IS-901 to its new orbital location.

Intelsat then transitioned roughly 30 of its commercial and government customers to the satellite on April 2. The transition of service took approximately six hours. IS-901 is now operating at the 332.5°E orbital slot and providing full service to Intelsat customers. Intelsat views life-extension services, like MEV technology, as a cost-effective and efficient way to minimize service disruptions, enhance the overall flexibility of its satellite fleet and better support the evolving needs of its customers. Under the terms of the contract, Northrop Grumman and SpaceLogistics will provide five years of life extension services to IS-901 before returning the spacecraft to a final decommissioned orbit. MEV-1 will then be available to provide additional mission extension services for new clients including orbit raising, inclination corrections and inspections. Intelsat has already also contracted with Northrop Grumman for a second MEV (MEV-2) to service Intelsat 1002 satellite later this year.



### CSS and Forsway partner to deliver affordable broadband connectivity in West Africa

CSS, a West African communications services provider with 20 years of experience supplying critical satellite and broadband services, together with Forsway, a provider of innovative solutions tapping satellite and existing terrestrial technologies to enable cost-efficient broadband, have announced the next phase of their cooperation in Mauritania to deliver affordable broadband in West Africa.

Tapping CSS' local expertise, Arabsat's Xtend Africa managed service, and Forsway's unique satellite broadband extension, the partners came together to provide emerging economies in Africa with access to affordable satellite internet services and opportunities aimed at help build a productive economy, business, education and access to health services and information.

CSS' CEO and founder Houssein Cherif commented: "We have been trialing the Xtend Africa managed service from Arabsat / Forsway during a first assessment phase. The results, boosting poorly performing mobile and VSAT links in an affordable and dynamic way, are very promising. Therefore, despite the uncertain times we live in, we committed to investing in additional equipment and expand our West African service offering. Now, more than ever, affordable broadband can make a difference in our local markets."

### Algerian internet capacity suffers during SEA-ME-WE4 cable maintenance

The Algerian government has warned that scheduled maintenance to the South East Asia–Middle East–Western Europe 4 (SEA-ME-WE4) submarine cable will affect internet

services in the country. Earlier reports reveals that the National operator Algeria Telecom, which manages the country's telecommunications infrastructure, announced the cable plans. Algerian Minister of Post and Information and Communication Technologies Brahim Boumzar said efforts have been made to provide alternative access to internet subscribers. In preparation for the maintenance, authorities used the country's access to the Hannibal fibre optic cable, an important telecoms backbone in the Mediterranean basin connecting Tunisia to Italy. The country had limited options because of non-availability of Algeria's other submarine cables including Orval/Alval, which links Algiers, Oran and Valence in Spain, and Medex which connects Annaba, the US and Asia via the Mediterranean basin. Algeria and Tunisia have both been affected by the maintenance and Benabdelouahad said the two countries will suffer a loss of data capacity. The part of the cable that will be affected by this work has a capacity of approximately 700 Gigabits. Several other African countries have recorded internet disruptions.

### Egypt launches 'Start Your Dream' online initiative

Egyptian Minister of Culture Inas Abdel Dayem announced the launch of the digital platform for the permanent workshop to prepare and train actors "Start your dream online". This initiative is implemented by the Theatrical Art House's Youth Theater Ensemble led by director Adel Hassan, and comes within the framework of the free e-initiative, "Stay at Home ... Culture is between your Hands."

Within the initiative, a daily set of 15-minute video lectures focusing on various theatrical topics are scheduled to be broadcast on the YouTube channel of the Ministry of Culture, and its various social media platforms. Abdel Dayem stated that the "Start your dream" initiative is one of the ambitious projects implemented by the Ministry of Culture to discover and foster promising and talented people.

The minister also noted that in line with the exceptional circumstance that the country is going through, remote training has



been adopted to contribute to achieving the aspirations of talented youth, emphasizing that work is in progress to further develop the "Culture is between your Hands" initiative to attract audiences from different ages and social classes.

### Africa embraces remote learning

Some encouraging news in this difficult time comes from the World Bank, highlighting how distance learning is being rolled out in a number of African countries during the coronavirus pandemic and associated lockdowns. Highlights include steps to implement distance learning and assessment in Egypt via access to the Egyptian Knowledge Bank, providing content by grade level and subject. There's also a digital platform that offers a communication channel between students and teachers to enable approximately 22



million students distributed over nearly 55,000 schools to communicate with teachers. A contract with the online learning provider Edmodo and free SIM cards to students are also part of Egypt's remote learning initiatives. In Kenya the ministry of education has designed online learning programmes and resources. Materials and programmes will also be delivered using radio, television, YouTube and other platforms. Meanwhile, Orange Liberia has announced that it is granting free access to online educational content to students and teachers while all schools and universities are closed via a website called Orange Campus Africa. In Libya local television stations will be broadcasting lessons for middle and secondary schoolchildren, while Morocco has put together content in order to help students with their remote learning, and, in South Africa, leading operator Telkom has zero-rated education websites to provide cost-free access to learners. Finally, at least for now, the Tunisia-based Arab League Educational, Cultural and Scientific Organization (ALECSO) has launched an e-learning initiative.

## Rwanda launches first-ever satellite to



### connect schools in rural area to the internet

The government of Rwanda and a UK-based company OneWeb has launched the first-ever satellite that will connect remote schools in the country to the internet. According to Face 2 Face Africa, many schools in the rural parts of Rwanda are without proper road networks and electricity, making it difficult to acquire internet connectivity.

The New Times reports that the satellite was sent into orbit on Wednesday, March 25, from a spaceport on the Atlantic coast of French Guiana. Ahead of the launch, Rwanda's ICT minister, Paula Ingabire, had said: "Rwanda's choice to invest in space technologies is part of our broader mission to bridge the digital divide by providing equal digital opportunities to rural and remote communities. "We are delighted to partner with OneWeb in this transformative initiative which presents us a huge opportunity to leverage satellite connectivity, using OneWeb's constellation, providing low-latency and high-speed internet to schools in remote communities of Rwanda."

## Thuraya launch COVID-19 Global Humanitarian Response Plan

Thuraya has welcomed the launch of the COVID-19 Global Humanitarian Response Plan (HRP) announced by the United Nations Secretary-General on March 25. The company will use its expertise and apply lessons learned from the 2014-2016 Ebola outbreak, to help the global community implement the HRP and save lives during the COVID-19 pandemic.

The Global HRP is a co-ordinated US\$2 billion humanitarian response to fight COVID-19 in 51 of the world's poorest countries across, Africa, the Middle East, Asia and South America. Providing ubiquitous coverage in more than 160 countries, Thuraya will enable always-on voice and internet connections for COVID-19 relief missions, especially in regions where telecommunications infrastructure is likely to be weak or unavailable. The company had a similar arrangement with ETC during the 2014-16 Ebola outbreak, when it supplied voice and broadband links for the World Health Organization, U S Centers for Disease Control and Prevention, NetHope and other NGOs in the severely affected areas of Sierra Leone. Wireless connections were essential for health workers and relief agencies in different locations to stay connected and share instant updates, including emerging hotspots and rates of death and recovery. However, cellular networks could not handle the surge of user traffic. Only widespread use of satellite communications kept vital information flowing.



## African Telecommunications Union calls for harmonised action by telecommunications regulators and operators in Africa

The African Telecommunications Union (ATU), a specialised agency of the African Union in the field of telecommunications, has put together a set of guidelines to assist in combating the Coronavirus disease (COVID-19) pandemic, that every Member State should consider.

Africa has so far recorded relatively few coronavirus cases compared to the rest of the world. Twenty-seven African countries have recorded over 357 coronavirus cases, according to the World Health Organization on Thursday 19th March 2020. Egypt leads in cumulated confirmed cases at 196, South Africa 116, Algeria 72, Morocco 49, and Senegal 36. Other countries with over ten cases include Tunisia, Burkina Faso, D.R. Congo, Rwanda and Cameroon. However, Heads of States and Governments across the continent are taking no chances as they race to stop the spread of the virus by sensitizing their citizens about the pandemic and the various ways to combat the disease. Globally, telecoms/ICTs have become a pillar in the prevention, preparedness and response to the Covid-19 pandemic.

## Intelsat, AMN connect thousands of remote areas in Africa

Satellite service provider Intelsat and Africa Mobile Networks (AMN), a consortium that develops mobile network base stations in sub-Saharan Africa's rural areas, have announced they have successfully connected a thousand remote localities in the region. This makes a total of 3.5 million more individuals that now have access to telecom services.

The deal for this project was signed in October 2018. At the end of 2019, the two partners had succeeded in connecting more than 500 localities. Access to the mobile network was made possible by AMN's

## Avanti Communications provides Covid-19 response to Niger's government

Avanti Communications (Avanti), the leading provider of satellite technology across EMEA supports the Niger Government's response to Covid-19. As the world seeks to stay connected from behind closed doors, satellite connectivity is playing an important role in guaranteeing secure and reliable communication for government bodies, first aid responders and health organisations.

Using HYLAS 4 capacity, Avanti provides resilient and secure satellite connectivity and equipment to 10 government sites across the country, keeping lines of communication open for key government bodies in Niger. Avanti are collaborating with the National Agency of Information Society (ANSI), the technical arm of the government of Niger responsible for coordinating ICT solutions in the Covid-19 response in Niger.

The first site was set up on 15 April 2020 and the remaining 9 will be installed over the next few weeks. Avanti CEO, Kyle Whitehill, says 'At Avanti, we are deeply concerned about the spread of the pandemic and we want to help in any way we can. The telecommunications industry has an important role to play in this global crisis and we are privileged to be able to use our satellite technology to support the Niger Government in its initiative to fight Covid-19.'

ANSI CEO, Ibrahima Guimba-Saïdou, commented 'In Niger we



are leveraging all aspects of ICT in our fight against COVID-19. As such assuring good availability and good connectivity at our strategic locations is mandatory. The Avanti VSATs are reinforcing our technical capabilities.'

## Eutelsat's HOTBIRD to launch first HD African travel channel

Eutelsat Communications' HOTBIRD video hotspot has been selected by Travel Africa Network for the broadcast of its first High Definition African travel channel, with 100% African content dedicated to promoting tourism and hospitality in Africa.

The multi-year contract will enable Travel Africa Network to broadcast high-quality content throughout Europe and MENA, covering African gastronomy, culture, the best places to travel and stay and destination documentaries.

With its unique pan-European coverage, the high-power HOTBIRD satellites at 13° East form one of the largest broadcasting systems in EMEA, delivering content to more than 135 million TV homes in Europe, North Africa and the Middle

East.

Commenting on the deal, Nicolas Baravalle, Regional Vice President, Sub Saharan Africa of Eutelsat of Eutelsat said: "We are proud to welcome Travel Africa Network to the HOTBIRD line-up. Their confidence reflects the unparalleled reach of our 13° East of both installed households and luxury hotels, and we hope it will lead the way for more African channels targeting Europe and MENA."

Maggie Mutangiri, CEO of Travel Africa Network said: "We are delighted to launch the first dedicated African travel channel on HOTBIRD, enabling us to broadcast high quality content to the widest-possible audience to promote African travel experiences and attract more visitors to our beautiful continent. We look forward to a long and fruitful relationship with Eutelsat as we look to expand our offer in the future."

## Gilat Telecom's successful world's first trials of SD-WAN for satellite and fiber in Africa

Gilat Telecom has designed its SD-WAN to specifically address the needs of African MNOs, ISPs and enterprises and is using AI and machine-learning algorithms to improve the user experience through improved traffic management and maximized bandwidth. Most MNOs and ISPs in Africa use both satellite and fiber networks to maximize coverage creating asymmetric traffic routes with end-customers receiving traffic over satellite and sending over fiber. Gilat Telecom's SD-WAN enables service providers and MNOs to centrally control the route that both satellite and fiber traffic takes to and from the customer. It enables different applications – voice, streaming, caching (Facebook, Netflix, Microsoft cloud services etc) to be identified with automatic prioritization, according to the customer's needs and demands.

For African MNOs and ISPs, the major benefit is the ability to achieve more from their satellite bandwidth. With Gilat Telecom's intelligent routing, capacity can be expanded by up to 20 percent



(the equivalent of 6 Mbit/s can be achieved from a 5 Mbit/s downlink). For enterprises with multiple office sites served by individual routers and on-site management, Gilat Telecom's SD-WAN sits in HQ and enables traffic across the enterprise's network to be managed from one central SD-WAN controller over a secure and optimized connection. This enables the enterprise to save bandwidth, and money, and gives users faster connectivity.

Amir Cohen, CTO of Gilat Telecom, said that their SD-WAN solution enables MNOs, ISPs and enterprises across Africa to achieve more capacity from less hardware and software. It has been extensively tested by three reputable companies and they would like to publicly thank them for their extensive feedback which helped their engineers to create a world-first.

## World Bank supports Gambian telecoms reform plans

According to reports, the World Bank has allocated \$30 million to Gambia for use in telecommunications and energy. The funding, in the form of grants aimed at improving financial sustainability and the delivery of services, will support the implementation of reforms in the telecommunications and energy sectors, say press agencies. New procurement procedures will also be adopted to minimise what is called 'over-the-counter procurement'.

Initiatives financed by the new funds will aim to ensure that public investments in projects fall within the framework of priorities defined by the country's National Development Plan – including economic stabilisation, growth stimulation and structural transformation.

Under the plan, the country's government says it intends to undertake major reforms in a bid to enhance macroeconomic management for sustainable and inclusive economic growth and poverty reduction. This, the plan states, will be achieved through prudent fiscal management, debt sustainability measures, broadening the tax base and improving tax efficiency, as well as implementing public finance management reforms.

It is partly in this context that the Gambian government committed last year to reforming state-backed fixed line



operator Gamtel and its mobile subsidiary Gamcel, which trails well behind the country's private sector mobile operators in terms of size. It was decided early in 2019 that the two firms should be restructured and that shares in Gamcel be divested, though this process does not appear to have been completed yet.

## AsiaSat keeps the world connected as linear TV viewing witnesses upsurge amid COVID-19 lockdown

Recent media reports have revealed shifts in consumers' viewing behaviours as COVID-19 situation evolves with individuals and families spending more time at home, which

noted a spike in linear TV viewing, in terms of penetration and time spent across multiple markets and all generations.

News channels and programmes have seen a surge in viewership as news updates and government announcements on new regulations and the pandemic development become profoundly important to the public. During this period of uncertainty, satellite continues to be a reliable and cost effective means for content delivery, serving audiences nationally and abroad with critical and timely news and information.

As Asia's leading provider of broadcast platforms, AsiaSat strives to meet consumers' evolving demand for content and viewing quality. Among the 550 TV and radio channels originated from



more than 30 countries and regions in 30 languages delivered by the AsiaSat fleet, more than 80 are news channels, with 60% of them in local languages targeting local markets as well as expatriates and travellers who want to stay abreast of the happenings in their home countries.

Over the past year, the number of HDTV channels increased across AsiaSat's core video satellites AsiaSat 5 and AsiaSat 7, as well as its new video hotbird AsiaSat 9 at 122°E. These HDTV channels have included the Asian Action Channel, CTI Asia, ET Mall, PILI TV, Trace Sport Stars, Trace Urban, TVB Xing He and tvN Movies on AsiaSat 9, and a selection of WarnerMedia's bouquet of regional HD channels on AsiaSat 7 including CNN, Cartoon Network, Boomerang and Warner TV, raising the share of HDTV services to 30% across the AsiaSat fleet.

## Maritime connectivity market faces COVID-19 setback

In its latest research titled, "Prospects for Maritime Satellite Communications," Euroconsult projects that the previously growing maritime connectivity market will experience a significant setback due to the Covid-19 pandemic. Maritime VSAT connectivity reached an all-time high of 28,200 connected vessels at the end of 2019 but because of the current health crisis, the previous projection of 49,300 terminals by 2023 has been reduced to 40,600 units.

In 2019, the Maritime satellite VSAT communications market experienced high growth with the total number of terminals increasing by 17.5 percent year over year, and VSAT services revenue growing by 11 percent to approach \$1.3 billion. Increasing demand from passengers, as well as regulatory pressure on communications and crew welfare were major factors pushing maritime operators to install new generation satellite systems on their vessels.

"Despite the current setback, the fundamentals of maritime connectivity should continue to apply, with strong demand from the shipping industry as well as for leisure and business connectivity

## Nigeria broadband penetration hits 39.58%

According to the latest industry statistics released by the Nigerian Communications Commission (NCC), the country's telecoms regulator, total number of active users of internet in the country increased by 3.29 million to hit 132.01 million as at the end of February this year. The regulator showed that of the total number, the Global Service for Mobile Communication (GSM) operators maintained their unchallenged domination of the market with 131.65 million users on the networks of mobile network operators (MNOs), including MTN, Globacom, Airtel and 9Mobile.

Other operators providing internet services in the country as captured by the NCC data apart from the GSM are Voice Over



Internet Protocol (VoIP) and fixed network which have on their various networks as at the end of February, 353,780 and 9,866 users respectively.

In terms of new internet users recorded in the month by GSM operators, indigenous Globacom led the pack beating MTN Nigeria this time as Glo attracted 1.74 million new Internet users while MTN welcomed 0.96 million customers on its network. Airtel Nigeria trailed with additional 0.67 million users coming on its network within the 28 days of February while 9Mobile, on the contrary, lost 100,000 customers to sustain its perpetual decline. Consequently, MTN remained in its position as the operator with the highest internet users at 56.49 million, followed by Airtel which serves 36.17 million while Globacom and 9Mobile possess 30.95 million and 7.94 million active internet subscribers respectively.

## Inmarsat launches solution for the rail industry

A new Inmarsat Rail Telemetry and Communications Solution for the global rail industry provides real-time data transfer and push-to-talk communications to connect drivers and railway staff working in remote areas across the globe, to drive operational efficiencies and improve the overall safety of the railway.

Railways are more critical than ever in supporting the global movement of goods in remote areas. However; there are many challenges facing today's railway operators, including optimising network capacity, carrying out vital maintenance work, improving health and safety and minimising the impact of adverse weather

conditions.

These are exacerbated in large regions where sections of the railway pass through black spots – areas of minimal or zero cellular network coverage – when railway staff are unable to communicate, or send and receive any data from trins to the control centre, leading to inefficiencies and potentially safety concerns.

The new Rail Telemetry and Communications Solution leverages our Broadband Global Area Network, which offers industry-leading reliability of up to 99.9% uptime. Low form factor satellite terminals, such as the new Cobham EXPLORER 323, are mounted on locomotives providing real-time GPS, telemetry and PTT capabilities anywhere in the world.

## Spacecom and Comtech Telecommunications Corp. demonstrate 1.3 Gigabit C-band link over AMOS-17 with Telemedia South Africa

Spacecom and Comtech Telecommunications Corp. announced the successful demonstration of a 1.3 Gbps link using Comtech EF Data's CDM-760 Advanced High-Speed Trunking and Broadcast Modems operating over AMOS-17 C-band HTS payload. The exceptionally high throughput of 1.3 Gbps on a single link was established between two Telemedia facilities over AMOS-17's C-band spot beam using a single CDM-760 modem per facility. Telemedia is a leading provider of broadcast and teleport services in South Africa.

In addition, using the DoubleTalk® Carrier-in-Carrier® adaptive cancellation functionality of the CDM-760, the team established a symmetrical 270Mbps/270Mbps link between two Telemedia sites using a total of only 62.8MHz on AMOS-17, achieving spectral efficiencies of 8.6 bits/Hz in such a high capacity C-band link.

Ping tests showed that these links had a round-trip delay of less than 500ms, including the satellite link, modems and external routers, which is extremely low latency for a GEO satellite link.

According to Eran Shapiro, Director of Business and Technology Ventures at Spacecom, "We were thrilled to partner with Comtech EF Data and Telemedia to demonstrate the very high throughput customers can enjoy on AMOS-17 C-band spot beams, without having to compromise on service availability or



on solution complexity. The throughput and efficiencies of AMOS-17's spot beams are unique over Sub Saharan Africa. Comtech EF Data's modems and team proved this, while only using one modem per site. Engaging the African market with key enabling connectivity technologies for commercial and government sectors is a strategic goal for Spacecom. Together with Comtech EF Data, we are able to address important market segments with cost-effective, easy to deploy and maintain solutions."

## Tunisia's announces first homebuilt satellite

The African space market is in full bloom and is now estimated at more than 7 billion dollars a year. In almost 21 years, 32 satellites have been launched by eight African countries, three of which are financed by African institutions.

The continent is also progressing, with home-built satellites. One such case is Tunisia, which has just manufactured a satellite named "challenge one." It is produced by TELNET Company with support from Russia. It is scheduled to be launched from its Soyuz 2 spacecraft on November 15. Telnet aims to progressively deploy a constellation of 30 more nanosatellites over the next decade.

Anis Youssef, Head of Innovation Activities at Telnet: "Telnet's specificity – as a Tunisian company – is that we are not buying a satellite. We are developing one ourselves. "All this is in the interest of creating a gateway between Russia and Tunisia, around space nano satellites, and the technology of the Internet of Things (IoT)."

This satellite specializes in the Internet of Things. It is 100% made by Tunisian resources and skills, and thanks to a new technology developed in Tunisia. Each device in the system will eventually be able to be individually programmed, controlled or reset in space from Telnet's labs. There are many possible uses for Challenge One, ranging from remotely activating solar pumps in the Sahara to tracking livestock crossing Tunisian borders into Algeria or Libya.

### Intelsat undertakes financial restructuring for future innovation and growth

Intelsat S.A., operator of the world's largest and most advanced satellite fleet and connectivity infrastructure, has announced that it has undertaken a financial restructuring to position the Company for long-term success. The restructuring process is intended to enhance the Company's liquidity and will likely



result in a substantial reduction of Intelsat's legacy debt burden, allowing for Intelsat to emerge with a strengthened balance sheet to complement its strong operating model and future growth plans.

One of the primary catalysts for restructuring the balance sheet now is Intelsat's desire to participate in the accelerated clearing of C-band spectrum under the Federal Communications Commission order in support of a build-out of 5G wireless infrastructure in the United States. To meet the FCC's accelerated clearing deadlines and ultimately be eligible to receive \$4.87 billion of accelerated relocation payments, Intelsat needs to spend more than \$1 billion on clearing activities. These clearing activities must start immediately, long before costs begin to be reimbursed. The Company is also managing the economic slowdown impacting several of its end

markets caused by the COVID-19 global health crisis.

"This is a transformational moment in the history of our company," said Stephen Spengler, Chief Executive Officer of Intelsat. "Intelsat is the pioneer and foundational architect of the satellite industry. For more than 50 years, we have been respected for quality, innovation, sector leadership, and premium services. Our success has come despite being burdened in recent years by substantial legacy debt. Now is the time to change that. We intend to move forward with the accelerated clearing of C-band spectrum in the United States and to achieve a comprehensive solution that would result in a stronger balance sheet. This will position us to invest and pursue our strategic growth objectives, build on our strengths, and serve the mission-critical needs of our customers with additional resources and wind in our sails."

### BBC World News and SES extend HD deal



#### to ASTRA 19.2 degrees East

TV viewers across Western Europe will continue to be able to watch BBC World News thanks to an extended deal with SES. BBC Global News delivers its HD news channel, BBC World News, free-to-air across Europe on SES's Astra satellite at 19.2 degrees East.

The total HD reach at Astra 19.2 degrees East has increased every year, rising from 65 million homes at year end 2015 to 88 million by year end 2019, a 34% growth in five years. The BBC World News channel, which has been available in HD through SES since 2015, is distributed via a multiplex operated and uplinked by SES from its Luxembourg headquarters.

Chris Davies, executive vice president of marketing and distribution for BBC Global News, said, "This deal with SES is really important as it allows us to reliably reach widespread audiences across Western Europe. Amidst one of the biggest news stories of this generation, we're seeing unprecedented demand for quality journalism. Since the beginning of the year, we've taken BBC World News from being available in 465 million homes worldwide to over half a billion homes, to provide a growing audience with trusted, accurate and impartial news."

"Since the COVID-19 health crisis started, we have heard from our customers that demand for linear TV, especially news programmes, is on the rise and that reliable news producers such as the BBC are now more critical in providing accurate news and information to millions of viewers," said Ferdinand Kayser, CEO at SES Video. "We're pleased to continue working with the BBC and to help bring high-quality

HD news to 88 million European households at a time when they need it most."

### WHO offering COVID-19 tracking app to governments worldwide

The World Health Organisation (WHO) is readying the launch of a new app aimed at stemming the spread of Covid-19. Scheduled for a global launch later in May, the app will let users check their symptoms in order to determine if they are infected with the virus. Reuters quoted the WHO CIO Bernardo Mariano as saying that any government would be able to use the technology that powers the app to introduce their own offering. As well as flagging cases of potential infection, the WHO app will also be able to provide users with information about local testing options for the virus. Additionally, it will offer users resources for safeguarding their mental health.

Mariano noted that the WHO's app would be of particular benefit in developing regions such as Africa and Latin America, noting that countries with vulnerable public health services would be able to implement the app swiftly rather than spending time and effort developing their own.

The WHO also acknowledges the potential advantages of implementing contact-tracing technology to the app, which would be based on Bluetooth. Reuters confirmed that the organisation has approached Apple and Google about the proximity detection technology that the firms have developed together and are planning to launch imminently.

As well as the new app, the WHO has spearheaded initiatives to provide accurate scientific information and alerts via messaging partnerships, including with WhatsApp. It intends to launch a similar campaign via SMS for millions of users with low-end devices.

### NSR: Flat panel satellite antennas on track for \$12 billion over next decade

NSR's Flat Panel Satellite Antennas, 5th Edition report, now released, forecasts cumulative revenue from flat panel satellite



antenna sales to reach \$12 billion by 2029. Mobile applications, particularly government and commercial aviation, drive the opportunity, at 98% of the market value over the next decade. Fixed applications, mainly consumer and enterprise broadband, drive volume with over 582,000 Flat Panel Satellite Antennas to be shipped in the same timeframe

"Commercial Aviation and Maritime are being hit very hard this year," states Dallas Kasaboski, Senior Analyst and report author. "With over 70% of every airline's fleet currently grounded, the number of commercial aero shipped units dropped by 55% so far in 2020; however, this is an equipment market, with long lead times. Due to the necessity of a low-profile antenna, and the priority of government customers, ultimately the market will see less of an impact in 2021 and beyond." NSR's

FPA5 notes that commercial and government aeronautical, along with commercial land-mobile, demonstrate strong presence of FPAs, exceeding 77% of their respective markets by 2029. However, in most markets, FPAs will not be competitive with opportunity only reaching 3% of all satcom units, with a sizable challenge in broadband markets. "The overall broadband market outlook has been reduced significantly due to the exits of OneWeb and LeoSat. FPAs also have a long road to becoming cheap and reliable enough to work in a mass market. Manufacturers are pivoting to scale up, and drop costs, but parabolic equipment will be too competitive



in serving GEO-HTS, resulting in low overall market penetration," adds Kasaboski. However, Non-GEO HTS capacity, including potential constellations from SES, Telesat, Amazon, SpaceX, and ViaSat, is where FPAs will dominate, especially with connected vehicle and consumer broadband markets

### Mining industry undergoing IoT revolution

The latest Inmarsat report has revealed that the global mining sector is undergoing an Internet of Things (IoT) revolution with respondents reporting significant increases in adoption of connected technologies.

Specialist market research company Vanson Bourne was employed by Inmarsat to interview 200 respondents with either decision-making or influencing responsibilities for IoT-related initiatives at organisations numbering over 500 personnel. Mining organisations reported successes in implementing projects to safeguard workers via remote tracking, monitor drilling and observe acid mine drainage remotely. However, despite this progress, a range of challenges are hindering the sector's ability to reap the rewards that IoT has to offer.

'The Rise of IoT in Mining' is the third IoT-focused research project undertaken by Inmarsat and focuses on the use of, attitude to and predictions for IoT across the global mining sector. As part of the initiative Inmarsat is also offering mining companies the opportunity to measure their IoT readiness versus the 200 respondents to the survey, using their free online IoT maturity tool.

According to the research, most organisations (65%) have fully deployed at least one IoT project, while 33% are trialling or have trialled a project, with only 2% of respondents not having begun an IoT project. These findings echo the predictions reported in Inmarsat's 2018 mining research, where only 2% had fully deployed an IoT solution, 29% were trialling one and 69% were planning on beginning IoT projects within the next two years. Noticeably, there is a considerable geographical variance in IoT adoption and maturity across different regions, with 98% of North American respondents having successfully deployed IoT-enabled projects, compared with only 50% in

Africa and 38% in South America.

### China-funded satellite television project benefits 1,000 villages in Mozambique

Mozambique announced the conclusion of a project to bring digital satellite television signal to 1,000 villages in the country, which is supposed to benefit over 20,000 families. The Minister of Transport and Communication Janfar Abdulai made the announcement after reviewing the project in the northern province of Cabo Delgado.

"This project is included in the 100 days of governance and now it is totally concluded, here today we are reviewing how the beneficiaries feel with the project and we are able to testify that they are happy, they have direct access to information and we share their satisfaction," said the minister.

He said the project generated about 2,000 jobs in total and trained work force particularly young people to be in charge of the maintenance and provide assistance to the beneficiaries. The project, covering all the ten provinces and the capital city of Mozambique, was co-funded by China and implemented by the Chinese electronics and media company StarTimes. The project is part of the resolutions of the Johannesburg Summit of the Forum on China-Africa Cooperation in 2015, in which the Chinese government pledged to provide satellite television access for 10,000 villages in Africa.

### Vodacom signs up with Loon to deliver 4G-



### by-balloon to Mozambique

Mobile operator Vodacom is to use Alphabet's Loon balloon-carried base stations to extend coverage in Mozambique. The balloons will float 20km above the ground in the provinces of Cabo Delgado and Niassa, in the north of the country close to the border with Tanzania. Loon's CEO Alastair Westgarth said: "We view this as the first step to a larger partnership that will allow us to serve more of those users throughout Africa." Loon is already experimenting with balloons in Kenya, on the other side of Tanzania, in a project with Telkom Kenya.

Shameel Joosub, the group CEO of Vodacom, confirmed the company's interest in expanding balloon coverage. "We look forward to forging similar partnerships and projects across the continent, as we ensure that no one is left behind when it comes to accessing the global digital economy," he said.

The balloons will deliver voice, data, SMA and USSD on 4G, as well as M-Pesa mobile financial services. Vodacom said: "The service will be available to any Vodacom subscriber with a standard 4G-VoLTE enabled handset and SIM card. Users will not need to do anything special to connect to the service; they will connect just as they would to a normal cell tower. In fact, it's unlikely that a user will know that they are connected to the service provided by a high altitude balloon, except for the fact that they may have a signal in a location where it previously did

not exist."

Vodacom and Loon will need to install physical terrestrial infrastructure to connect the balloons to the core network. And Loon said it will need "to learn the stratospheric wind patterns on which the balloons must navigate to remain above the service area". They will be controlled with what Loon, owned by Google's parent company Alphabet, calls an autonomous navigation system.



### GiTy to provide internet services in Africa via Spacecom's AMOS-17

Spacecom operator of the AMOS satellite fleet, announced that the company signed a multi-year contract with GiTy, a.s., a leading telecom service provider based in the Czech Republic, for C-band capacity on the AMOS-17 communication satellite, in order to deliver connectivity to embassies across Africa.

According to Radek Ondras, Network Operations Director at GiTy, "AMOS-17's position over Africa and its unique performance and capabilities provide us with an excellent solution for our very specific needs. Partnering with Spacecom since as early as AMOS-3, we are confident they will provide us with high quality, personalized and reliable satellite communication services. GiTy is happy to contract capacity on the AMOS-17 satellite, which allows us to enter Africa with state of the art technology".

Spacecom VP Sales EU and ME, Eyal Altshuler stated, "We are proud to be GiTy's long-term partner allowing us to support their growing needs of communication in Africa. Spacecom welcomes GiTy on board of our new AMOS-17 satellite and I trust that our long standing partnership will continue to grow further".

AMOS-17 is an HTS satellite designed specifically to meet Africa's fast-growing communication demands. The satellites C-Band HTS, Ka-Band and Ku-Band capabilities, enable the combination of broad regional beams and high throughput spot beams that maximize throughput and spectral efficiency. AMOS-17 supports connectivity between Africa, the Middle East, Europe, India and China.

## Azercosmos signed a partnership agreement with Africa's Space Engineering Company

Azercosmos has signed a partnership agreement with Space Engineering, which provides telecommunication and Internet services in the African region. According to this agreement, Mwangaza TV and Radio will be broadcast in the Republic of Kenya with the use of the Space Engineering provider via Azerspace-1 satellite.

With an audience of around 50 million viewers and listeners, Mwangaza TV airs daily news and socio-economic programs in the English language. Within the framework of the agreement, Space Engineering also offers data services to its customers in the East African region via the Azerspace-1 satellite.

"We are confident that this partnership with East Africa's leading satellite service provider, Space Engineering, will be mutually beneficial. This agreement serves as an indication of our desire to provide highly reliable satellite services to the people of the African region, especially the Kenyan population," said Mark Guthrie, Chief Commercial Officer at Azercosmos.



## Telefónica puts Telesat's phase 1 LEO Satellite to the test

Telesat, and Telefónica International Wholesale Services (TIWS), the international wholesale services provider of the Telefónica Group, one of the world's largest telecommunications companies, have completed live in-orbit testing across a wide range of applications on Telesat's Low Earth Orbit (LEO) Phase 1 satellite.

With a mission to increase agility and improve operational efficiencies, TIWS partnered with Telesat on a rigorous testing campaign to explore the performance and feasibility of leveraging LEO satellites for high-end services. Testing demonstrated that Telesat LEO could be a viable option for wireless backhaul and presents a substantial improvement in performance over geostationary orbit (GEO) links, without the use of compression or TCP acceleration techniques that are typically required in 650ms latency GEO environments.

"As we plan, design and build our offerings to provide best-in-class connectivity for our customers, we are eager to explore how cutting-edge technologies like Telesat LEO can integrate with our global connectivity infrastructure," explains Gustavo Arditti, TIWS Satellite Business Unit Director. "Across every application tested, Telesat LEO delivered an outstanding performance, with significant improvements over what we can achieve via GEO satellites today."

"The ability to demonstrate fibre-like performance via satellite across a number of applications that perform poorly on GEO

satellite backhaul is a testament to the capabilities of our Telesat LEO network," stated Erwin Hudson, Vice President, Telesat LEO. "With its high-throughput links, ultra-low latency, and disruptive economics, Telesat LEO offers an unparalleled value proposition to expand the reach of 4G and 5G networks."

## Gilat Telecom expands VSAT services across Africa

Gilat Telecom announced that its VSAT services are now available in every country in Africa offering significant advantages over other domestic and international connectivity providers. A new self-control portal – this gives organisations complete control over their networks and full visibility of all their services including billing, OSS and BSS visible on the same dashboard. This portal was developed specifically for the African market with e-banking, ease of use and availability.

Faster time to delivery – with warehouses in seven countries and hundreds of field engineers, Gilat Telecom can provide fast and reliable broadband to an organisation within just a few days. Faster Speeds – downlinks of 70Mbps with up to 15Mbps uplink per single terminal. Aggressive OPEX Pricing – up to 20% lower than competitors. A 'More For Less' pledge – customers' CAPEX is minimised with investment limited to high performance remote terminals.

Flexibility – The use of multiple HTS and regular satellites enables Gilat Telecom to tailor its service to meet the exact demands of customers. Providers include AfricaSat, ABS, Intelsat, Belintersat, Chinasat, Spacecom, Azerspace, SES and more. In addition, Gilat Telecom uses the equipment and services of a wide range of vendors including Newtec, iDirect, Novelsat, UHP, Comtech, Gilat Satellite Networks.

## Inmarsat extends seafarer well-being commitments

Inmarsat continues to ramp up its response to COVID-19, with additional initiatives to improve seafarer wellbeing. These include further collaboration with ISWAN



(International Seafarers' Welfare and Assistance Network) and maritime charities, the launch of a new chatcard and the wider roll-out of a COVID-19 video telemedicine call service.

As the pandemic has unfolded, the company has worked closely with welfare organisation ISWAN and the major maritime charities to ensure that seafarers stay connected without the burden of additional financial anxiety. Inmarsat is now offering crew access to ISWAN's SeafarerHelp portal and live chat function via its new onboard Wi-Fi portal, Fleet Hotspot, as well as continuing to offer free voice phone calls



to the service. It also continues to provide satellite phones to port chaplains in ports where a number of seafarers are stranded and have no access to the internet.

SeafarerHelp is ISWAN's free, confidential, multilingual helpline, which offers support and assistance to seafarers and their families around the world. The helpline service is available 24 hours a day, 365 days a year, and seafarers can get in touch via a range of contact methods including Live Chat, email and telephone.

### Telefónica tests Telesat's LEO satellite for backhaul

Telefónica International Wholesale Services (TIWS) has completed live in-orbit testing across a range of applications on Telesat's Low Earth Orbit (LEO) Phase 1 satellite. TIWS partnered with global satellite operator Telesat to explore the



performance and feasibility of leveraging LEO satellites for high-end services. They concluded that the tests demonstrated "superior near fibre-like performance" and that TelesatLEO could be a viable option for wireless backhaul.

The results presented a substantial improvement in performance over geostationary orbit (GEO) links, without the use of compression or transmission control protocol (TCP) acceleration techniques that are typically required in 650ms latency GEO environments, TIWS said.

Applications tested over Telesat LEO resulted in observed round trip latency of 30-60ms without any packet loss. Test scenarios included high-definition video streaming; video conferencing with teams; remote desktop connection to seamlessly manage a remote computer; a VPN connection without any delay or outages; FTP-encrypted file transfers of 2 GB in both directions; and IPsec tunnel encryption with no reduction in the performance of the link.

"As we plan, design and build our offerings to provide best-in-class connectivity for our customers, we are eager to explore how cutting-edge technologies like Telesat LEO can integrate with our global connectivity infrastructure," said Gustavo Arditti, TIWS Satellite Business Unit Director. "Across every application tested, Telesat LEO delivered an outstanding performance, with significant improvements over what we can achieve via GEO satellites today."

### British Council launches digital English library for Moroccan students

An English-language digital library launched in Rabat for the benefit of Moroccan students and with the aim of strengthening Morocco-UK cooperation in the fields of higher education and scientific research. The Ministry of Education and the British

Council in Morocco led the initiative to grant Moroccan students, teachers, and researchers free access to the British Council's vast digital collection of cultural and scientific teaching resources and distance learning programs.

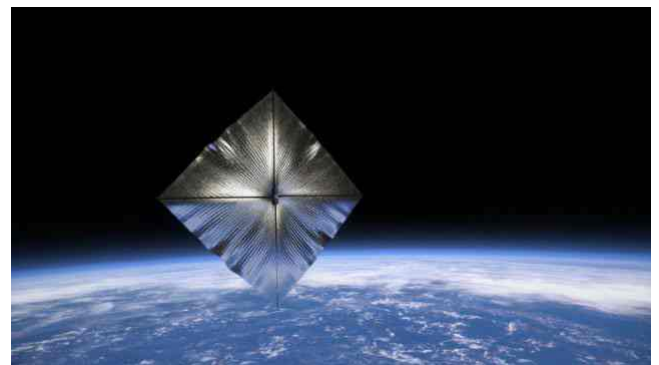
During the June 9 launch, Minister of Education and Government Spokesman Saaid Amzazi highlighted the "excellent" relations between Morocco and the UK, adding that "the higher education and scientific research sector is a driving force behind the exceptional bilateral cooperation between the two Kingdoms." Amzazi said the first meeting of the Morocco-British Joint Commission on Higher Education and Scientific Research on January 22 in London confirmed the two countries' strong cooperation in the academic field, as did Morocco's participation in the Education World Forum in London from January 19-22.

The minister delegate for Higher Education and Scientific Research, Driss Ouauicha, celebrated the British Council's "generous gesture." The digital library offers nearly 100,000 digital resources in various academic fields, including anthropology, business, economics, information technology, engineering, fine arts, history, law, medicine, and physical sciences.

### MEASAT enhances its VSAT service management with DataMiner

Skyline Communications announced that MEASAT Satellite Systems has recently deployed the award-winning DataMiner system. And that means another major project, considering MEASAT is a premium supplier of communication and video services to leading broadcasters, Direct-To-Home (DTH) platforms and telecom operators.

MEASAT provides their diverse customer base with top-of-the-line-quality services and highly customized VSAT satellite solutions. In delivering these services, MEASAT continuously improves and further optimizes their operational process. "Which is exactly why they turned to DataMiner," commented Naveendran Murthy, Sales Manager for the APAC region at Skyline Communications. "Having a unified network that can



be managed and controlled from a single pane of glass, no matter how complex and heterogenous the underlying infrastructure, is essential in the satellite industry. With our DataMiner system in place, MEASAT can now count on a reliable solution that enables them to deliver the highest quality of real-time data sharing to support their regional customers, and in the most efficient way possible too."

### Satellite connectivity supports ambulance services in Dubai

Continuing evidence of the importance of wireless telecommunications during the health crisis comes from the UAE, where satellite services are playing a part in the UAE's efforts to contain the coronavirus pandemic – in this case through Dubai's ambulance services.

Mobile satellite services company Thuraya has announced that it is providing always-on satellite connectivity to Dubai

Corporation for Ambulance Services through its partner Cygnus Telecom, a provider of customized telecommunications and surveillance solutions for business needs, headquartered in Dubai.

Following the launch of Mobile Laboratory Units by Dubai Corporation for Ambulance Services to provide free home-based testing for the elderly and people with special needs, Cygnus Telecom, the master distributor of Thuraya's voice



solutions, has equipped 12 ambulances with Thuraya X5-Touch satellite phones so that paramedics remain connected while on duty in the remote areas of Dubai or on marine ambulances at sea.

The Android-based Thuraya X5-Touch devices offer various innovative safety features useful for medical responders, including advanced navigation, tracking and a built-in SOS button for emergencies. In addition to providing satellite connectivity, they keep users connected over terrestrial telecom networks so that they are also available on their local mobile numbers.

### SpaceX launches eighth Starlink mission, first VisorSat satellite

SpaceX launched a batch of 60 Starlink broadband satellites June 3, including one with a deployable sunshield meant to test out a new way to reduce the brightness of future satellites.

The Falcon 9 rocket lifted off at 9:25 p.m. Eastern from Cape Canaveral Air Force Station in Florida, and deployed the satellites into low Earth orbit 15 minutes later.

The rocket's first stage landed on SpaceX's drone ship "Just Read the Instructions" about nine minutes after lift off. The launch marked the fifth use of that booster, which previously flew one mission to geostationary transfer orbit and three missions to low Earth orbit, the latest being in January, also for Starlink. The launch was also the first time SpaceX successfully recovered a first-stage booster after five flights.

SpaceX has launched 482 Starlink satellites, counting Wednesday's launch and two prototypes launched in 2018. The company had planned its latest Starlink mission for May, but was delayed by Tropical Storm Arthur until after the company's Demo-2 Crew Dragon mission to the International Space Station, which took place May 30.

May was the first month this year SpaceX did not conduct a Starlink launch. The company had averaged one Starlink launch a month before the delay. SpaceX was originally targeting two Starlink launches a month throughout 2020.

SpaceX is building and launching a constellation of up to 12,000, and potentially 42,000 satellites in low Earth orbit to support a global satellite internet service. The company expects to start service late this year in Canada and parts of the

United States.

### SES to recoup US\$1.6 billion to launch new satellites

SES has confirmed its intention to clear a portion of its C-band spectrum in the US, in line with the Federal Communications Commission's (FCC) order published in April.

The accelerated clearing of the spectrum including the migration of existing customers, is an important and resource-intensive process for the current C-band users.

SES' board of directors has approved investment of \$1.6 billion, which includes the procurement and launch of new satellites and other equipment and services – expenses that are repaid through the program Clearinghouse. SES says that it intends to place the vast majority of this investment with US suppliers. In addition, the company has arranged deferred payment terms with the vendors taking part in the satellite programs associated with the accelerated clearing. SES intends to meet the deadlines envisaged in the FCC order, which entitles SES to receive up to \$3.97 billion in accelerated relocation payments. The company has supported the FCC's plan to clear C-band in order to drive up 5G leadership in the US, while also protecting the spectrum's current users.

### MultiChoice integrates Netflix and Amazon, launch DStv streaming product

Africa's leading pay TV operator MultiChoice has agreed to add Netflix and Amazon Prime Video to its TV offering and



has posted solid year end results. MultiChoice said in its results presentation that it had agreed deals with Netflix and Amazon to integrate their services into its Explora decoder. The pay TV operator has also launched field trials of its own DStv streaming product..

"As our industry evolves, we believe that we are well positioned to benefit from both worlds – a large, growing pay TV market in Africa, as well as an emerging over-the-top opportunity, where our own OTT services and aggregation capabilities can drive success."

MultiChoice said that its own DStv streaming offering would launch later this year. MultiChoice holding owns operations that span over 50 countries, providing entertainment, interactive and ecommerce services. The group employs over 6,000 collaborators, 690 of whom are based in their South African headquarters. The group claims over 3 million paid-up subscribers in Africa, the Mediterranean and Asia, 1.25 million of whom are in Africa.

The company already provides a streaming offering, Showmax, which is also available on Explora and can be seen as a competitor with Netflix and Amazon to some extent, and the move to integrate the latter represents a

## South Africa to invest in satcoms and broadband expansion

The South African government has announced plans to invest in satcom and broadband expansion projects during a government presentation at the launch earlier this week of the Sustainable Infrastructure Development Symposium South Africa (a virtual event this year) were two important telecommunications initiatives in satellite communications and broadband.

A planned Space Infrastructure Hub will allow for the development of satellite infrastructure, satellite-based augmentation systems, and earth observation satellites. This type of infrastructure aims to reduce South Africa's reliance on other countries for the type of information that these satellites can make available and is expected to reduce the timeframes for collecting necessary



data.

It will also, according to the government, provide information that might be used to develop products and services that can allow targeted responses to the country's socio-economic and infrastructure challenges

Project Thobela, meanwhile, focuses on broadband. Businesses and households are becoming increasingly reliant on the internet, and the coronavirus pandemic has meant that even more activity is taking place online. The 2018 General Household Survey estimated that only a tenth of South African households had access to the internet at home. The figure is even lower in rural areas. By bringing internet connectivity to regions with low levels of broadband penetration, Project Thobela aims to help to close South Africa's digital divide.

The other projects include a greenfield citrus project, a water augmentation project and The Greater Cornubia, a new city that will be a mixed-use and mixed-income development.

## Intelsat and Liquid Telecom extend successful partnership that delivers reliable internet services to Africa

Intelsat, operator of the world's largest integrated satellite and terrestrial network, has announced an extension of its partnership with Liquid Telecom the leading pan-African telecoms group. The two companies have collaborated for four years to deliver Liquid Telecom's multi-award-winning very-small-aperture terminal (VSAT) service over Intelsat's high-throughput satellite fleet, providing a robust, secure and reliable communications network to communities,

schools and businesses in 20 countries across the continent. Through the partnership extension, Liquid Telecom will be able to connect more than 2,000 additional VSAT terminals across the continent. This will ensure the continuity of high-speed, reliable satellite connectivity to mobile operators, carriers, enterprise, media, content companies and retail customers across Africa, and it will also help Liquid Telecom better serve the growing demand for improved connectivity in its rural service areas. "Extending our partnership with Intelsat will enable us to continue developing VSAT products with high-efficiency models and ubiquitous coverage; in fact, Liquid Telecom has just added three new high-performance VSAT service offerings to our portfolio, each with a range of data volume options. Liquid Telecom is continuing to drive increased demand and improve service levels across the continent, and this continuation of our partnership with Intelsat is a significant boost in that regard," said Liquid Telecom Satellite Services CEO Scott Mumford.

## SSPI appoints Thomas Van Den Driessche of ST Engineering iDirect and Nicole Robinson of SES as new leaders on Board of Directors

The Board of Directors of Space & Satellite Professionals International has appointed Thomas Van Den Driessche, resident and Chief Commercial Officer of ST Engineering iDirect, as its new Chair, and Nicole Robinson, Senior Vice President for Global Government at SES, as its new President, effective July 1, 2020. Thomas succeeds David yers, President of the Communications Sector at Peraton, who has served on the Board as a Director, President and Chair since 2013. David is stepping down at the end of his final term with the gratitude of the entire Board for his many contributions

Thomas Van Den Driessche is President & CCO at ST Engineering iDirect, where he is responsible for defining strategy, execution and communications to achieve the company's short- and long-term goals. Thomas has been



active in the broadcast and satellite markets for 18 years, including 11 years at Newtec, where he held a variety of positions, including Sales and Business Development, VP of Market Strategy and CCO before finally becoming CEO. Before joining Newtec, he began his career as a product manager in the broadcast and AV market and received awards for his work from leading organizations such as NAB, Infocomm and Vanguard

As Senior Vice President of Global Government for SES Networks, Nicole Robinson is responsible for the company's global business portfolio of government customers in the areas of defense, security, humanitarian, federal, civilian and institutional organizations. She also serves as Chairman of

the Board of Redu Space Services and Director of the LuxGovSat Board of Directors. Nicole has served in a variety of executive roles during her 12 years at SES, including leading teams in the areas of government product development, sales and business development, government affairs and marketing. Before joining SES, she served as leader of the Strategic Communications function for the U.S. Joint Forces Command's Standing Joint Force Headquarters (SJFHQ). In 2012, she received a Promise Award from SSPI as a leader among the 20 Under 35.

## Ethiopian Ministry of Education partners with UNICEF, Save the Children and SES to broadcast educational content on Ethiosat TV Platform

The Ethiopian Ministry of Education (MoE) and Regional Education Bureaus (REBs) with the support of UNICEF, Save the Children, and a leader in global content connectivity solutions, SES, have launched nine new educational TV channels on Ethiosat TV platform to enable the continuity of learning for school children who have been at home since 16 March amid COVID-19 school closures. These educational channels, which will be available to broadcast in 8 languages in different regions in Ethiopia are available exclusively on Ethiosat TV platform on SES' NSS-12 at 57 degrees East as of 1st of June 2020. Ethiosat is Ethiopia's first dedicated TV platform launched in October 2019 by agreement between the Association of Ethiopian Broadcasters (AEB), the Ethiopian Broadcasting Corporation (EBC), and SES. Educational content for primary and secondary students is being developed by the Ministry of Education and Regional Education Bureaus with support of UNICEF, Save the Children and other partners. "Forming a crucial component of our COVID-19 education response plan, these new TV channels offer a fast, scalable solution for distance learning for Ethiopia's school age children," said Minister of Education, H.E Dr.-Eng. Getahun Mekuria. Eight of the new educational TV channels will



be named according to the region they serve and one will be for the MoE. "This is a solution that not only provides continuity of learning during the COVID-19 crisis, but also strengthens the resilience of the Ethiopian educational system to respond to other crises in the future," added Ekin Ogotogullari, Country Director for Save the Children in Ethiopia.

## Demand for educational Ghanaian TV channel Joy Learning grows amid COVID-19, powered by SES

Joy Learning, the free-to-air (FTA) not-for-profit TV channel dedicated solely to Ghanaian educational content, has proven to be a critical source of learning for senior high school (SHS) pupils across the West African sub-region while schools have been closed to combat the spread of COVID-19.

This is according to Abdulai Awudu, General Manager of Joy Learning, who says the channel can be accessed by TV viewers throughout the sub-region as part of the FTA direct-to-home (DTH) MultiTV platform on SES's Astra-2F, by using a standard decoder or TV with built-in DTH tuner. "While this channel was originally created to give Ghanaian SHS students access to educational content while they were away from school – as a result of the double-track system – it has recently proven useful to all English-speaking West African countries who follow the West Africa Examination Council curriculum."

The Joy Learning channel, which was officially launched on 30 December 2019, was part of a corporate social responsibility initiative undertaken by the Multimedia Group (MGL) through its Educare Foundation, in partnership with e-learning platform Wolo TV; service provider K-Net; and SES, the leader in global content connectivity solutions. SES provides the satellite capacity and broadcast services; K-Net provides local



backhaul and teleport services; Wolo creates and supplies the educational content; and MGL runs the channel.

The Joy Learning channel's wide reach is driven by SES's prime orbital position at 28.2 degrees East, which reaches 97% of all satellite TV homes in Ghana. From that orbital slot, SES hosts Multi TV, a FTA (Free-to-Air) platform that provides viewers free access to over 100 TV channels of high quality content, including the Joy Learning channel. While giving broadcasters access to the highest reach in West Africa.

## ATU, Ericsson sign MoU to accelerate growth of ICT in Africa

The African Telecommunications Union, ATU, has signed a Memorandum of Understanding (MoU) with Ericsson to help fast track the roll out of technology across the continent. According to ATU, a specialised agency of the African Union in fostering the growth of ICT in Africa, The MoU will support the growth of ICT as a critical infrastructure for the 21st century and help set the foundation for social and economic progress in the continent. In the understanding, the two organisations look towards promoting global and regional coordination and harmonisation of spectrum usage to encourage economies of scale and maximise the affordability for all users in Africa.

"Our collaboration with Ericsson is geared towards connecting, innovating and transforming the continent into a knowledge economy," commented John Omo, Secretary General of the ATU. Omo, who spoke during the signing of the MoU in Nairobi, Kenya further noted that it is imperative for

## Inmarsat launches Tailings Insight

Inmarsat has launched Tailings Insight, a new Internet of Things (IoT) solution for monitoring mining tailings storage facilities (TSFs), which builds on and upgrades our award-winning Tailings Dam Monitoring Solution.

Available in two new propositions: Tailings Insight – Cloud and Tailings Insight – Plus, the flexible solutions are designed to respond to the differing needs of miners and reflect our commitment to building more transparent, safer management of TSFs globally.

Our award-winning Tailings Dam Monitoring Solution was launched in March 2019 after several years of development with industry partners. As a fully managed service, the solution worked by collecting data from a range of industry-established sensors via Long Range Wide Area Network (LoRaWAN) edge connectivity, before transferring that data across our L-band network to a dashboard. This ensured mining companies were able to see the status of key metrics in one place and in real-time, facilitating more responsive decision-making and safer mining operations.



## Intelsat announces Q1 2020 results

Intelsat, one of the leading provider of satellite services, delivering information and entertainment for many of the world's leading media and network companies, multinational corporations, Internet Service Providers and governmental agencies has announced financial results for the three months ended March 31, 2020. According to the report, Intelsat reported total revenue of \$458.8 million and net loss attributable to Intelsat S.A. of \$218.8 million for the three months ended March 31, 2020.

Intelsat's Chief Executive Officer, Stephen Spengler, said, "Like many companies, we were not immune to the effects of COVID-19, which created challenges for our underlying business. Our first quarter results reflect the decline in sea and air travel which negatively impacted our network services business. The media business also experienced disruptions primarily related to the decline in "occasional use" services for sporting events and concerts which were cancelled to comply with the broad stay-at-home orders issued during the period. We were pleased with the resilience of the government services business which delivered stable results in a challenging environment while generating renewals and new business contracts."

Spengler concluded, "Recently, we announced our decision to opt into the FCC Accelerated C-band Clearing Plan. We are already working closely with our customers and vendors to ensure we achieve the agreed upon milestones. Intelsat is committed to helping the U.S. maintain its leadership in developing advanced telecommunications technologies. Our role in clearing the C-band will help create a winning formula for America in the race to deploy 5G networks."

## SES to recoup US\$1.6 billion to launch new satellites

SES has confirmed its intention to clear a portion of its C-band

spectrum in the US, in line with the Federal Communications Commission's (FCC) order as published in April. The accelerated clearing of the spectrum including the migration of existing customers, is an important and resource-intensive process for the current C-band users.

SES was founded in Luxembourg in 1985 as Europe's first satellite operator. Today, the company is one of the leading satellite operators with offices in 17 countries and teleports around the world. We reach 258 million homes worldwide and facilitate the broadcasting of 6,200 TV and radio channels including 1,200 in High Definition

SES' board of directors has approved investment of \$1.6 billion, which includes the procurement and launch of new satellites and other equipment and services – expenses that are repaid through the program Clearinghouse. SES says that it intends to place the vast majority of this investment with US suppliers. In addition, the company has arranged deferred payment terms with the vendors taking part in the satellite programs associated with the accelerated clearing. SES intends to meet the deadlines envisaged in the FCC order, which entitles SES to receive up to \$3.97 billion in accelerated relocation payments. The company has supported the FCC's plan to clear C-band in order to drive up 5G leadership in the US, while also protecting the spectrum's current users.

## Vezeeta extends its telehealth solution

Vezeeta, the leading digital healthcare platform of the region has partnered with Saudi's leading telecom company STC to provide its employees with free telehealth services. The Dubai-headquartered healthtech said that the partnership will enable STC's employees in Saudi to book free phone calls and video calls through Vezeeta's app. The employees, Vezeeta said, will also be able to schedule home visits of doctors at special rates.

"This partnership also reiterates Vezeeta's mission and responsibility as a healthtech leader to support the efforts of the local government in combatting the spread of Covid-19 in the region, and ensure the health and safety of the local communities," noted the statement. STC employs thousands of employees across the Kingdom and its other markets and



was one of the first large corporates in the Kingdom to enforce a work-from-policy due to Covid-19.

Saudi Technology Ventures, the \$500 million VC fund that is anchored by STC, having led Vezeeta's \$12 million Series C (in late 2018) is one of the main investors in the Cairo-born company. Vezeeta that has been aggressively expanding into new products and markets had launched its telehealth solutions in Saudi in March.

Majid Matbouly, MD of Vezeeta, Saudi Arabia, commenting on the partnership, said, "Our partnership with STC has presented us with a unique opportunity to expand people's

access to our telehealth solution, which amid the current healthcare crisis is more vital than ever. As the movement restrictions start to slowly lift across the region, access to instant preventive care and remote medical consultations is key to help limit the spread of the virus."

STC said that through this partnership they "remain committed to relying on advanced technology to care for the health and well-being of their employees and their families. By leveraging Zezeeta's cutting-edge telehealth solution, STC employees can access the best health and medical care in the Kingdom, and continue to thrive during times of uncertainty such as now."

### **Hughes demonstrates live, HD video transmission over satellite via in-flight black hawk helicopter**



Hughes Network Systems, LLC announced the successful in-flight demonstration of Hughes HeloSAT™ satellite communications (SATCOM) from a Black Hawk helicopter. The HeloSAT solution including a Hughes HM series modem with proprietary through-the-rotor waveform, fuselage-mounted antenna and network management—transmitted consistent, real-time, full-motion video to a live global audience from the Black Hawk as it surveilled the Tennessee landscape on May 21.

"Customers from as far away as Spain, India and the United Arab Emirates watched the Hughes HeloSAT demonstration in Tennessee via livestream – the epitome of Beyond Line of Sight (BLoS) communications," said Wayne Marhefka, senior director, Hughes Defense. "This flight validates the Hughes HeloSAT capability to support missions such as Intelligence, Surveillance and Reconnaissance (ISR), search and rescue, emergency response and airborne command aboard rotary aircraft like the Black Hawk."

"Throughout the 30-minute flight, HeloSAT maintained the live-stream video feed—something I've never experienced before on a rotary wing," said John Wellington, chief flight instructor, XP Services Inc., and former 160th Special Operations Aviation Regiment flight lead, who piloted the Black Hawk for the demonstration. "Maintaining connectivity for the duration of the mission is critical, because when it is time to go, you need to be ready to go."

With the low Size, Weight and Power (SWAP) necessary for in-flight applications, HeloSAT has been tested on more than a dozen different types of rotary-wing aircraft. The wideband SATCOM solution supports mission-critical transmissions ranging from basic voice and data to bandwidth-intensive, high definition camera and electro-optical/infrared (EO/IR) feeds.

### **SES selects two US companies to build four new satellites as part of accelerated C-band clearing plan**

SES, the leader in global content connectivity solutions, announces it has selected two US satellite manufacturers, Northrop Grumman and the Boeing Company, to deliver four new satellites as part of the company's accelerated C-band clearing plan to meet the Federal Communications Commission's objectives to roll-out 5G services.

Northrop Grumman will deliver two flight-proven GeoStar-3 satellites, each equipped with a high-quality C-band payload to deliver the superior customer experience that end users are accustomed to. The two satellites – SES-18 and SES-19 – will be designed, assembled and tested in Dulles, Virginia.

The Boeing Company will deliver a pair of highly efficient all-electric 702SP satellites. The two satellites – SES-20 and SES-21 – will be manufactured and assembled in Los Angeles, California.

These four C-band only new satellites will enable SES to clear 280 MHz of mid-band spectrum for 5G use while seamlessly migrating SES's existing C-band customers. Each satellite will have 10 primary transponders of 36 MHz plus back-up tubes so they can enable the broadcast delivery of digital television to more than 120 million TV homes as well as provide critical data services. The satellites, when launched in Q3 2022, will be positioned at 103 degrees West, 131 degrees West and 135 degrees West orbital slots. The cost of manufacturing these four satellites is part of the USD 1.6 billion investment envelope that SES has announced in May.

SES is committed to investing in America by procuring services and equipment needed for the C-band transition from large and small businesses across the U.S., and these



significant partnerships with Northrop Grumman and the Boeing Company are cornerstones of that commitment.

### **Intelsat procures new satellites for C-band spectrum transition**

Intelsat, operator of the world's largest integrated satellite and terrestrial network, announced that it has contracted for new satellites with US manufacturers, a necessary step to meet the accelerated C-band spectrum clearing timelines established by the Federal Communications Commission (FCC) earlier this year.

Intelsat has entered into two new agreements; one with Maxar Technologies to build and deliver four satellites, and another with Northrop Grumman to build and deliver two satellites. Intelsat is currently in negotiations with manufacturers for a seventh satellite required to support its C-band transition.

Later this week, Intelsat plans to file its full C-band spectrum transition plan with the FCC in accordance with the FCC's revised timeline. The plan will provide additional manufacturing and launch details for new satellites and outline the steps that Intelsat will take to reconfigure its terrestrial-based infrastructure and to ensure a successful transition.

"Quickly clearing 300 megahertz of the U.S. C-band spectrum to make way for 5G wireless applications is a complex task, layered with a significant number of highly interdependent technical activities, including building and launching multiple new satellites designed to operate at the higher portion of the band," said Intelsat Chief Services Officer Mike DeMarco. "Intelsat looks forward to collaborating with our longstanding partners Maxar Technologies and Northrop Grumman on these critical builds, essential to clearing portions of the C-band spectrum and cementing America's leadership in 5G."

## Globalstar launches new ST100 satellite transmitter

Globalstar Europe Satellite Services Ltd, a wholly owned subsidiary of Globalstar Inc. and the leader in satellite messaging and emergency notification technologies, today introduced the ST100, an innovative, embeddable, one-way satellite transmitter ready for rapid product development and manufacturing in the global marketplace. The ST100 is lightweight, low-power consuming and small with embedded antennas, all on one commercial IoT board. The ST100 provides low cost, reliable connectivity powered by the Globalstar Low Earth Orbit (LEO) satellite constellation, and offers satcom integration capability to any original equipment



manufacturer (OEM) product.

The ST100 is the newest addition to the Globalstar commercial IoT embedded solutions product line, joining the STX3 and STINGR satellite transmitters. These embedded technologies are ideal for delivering remote sensing, tracking and monitoring of field applications across industrial and remote operations. With their global connectivity, Globalstar's Embedded Solutions do not require any additional ground infrastructure for data exchange, reducing costs typically associated with traditional connectivity while saving more than half the typical time to production. Because the ST100 operates on the Globalstar Satellite Network, one solution works everywhere without multiple country service contracts or roaming fees.

## SpaceX's historic launch succeeds on its second attempt

A new era of American spaceflight began Saturday as SpaceX's Falcon 9 rocket broke through Earth's upper

atmosphere carrying veteran astronauts Robert Behnken and Douglas Hurley atop a pillar of flame. This marks both the first time that a commercial aerospace company has transported astronauts off-world and the first time since the cancellation of the Space Shuttle program in 2011 that astronauts have lifted off from US soil.

The Falcon 9 rocket lifted off from historic Launch Complex 39A, the same one used during the Apollo moon landing mission in 1969, at just after 3:22 pm ET on Saturday. Wet weather had been a factor leading up to today. NASA had estimated just a 60 percent chance to launch on Monday and got NASA within 17 minutes of launch on Wednesday before forcing the space agency to wave off that attempt. However, the skies above Cape Canaveral have cleared sufficiently to



allow for the Falcon 9's "instantaneous" launch window, which is in place due to the relative alignment of the ISS to the planet.

"Today marks a new era in human spaceflight begins as we once again launched American astronauts on American rockets from American soil on their way to the International Space Station, our national lab orbiting Earth," NASA Administrator Jim Bridenstine said in a press release. "I thank and congratulate Bob Behnken, Doug Hurley, and the SpaceX and NASA teams for this significant achievement for the United States. The launch of this commercial space system designed for humans is a phenomenal demonstration of American excellence and is an important step on our path to expand human exploration to the Moon and Mars."

## SES delivers video services for BBC studios

BBC Studios (BBCS) and its subsidiary UKTV have selected SES to manage the playout and distribution of over 50 linear channels, and their associated video on demand (VOD) services, SES announced today.

SES will provide playout, content processing, distribution, and VOD services, delivering BBCS and UKTV content to a network of affiliates globally and in the UK. These services will be based on SES's European global delivery services with technical playout infrastructure provided from SES's new Stockley Park facility in London and with SES's Munich playout facility overseeing operational management.

BBCS is the commercial production and distribution arm of the BBC, crafting over 2,500 hours of content every year. BBCS is focused on promoting the creative talent of the BBC and the UK internationally and operates a global content distribution and branded services business. UKTV is a wholly owned subsidiary of BBCS. It has been at the forefront of UK branded television for over 25 years and its channels span comedy, entertainment, natural history, factual and drama. The

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broadcaster is a significant investor in British creativity and is committed to working with new and established writers, directors and programme-makers.

SES has been awarded the multi-year contract after responding to a BBCS and UKTV RFP where its service offering aligned with the BBCS and UKTV performance, business and commercial requirements. The new deal also builds on BBCS and UKTV's desire for cloud innovation in the media industry.

"Our UK and global audiences and advertisers expect seamlessly delivered high-quality services, and in the transforming world of broadcast we need flexibility and responsiveness to meet ever changing audience demands. By selecting SES, we believe we have found a partner that is committed to delivering innovation and can meet our business needs going into the future," said Marcus Arthur, President UK, Ireland BBC Studios & CEO UKTV.

## IMSO signs agreement yo access BeiDou



### message service systems

The International Mobile Satellite Organization (IMSO) has the pleasure to announce that it has signed an agreement with the China Transport Telecommunication and Information Group Co. (CTTIC) to perform a technical and operational assessment of the BeiDou Message Service System (BDMSS).

This follows on from the invitation by the seventh session of the International Maritime Organization's (IMO) Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) to IMSO to conduct the assessment, two years after CTTIC submitted the application to the 99th session of the IMO's Maritime Safety Committee (MSC). The assessment process will evaluate the technical and operational capability of BDMSS to provide mobile satellite communication services, in particular, the Global Maritime Distress and Safety System (GMDSS).

After receiving the go ahead from NCSR 7, IMSO hosted introductory meetings with representatives from CTTIC at the IMSO Headquarters, London in January 2020. Here the process was outlined and the discussions of the details of the

assessment began. Taking into account the agreed effective date of the Agreement to be 17 January 2020, the date of the first meeting, while preparing for the signing of this agreement, IMSO has simultaneously started the work on the assessment: selecting the Group of Experts and Observers, outlining the assessment plan and timeline for the accomplishment of the tasks.

IMSO has now selected a Group of Experts for the process who will imminently start to assess BDMSS compliance with the criteria set out in IMO resolution A 1001(25) on Criteria for the provision of the satellite Communication Systems in the Global Maritime Distress and safety System (GMDSS), taking into account the guidance laid down in MSC.1/Circ. 1414. IMSO will then submit a report on this process to the NCSR Sub-Committee for consideration.

## Thuraya users to benefit from Ericsson core network modernization

United Arab Emirates-based mobile satellite services operator Thuraya has signed an agreement with Ericsson for a core network modernization and upgrade to a 4G and 5G ready infrastructure. Ericsson will modernize and optimize Thuraya's network to a virtualized core that supports existing and new features and services in the future. The deal will ensure that Thuraya can continue to offer its users the best possible user experience in the most efficient way.

Ericsson will also migrate the existing Thuraya users to the new platform and oversee its integration with existing systems. The operator's mobile-data users, especially those in remote locations or areas where traffic is dense, will benefit from higher availability and reliability.

As a result, Thuraya can provide consumers more flexible



and easy-to-use communication services integrated with various terminals, which will work seamlessly when they move between different access points.

Adnan Al Muhairi, Deputy Chief Technical Officer of Thuraya stated: "By modernizing Thuraya's core network, we are looking to build its resilience and enhance overall performance. This would also improve other key aspects like guaranteeing more flexible, reliable and effective services. Our strategy is to make optimum use of existing assets and invest in infrastructure upgrades so that the network is ready to accommodate Thuraya's Next Generation System. We have a longstanding partnership with Ericsson and acknowledge them as a leader in deploying new technologies to enable high-quality mobile broadband



solutions.”

### Digital Earth Africa releases analysis-ready satellite data for all of Africa that can support COVID-19 response and recovery

African nations can now access high-resolution satellite images in the Digital Earth Africa (DE Africa) platform that will enable countries to monitor changes that relate to people and the environment due to the impacts of COVID-19 and other critical challenges.

DE Africa has made available vast amounts of data captured by Europe's Sentinel-2 satellites in a format that makes it accessible and suitable for general use. Satellite images captured by Sentinel-2 are particularly important for Africa because they offer ten-metre resolution and are captured every five days, so land and water can be analysed in unprecedented detail.

Satellite imagery can be used to address many challenges



faced by the African continent as it enables countries to actively monitor and manage natural resources and respond to crises, said DE Africa Managing Director, Dr Adam Lewis. “We are pleased to announce the availability of this new data within the DE Africa platform. It is the first analysis-ready data at the continental scale for Africa, meaning it is made available shortly after images are captured and provided in a familiar image file format.”

“Optimising the availability and accessibility of satellite data places Africa in a better position to drive decisions across the continent. It addresses the key problem of making vast amounts of data being captured by satellites available, findable, accessible and suitable, providing an opportunity for a larger range of non-specialist people to use the valuable information,” Dr Lewis said. Managing Director Earth Observation at the South African National Space Agency and Co-chair of the DE Africa Technical Advisory Committee, Ms Andiswa Mlisa, said that not only is this an important milestone for the program but it comes at an important time.

### Liquid Telecom provides VSAT connectivity to new ISP in Malawi

Leading pan-African telecoms group Liquid Telecom has announced that it is providing its multi-award-winning managed VSAT connectivity services to mbora, a pioneering new social enterprise in Malawi.

mbora provides people living and working in rural areas with free connectivity at a community hub. It has also built a super app to help increase digital inclusion by providing access to useful and relevant information and services online including

finance and healthcare. Content and service organisations are able to use the app as a marketplace to reach important food-producing farming and fishing communities in rural Sub-Saharan Africa.

Liquid Telecom is providing mbora with its own VSAT network. Each mbora hub is serviced with broadband speeds of up to 36mbps, which in turn enables mbora and its content partners to digitally deliver their services to mbora users over a free internet connection. Liquid Telecom is using the latest High-Throughput-Satellite of its long-term partner Intelsat and providing an uncapped data service to mbora.

The first community hub is now live in a lake shore village near Mangochi, Malawi, a four-hour drive from the country's capital, Lilongwe. mbora is aiming to build 150 hubs encircling Lake Malawi and to expand across the region. mbora chose Liquid Telecom after evaluating all of its connectivity options from both domestic and pan-African operators.

Adrian Raisbeck, Founder and CEO of mbora, said “Malawi is one of the world's least developed and poorest countries and yet it is blessed with great soils and the third largest body of water on the African continent. Rural communities in Malawi should be living wealthy and resilient livelihoods.

### Advantech Wireless Technologies provides solution for satcom operators migrating from low C-band due to roll out of 5G

Advantech Wireless Technologies Inc. is supplying its Insat C-band 1000W Redundant, GaN-based Solid State System (SSPB) Solution to a Major Network provider in LATAM. The System includes an on-line Taurus SSPA with a dedicated backup amplifier to ensure maximum availability. Packaged for outdoor applications, Taurus optimizes useable output power by eliminating IFL insertion loss, making it the ideal solution for both mobile and fixed Communication terminals.

Specifically designed for high power and high linearity in 6.725-



7.025 GHz, these 1,000W units are perfect for migrating to the upper end of the C-band spectrum for better separation from interfering 5G traffic. The units are designed to support higher modulation and error correcting codes, which will allow more users in less spectrum. That in exchange will generate increased revenue for satellite operators, in parallel with OPEX reduction for users. The tremendous backhaul capacity that 5G will require, will need as high as possible power and linearity, and that is what these units provide.

In today's world, it is crucial to be permanently connected and able to communicate via voice and data on every device. Providing such network coverage in areas where usage can be unpredictable and irregular is an expensive challenge for network operators.

“As an expert in satellite backhaul solutions, at Advantech we are constantly aware of the challenges network operators face and know how critical it is to connect remote communities,” said Cristi Damian, VP Business Development. “In remote areas where traditional terrestrial backhaul networks can be cost-

prohibitive, satellite backhaul is the best option. Our high power solid state power amplifier solutions help network operators achieve their reach by directing resources using cellular backhaul over satellites."

### **Konnnect Africa offers broadband internet connection to all isolation centers in Sokoto State, Nigeria to fight against Covid-19**

Konnnect, a subsidiary of Eutelsat Communications, pursues its ambition to connect the entire African continent to very high speed Internet, and more particularly in this context of the current health crisis. Konnect has recently proposed to offer broadband internet connection to isolation centers to fight against Covid-19 in Sokoto, a north-western state in



Nigeria, where it will enable the real-time connection of centers, leading to an effective coordination of medical services and improved the care offer thanks to telemedicine.

With this offer, Konnect joins the fight of several African governments to combat Covid-19 by allowing access to care for the greatest number of people. Each isolation center will benefit from free broadband connectivity. This deployment is made possible through the partnership with Coollink, a foremost ISP in Nigeria

Commenting on the agreement, Jean-Claude Tshipama, CEO of Konnect Africa, said: "This operation demonstrates our ability to meet as quickly as possible the connectivity needs of institutional and commercial structures, even in complex times like these. We want Sokoto State to benefit from our expertise and the quality of our broadband services by providing FREE connectivity to all isolation centers."

Shahin Nouri, CEO of Coollink, added: "Helping the Sokoto State Government to provide free satellite internet services to isolation centers is very important to us. It shows our engagement to deliver high-speed Internet anywhere in Nigeria and to help communities in crisis. Eutelsat Konnect has been a very important partner for us, and with such initiatives, is showing its commitment to the Nigerian market.

### **Access to reliable IoT connectivity would transform mining sector**

Organisations across the mining industry are struggling to take full advantage of Internet of Things (IoT)-enabled applications due to a lack of reliable connectivity, with only 15% of mining organisations consistently having access to reliable connectivity for their IoT-enabled projects.

These latest results have emerged from the 2020 edition of Inmarsat's research programme into IoT trends, The Rise of IoT in Mining. The report found that 45% of respondents



struggled to access connectivity across mine sites so that it hinders their ability to gather data. A further 40% indicated they could access connectivity but that it was often unreliable causing them to struggle to collect data. Just 15% reported they could access reliable connectivity wherever their data producers were.

Although the mining sector has increased its adoption of IoT in recent years with 65% of respondents fully deploying a project, 33% have still only trialled or are currently trialling a project and 2% have not trialled or deployed at all, proving that connectivity is impeding miners' abilities to harness the benefits of IoT.

Commenting on the findings, Joe Carr, Director of Mining, Inmarsat, said: "Inmarsat's highly reliable L-band BGAN connectivity is helping organisations across all stages of their IoT journey to get the reliable connectivity needed, to ensure they can generate, analyse and action the necessary data and improve the way they operate.

"Although our research has indicated that the global mining sector is undergoing an upswing in IoT adoption, reliable network connectivity is still clearly a sticking point that Inmarsat can help alleviate. To gain value from IoT-enabled projects, the right data must be where it needs to be at the right time, otherwise insights and return on investment cannot be delivered.

"The research points to a clear correlation between connectivity and those respondents who have fully deployed IoT projects. From our work in the industry, we see that poor connectivity can hamper getting a project fully deployed from a proof of concept into mainstream business operations. However, we also see from the research that for many who have fully deployed IoT projects connectivity continues to be a challenge. Inmarsat's connectivity and capability can help the sector transform quickly through the use of IoT."

## Microsoft equip South Africans with digital skills needed for economic recovery

Microsoft South Africa is announcing details of the local programme aligned to the recently launched Global Skills Initiative, aimed at bringing more digital skills to 25 million people worldwide by the end of the year. The initiative is a response to the economic crisis caused by the COVID-19 pandemic. Unemployment is an ongoing challenge in South Africa, with statistics showing that it increased to 3-.1% in the first quarter of the year, and economists warning that it is likely to continue rising because of the impact of the pandemic.



“Expanded access to digital skills is an important step in accelerating economic recovery, especially for the people hardest hit by job losses. There was already a shift to digital technologies and increasing demand for people with digital skills even before the pandemic struck, but it has accelerated the need for these types of skills,” says Siya Madyibi, Legal and Corporate Affairs Director at Microsoft South Africa.

This is a comprehensive technology initiative that will build on data and digital technology. It starts with data on jobs and skills from the LinkedIn Economic Graph. It provides free access to content in LinkedIn Learning, Microsoft Learn and the GitHub Learning Lab, and couples those with Microsoft Certifications and LinkedIn job seeking tools. All of these resources are available at a central location, [opportunity.linkedin.com](https://opportunity.linkedin.com).

While these resources are broadly available online to South Africans, vulnerable job seekers from poorer and more remote areas will need additional support on their journey. This is why Microsoft is backing the effort by partnering with strategic long-term partner non-profits like AfrikaTakkun to drive the programme and assist the people who need it most.

## Rwanda aiming for full school connectivity by 2024

The government of Rwanda plans to invest RWF4.8 billion (US\$5 million) to connect every secondary school in the country to the internet by the end of 2024. A report from AgenceEcofin says that around 52% of schools currently have internet connections, with authorities aiming to raise this figure to 62% by the end of this year. Out of 1,459 public secondary schools, 724 are already connected to the internet, 678 of which are connected via 4G.

## UAE launches Hope probe in Arab world's first mission to Mars

Last July, the United Arab Emirates launched its first mission to

Mars, the Arab world's first. The Hope Probe blasted off from Japan's Tanegashima Space Center for a seven-month journey to the red planet, where it will orbit and send back data about the atmosphere. The mission was initially due to launch on July 14, but was delayed by bad weather. Just over an hour after launch, the probe deployed solar panels to power its systems and established radio communication with the mission on earth. There are currently eight active missions exploring Mars; some orbit the planet and some have landed on its surface. China and the United States each plan to send another this year. The Emirates Mars Mission has cost \$200m, according to Minister for Advanced Sciences Sarah Amiri. It aims to provide a complete picture of the planet's atmosphere for the first time, studying daily and seasonal changes. The mission also carries great symbolism as the first interplanetary voyage undertaken by an Arab country. The legacy of the Islamic Golden Age—which began in the eighth century and saw Arab and Muslim scientists make great strides in fields such as mathematics, astronomy, medicine, and philosophy—still holds great emotional power in a part of the world now beset by unemployment, extremism, displacement, civil wars, and poverty.

## Comtech receives US\$1.3 million in orders to support cellular LTE backhaul in the Middle East

Comtech Telecommunications Corp. (NASDAQ: CMTL) announced that during its fourth quarter of fiscal 2020, its Tempe, Arizona-based subsidiary, Comtech EF Data Corp., which is part of Comtech's Commercial Solutions segment,



received \$1.3 million in orders for advanced satellite modems, WAN optimization and redundancy switches. The equipment will be utilized to support cellular LTE backhaul for a service provider in the Middle East.

“As COVID-19 is affecting the way we work, live and play, providing high quality, high-speed broadband everywhere is essential and Comtech EF Data solutions are well equipped to meet the challenge.”

“I am pleased that Comtech was selected to provide our award-winning, turnkey high-speed trunking solutions to a customer in the Middle East,” said Fred Kornberg, Chairman

of the Board and Chief Executive Officer of Comtech Telecommunications Corp. "As COVID-19 is affecting the way we work, live and play, providing high quality, high-speed broadband everywhere is essential and Comtech EF Data solutions are well equipped to meet the challenge."

The CDM-760 Advanced High-Speed Trunking and Broadcast Modem is the most widely deployed high-speed trunking modem in the industry, and supports GEO, MEO and LEO operation at up to 1.4 Gbps per second. The service provider will utilize the CDM-760 and the FX WAN optimizers to support its LTE traffic. This integrated and unique solution automatically adapts in real-time to changing end user demands on the ground and to link conditions over the satellite.

### **Eutelsat and Intelsat sign multi-year, strategic agreement to secure the 48°East orbital position for Eutelsat Quantum**

Eutelsat Communications and Intelsat S.A. have signed a long-term partnership agreement securing the 48°East orbital position. EUTELSAT QUANTUM will be located at the position, where the operators both have orbital rights. Expected to be launched by the end of 2020, EUTELSAT QUANTUM is a full expansion satellite providing premium capacity with unprecedented flexibility features. Its groundbreaking software-based design enables users to actively define and shape performance and reach to meet their specific requirements. The 48°East position, with its extensive coverage, notably of the MENA region, is ideally placed to address, amongst others, the unique needs of government users.

Under the agreement, the capacity on EUTELSAT QUANTUM will be distributed by Eutelsat and its subsidiary, Eutelsat Americas Corp. and Intelsat and its subsidiary, Intelsat General Communications LLC (IGC), thereby maximizing the commercial potential of the satellite and creating conditions for the fastest possible ramp-up of the satellite.

Each partner will benefit from the commercial reach of the other, notably in the government vertical, where IGC plans to offer the EUTELSAT QUANTUM satellite payload with



additional security enhancements including secure and protected payload management, customized power allocation and on-demand beam forming. The resulting collaboration will enable the EUTELSAT QUANTUM payload to meet the U.S. government's most demanding Information Assurance (IA) and Cybersecurity requirements. Commenting on the agreement, David Bair CEO and President of Eutelsat America Corp said: "We are delighted to partner with Intelsat to optimize the commercial potential of the assets represented by the 48°East position and the

innovative features of EUTELSAT QUANTUM. This groundbreaking satellite has already attracted significant interest from potential Government customers, and we are also excited to team with industry leading systems integrators to provide this unique capability as part of a high value solution".

### **Télécoms Sans Frontières celebrates 20 years of partnership with Inmarsat**

Télécoms Sans Frontières and Inmarsat, the world leader in global, mobile satellite communications today celebrate 20 years of partnership providing essential first response communications in disaster relief worldwide.

Télécoms Sans Frontières (TSF) is the world's first non-governmental organisation (NGO) focusing on emergency-response technologies. During humanitarian crises TSF provides people touched by tragedy the possibility to contact their loved ones and begin to regain control of their lives. TSF also builds rapid-response communications centres for local and international responders.

Since its creation, TSF has responded to over 140 crises in more than 70 countries, providing communication means to over 20 million people and nearly 1,000 NGOs. Whether



storms, earthquakes, floods or massive population displacements, TSF is often first on the scene, enabling coordination of relief efforts and restoring contact to victims of disasters worldwide.

Jean-François Cazenave, President of TSF, says: "Back in 2000 the partnership with Inmarsat allowed us to turn what was at that time a group of passionate humanitarian professionals into a fully-fledged NGO. We are particularly proud of celebrating this 20th anniversary, because the partnership with Inmarsat is a shining example of what partnerships mean for TSF. It's of course about financial support, and providing us the means to assist the most vulnerable, but it goes far beyond this. All of this is grounded in solid human relationships with people who understood from the very first moment our vision and our values and who are always willing to go the extra mile to support them. It is rooted in a shared commitment to use technologies to give a voice to those silenced by any kind of humanitarian crisis."

### **Azercosmos signed an agreement with Prime African Media Systems**

Azercosmos signed a cooperation agreement with Canada's Prime African Media Systems company. Prime African Media Systems operates in the field of telecommunications, providing satellite solutions and teleport services.

According to the agreement, Prime African Media Systems will broadcast ATN TV in the West African region using the capacity of Azerspace-2 satellite. "Thanks to the infrastructure capabilities of Prime African Media Systems, we will provide innovative satellite solutions to difficult

geographical locations in the African region," said Mark Guthrie, Chief Commercial Officer at Azercosmos.

"This is a great opportunity for us to project and present the African stories from the African perspective. The options are limitless for us to educate, elevate and empower African generations through this satellite solution from Azercosmos" said Victory Khan, Technical Director at Prime African Media Systems.

### **CANAL+ to launch first premium DTH Platform over Ethiopia, Broadcast from EUTELSAT 7C**

Eutelsat Communications and CANAL+ have signed a multi-year, multi-transponder contract for Ku capacity on EUTELSAT 7C to support the launch by CANAL+ of a premium DTH platform in Ethiopia at the beginning of 2021. Leveraging Eutelsat 7C's incremental capacity dedicated to Ethiopia, CANAL+ will launch a comprehensive broadcast offer encompassing a DTH pay-TV offer of some 50 premium channels in a mix of standard and high definition, enriched by



the addition of a selection of Ethiopian Free-to-air content. EUTELSAT 7C is a high-power broadcast satellite which entered into service in January 2020 and is co-positioned with EUTELSAT 7B at the 7° East position to form a two-satellite constellation with unparalleled flexibility and connectivity. Eutelsat is already the leading carrier of Ethiopian channels through its 7/8° West video neighborhood.

Commenting on the deal, Rodolphe Belmer, CEO of Eutelsat Communications said: "We are honored to accompany our long-standing partner CANAL+ as it extends its services to the Ethiopian broadcast market which Eutelsat already knows well. This agreement highlights the appetite for high quality and varied programming in this dynamic country as well as throughout the broader African continent, which is fastest growing satellite broadcast market. It also confirms the relevance of our investments in selected incremental resources to tap growth pockets in emergent video markets."

### **Speedcast executes new bandwidth agreement with Intelsat**

Speedcast International Limited announced that it has signed a new contract with Intelsat S.A., operator of the world's largest integrated satellite and terrestrial network.

Under the new multi-year contract, Speedcast will leverage the unparalleled reach and reliability of Intelsat's global connectivity infrastructure and innovative service offerings to support Speedcast's customer operations across the energy, maritime, cruise, mining, enterprise, media, humanitarian, and government sectors. Intelsat's advanced global fleet includes more than 50 satellites that operate seamlessly with the IntelsatOne ground network, offering the world's most extensive, flexible, reliable, and secure communications

network.

"This new agreement will offer us the flexibility and global scale we need to best support our customers," said Peter Shaper, Chief Executive Officer at Speedcast. "As we navigate the near-term headwinds stemming from the global COVID-19 pandemic and work toward finalizing our recapitalization process, it is critical that we find opportunities to reassess our overall bandwidth purchasing to better support our network, while also allowing us to help our customers through these unprecedented times. We look forward to expanding our use of the Intelsat network, and further transforming our business."

This agreement marks a significant milestone for Speedcast as the company looks towards emergence from its chapter 11 proceeding and seeks to cement renewed relationships with key suppliers. It will provide increased capacity to assist customers with critical short-term requirements as the industry continues to adapt to the current environment. The agreement was approved by the U.S. courts overseeing the financial restructuring cases for both Speedcast and Intelsat.

### **Eutelsat Communications releases full year 2019-20 results**

The Board of Directors of Eutelsat Communications, chaired by Dominique D'Hinnin, reviewed the financial results for the year ended 30 June 2020. Rodolphe Belmer, Chief Executive Officer of Eutelsat Communications, said: "Eutelsat has produced a robust set of results for Financial Year 2019-20 in the face of the Covid-19 headwinds, with a record level of Discretionary Free Cash Flow and an EBITDA margin that remains industry leading. Our core Broadcast business remains resilient, as demonstrated by the securing of a number of new contracts in Sub-Saharan



Africa, notably with Canal+ Ethiopia.

We have also made significant headway in our Fixed Broadband strategy ahead of entry into service of EUTELSAT KONNECT. In Europe, a major wholesale agreement has been signed with Orange for the entire French capacity of EUTELSAT KONNECT and we are adding a retail pillar to our distribution strategy with the acquisition of the European satellite broadband activities of Bigblu Broadband, the leading distributor of satellite Broadband in Europe. In Africa the Schoolap project in DRC highlights the opportunities in the business-to-government vertical.

As a result, the coming year is expected to mark a turning point for our Fixed Broadband vertical, with the ramp-up of EUTELSAT KONNECT, to be followed in subsequent years by further incremental Connectivity capacity, namely KONNECT VHTS and EUTELSAT 10B, adding traction to our return to growth strategy.

### Telesat reports results for the quarter and six months ended June 30, 2020

Telesat has announced its financial results for the three and six-month periods ended June 30, 2020. All amounts are in Canadian dollars and reported under International Financial Reporting Standards (“IFRS”) unless otherwise noted. For the quarter ended June 30, 2020, Telesat reported consolidated revenue of \$208 million, a decrease of 10% (\$23 million) compared to the same period in 2019. When adjusted for changes in foreign exchange rates, revenue declined 11% (\$25 million) compared to 2019. Revenue decreases were primarily due to a reduction of service for one of Telesat's North American DTH customers and lower revenue due to the completion of the term for prepaid services in a customer agreement that was accounted for as having a significant financing component. In addition, revenue associated with short-term services provided to another satellite operator in the second quarter of 2019 did not recur in 2020.

Operating expenses for the quarter were \$46 million, an increase of \$8 million from 2019. When adjusted for changes in foreign exchange rates, operating expenses increased by \$7 million from 2019. Approximately 50% of the increase in operating expenses was the result of a provision for bad debt primarily related to customers in the mobility sector whose business is under pressure from COVID-19. Other increased expenses include compensation associated with the Low Earth Orbit (“LEO”) program, professional fees, and in-orbit insurance.

covering Ethiopia as well as Ethiopian diaspora in zones within the satellite’s footprint, notably the Middle East.

Part of the Ethiopian-owned Strong Roots Group, Strong Roots Ethiopia Broadcasting Services PLC is an upcoming player in the Ethiopian broadcast market. Its new DTH Platform will distribute high quality content on news, entertainment, education, kids, documentary, ”.



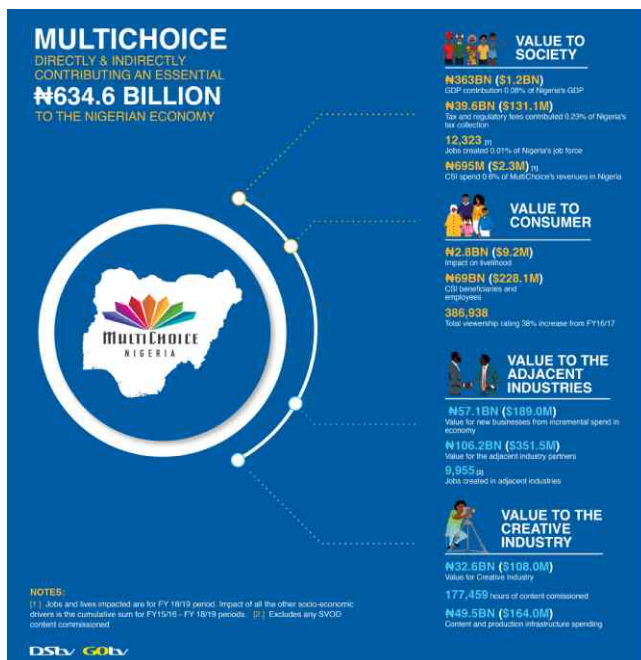
### Honeywell launches world's smallest satellite communications technology for UAV

Honeywell has launched its smallest, lightest satellite communications system yet, specifically designed for unmanned aerial vehicles. Weighing in at only one kilogram (2.2 pounds), the new system is 90% lighter than Honeywell's smallest connectivity system and will bring some of the same connectivity capabilities enjoyed by larger aircraft to smaller unmanned vehicles in the air or on land.

Satellite communications, or SATCOM, is a broad category of critical technologies that helps connect aircraft to each other and to operators or air traffic control on the ground. Also within this category are technologies that make in-flight Wi-Fi or fleet tracking possible.

"Transportation as we know it is changing rapidly, and the need for connectivity is only becoming more important. As platforms evolve and new vehicles start operating both on land and in the air, it's critical that satellite communications technology evolves alongside them," said Amanda King, vice president and general manager, Aerospace Connected Secure Solutions, Honeywell Connected Enterprise. "Honeywell's small UAV SATCOM system is a game-changer for these smaller unmanned aircraft that previously couldn't be equipped with satellite communications. Now, they've got access to everything we've come to expect from the large-aircraft experience — just in a smaller package."

The Honeywell Small UAV SATCOM system, powered by Inmarsat's global satellite communications network, provides unmanned aerial vehicles with global connectivity and real-time video streaming. Seamless connectivity, delivered through Inmarsat's comprehensive satellite network, is essential for safe and efficient air traffic management that enables beyond-visual-line-of-sight (BVLOS) capabilities. BVLOS allows unmanned aircraft to be operated remotely at scale, beyond the pilot's field of view. This technology can be used for a variety of applications, including unmanned aerial vehicle inspections, where it is estimated to double or triple daily inspection capacity.



Adjusted EBITDA was \$164 million, a decrease of 17% (\$33 million) or, when adjusted for foreign exchange rates, a decrease of \$34 million. The Adjusted EBITDA margin for the second quarter of 2020 was 79.1%, compared to 85.2% in 2019.

### Eutelsat 8 West B selected by Strong Roots for new DTH platform in Ethiopia and the Middle East

Eutelsat Communications and Strong Roots Ethiopia Broadcasting Service PLC have concluded a Master Service Agreement for a Ku capacity on a 36 MHz transponder on Eutelsat's EUTELSAT 8 West B satellite. The capacity will enable Strong Roots to launch a new free to air DTH platform

entertainment (IFE) and connectivity systems to enhance the passenger experience onboard its Airbus A220 aircraft. The airline has equipped two of its A220s with Panasonic's eX1 IFE solution which is specifically designed for narrowbody aircraft. Each seat will feature elegant full HD seatback monitors, complete with touch displays and handsets, and an intuitive, personalized interface. Passengers will have access to USB and laptop charging power points at every seat.

Air Tanzania's A220s will also be fitted with Panasonic's inflight Wi-Fi service. Panasonic's next generation connectivity enables fast internet to video streaming, all powered by its new satellite modem featuring bandwidth up to twenty times greater than previously available.

The announcement marks the extension of Panasonic's relationship with Air Tanzania following the airline's selection



of its inflight entertainment and connectivity solutions for two of its Boeing 787 aircraft and two Airbus A220s in 2018. "By selecting Panasonic's inflight entertainment and connectivity systems, Air Tanzania can deliver personalized, immersive entertainment to every passenger, no matter where in the cabin they are seated," said Ken Sain, Chief Executive Officer of Panasonic Avionics Corporation. "These inflight experiences will help Air Tanzania encourage brand loyalty, keeping their valued customers coming back time and time again."

The flag carrier of Tanzania was the first African airline to take delivery of the A220 in November 2018 and January 2019. It operates a fleet consisting of the Dash 8-Q400, Airbus A220 and Boeing 787-8 Dreamliner.

"Operating our new A220 equipped with Panasonic's IFE and Wi-Fi service brings together the right culture, values, and expertise to fulfil our goal of satisfying our customers—which is part of our vision," said Eng. Ladislaus Matindi, CEO & Managing Director of Air Tanzania.

### **Euroconsult: Pandemic won't stop smallsat market takeoff**

In its 6th edition of its latest research titled "Prospects for the Small Satellite Market," Euroconsult forecasts that two mega-constellations will account for half of the smallsats to be launched between 2020 and 2029, yet only account for

one fifth of the total smallsat market value due to economies of scale, mass manufacturing and batch launches. The report also addresses the impact of COVID-19 on the small satellite industry and provides updated analysis of the ongoing uncertainties related to the pandemic, smallsat constellations and the OneWeb bankruptcy, despite its recent acquisition.

The 2020s are predicted to be the decade of small satellites with an annual average of 1,000 smallsats to be launched. By comparison, 2019 had the highest number of smallsats to date, with 385 smallsats launched. These spacecraft generated \$2.8 billion of market value in 2019, of which 70 percent for manufacturing and 30 percent for launch. From 2020 to 2029, the smallsat market value is projected to reach \$51 billion, of which \$33 billion for manufacturing and \$18 billion for launch. This is more than four times the market size of the previous decade.

### **Infinet Wireless strengthens West African presence with new Cameroon HQ and localised training programmes**

Infinet Wireless, the global leader in fixed broadband wireless connectivity, has opened a new regional office in Cameroon as the company expands its operations in one of the world's fastest growing economic regions.

This new presence will be initially managed by Ludovic Thierry Takam, a Yaounde native and Technical Engineer, who has been with Infinet Wireless since 2013. Thierry will oversee the establishment of a new platform to enable mutually beneficial exchanges of technology expertise between the Infinet Wireless management teams and their African counterparts. This will include setting up technological programs and qualifications in several universities as part of the Infinet Wireless Academy.

This presence will also be used to deliver Infinet Wireless' latest technological breakthroughs, supporting its customer base with all their current and future wireless projects involving the company's solutions. Specific focus will be given to verticals such as new infrastructures for service providers of all types, homeland security, mobile connectivity, energy and mining applications, as well as solutions for smart cities.



"Infinet Wireless' cost effective and market leading solutions can make a significant contribution to the economic development of the sub-Saharan region. Our presence much closer to the end users represents a win-win partnership for all stakeholders in the region, allowing us to react much quicker to market demands but also to make available our

technological know-how and innovative solutions in the delivery of wireless infrastructures. Africa is a rapidly developing continent, both economically and technologically, and we are committed and excited to be a part of a history in the making," said Kamal Mokrani, Infinet's Global Vice President.

Takam will also assist the company's African partners more closely by supporting their design and deployment efforts often needed for large-scale projects. This was initially discussed at a forum held in the city of Sochi, Russia, in October 2019, as part of the first Russia-Africa Economic Forum and Summit, during which the company's credentials were shared with many high level African decision makers.



### COVID-19: Satellites tracking vehicle movements

The South African National Space Agency, SANSA has been utilising remote sensing satellite imagery to assess vehicle presence on the roads and at shopping centres. During lockdown, human mobility is expected to be minimised and the correlation of human mobility was measured against vehicle presence on the roads and shopping centres.

During this period, human mobility was not hindered in any form, therefore high visibility of vehicles was observed on the roads and at Kenilworth shopping centre parking lot and surrounding areas. This translated into high human mobility within this area of Kenilworth, Cape Town, Western Cape.

President Cyril Ramaphosa declared South Africa a state of national disaster on 15 March 2020. After the declaration, human mobility remained high as indicated by the presence of vehicles on the road as per images below.

Upon the declaration on the 23 March 2020 of the Level 5 national lockdown to take effect on the 26 March 2020 at 2h59. High volumes of vehicles continued to be visible on the roads, with much higher volumes visible from 25-26 March 2020.

On the 27 March, first day of the level 5 national lockdown, huge reduction in the visibility of vehicles on the road is observed from the satellite imagery below. This indicates that citizens in this area heeded to the call for national lockdown with the exception of the few essential workers.

During the month of April 2020, extremely low to no vehicle

presence is observed. Most of the vehicles are observed in the same location on multiple satellite imagery leading us to conclude that these were parked and not moving during the month of April 2020.

At the beginning of May 2020, an announcement was made for some of the lockdown restrictions to be relaxed and the country adopted level 4 state of lockdown. During this period, inter-province movements were allowed from 1-7 May 2020. During this period, an increase in vehicle presence is observed on the road in the area. Upon the expiry of the inter-provincial movement allowance, the Level 4 lockdown continued, however there seem to not be any change in the presence of vehicles in the area (08-26 May 2020).

### SES launches free-to-air satellite channel to fight spread of COVID-19

Millions of households across Africa, Europe, and Asia-Pacific will be able to access a free-to-air TV channel via SES satellites dedicated to delivering reliable, informative content about COVID-19. The channel – Fight COVID-19 – broadcasts content that is aimed at providing underserved and rural communities with critical information about how to limit the spread of the virus.

The content is provided by trusted organisations such as UNICEF and AFP as well as global EdTech social enterprise Potential.com. The content aims to impartially inform TV viewers about identifying COVID-19 symptoms, the recovery process, and how to manage the effects of a global pandemic and social distancing, such as managing a household, children or mental health. SES welcomes additional content



providers from international and regional organisations to contribute to the COVID-19 channel.

The channel is broadcast free-to-air from SES's satellite fleet and is available in ASTRA 4A at 5 degrees East for Sub-Saharan Africa and Ukraine, ASTRA 2F at 28.2 degrees East for West Africa, NSS-12 at 57 degrees East for Ethiopia and adjacent countries and SES-9 at 108.2 degrees East for the Philippines

"Our lives have been disrupted by COVID-19 in the last few months, and unfortunately, it doesn't seem to be going away anytime soon. Through the global reach of satellite, we are in a position to contribute our resources wisely to help provide important information to vulnerable communities," said Steve Collar, CEO of SES. "We have been really fortunate to be able to collaborate with UNICEF, AFP and Potential.com who are willing to contribute their content for this good cause. Together, we hope to reach a wide group of audiences with reliable and trustworthy content and do our part in helping slow the spread of COVID-19."



## Africa Mobile Networks passes milestone of 1 billion phone calls per year

Africa Mobile Networks, AMN has announced that it now processes more than 1 billion phone calls annually for subscribers in previously unconnected rural areas in Sub-Saharan Africa.

In June 2020, AMN processed 91,623,222 voice calls, representing an annualised rate of 1.1 billion calls per annum,



plus also nearly 6 terabytes (6,000 GB) of data. These services are provided to rural users in Sub-Saharan Africa who previously were mostly unconnected before AMN's investment in the mobile network infrastructure. AMN now owns and operates approximately 1,200 base stations serving a population of 4 million people in 8 countries: Nigeria, DRC, Cameroon, Guinea, Zambia, Bissau, Liberia and Congo. The 2G/3G/4G mobile network services are provided by AMN on behalf of tier-1 licensed mobile network operators in each country.

AMN is installing new base stations at a rate of about 200 per month and by the end of 2020 will have nearly 2,000 base stations. AMN ultimately aims to deliver mobile network services to over 60 million people in up to 30 countries with more than 20,000 base stations. AMN's solutions are 100% ubiquitous, without restrictions due to power or backhaul connectivity, and can be deployed at any location throughout the continent with no exceptions.

## SES delivers video services for BBC studios

BBC Studios (BBCS) and its subsidiary UKTV have selected SES to manage the playout and distribution of over 50 linear channels, and their associated video on demand (VOD) services, according to SES.

SES will provide playout, content processing, distribution, and VOD services, delivering BBCS and UKTV content to a network of affiliates globally and in the UK. These services will be based on SES's European global delivery services with technical playout infrastructure provided from SES's new Stockley Park facility in London and with SES's Munich playout facility overseeing operational management.

BBCS is the commercial production and distribution arm of the BBC, crafting over 2,500 hours of content every year. BBCS is focused on promoting the creative talent of the BBC and the UK internationally and operates a global content distribution and branded services business. UKTV is a wholly owned subsidiary of BBCS. It has been at the forefront of UK branded television for over 25 years and its channels span comedy, entertainment, natural history, factual and drama. The

broadcaster is a significant investor in British creativity and is committed to working with new and established writers, directors and programme-makers.

SES has been awarded the multi-year contract after responding to a BBCS and UKTV RFP where its service offering aligned with the BBCS and UKTV performance, business and commercial requirements. The new deal also builds on BBCS and UKTV's desire for cloud innovation in the media industry.

## Yahsat names Andrew Cole as new Chief Financial Officer

Al Yah Satellite Communications Company, Yahsat, the leading UAE-based global satellite operator, announced that its Board of Directors has appointed Andrew Cole as Chief Financial Officer (CFO).

Andrew joins Yahsat soon after the company boosted its leadership with four Emirati executive appointments to lead its government, commercial, operational and technical business units.

Andrew has 25 years of cross-sector experience in senior finance, operational and advisory roles. From 2015 to 2019, he was the Group Financial Controller at SES, a company with a constellation of Geostationary and Medium Earth Orbit Satellites. His primary functions covered all aspects of Finance including Financial Planning, Governance, Risk (including satellite insurance) and Compliance, Accounting and Global Controlling operations. He has also worked for EY and KPMG



London as an external auditor and business advisor to many global enterprises. His experience during his years in an external advisory role includes M&A and Financing, Corporate Restructuring, Commercial Planning, Tax, Treasury, Audit & Accounting as well as Risk Management.

Andrew is a Fellow of the Institute of Chartered Accountants in England and Wales (ICAEW). He has an Executive MBA degree from Ecole Nationale des Ponts et Chaussées and a Post Graduate certificate in International Business from the University of Edinburgh.

He succeeds the current CFO, Balakrishnan Doraisamy, who will be retiring, having served Yahsat for almost 12 years. Balakrishnan will continue to be part of the company as Strategic Advisor.

## IEC Telecom enables VSAT-like connectivity for small vessels

As the pandemic brought the world to a standstill, it quickly became apparent that digitalised and VSAT-enabled vessels had a distinct advantage in ensuring business continuity and supporting crew welfare. The maritime sector has been impacted by travel restrictions, port closures, and mandatory quarantine periods. With crew changeovers at a standstill and contracts extended for months, the demand for products that offer secure data over robust communication systems has

increased tremendously.

While large vessels are equipped with multiple channels of communication, including circuit-switch terminals and VoIP applications powered by VSAT, smaller vessels such as those used in the oil and gas sector and fishing industry are hardly reachable.

IEC Telecom, a recognised international provider of satcom products and services, challenges those limitations with its state-of-the-art Orion Edge solution. Powered by Thuraya's Orion IP MSS terminal and equipped with IEC Telecom's OneGate Compact network management system, Orion Edge offers high bandwidth for corporate and crew welfare needs.

With Orion Edge, IEC Telecom can provide small boats with the connectivity they need to compete in today's world, including features previously reserved only for large vessels such as videoconferencing and remote maintenance.

In addition, Orion Edge provides crew with a dedicated network supporting web browsing, social media, VoIP calls and email software — all accessible via individual crew vouchers — while the digital dashboard gives the captain



and vessel operator the opportunity to keep tabs on usage.

### WTA renews Tier 4 certification of Eutelsat's Rambouillet Teleport

World Teleport Association (WTA) has renewed the Tier 4 certification of Eutelsat Communications' Rambouillet Teleport in France under WTA's Teleport Certification Program, following an audit of the facility by the association. WTA's Teleport Certification Program serves both teleport operators and their customers by creating an objective, transparent, and internationally accepted method for teleport operators to document the quality of their operations for customers and strategic partners. It also provides a means for customers to select teleport vendors delivering the price-performance level that is appropriate for their applications. Full Certification is issued at a Tier number from 1 through 4, of which 4 represents the highest degree of excellence, and remains in effect for 3 years.

José Sanchez, Eutelsat's Director of Service Operations said: "We are delighted at the renewal of Tier-4 WTA certification. We were the first ever satellite operator to obtain it in 2016 and the first ever teleport to certify Tier-4. To consistently achieve this highest level of certification testifies to the commitment of our teams to providing the highest quality of service to our customers, as well as the remarkable performance of our facilities at the Paris-Rambouillet teleport in terms of infrastructure, security, organization and operational procedures. The WTA certification program launched in 2015 has become the most important instrument of the Association to raise the standards of the industry. By renewing our certification we exemplify our commitment to excellence."

### Middle East Airlines Selects Panasonic

### Avionics for inflight entertainment and connectivity

Panasonic Avionics has been selected by Middle East Airlines-Air Liban (MEA) to provide inflight entertainment and connectivity (IFEC) solutions for 15 of its Airbus A321 family aircraft. Upon delivery from July 2020 onwards, 9 A321neos will become the first connected aircraft to join MEA's fleet. They will be linefitted with Panasonic's eX1 seatback IFE solution, designed specifically for narrow body aircraft.

eX1 offers elegant full HD seatback monitors, complete with touch displays and handsets, and an intuitive, personalized interface. Passengers will have access to USB and laptop



charging power points at every seat as well. MEA's A321neos will also be fitted with Panasonic's inflight Wi-Fi service, with a host of next generation connectivity benefits from fast internet to video streaming, all powered by its new satellite modem which offers bandwidth up to twenty times greater than previously available. Panasonic's high-performance connectivity is a powerful way for airlines to build brand loyalty by delivering new and personalized content to passengers inflight.

### Ofek 16 satellite declares full operational capabilities

The Israel Ministry of Defense and Israel Aerospace Industries Have Received the First Images from the Ofek 16 Satellite. One week following the successful launch of the Ofek 16 satellite into space, the engineering teams of the Space Administration in the Directorate of Defense Research and Development (DDR&D), of the Israel Ministry of Defense (IMoD), and Israel Aerospace Industries (IAI), have operated the satellite's observation camera for the first time. The high-quality images were received over night, at an IAI control station in the city of Yehud (central Israel).

Since the launch, IAI and IMoD teams have conducted a series of pre-planned tests during which all of the satellite's systems and subsystems were activated in a gradual and controlled manner. Upon completion of the process, the satellite's camera was also activated successfully. In the coming weeks, engineering teams will complete the rigorous tests, and prepare the satellite for operational use.

Head of the Space and Satellite Administration in the Israel

Ministry of Defense, Amnon Harari: "This is the most significant milestone since the launch of the Ofek 16 satellite. The images we received from the satellite are of excellent quality. We will continue the orderly process of transferring the satellite to operational use, anticipating that over the years, the system will provide great intelligence to the defense establishment."

IAI EVP and General Manager of the Systems, Missiles and Space Group, Boaz Levy: "This is a landmark achievement – the result of a complex technological and operational process that reflects IAI's capabilities in the field of space, and also highlights our partnership with other defense industries. Under the leadership of the Ministry of Defense, IAI will



continue to advance Israel's space program towards further operational achievements."

The Ofek 16 satellite is an electro-optical observation satellite with advanced capabilities. It is equipped with a high-quality camera developed and manufactured by Elbit Systems. In the coming weeks, following the completion of the 'in orbit testing' process conducted by the DDR&D, IAI and the IDF, the Ministry of Defense will transfer responsibilities to Unit 9900 of the IDF's Intelligence Cops, after which the satellite will be declared operational.

## World Bank grants Niger US\$100 million for digital push

Niger is set to receive funding of US\$100 million from the World Bank in order to push digital transformation initiatives. As reported by Ecofinagency.com, the World Bank's International Development Association (IDA) has approved a loan and a grant – each worth US\$50 million – to help Niger improve access to vital social services in the country's poorest regions, as well as augmenting infrastructure nationwide. CommsUpdate notes that part of the funding will be used for Niger's Smart Villages project, which seeks to boost rural broadband and mobile connectivity. In turn, this will increase access to mobile financial services in the most remote areas of Niger.

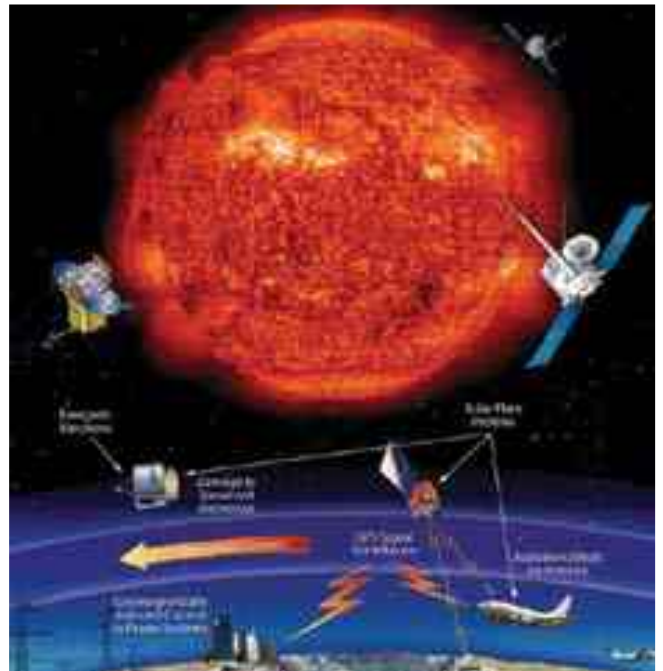
Tim Kelly, Senior Digital Development Specialist at the World Bank, stated: "The [COVID-19] pandemic has revealed the urgency of accelerating the digital transformation to enable countries like Niger to keep the private sector active and save lives and jobs. By ensuring that all citizens have access to quality and affordable internet connection, that online public services are easily accessible, and that the digital economy drives growth, innovation, and job creation, this new project will help Niger harness its potential for digital development."

## ESRI and Planet expand imagery accessibility for users

Esri announced plans to broaden the company's partnership with Planet, a global leader in satellite imagery and insights that pilots the world's largest active fleet of Earth-imaging satellites. This next phase of the partnership will expand availability of Planet's groundbreaking imagery to Esri users, giving them the ability to buy the company's imagery directly from Esri, simplifying workflows and increasing process efficiency.

Planet became an Esri partner in 2019, when an ArcGIS Pro desktop add-in was released to allow users to easily access Planet Basemaps from within existing projects. This capability has helped participating organizations across the globe to maintain an accurate, consistent awareness of their assets and operations.

"We are very excited to strengthen our partnership with Esri and to be able to provide its users with access to Planet's



satellite imagery and analytics," said John Atkinson, vice president of Partnerships at Planet. "We are working directly with Esri to tailor our packages to meet the needs of our customers."

As this new agreement goes into effect, Planet and Esri will also collaborate on joint offerings for organizations in the civil government and energy industries. Planet's high-cadence imagery offers these customers insight into daily changes occurring in their communities, paving the way for smarter land-use planning and strategic decision-making.

## Air Tanzania selects Panasonic Avionics for its A220 IFE and connectivity

Air Tanzania has selected Panasonic Avionics' inflight entertainment (IFE) and connectivity systems to enhance the passenger experience onboard its Airbus A220 aircraft. The airline has equipped two of its A220s with Panasonic's eX1 IFE solution which is specifically designed for narrowbody aircraft. Each seat will feature elegant full HD seatback monitors, complete with touch displays and handsets, and an intuitive, personalized interface. Passengers will have access to USB and laptop charging power points at every seat.

Air Tanzania's A220s will also be fitted with Panasonic's

inflight Wi-Fi service. Panasonic's next generation connectivity enables fast internet to video streaming, all powered by its new satellite modem featuring bandwidth up to twenty times greater than previously available.

The announcement marks the extension of Panasonic's relationship with Air Tanzania following the airline's selection of its inflight entertainment and connectivity solutions for two of its Boeing 787 aircraft and two Airbus A 2 2 0 s i n 2 0 1 8 .

"By selecting Panasonic's inflight entertainment and connectivity systems, Air Tanzania can deliver personalized, immersive entertainment to every passenger, no matter where in the cabin they are seated," said Ken Sain, Chief Executive Officer of Panasonic Avionics Corporation. "These inflight experiences will help Air Tanzania encourage brand loyalty, keeping their valued customers coming back time and time again."

The flag carrier of Tanzania was the first African airline to take delivery of the A220 in November 2018 and January 2019. It operates a fleet consisting of the Dash 8-Q400, Airbus A220 and Boeing 787-8 Dreamliner.

"Operating our new A220 equipped with Panasonic's IFE and Wi-Fi service brings together the right culture, values, and expertise to fulfil our goal of satisfying our customers—which is part of our vision," said Eng. Ladislaus Matindi, CEO & Managing Director of Air Tanzania.

### Advantech supports satcom operators migrating from low C-band due to roll out of 5G

Advantech Wireless Technologies Inc. is supplying its Insat C-band 1000W Redundant, GaN-based Solid State System (SSPB) Solution to a Major Network provider in LATAM. The System includes an on-line Taurus SSPA with a dedicated backup amplifier to ensure maximum availability. Packaged for outdoor applications, Taurus optimizes useable output power by eliminating IFL insertion loss, making it the ideal solution for both mobile and fixed Communication terminals.

Specifically designed for high power and high linearity in 6.725-7.025 GHz, these 1,000W units are perfect for migrating to the upper end of the C-band spectrum for



better separation from interfering 5G traffic. The units are designed to support higher modulation and error correcting codes, which will allow more users in less spectrum. That in exchange will generate increased revenue for satellite operators, in parallel with OPEX reduction for users. The tremendous backhaul capacity that 5G will require, will need as high as possible power and linearity, and that is what these units provide.

In today's world, it is crucial to be permanently connected and able to communicate via voice and data on every device. Providing such network coverage in areas where usage can be unpredictable and irregular is an expensive

### IEC Telecom: Enabling VSAT-like connectivity for small vessels

As the pandemic brought the world to a standstill, it quickly became apparent that digitalised and VSAT-enabled vessels had a distinct advantage in ensuring business continuity and supporting crew welfare. The maritime sector has been impacted by travel restrictions, port closures, and mandatory quarantine periods. With crew changeovers at a standstill and contracts extended for months, the demand for products that offer secure data over robust communication systems has increased tremendously.



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In addition, Orion Edge provides crew with a dedicated network supporting web browsing, social media, VoIP calls and email software — all accessible via individual crew vouchers — while the digital dashboard gives the captain and vessel operator the opportunity to keep tabs on usage.

### Comtech receives US\$1.3 million in orders to support cellular LTE backhaul in the Middle East

Comtech EF Data Corp., which is part of Comtech's Commercial Solutions segment, has received \$1.3 million in orders for advanced satellite modems, WAN optimization and redundancy switches. The equipment will be utilized to support cellular LTE backhaul for a service provider in the Middle East.

"As COVID-19 is affecting the way we work, live and play, providing high quality, high-speed broadband everywhere is essential and Comtech EF Data solutions are well equipped to

meet the challenge.”

“I am pleased that Comtech was selected to provide our award-winning, turnkey high-speed trunking solutions to a customer in the Middle East,” said Fred Kornberg, Chairman of the Board and Chief Executive Officer of Comtech Telecommunications Corp. “As COVID-19 is affecting the way we work, live and play, providing high quality, high-speed broadband everywhere is essential and Comtech EF Data solutions are well equipped to meet the challenge.”

The CDM-760 Advanced High-Speed Trunking and Broadcast Modem is the most widely deployed high-speed trunking modem in the industry, and supports GEO, MEO and LEO operation at up to 1.4 Gbps per second. The service provider will utilize the CDM-760 and the FX WAN optimizers to support its LTE traffic. This integrated and unique solution automatically adapts in real-time to changing end user demands on the ground and to link conditions over the satellite.

Richard Swardh, Senior Vice President of Comtech EF Data's Premium Enterprise and Mobile Operators vertical commented on the project, “Comtech EF Data continues to extend the lead in capacity deployed over satellite in support of 2G, 3G and LTE backhaul. To meet an ever-growing consumer demand for higher speed and better Quality of Experience, Mobile



Networks Operators are adapting by deploying the latest generation wireless standards along with improved backhaul capabilities provided with our solutions. We are honored and excited that this service provider selected our CDM-760 modems and WAN optimization to now support 2 Gbps of LTE backhaul traffic and to prepare for a future roll out of 5G services.”

### **Covid-19 impact on satellite connectivity and video market delays return to growth**

In its latest research titled, “Satellite Connectivity and Video Market,” Euroconsult revised its forecast to account for the impact of COVID-19. The pandemic has deeply impacted maritime and in-flight connectivity demand, and to a lesser extent other segments such as enterprise networks. It remains to be seen how long those markets will take to recover.

Long-term market drivers for satellite connectivity remain strong and before the pandemic the market was starting to show signs of recovery from the major market price reset. However, due to COVID-19's impact on bandwidth consumption by cruise ships, commercial airlines, and the energy sector, return to growth previously forecast to begin in 2020 is now unlikely until 2022. According to Euroconsult's forecast, the satellite and connectivity market is now expected to surpass its historic revenue peak by 2024 and will become an \$18.7 billion market by 2029. “Not all market segments have been negatively impacted by COVID-19,” said Nathan de

Ruiter, Managing Director of Euroconsult Canada. “Consumer broadband saw growth in North America following the pandemic, with existing subscribers shifting to higher value plans and overall growth in subscriber base. Nonetheless, temporary supply chain issues have caused delays in new project rollouts in most market segments. Despite the short-term headwinds caused by the pandemic, we expect underlying market drivers to prevail, enabling long-term growth.”



### **Eutelsat to acquire European satellite broadband activities of Bigblu Broadband**

Eutelsat Communications has reached an agreement with Bigblu Broadband to acquire its European satellite broadband activities. Bigblu Broadband is the largest distributor of satellite broadband packages in Europe with a proven track record, as evidenced by its success as the main Gold member of Euro Broadband Infrastructure's Preferred Partnership Programme since 2019. Bigblu Broadband has developed a well-established platform for satellite broadband, relying on a unique network of installers and resellers. The activities to be acquired by Eutelsat (BBB Europe) currently count around 50,000 subscribers across an expanding pan-European footprint which includes operations in the UK, Ireland, France, Germany, Italy, Spain, Portugal, Poland, Hungary and Greece.

The agreement coincides with the entry into service of EUTELSAT KONNECT, due to start gradually from fall 2020 with operation at full capacity expected from early 2021, bringing capacity in high-demand areas, improved end-user experience and unparalleled economics and flexibility.

With its scalable platform for direct sales including digital marketing platforms, multi-lingual call centers, billing and CRM systems, the integration of BBB Europe will enable Eutelsat to overcome the limitations of its existing indirect model by offering enhanced access to the end-user, direct control over product definition and price for faster alignment with market needs, and increased control of distribution levers including sales force incentives, communication and promotions. The addition of this retail channel as a complement to wholesale agreements with telecom operators, such as the recent deal with Orange in France, will favour an accelerated ramp-up of upcoming capacity and the maximization of customer value over time.

## SES picks SpaceX to launch four additional O3b mPOWER satellites

SES has announced that it has selected SpaceX as a launch partner to deliver the four newly-ordered O3b mPOWER spacecraft of its next-generation Medium Earth Orbit (MEO) communications system. Just like the initial seven O3b mPOWER satellites procured, these additional four satellites will be launched into space on board Falcon 9 rockets from Cape Canaveral. A total of four Falcon 9 rockets will be used to support the deployment of all O3b mPOWER satellites.

SES's O3b mPOWER fully-funded communications system comprises 11 high-throughput and low-latency satellites as well as an automated and intelligence-powered ground infrastructure. Built by Boeing, each satellite will generate thousands of dynamic beams and can deliver connectivity services ranging from 50Mbps to multiple gigabits per second to telecommunications, maritime,



aeronautical, and energy, as well as governments and institutions across the world. SES has previously announced Orange and Carnival Cruises its first O3b mPOWER customers. O3b mPOWER is SES's next-generation MEO system. It is built on the proven track record of SES's current O3b constellation of 20 MEO satellites. Today, the O3b system is delivering high-performance communications services to customers operating in nearly 50 countries.

SES and SpaceX disrupted the industry back in 2013 when SES became the first to launch a commercial geostationary (GEO) satellite with SpaceX, and later as the first ever payload on a flight-proven SpaceX rocket. Their next O3b mPOWER launch in 2021 will be another one for the record books as the revolutionary terabit-scale capabilities of SES's O3b mPOWER communications system disrupt the industry again.

SES's selection of SpaceX to support launch of the full O3b mPOWER constellation is a testament to our deep partnership built over the past decade," said SpaceX Vice President of Commercial Sales Tom Ochiner. "We look forward to working with SES to make history again through the successful deployment of this new system."

## IEC Telecom & Thuraya empower critical humanitarian operations with high bandwidth via a portable Rapid Deployment Kit

Global satellite communications specialist IEC Telecom, along with mobile-satellite service provider Thuraya, introduced its Rapid Deployment Kit (RDK), designed to provide Humanitarian Response Teams with reliable connectivity during COVID-19 and support emergency and disaster relief efforts even in the most remote areas.

With over 126 million people in need of humanitarian assistance globally, including 70 million forcibly displaced, governments and the global community are stressing the significance of on-time medical and humanitarian responses. The RDK solution enables frontline workers to

respond immediately and effectively to mitigate the wider secondary impacts of the pandemic.

Nabil Ben Soussia - CEO Asia, Middle East & CIS commented, "COVID-19 has proved that timely communication is of utmost importance. Satellite technologies play a crucial role in monitoring and managing the situation in challenging environments. Our latest Rapid Deployment Kit (RDK) offers high speed connectivity, previously reserved only for VSAT users, via a compact and portable solution. RDK can easily be deployed in a short span of time without the need for an onsite technician, enabling mobile humanitarian missions with reliable connectivity for an immediate response."

RDK is a technological breakthrough, powered by Thuraya broadband terminals and the OneGate Aid Compact network management system from IEC Telecom. The new solution provides field missions with a VSAT-like experience anywhere they go. RDK is equipped with bandwidth optimization and advanced filtration tools, offering a user experience up to 2+ Mbps, which allows taking full advantage of digitalization, including videoconferencing, remote maintenance, telemedicine, and more for smooth communications during critical humanitarian missions.

## Airbus to build BADR-8 satellite for Arabsat, with optical communications payload TELEO

Airbus has been contracted by Arabsat, one of the world's top satellite operators, to build BADR-8, their new generation telecommunications satellite. BADR-8 will replace and



increase Arabsat's capacity and augment its core business at the BADR hotspot 26°E.

The BADR-8 satellite will be based on the state-of-the-art Airbus Eurostar Neo electric orbit raising platform giving access to a wide range of launchers. BADR-8 will also include the innovative Airbus developed TELEO optical communications payload demonstrator. This payload will enable very high capacity analogue optical feeder link communications, as part of the development by Airbus of a new generation of optical communications technology in space to be integrated in its future commercial products, which is highly robust against jamming.

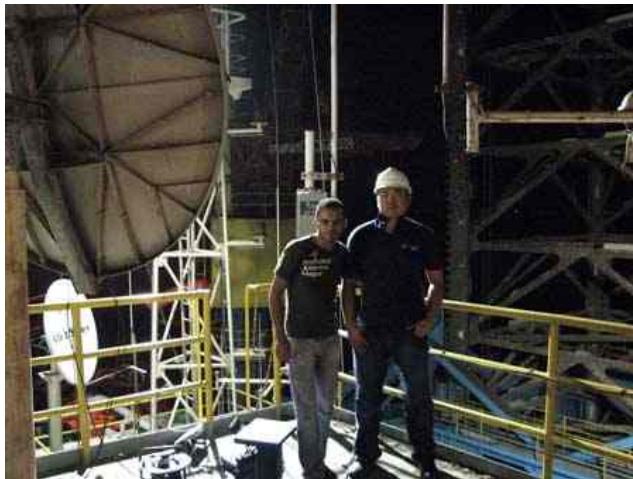
Jean-Marc Nasr, Head of Space Systems, said: "This important contract with our long-standing customer Arabsat has a special significance for Airbus Defence and Space. It is the first seventh-generation Arabsat satellite and the first Eurostar Neo satellite we are building for Arabsat after six previous Eurostar

satellites. BADR-8 incorporates the best of our expertise and technologies, including a very innovative optical communications hosted payload. This further strengthens our continuing strategic partnership with the Arab Satellite Communications Organisation, which has been connecting people by satellite across the Middle East and the world for more than 40 years.

Khalid Balkheyour, President and CEO of Arabsat said “We are delighted to sign this contract with our long term partner Airbus. It marks another milestone in our objectives to provide customers with premium satellite technology with the highest level of performance, and to expand reliability and service security. BADR-8 will be joining our Badr-network at Arabsat 26°E hotspot, expanding our service over EMEA region.”

### Intelsat announces successful launch of Galaxy 30 Satellite

Intelsat S.A. operator of the world's first Globalized Network, delivering high-quality, cost-effective video and broadband services anywhere in the world has announced the successful launch of Galaxy 30, a geosynchronous communications satellite that will primarily provide high performance television distribution service to Intelsat North American customers. Galaxy 30 is the first satellite in Intelsat's Galaxy fleet refresh plan and will replace Galaxy 14 at 125 degrees west once it is in service in early 2021. The Intelsat Galaxy fleet is the most reliable and efficient media content distribution



system in North America, offering customers an unmatched penetration of cable head-ends.

“The launch of Galaxy 30 demonstrates Intelsat's long-term commitment to our North American media customers,” said Intelsat CEO Stephen Spengler. “At Intelsat, we're constantly innovating, investing in and upgrading our satellite fleet and terrestrial infrastructure. Galaxy 30 is a great example of how we help our customers stay ahead of evolving consumer demands, today and well into the future.”

With C-, Ku-, Ka- and L-band capabilities, Galaxy 30 is the first four-frequency Intelsat satellite. In addition to serving Intelsat's media business customers, Galaxy 30 will also offer broadband, mobility and network services to Intelsat mobile network operator, enterprise and government customers in North America. The new satellite is also carrying a U.S. Federal Aviation Administration hosted payload for Leidos.

Galaxy 30 will play an important role in Intelsat's U.S. C-band spectrum transition plan, which is accelerating America's path to 5G. Intelsat is facilitating the work of the U.S. Federal Communications Commission (FCC) in transitioning and safeguarding media services currently utilizing the lower portion of the band to make way for 5G wireless services. Intelsat is not seeking any reimbursement costs from the FCC's public auction proceeds for any aspect of the Galaxy 30 launch or relocation.

“The launch was especially important for Intelsat because Northrop Grumman's innovative MEV-2 launched alongside Galaxy 30,”

continued Spengler. “Intelsat was proud to partner with Northrop Grumman earlier this year to pioneer the future of in-space servicing with MEV-1 and our Intelsat 901 satellite. We're looking forward to this next exciting servicing mission with Intelsat 10-02.”

MEV-2 is scheduled to dock with Intelsat 10-02 in 2021, providing it with five additional years of high-performance life. Intelsat 10-02 delivers media distribution and broadband services to Intelsat customers across Europe, the Middle East, Africa and South America. Telenor Satellite contracts for capacity on Intelsat 10-02 and is partnering with Intelsat to bring the benefits of in-space servicing to its customers.

### No roaming charges between Central African countries in 2021

First agreed back in February, the six countries of the CEMAC have confirmed that they will abolish roaming charges between their territories, beginning at the start of 2021.

The countries – Cameroon, Congo, Gabon, Chad, Equatorial Guinea, and Central African Republic – have been in discussions on this topic for many years, with similar agreements being struck across the continent in recent years. For example, a union of Western African countries, the Economic Community of West African States (ECOWAS), had agreed to remove roaming fees for its 15 members back in 2017.

Finally confirmed, the roaming agreement will allow nationals of any of the CEMAC countries to visit these other selected nations without fear of expensive calls and texts.

“The Council welcomes this decision, which contributes to the densification of the integration of peoples within CEMAC, in that it aims to facilitate the mobility of populations through Information and Communication Technologies, reducing



communication costs,” said a statement from the Union économique de l'Afrique centrale.

This agreement should also begin to encourage the national telcos to work together across borders, particularly when it comes to accessing subsea cables around the Gulf of Guinea.

### Spacecom, NOVELSAT demonstrate high-volume video delivery over AMOS-17 satellite for 5G networks and Wi-Fi hotspots

Spacecom and NOVELSAT announced the successful demonstration of end-to-end video delivery over AMOS-17 high throughput satellite, from network core to network edge, serving user devices over a wireless network and showcasing high-quality user experience.. The demonstration illustrated a complete network architecture for the delivery of Over-The-Top (OTT) live video content to multiple user devices, using NOVELSAT's video processing and

delivery solution over Spacecom's AMOS-17 fully digital satellite operating live multi-band broadcasting.

NOVELSAT Video Core Cloud staged content acquisition from multiple sources in multiple formats, performing multi-channel transcoding to HEVC and satellite modulation utilizing NOVELSAT NS4TM bandwidth-efficient waveform, and transmitting a single high-quality profile of each video channel.

NOVELSAT Video Edge Gateway displayed content processing and delivery, demodulating the satellite transmission, executing decoding and transcoding, generating multiple video profiles, performing multi-profile packaging and delivering live video streams to user devices at network edge over a wireless network.

Spacecom AMOS 17 digital satellite powered the space segment of the demonstration, providing highly efficient connectivity from the satellite to the terrestrial network edges, interconnecting the video cloud core to the video edge gateway.

The demonstration highlighted the benefits, in terms of bandwidth efficiency, delivery cost and end-user Quality of Experience (QoE), of using satellite-based video delivery for distributing high volumes of live video content to cell sites and Wi-Fi access points. Bypassing terrestrial backhaul network congestion and performing transcoding and packaging at the edge, enable OTT delivery of high quality and



low latency live IP video streaming to any device, and at the lowest investment in network infrastructure.

According to Eran Shapiro, Director of Business and Technology Ventures at Spacecom, "We are excited to partner with NOVELSAT to demonstrate how viewers will benefit from access to more content, at their convenience and with higher viewing quality. The coverage and efficiencies of AMOS-17's beams are unique over Sub Saharan Africa, and with NOVELSAT video processing and delivery solution we can effectively cater to changing lifestyles and viewing habits. Engaging the African media market with key enabling technologies for linear, OTT, VoD and other services is a strategic goal for Spacecom. Together with NOVELSAT, we are able to address important market segments with cost-effective, efficient and easy to deploy solutions."

### **Azercosmos with iSAT Africa to provide satellite services via Azerspace-2 in Africa**

Azercosmos established a cooperation with iSAT Africa, the leading data, video and internet service provider serving Telco's, ISP's, Media companies, Enterprise Govt and others in Africa and Middle East. iSAT Africa services include MPLS, SDWan, Media solutions, OTT using terrestrial and satellite technologies. According to the agreement, iSAT Africa will meet the growing demand for telecommunications in various parts of Africa, that can't be served using terrestrial, via the resources of Azerspace-2 satellite. iSAT Africa will use the capacity of the Azerspace-2 satellite to provide various satellite solutions, in addition to data and video services provided to 90% of the African region.

"We intend to actively develop our cooperation with iSAT Africa. This cooperation will allow us to use the capabilities of the Azerspace-2 satellite even in the most remote areas of Africa," said Mark Guthrie, Chief Commercial Officer at Azercosmos.

"Our partnership status with Azercosmos guarantees successful implementation of our projects on satellite services, even during the ongoing pandemic. We will be able to provide fast and efficient services to our customers in Africa and also from Africa," noted Stanley Ayittah, Head of Business development of iSAT Africa.

### **IPSTAR: The world's first high throughput satellite celebrates 15 years of excellence**

On 11 August 2005, IPSTAR roared into orbit and the satellite industry was not the same again. The launch of the IPSTAR broadband satellite, to this day 15 years ago exactly, marked the introduction of broadband satellite services in Asia Pacific.

With IPSTAR, Thaicom was the first operator in the world to develop and launch a High Throughput Satellite (HTS). In the years to come IPSTAR would connect hundreds of thousands of users in underserved and unserved areas across Asia Pacific to broadband internet. IPSTAR has been the region's leading broadband satellite platform, underlining Thaicom's innovative and pioneering role in the satellite industry. IPSTAR was built by US-based Space Systems Loral, the satellite manufacturer who developed and designed the satellite's core technologies.

At the time of launch, IPSTAR was the heaviest commercial GEO satellite ever orbited with a launch mass of nearly 6,500 kg. It was also the first satellite to achieve a maximum 45 Gbps of bandwidth capacity.

### **Saab explores Low-Earth Orbit satellite communication for global maritime**



#### **connectivity**

Saab will, together with the companies ORBCOMM and AAC Clyde Space, lead a groundbreaking Swedish space project; to develop space based communication for the maritime sector via the new automatic tracking standard, VDES. The new VDES package does not only enable safer, more sustainable and greener shipping but the technology also has spin-off potential for other industries.

Saab has in recent years broadened its offer to include space based products and solutions. The company is now taking a next step and investing in a satellite project that will expand global data communication opportunities for the maritime industry but also potentially for other industrial Internet of Things (IoT) applications.



## ST Engineering iDirect collaborates with Paratus and KNS to bring reliable, high-speed connectivity to mining vessels

ST Engineering iDirect announced that its long-term customer Paratus, a pan-African telecommunications group which provides satellite connectivity across Africa, has deployed its iDirect modems with marine antenna from manufacturer and integrator KNS Inc., to provide reliable, high-speed connectivity to mining ships based in Guinea, West Africa.

The vessels and their crew require constant and reliable communications to keep in permanent contact with their headquarters on land, and with other shipping vessels during operations at the Boffa port in Guinea, where 3G/4G connectivity is poor and internet services are limited.

The ships were installed with the iDirect modem and KNS 1.2m Maritime Antenna Z12Mk2 in Shanghai, China, enabling bandwidth-intensive applications including video, email and WeChat to be run. Paratus remotely configured the modems and commissioned the antennas for the ships when they arrived in Boffa. Commissioning is completed with the ships being operational.

“We are pleased to be working alongside our long-term partner ST Engineering iDirect as we continue to address poor connectivity issues that currently affect Africa,” said Colwyn van Rensburg, Chief Development Officer at Paratus. “The work we have undertaken has more than



satisfied our customer, and the company is looking to implement further connectivity for its offices in the future. We look forward to our continued success together.”

“Our collaboration with ST Engineering iDirect stretches back for over a decade,” commented EZ Gao, Manager of Asia and MENA at KNS. “We already have plans in place to expand our collaboration to the market, building upon this very strong foundation to drive expansion towards more price-sensitive customers in certain market segments and regions to enable this kind of mission-critical connectivity at sea.”

“We are excited to extend our relationship with Paratus, whom we have worked with for many years to provide data rates and multi-service capabilities to their customers,” said Pieter-Paul Mooijman, Regional Vice President for Africa at ST Engineering iDirect. “Paratus is already utilizing ST Engineering iDirect hubs to power connectivity in Angola, Namibia and South Africa.

## Globalstar launches new SPOT Gen4 satellite messenger in EMEA

Globalstar Europe Satellite Services Ltd, announces that SPOT Gen4™, the new generation of the SPOT Satellite GPS Messenger™, is now available in EMEA. SPOT Gen4 offers many new features including an enhanced, more detailed mapping interface with more display options, improved product specifications for water resistance, and geofencing capability, among others.

SPOT Gen4 is the newest member of the award-winning SPOT satellite-enabled tracking and safety product portfolio. It provides users with ubiquitous reliable tracking and a vital line of communication with colleagues, friends and family, and emergency support enabled by Globalstar's second generation satellite fleet in Low Earth Orbit (LEO).

SPOT Gen4 features include enhanced design – The new Gen4 has a sleek new look with improved grip and design features that snap in place to securely cover the Help and SOS buttons. It's rugged, portable and includes a new multi-use carabiner and strap

Upgraded IP68 rating – Offers increased water resistance, up to 30 minutes at two meters in water. Motion activated tracking – SPOT Gen4 sends tracks at a chosen rate for as long as the device is turned on and moving, conserving battery life. Alerts can be set to auto-send notifications to others when movement is



detected or upon entry and exit of specific geographic areas programmed into the SPOT Mapping interface.

## Avanti CEO Kyle Whitehill selected to advise UK DFID

Avanti Communications CEO, Kyle Whitehill, has been requested to join the newly formed Telecoms and Technology Trade Advisory Group for the Department for International Trade. Sitting alongside senior executives from Samsung, Facebook and BT, Whitehill will provide strategic and technical consultancy to DIT to help progress the UK's trade negotiations. With Brexit pending, the Government has selected advisors whose credentials demonstrate they can support the effort to progress negotiations at pace and bring relevant understanding, insight and experience necessary for this complex task.

Their advice will be used to help guide the government's negotiating position and achieve key industry asks that benefit the UK, including securing new market access on products and agreeing cutting-edge digital trade rules.

Whitehill comments, “It's an honour to have been invited to represent the satellite communications industry at the highest level and contribute my insight and thinking alongside some of the UK's top businesspeople. Together we will be working on behalf of everyone in the UK to inform the Government's negotiating position and help them deliver deals that benefit the whole country.”

Secretary of State for International Trade, Liz Truss said, “This is about bringing business closer to the negotiating table and using their expertise to help secure the best possible deals that deliver jobs and growth across Britain. Talks with Japan, the US, Australia and New Zealand are entering their crucial latter stages, so it is only right that we step up engagement with vital

industries to utilise their technical and strategic expertise.”

### Standard Chartered and Airtel Africa form partnership to drive financial inclusion across Africa

Standard Chartered Bank and Airtel Africa have announced a strategic collaboration to drive financial inclusion across key markets in Africa by providing customers with increased access to mobile financial services.

Through the collaboration, Standard Chartered and Airtel Africa will work together to co-create new, innovative products aimed at enhancing the accessibility of financial services and, ultimately, better serve people across Africa. In line with this, Airtel Money's customers will be able to make real-time online deposits and withdrawals from Standard Chartered bank accounts, receive international money transfers directly to their wallets, and access savings products amongst other services.

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Standard Chartered's corporate clients will also be able to make rapid and secure bulk disbursements, such as payroll payments, directly into the Airtel Money customers wallet. This reduces the risks associated with travelling long distances for cash payments and instead customers can go to any Airtel Money agent, kiosk, or branch to cash-out their funds.

Commenting on the collaboration, Sunil Kaushal, Regional CEO, Africa and Middle East said: “By collaborating with innovative organisations like Airtel Africa, we are accelerating our mobile and digital-led strategy to provide best in class financial services to Africa. Over the past year, Standard Chartered has rapidly launched digital banks across 9 countries on the continent, allowing our customers to enjoy seamless services from the safety of their homes even during the peak of the pandemic. This partnership will further enhance the ability of our customers to manage and move money safely and securely and create market-leading financial solutions across countries.”

### Intelsat announces new Vice President of Global Government Affairs and Policy Peter B. Davidson

Intelsat, operator of the world's largest integrated satellite and terrestrial network, today announced that Peter B. Davidson has joined the company as Vice President of Global Government Affairs and Policy. Based in the company's McLean, Va. office, Davidson is responsible for leading the development of Intelsat's government relations strategy globally, building relationships with individuals in the U.S. Congress and Administration, as well as international administrations and regulatory bodies that impact Intelsat's business around the world. He will report to Intelsat's Executive Vice President, General Counsel and Chief Administrative Officer Michelle Bryan.

“Peter is a dynamic leader with a broad range of experience, and we look forward to working alongside him to further advance our near and long-term government affairs initiatives. We're pleased to welcome him to the Intelsat family,” said Bryan.

Davidson brings more than 35 years of experience in government affairs, telecom and legal knowledge to his new role at Intelsat. Most recently, Davidson served as Deputy Dean for Strategic Initiatives and Assistant Professor of Law, at the Antonin Scalia Law School at George Mason University. Before that, he served as General Counsel at the Department of Commerce, acting as the third most senior official and overseeing nearly 400 attorneys across all 13 of the Department's bureaus.

### Gilat Telecom now offering Intelsat FlexMove, the industry-first managed service for ubiquitous, high-throughput satellite (HTS) land mobile connectivity

Gilat Telecom announced it is now offering the Intelsat FlexMove managed service for ubiquitous, high-speed land mobile connectivity. With FlexMove, Gilat Telecom's customers can easily connect to the internet, private data networks and cloud services from virtually anywhere in the world, including while on-the-move, or on-the-pause at a temporary site.

“With the Intelsat FlexMove service, we can help our customers quickly and easily deploy mission-critical communications and maintain a seamless connection to the people and applications they rely on,” said GILAT TELECOM VP Defense & HLS, Ami Schneider. “Gilat Telecom is excited to partner with Intelsat to offer an industry-first high-throughput, ubiquitous connectivity solution.”

The “always-on” FlexMove connectivity solution from Gilat Telecom is up to 20 times faster than current mobile satellite solutions (MSS) for a fraction of the cost. It offers global, multi-layered, redundant coverage that enables even the most data-intensive applications.



“Intelsat welcomes Gilat Telecom as a valued FlexMove solution partner,” said Intelsat Director for Land Mobile, Joel Schroeder. “With the ubiquitous, high-throughput FlexMove service, Gilat Telecom's customers can seamlessly connect with confidence — even in the most remote or challenging locations.”

Gilat Telecom is now offering FlexMove service plans that are sold by the gigabyte (GB). These plans are seamlessly integrated with a portfolio of qualified satellite terminals

empowering even non-technical personnel to set-up and connect to the internet in just minutes. Service plans are designed for recurring, seasonal, occasional and, event-based use. Users can pool airtime and share data costs across multiple terminals, making FlexMove a cost-effective connectivity solution for organizations with large vehicle fleets and numerous remote locations.

FlexMove services for Communications-on-the-Move (COTM) applications use a flat-panel compact, vehicle-mounted satellite terminal that automatically acquires a connection and maintains communication while the vehicle is moving. The FlexMove Communications-on-the-Pause (COTP) service uses a highly compact and portable satellite



terminal with an automatic or assisted pointing function to connect to a satellite. Connectivity choices include a public internet connection or a private IP solution to access a customer's network

### **Africa Mobile Networks (AMN) extends Gilat's contract of powering Africa's largest satellite cellular backhaul network**

Gilat Satellite Networks Ltd., a worldwide leader in satellite networking technology, solutions and services, announces the extension of Gilat's contract with Africa Mobile Networks (AMN) to power the largest satellite cellular backhaul network in Africa. AMN's network enabled by Gilat's technology serves multiple Tier-1 Telcos in over ten countries throughout Africa.

"AMN has selected Gilat, due to its superior technology, to further extend Africa's largest satellite cellular backhaul network constructed by AMN and powered by Gilat's VSAT technology," said Michael Darcy, CEO AMN. "We are pleased to contribute to closing the digital divide by furthering the reach of our network to additional countries reaching more of the population in rural areas."

"Gilat is honored to enhance its long-standing partnership with AMN and to have been selected once again to provide high-quality solutions for cellular backhaul over satellite to serve Tier-1 Telcos coverage throughout Africa," said Michal Aharonov, VP Global Broadband Networks at Gilat. "Gilat has provided over 2,000 VSATs to AMN and is pleased to participate in plans of site migrations from 2G/3G to 4G, as the requirement for data communication is rising."

### **New Express-80 and Express-103 communications and broadcasting**

#### **satellites in target orbit now**

On July 31, 2020, two spacecrafts, Express-80 and Express-103, ordered by the Russian Satellite Communications Company (RSCC), were launched from the Baikonur cosmodrome. The new satellites were put into the target geotransfer orbit and later will be placed in the geostationary orbit at 80° and 96.5° E. The spacecrafts are intended to provide fixed and mobile services; digital TV and radio broadcasting; high-speed Internet access, as well as data transmission across the Russian Federation and abroad. The full-scale functioning is scheduled to commence in January and February 2021.

"With two newly-launched satellites, Express-80 and Express-103, the throughput of our constellation is now up by a quarter," said Yuri Prokhorov, RSCC acting Director General. "It is crucial for RSCC that these spacecrafts in orbital slots centered over the Russian Federation are already demanded by our customers. This will allow telecom operators to transfer their networks from foreign spacecraft and provide domestic subscribers with the most advanced digital communications and broadcasting services, including Internet access for maritime and aerial customers."

### **Microsoft Africa Research Institute opens in Nairobi**

In the latest demonstration of its continued commitment to Africa, Microsoft has created a new Microsoft Africa Research Institute (MARI) in Nairobi, Kenya, which will be co-located in Microsoft Africa Development Centre. MARI will focus on foundational research to improve productivity in three areas: work, health, and society.

MARI's mission is to understand how innovative technologies, like cloud and AI, are helping to solve local challenges, and how we can then use this understanding to influence product creation and unearth opportunities. MARI endeavours to create a more productive future for work by understanding Africa's unique business landscape, and use these insights to design products that address these unique, non-traditional organisational structures to enable new ways of working and



collaborating.

"We're seeing some really fantastic momentum in our work at the ADC, and this new research institute will help us partner to solve local and global challenges," says Jack Ngare, managing director, Microsoft Africa Development Centre in Kenya. "We are very focused on how innovative cloud technology is driving the future development of the continent, and the work this team is seeking to do align closely with our overall goals for the ADC."

Africa's growing youth population and emerging computer

science talent are key, as MARI couples foundational research with product development by bringing together researchers, engineers, designers, and the community, including local academic institutions.

### **Ka-band transceiver for satellite communications**

Scientists at the Tokyo Institute of Technology and Socionext have developed a transceiver for enabling seamless communication between earth ground platforms and satellites in the low, middle, and geostationary earth orbits. According to the scientists involved in the project this transceiver could help to bring the Internet to people in remote rural areas and at sea



Despite communications technologies having advanced rapidly there are still issues when it comes to bringing connectivity to remote locations, such as rural areas or the open sea. Satellite communication (SATCOM) is an attractive option for providing data links to such places; but for effective SATCOM, the right equipment must exist both in space and on Earth

At the forefront of research into SATCOM technologies are scientists from the Prof Kenichi Okada's lab at Tokyo Institute of Technology (Tokyo Tech), who have developed a transceiver for SATCOM using standard CMOS technology. The transceiver, which operates in the 'Ka band', means a 27–31 GHz frequency range for uplink (ground to satellite) and 17–21 GHz range for downlink (satellite to ground)

The design carries a variety of features. On the transmitter (TX) side, a high-quality-factor transformer is employed to achieve efficient power use and high linearity in transmission, which results in lower distortion during transmission. The receiver (RX) side features a dual-channel architecture that unlocks several capabilities

By having two RX channels it allows for receiving signals from two satellites simultaneously. These signals are received in parallel using either two independent polarization modes or two different frequencies. In addition, the proposed design can perform adjacent-channel interference cancellation; that is, the 'contamination' on a signal received in one channel by another signal on an adjacent frequency band is eliminated using information received at the other channel. This strategy increases the dynamic range of the system, thus allowing it to operate correctly even in less-than-ideal scenarios with stronger noise and interference

### **NEXSTAND EU celebrate a new**

### **partnership with the Turing Trust – 1 for 1 Tech for children in Africa**

NEXSTAND EU, London based remote working accessory company engages in a charity partnership with the Turing Trust. Helping to fund ICT education and resources for underprivileged children in Sub Saharan Africa. Alan Turing was renowned for his work breaking the Enigma codes in WW2 and is recognised as a founder of computer science, helping to develop the earliest computers. James Turing is the great-nephew of Alan and a founder of the Turing Trust.

The Turing Trust supports education in sub-Saharan Africa by reusing computers and improving teacher training using ICT. The Trust has reused over 5,700 PCs enabling more than 55,000 students to gain a digital education.

NEXSTAND EU aims to support The Turing Trust by donating a percentage of profits as well as a further one-for-one donation whereby every remote work set sold will supply a mouse alongside a computer. "We're always looking for new ways to have people's back and with this new partnership, we are delighted to be able to extend our reach to help the most disadvantaged young people in Sub-Saharan Africa. We're passionate that they too should have access to ICT education. On a personal note, the organisation's work is close to my heart due to my families history with Malawi, I'd love to see the people of Malawi and other sub-Saharan African countries reap the benefits of the digital age." Samantha Eaton, CEO of NEXSTAND EU.

"With the support of fantastic, socially-minded companies such as NEXSTAND EU we will be able to realise our vision where every school had adequate IT resources to empower students with these vital skills." James Turing

### **MBRSC releases satellite image captured by KhalifaSat**



The Mohammed Bin Rashid Space Centre (MBRSC) has announced the completion of an updated map of the Abu Dhabi and Dubai using the UAE's first high-resolution satellite image "Mosaic", captured by KhalifaSat.

The system captures a matrix of individual digital images to create a single high-resolution picture of the UAE's terrain, said a statement from MBRSC.

This imaging system by MBRSC will provide a comprehensive view of the UAE's topography, using remote sensing systems, image processing, geographic information systems and artificial intelligence.

While the service currently provides detailed high-resolution satellite image mosaic of Abu Dhabi and Dubai, mosaic of all Emirates will be released soon.

The system is part of the MBRSC's efforts to support federal and local government entities, research and academic institutions as well as the private sector to take advantage of this type of technology that plays an important role in understanding the geography, topography and environmental impacts of large areas in the UAE more accurately.

In view of the MBRSC's efforts to spread knowledge, expand the use of space technologies owned by them and extend cooperation frameworks to all entities, "Mosaic" will be provided to all government and non-governmental entities free of charge for the purpose of benefiting the agencies and



enhancing their role in the UAE society.

This type of satellite imagery is relevant to stakeholders in infrastructure, urban planning, environment and climate change sectors, energy, education, technology, roads and transportation, among others in the UAE.

Accordingly, MBRSC will provide high-resolution images from the "Mosaic" system, after conducting a comprehensive survey of the area requested by the entity, according to the nature of their activity..

### **Telecom Namibia upgrades VSAT to bring connectivity to remote areas**

Telecom Namibia has upgraded its VSAT hub to ensure faster and reliable connectivity for users in remote areas and will soon begin deploying remote terminals to various areas across the country following successful pilot installations.

Lukas Shuuya, Acting Chief Technical Information Officer, noted in a press release that the VSAT service, dubbed 'Satlink', is an ideal solution for those who cannot get a voice and/or broadband internet access via the company's existing wireless or wireline access technologies. 'Telecom's upgraded VSAT is based on the latest high capacity, high throughput and low latency satellite technology and supports delivery of both narrowband and broadband connectivity anywhere in Namibia, even in the remotest places,' he added. Telecom markets a range of Satlink packages offering unlimited data volumes and download speeds of up to 10Mbps.

### **UAE space programmes boost Asia's lead in 4th Industrial revolution**

The UAE's space programmes, especially the successful launch of its Mars Mission, will give a fillip to Asia's lead in fourth Industrial revolution and make the Emirates "a big stakeholder in the development of developing countries across the globe," a senior academic told Emirates News Agency, WAM.

"Asians are leading the race in terms of the fourth industrial

revolution [4IR] in which space technology has a core role. China, India, South Korea, and Japan are at its forefront, and the UAE has joined them with its successful space programmes," said Dr. Narayanappa Janardhan who is a Senior Research Fellow at the Emirates Diplomatic Academy, EDA, in Abu Dhabi. 4IR is a technological revolution that merges the physical, digital and biological technologies in order to deliver unprecedented products and services in new and emerging sectors.

"The UAE will become a frontrunner among those leading Asian nations and its 'look east policy' will also help further develop the ties with those countries," he added in an interview with WAM.

As WAM reported in the last two weeks, China, India, South Korea and Japan, along with the US, Russia and European Union, appreciated the Emirates Mars Mission and expressed their keen interest in further developing cooperation with the UAE in space sector.

### **SES: Half Year 2020 Results**

SES S.A. announced financial results for the six months ended 30 June 2020. Steve Collar, CEO of SES, commented: "The business has performed well in the first half of the year, delivering solid revenue in challenging trading conditions, while the benefits of the proactive cost-saving measures that we took early in the development of COVID-19 are also seen in our H1 results. We were particularly pleased to sign a broad distribution agreement with BBC Studios during the quarter, underlining our ability to support premium customers across a range of satellite and terrestrial distribution methods as well as significant extensions with ProSieben in Germany and Austria. On the Networks side, we are seeing a pickup in our Government business after a slower first half, with a new and innovative use of the O3b constellation for the U.S. Government among a number of important deals won and signed in the second quarter.

Notwithstanding the resilience that our business has shown in the first half of the year, we are not immune to the impact that global lockdowns are having on a number of the markets that we



serve. We anticipate a slowdown in the pace of new business in the second half of the year and have updated our financial outlook for the full year in view of the challenges faced by a number of our customers, particularly in Mobility and Sports & Events. We were quick and early to initiate exceptional one-off cost reduction measures of EUR 40 - 60 million for 2020 to mitigate the impact of COVID-19 on our bottom line and are tracking well against this target.

Looking beyond COVID-19, 2020 has seen us make great strides in our more than two-year effort to repurpose spectrum in the U.S. for 5G while protecting the broadcast communities that we serve. Following the FCC Report and Order in February and the subsequent decision by all operators to adopt accelerated

clearing in May, we are executing strongly on all elements of our clearing and transition plan. We incorporate the financial impact of the C-Band project in our financials for the first time, including clear line of sight to almost USD 4 billion in accelerated relocation payments.

### UAE Space Agency, Yahsat and Khalifa University establish 'Khalifa University Space Technology and Innovation Centre'

Khalifa University of Science and Technology, the UAE Space Agency (UAESA), and AlYah Satellite Communications (YahSat), have signed a three-way funding agreement to establish and operate the Khalifa University Space Technology and Innovation Centre (KUSTIC), firmly committing to scientific innovations and laying the foundations for further inspiring the UAE's future space missions.

A virtual gathering in Abu Dhabi on the agreement was attended by His Excellency Dr. Ahmad Belhoul Al Falasi, Minister of State for Entrepreneurship and Small and Medium Enterprises and Chairman



of the UAE Space Agency, His Excellency Dr. Eng. Mohammed Nasser Al-Ahbab, Director-General of the UAE Space Agency, Dr Arif Sultan Al Hammadi, Executive Vice-President, Khalifa University of Science and Technology and Masood M. Sharif Mahmood, Chief Executive Officer of Yahsat.

The main objectives of KUSTIC will be to build capabilities and create a technical space hub through training UAE students in satellite design and manufacturing, conducting scientific research in space sector and applications, developing satellite manufacturing capabilities in the UAE, promoting and inspiring entrepreneurship in the space sector, supporting space science and technology initiatives of the UAE Space Agency, and focus on the design and assembly/integration/testing of small satellites through the Yahsat Space Lab.

KUSTIC will aim to achieve the UAE's vision in space exploration, technologies, and applications. It will play a crucial role in building capabilities and creating a technical hub by training UAE students in satellite design and manufacturing, conducting scientific research in the space sector and applications, and developing satellite manufacturing capabilities in the UAE. It will also promote and inspire entrepreneurship in the space sector; while supporting space science and technology initiatives of the UAE Space Agency.

The Center will incorporate the existing YahSat Space Lab (YSL), which was established in 2017 as the nationwide focal point in the design and Assembly/Integration/Testing (AIT) of CubeSats, both in terms of facilities and of expertise. All small satellite design, AIT and manufacturing activities of the Centre shall be performed at YSL. The lab produced and successfully launched the UAE's first imaging CubeSat in 2018.

### SpaceX manufactures 120 Starlink internet satellites per month

SpaceX is manufacturing its Starlink satellites at an unprecedented rate for the space industry, analysts say, as the company dives headlong into building a space-based global internet service.

Elon Musk's company told the Federal Communications Commission

in a presentation last month that its Starlink unit is "now building 120 satellites per month" and has "invested over \$70 million developing and producing thousands of consumer user terminals per month." "Invested hundreds of millions of dollars in Starlink to date," the SpaceX presentation added.

Starlink is SpaceX's ambitious plan to build an interconnected network of about 12,000 small satellites, to beam high-speed internet from orbit to anywhere in the world. The company has so far launched nearly 600 Starlink satellites and is currently building a system of ground stations and user terminals, to connect consumers directly to its network.

It's difficult to contextualize what SpaceX's satellite production rate means given the difference in size and complexity of spacecraft built by other companies. But Quilty Analytics founder Chris Quilty told CNBC that Starlink manufacturing is happening at a speed never before seen in the satellite sector. Quilty's boutique research and investment firm focuses on the satellite communications sector, which he founded after leading Raymond James' coverage of the space industry for 20 years.

"To put it in perspective, Iridium, which previously held the record for the largest commercial satellite constellation, was manufacturing satellites at the rate of about six satellites per month at the peak of production," Quilty said.

Iridium's NEXT satellites are nearly three times the mass of a Starlink satellite, at about 670 kilograms versus an estimated 260 kilograms. But, even with the caveat that each Starlink is smaller than an Iridium satellite, SpaceX is building its spacecraft 20 times as fast.



### West African nations to adopt new satellite technology to mitigate flood

Nigeria and other West African nations are set to adopt a new system of utilizing satellite technology in better predicting environmental patterns to help mitigate flood. The adoption follows an initiative by African Union (AU) Leaders and the European Union, in the training of key stakeholders in the application of the technology.

The training, which opened in Abuja and is also to be held simultaneously in other West African Countries, is being conducted by the Centre for Space Science and Technology Education (CSSTE), under the Global Monitoring for Environment and Security and Africa (GMES and Africa) initiative.

Giving insights on the training and adoption of satellite imaging, Ganiyu Agbaje, Executive Director, CSSTE Consortium, said that the use of the new technology will make it easier to predict floods and locate the people who are really affected.

According to him, the training was not to teach participants how to predict but to show them how to use additional satellite data to do their prediction better and support other methods.

He said that the technology has been on for a while around the World, adding that African leaders in collaboration with the EU initiated the training to help Africa better monitor the environment and mitigate disasters.

## OSGoF to produce maps with geospatial needs of all MDAs

The Office of the Surveyor General of the Federation (OSGoF) is to produce maps with geospatial needs for all the Ministries, Departments and Agencies (MDAs) of the Federal Government of Nigeria for proper planning and execution of projects and programmes of action.

This was disclosed by the Surveyor General of the Federation (SGoF), Surveyor Adeniran S. Taiwo while receiving officials of the Nigerian Institution of Surveyors (NIS) at OSGoF in Abuja.

The SGoF expressed delight over the amenability of the Minister for Works and Housing, Babatunde Fashola, SAN on the map-project who he said has deeper insight into the importance of geospatial data and information for planning and implementation of government projects. He added that the minister has been a great source of inspiration for OSGoF, and being its supervisory minister, OSGoF would ensure to give the best to the government and Nigerians.

Surveyor Taiwo explained that there would hardly be any meaningful implementation and execution of projects without geospatial data or information that would inform evidence-based decisions for proper planning before execution of projects.

He said geospatial maps for the MDAs would be of great value addition that would curb waste of scarce financial resource of the government pointing out that each MDA would be expected to abreast OSGoF with its geospatial needs based on its services and functions for the production of the maps.

Surveyor Taiwo commended the officials of NIS under the leadership of Surveyor Alabo C. D. Charles for its achievements so far urging them to support OSGoF in its drive to produce world-class survey contents for the Nigerian Government in order to speed up necessary development. He said OSGoF has no monopoly of knowledge and would



definitely collaborate with various professionals to achieving its mandates.

He mentioned that the Federal Government was committed to issues of surveying and mapping, and that because of its relevance has made compulsory surveying activities before the construction of government building and facilities. He advised members of the public to ensure proper surveyor by experts before embarking on any construction project to avoid loss of lives and wastes of resources.

## ITU and EIF partner to reduce the digital gender divide in Burundi, Ethiopia and Haiti

The International Telecommunication Union (ITU) and the

Enhanced Integrated Framework (EIF) have launched a cooperative project to enhance the digital ecosystem and build digital skills for women in Least Developed Countries (LDCs). The project will address the ongoing gender digital divide which, while narrowing in developed regions, has widened in developing nations and the LDCs since 2013. Across Africa, the proportion of women using the Internet is 12% lower than the proportion of men; in African LDCs, the disparity broadens to a 31% gap.

Combining their resources, ITU and EIF will enhance efforts to benefit women in Burundi, Ethiopia and Haiti. This will be achieved by building capacity at the policy level, increasing governments' ability to mainstream gender and information and communication technologies (ICTs), and by expanding



the horizons of thousands of women entrepreneurs in sectors such as textiles and apparel, and the coffee and cocoa value chains.

"More than ever before, digital technology is a key driver of women's economic opportunities," said ITU Secretary-General Houlin Zhao. "This partnership between ITU and EIF will result in vital policy support to ensure sustainable expansion of ICTs where it is most needed and will benefit women as they access and use ICTs to participate fully in their economies."

## ICASA delays spectrum auction to March 2021

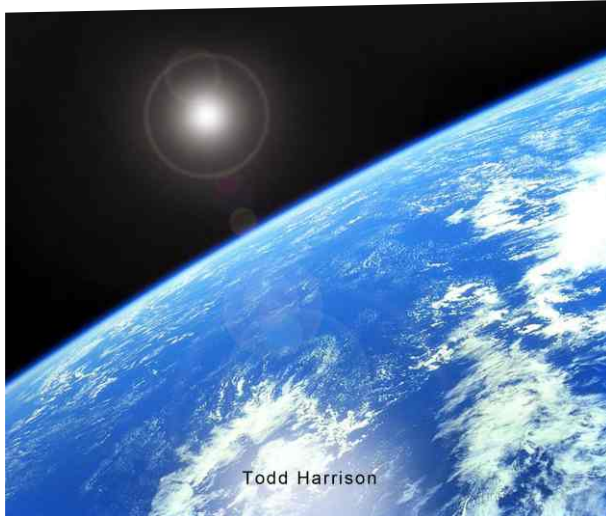
Telecommunications regulator the Independent Communications Authority of SA (Icasa) says it has had to delay the issuing of new spectrum to March 2021. The Independent Communications Authority of South Africa (ICASA) is an institution established in terms of Chapter 9 of the Constitution to support and promote democracy in South Africa. Equally important, it is an Institution specially designed to promote democracy in the Information and Communications Technology (ICT) ecosystem. ICASA is required to discharge this mandate by ensuring fairness and diversity of views broadly representing the South African society as well as providing universal access to a wide range of high-quality communications services at affordable prices in the regulation of broadcasting, telecommunications and postal services. Icasa said the invitation to apply (ITA) for both the wireless open access network (WOAN) and the international mobile telecommunications (IMT) spectrum, also known as high-demand spectrum, would be published "no later than 30 September 2020."

## Connectivity demand booms as leisure

## vessels become safer places to work and rest, reports IEC Telecom

Demand for faster and cheaper connectivity at sea is set to increase as sailing is recognised as a safer place to work, travel and holiday during the Covid-19 pandemic says satcom specialist IEC Telecom, which is experiencing an increase in enquiries from vessel operators in the maritime leisure sector.

With 'lockdowns' and restrictions easing in some parts of the world, yacht owners are now able to enjoy 'social distancing' onboard their vessels, which is leading to a boost in demand for high-speed connectivity and increased bandwidth capacity. With the focus on social distancing, yachts are becoming increasingly attractive remote offices for those able to attend to business matters while enjoying the open



sea, sunshine and fresh air. During this challenging time, sailors have an increased need to stay connected for both personal and operational purposes as well as to avoid the need to go ashore as much as possible.

The signs are pointing to an upsurge in leisure boating. Yacht chartering is seen one of the safest ways to enjoy a break at present due to the minimal contact charterers have with other people. Yachts are considered to be more hygienic, given the ratio of crew to guests and the exclusivity of being on a private boat. Affluent consumers are looking for getaways with fewer crowds, more privacy and the ability to gather privately with those closest to them. The Boat Affair platform (whose rentals are available in more than 60 countries) has seen a 23% increase in requests from customers who traditionally would opt for a hotel vacation or a seaside resort but are now seeking a safer alternative. And, according to a new survey by LuggageHero, 25% of travellers report they will try to avoid crowded commercial flights and public transportation in a post-coronavirus world.

## Intelsat to acquire commercial aviation business of Gogo

Intelsat has entered into a definitive agreement to acquire the commercial aviation business of Gogo the largest global provider of in-flight broadband connectivity, for \$400 million in cash, subject to customary adjustments.

The transaction further propels Intelsat's efforts in the growing commercial in-flight connectivity market, pairing its high-capacity global satellite and ground network with Gogo's installed base of more than 3,000 commercial aircraft to redefine the connectivity experience.

Gogo's leading commercial aviation business provides Intelsat with key airline relationships and customer-facing

capabilities, including a leading software platform, ISP and network management infrastructure. It currently serves 21 commercial airlines, including 9 of the top 20 global carriers.

This transaction will combine Intelsat's next-generation high throughput space assets with Gogo's best-in-class 2Ku antenna to uniquely position Intelsat to deliver more cost-effective and advanced commercial aviation broadband connectivity services. Passengers will benefit from an enhanced in-flight connectivity experience that delivers fast and reliable video streaming, browsing and cloud-based applications from gate to gate. Airlines can expect a fully integrated platform offering high reliability, flexibility and passenger satisfaction.

"Consumer demand for in-flight connectivity is expected to grow at a double-digit rate over the next decade, notwithstanding the impact of COVID-19. The addition of Gogo's commercial aviation business provides compelling strategic value for our stakeholders and makes strong commercial sense," said Intelsat's Chief Executive Officer, Stephen Spengler. "Gogo's business is a perfect fit with Intelsat's expansive satellite network and infrastructure due to the breadth of Gogo's technological solutions, global reach and operational excellence."

Mr. Spengler continued: "A priority growth objective for Intelsat is to extend our reach closer to the millions of customers who use our satellite capabilities to stay connected around the world. The addition of Gogo's commercial aviation business is a significant step toward this goal. We are growing beyond satellite connectivity to expand into consumer-optimized managed services."

## Egyptian Education Ministry partners with



## Orange to launch e-classes

The Egyptian Ministry of Education signed a co-operation protocol with technology company Orange Egypt to provide the hosting services and cloud infrastructure needed to operate and manage a digital e-class platform for three years. Through this agreement, Orange will provide the cloud infrastructure necessary to operate and manage the platform whose fees can be paid via smartphone, using Orange cash.

The ministry will produce an educational platform for students to display educational content. It will also determine the



technical needs related to hosting and the infrastructure necessary to launch the platform.

### Kenya's commercial capital, Nairobi to host new data centre

A new data centre is about to open in Kenya, courtesy of PAIX Data Centres, an African provider of cloud and carrier-neutral colocation data centre services. According to local press reports, PAIX (Pan African Internet Exchange data centres) plans to open the facility – called PAIX Nairobi-1 – at Britam Tower, the capital's tallest office building, in Upper Hill, Nairobi's financial district, in November.

There is, apparently, a strategic reason for this. The company has suggested that the office facilities of Britam Tower make the location attractive for international customers that are considering opening offices in Nairobi and points out that it gives them proximity and access to critical data infrastructure.



Nairobi-1 will host 240 cabinets with a total power capacity of 1.5MVA, 690 square metres of whitespace, and a guaranteed uptime of 99.982 percent, making the site highly suitable, PAIX says, for its interconnected customer community of internet service providers, telecom operators, cloud providers, content distribution networks, digital media and enterprises.

PAIX's data centre project in Kenya is supported by the Dutch government via the Dutch Good Growth Fund, providing PAIX's data centre projects with long-term growth financing.

PAIX was founded in 2016 by a team of data centre, telecom industry and investment professionals with a track record in the African market. In its data centre operations, PAIX aims to offer a leading global quality service level to its national and international customer base across the African continent.

### Nigeria's telecom sector posts double-digit growth

Nigeria's telecommunication sector has proven to be one of the biggest gainers amid the COVID-19 pandemic. The sector recorded an 18.10% growth in Q2 2020. This is according to the latest Gross Domestic Product (GDP) report released by the National Bureau of Statistics. According to the GDP report, the telecommunication sector grew by 18.1% in real terms during the second quarter of 2020, compared to 11.34% recorded in the corresponding quarter of 2019, and 9.71% in the previous quarter (Q1 2020).

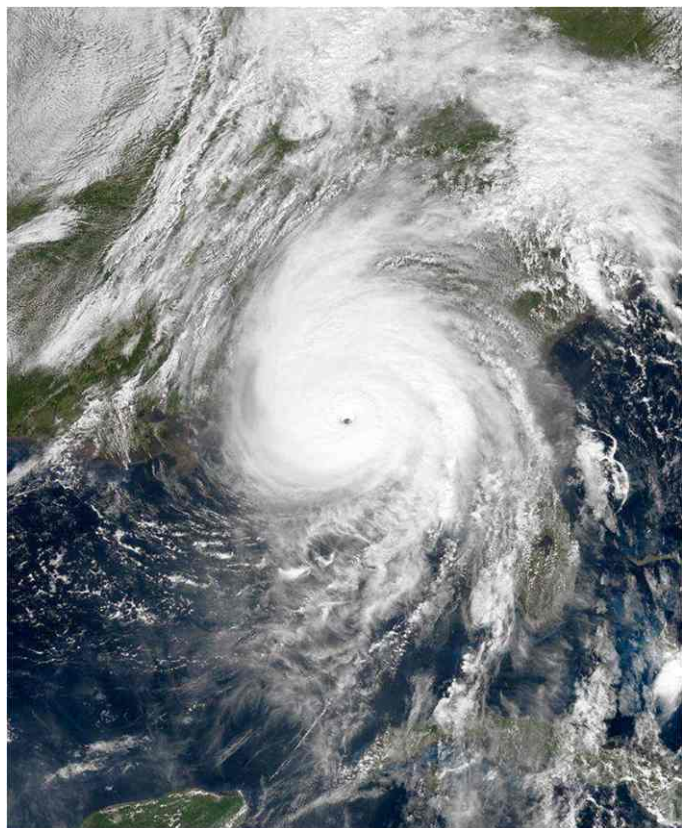
The COVID-19 induced lockdown significantly disrupted the Nigerian economy in the second quarter of 2020. However, the telecommunication sector came out resilient, driven by increased demand for data usage and growth in the number of mobile subscribers. Broadly, the Information and

Communication sector is comprised of the four activities of Telecommunications and Information Services, Publishing, Motion Picture, Sound Recording, and Music Production; and Broadcasting. Information and Communication (ICT), as a broad sector, grew by 15.1% and contributed 17.87% to the total value of real GDP (N15.9 trillion) in the quarter. In Q2 2020, the telecommunication sector grew by 18.1% year-on-year, while it grew by 24.8% quarter-on-quarter. This is the biggest growth the telecom sector would record since Q4 2018, when the telecom sector posted a GDP growth of c.19%.

### Cars with embedded connectivity to reach 200 million by 2025, with 5G adoption set to soar

A new study from Juniper Research has found that the number of vehicles with embedded connectivity will reach 200 million globally by 2025; rising from 110 million in 2020. One of the main beneficiaries of this growth will be mobile operators. The incorporation of eSIMs (embedded SIM) into the vehicle will enable operators to leverage their existing network infrastructure to claim \$3 billion of additional service revenue by 2025, by acting as an M2M (Machine-to-Machine) connectivity provider.

The new Juniper Research study, Operator Connected Car



Strategies: Future Opportunities & Market Forecasts 2020-2025, predicts that eSIMs will act as the catalyst for future operator service deployments in the connected car space. Smaller form factors and higher physical durability of eSIM modules will attract automotive OEMs to the new standard over existing traditional SIMs.

The research urges operators to leverage wholesale agreements with automotive OEMs to create steady revenue streams from the connected car market. However, operators must ensure the provision of management services, either directly, or via partnerships with established IoT platforms, to attract high spending automotive OEMs to their networks.

Research co-author Sam Barker remarked: 'As the adoption of embedded SIMs increases, operators' success in the market will be determined by which platforms can offer the most comprehensive value-added services to automotive OEMs.'

### **Azercosmos and Globecastpartner Extend Successful Partnership to Deliver Satellite Services to Africa**

Azercosmos has signed an extended partnership agreement with Globecast, the global solutions provider for media, to increase capacity and coverage across Africa. As a result of this expanded relationship with Azercosmos, Globecast is able to supply its customers across the continent with increased C-band capacity on the Azerspace-1 satellite. Globecast's platforms and their customers can now easily receive signals from the Azerspace-1 satellite and provide general entertainment, news, sports and special events coverage to viewers even in the most remote areas of the African region. As an example of the benefits of the relationship, the hugely popular Big Brother Naija Reality Shows will be aired



exclusively on the Multichoice DSTV platforms across Africa utilizing Azerspace-1's contribution coverage capacity to ingest the feeds into Multichoice's Command Centre throughout the year. The feeds are being uplinked in Nigeria and downlinked by both Multichoice and Globecast, the latter for redundancy.

"The high-quality coverage provided by the Azerspace-1 satellite is central to our partnership, alongside the technical support we receive. This cooperation provides increased opportunities and flexibility for our customers," said Jacques Andreou, Engineering Manager at Globecast. "Globecast's adaptable and innovative approach to the market is an important part of our service offering and allows us to achieve great success across Africa," said Mark Guthrie, Chief Commercial Officer at Azercosmos.

### **Gilat reports Q2 2020 results**

Gilat Satellite Networks Ltd., a worldwide leader in satellite networking technology, solutions and services, today reported its results for the second quarter ended June 30, 2020. **Adi Sfadia, Gilat's interim CEO, commented:** "The COVID-19 pandemic continued to affect Gilat's second quarter 2020 results, as we continued to see postponements and delays in orders. However, during the second quarter we began to see and are continuing to see a recovery in most of our areas of operations which is demonstrated by a significant increase in pipeline opportunities. We believe that as a result of these trends, coupled with the cost reduction initiatives we have executed and are continuing to execute, the second half of 2020 will be meaningfully better than the first half, for Gilat. "I am

pleased to report that Bosmat Halpern, Gilat's AVP Finance has been appointed as Gilat's interim CFO, and I am confident in her ability to wisely navigate Gilat's finances through these unprecedented times."

The acquisition of Gilat by Comtech Telecommunications Corp (Comtech) remains subject to certain conditions to closing, including regulatory approvals in Russia. As previously reported, Comtech filed a complaint against Gilat in the Delaware Court of Chancery seeking declaratory judgments that certain actions, if taken by Gilat in connection with Russia regulatory approval would breach Gilat's obligations under the Merger Agreement and that Gilat has suffered a Material Adverse Effect, as defined in the Merger Agreement, as a result of the COVID-19 pandemic. As a consequence, Comtech contends that it is not required to consummate the merger.

### **Algeria issues operators extra spectrum to tackle slow speeds**

Algeria is issuing its three mobile operators with additional spectrum holdings in a bid to restore connectivity after extensive network outages. Agence Ecofin reported that telecoms minister Brahim Boumzar met with senior executives from Algerie Telecom Mobile (Mobilis), Djezzy and Ooredoo after a week of nationwide connectivity problems. Boumzar confirmed that the ministry would work with regulator ARPCE (Authority for Regulation of Post & Electronic Communications) to issue extra spectrum to the operators, although he did not specify the frequencies that would be provided.

The meeting was arranged on the order of Algeria's President Abdelmadjid Tebboune, who called for a "definitive solution to the problem of low internet speed." Data speeds in Algeria have plummeted since 19th August, although TeleGeography reported that this was due to problems with international connections rather than local spectrum availability. Algerie Telecom bore the brunt of the public backlash against the issues, as the operator is largely responsible for the country's



terrestrial cross-border and submarine fibre cable connections. The operator issued a statement about the connectivity issues, saying: "This disruption has nothing to do with Algeria's national telecommunications network or its basic facilities; it is rather a fluctuation of the international network."

### **ST Engineering iDirect powers IP Access International's new FUSION product line**

ST Engineering iDirect, a company of ST Engineering North America, announced that its iDirectiQ Series Satellite Modems

have been integrated into mobile and fixed satellite internet solutions provider IP Access International's FUSION product line, providing seamless, reliable and cost-effective connectivity that meets increasingly complex communications requirements. As demand for always-on connectivity from commercial, government and emergency services organizations continues to grow, solutions that enable seamless switching between different networks are becoming increasingly essential. FUSION utilizes the iQ LTE satellite modem, which features an integrated LTE cellular modem, to create a converged solution that automatically finds and connects to all available networks, including LTE, 4G/5G and multiple satellite networks, without user intervention. This delivers reliable data communication for



several use cases where the physical path redundancy is critical.

This hybrid approach benefits markets, such as Government and Emergency Response, Oil and Gas, Mobile Banking, and Disaster Recovery, where connectivity is often limited due to their challenging operating environments. The iQ LTE modem and IP Access FUSION integration is a solution that enables customers to cost-effectively bring highly available and reliable connectivity to end users, opening up new business opportunities," said Bryan Hill, CEO, IP Access International. "The value of the IP Access solution lies in its integrated design which removes the need for multiple rack units, addressing space constraints in confined command vehicles."

### Liquid Telecom revolutionises cyber security with new offering

Liquid Telecom, the leading pan-African telecommunications group, unveiled its Cyber Security unit which offers end-to-end managed services for digital security solutions. The offering is designed to protect customers at every intersection of their digitally transformed business including network, people, and systems, revolutionising how cyber security is approached.

Cyber security is a real and imminent threat to businesses and their end-users, as highlighted by the survey commissioned in August 2020 by Liquid Telecom. IT decision makers across Africa were asked for their insights on cyber security trends, with 57% of those surveyed stating that they have seen an increase in threats over the COVID-19 pandemic period. And while many employees across the continent are returning to work, organisations are embracing a hybrid model of digital and onsite working. As such there are increasing concerns over the security of data, shadow IT and the financial implications of a security breach.

Liquid Telecom has streamlined and strengthened its cyber security offerings into one unit to address these growing

concerns. With decades of knowledge in this field and an eye on the future, the offering is designed to address the key concerns of IT decision makers, by securing businesses effectively to increase productivity.

"Although we're unveiling the cyber security unit today, Liquid Telecom is not new to this space. We have successfully secured our own network for the past 15 years, and now through our strategic partnerships with Netskope, Logicalis, Microsoft and Cyber Risk Aware we have curated the best solutions in the industry to address the changing demands of a digitally transformed business world. Allowing customers to focus on their core business offering while we manage their complete IT environment," said David Behr, Group Chief Digital Officer, Liquid Telecom.

### Liquid Telecom provides a boost to remote learning at Kibabii virtual school amidst Covid-19 pandemic

Nairobi - Liquid Telecom has connected Kibabii virtual school in Bungoma County to its high capacity fibre network with the latest digital and collaboration tools to enhance remote learning during the COVID-19 pandemic. As schools in Kenya have been closed since 15 March due to the lockdown, about 13 million students in public and private primary education have no option, but to learn from home. Virtual schools with fast internet and tools will help ensure that students remain connected and continue learning, especially important as students prepare for the upcoming Kenya national exams.

Many schools in Kenya are trying their best to maintain the curriculum via remote learning. However, due to the lack of reliable connectivity, a deficit in digital skills and the high cost of mobile data many students rely on radio and TV for their education with no interaction or feedback from the school teachers.



Having been a teaching assistant, Job WafulaNukhwanaempathised with the plight of the students and decided to take action to support them. He founded the Kibabii Online School that promotes remote learning. The virtual school has seen a steep increase in its numbers since Covid-19 outbreak. The school currently offers five lessons per class for the secondary school children and uses qualified and registered teachers to facilitate the sessions. The school was struggling with variable quality 3G mobile broadband which was hampering the overall delivery of remote learning. Despite its rural location, Liquid Telecom swiftly connected the school to its expansive and high-speed East Africa Backbone network that connects Uganda to Kenya.

Liquid Telecom is also working to help 140 schools in western Kenya to deliver online learning. By enabling them with Microsoft Teams and Office 365 collaboration tools and working with the teachers to help them deploy the tools, and to learn how to use them to teach online classes. Liquid Telecom had previously partnered with the USF fund to connect over

300 schools with internet, so that these schools are much more ready to switch to online classes.

### SpaceX to launch Turkish satellite by year-end

SpaceX will launch the fourth Turkish satellite to orbit by the end of this year, an official said. Ali Taha Koc, head of the country's Presidential Digital Transformation Office, said the satellite is being built by Airbus Defense and Space, among the pioneers in aerospace technology.

"With Turksat 5A, Turkey will have a coverage area that encompasses the Middle East, Europe, North Africa and South Africa," he added. Turksat 5A is expected to have more than 30 years of life in orbit. It will carry 42 transponders and be located at a somewhat unused Turkish orbital slot at 31 degrees East. Turkey is also building its own Turksat 6A craft for launch in 2022. Another Airbus, Turksat 5B is under construction for launch next year.

### Euroconsult charts COVID-19's shake up of in-



#### flight connectivity industry

In its latest research, Prospects for In-Flight Entertainment and Connectivity, Euroconsult provides a strategic review of the market reset resulting from the COVID-19 pandemic and its significant impact on the aviation industry. In-Flight Connectivity (IFC) has been a key driver for the entire ecosystem and constituted a \$1.4 billion market in 2019. Current restrictions on travel and health concerns, however, are expected to decrease service revenues by 20-30 percent in 2020.

The research found that roughly 9,200 aircraft were equipped to provide in-flight connectivity worldwide at the end of 2019. Despite the COVID-19 crisis, that number is projected to increase to between 15,000 and 18,000 aircraft by 2029.

Almost 110 airlines provide connectivity with the largest market in North America where only a few remaining aircraft are yet to be connected. The European market is gaining maturity in terms of penetration with the biggest airlines currently committed to an IFC solution. India could be a growth market for IFC as its regulatory environment changes following the recent grant of licenses authorizing IFC.

Euroconsult's findings are based on in-depth analysis with a focus on the strategic issues, technologies and services that are driving the industry. The research reviews prospects for both the commercial airline market as well as the business aviation market with facts and figures for year-end 2019 and projections for 2020 to 2029. It also includes an assessment of the Smart Plane concept and breaks down the value chain by network operators, service providers and equipment manufacturers.

"Intelsat's recently announced acquisition of Gogo's commercial business is an example of the reorganization of the In-Flight Connectivity industry following the COVID-19 crisis," said Xavier Lancel, Senior Consultant at Euroconsult. "While Gogo needed to take action, with its business in North America dropping by about 90 percent, Intelsat justified its acquisition on the basis that the commercial aviation business will rebound and ultimately grow. It also benefits from the ownership economics resulting from having its own satellite capacity."

Competition among IFC service providers was already intensifying even before the COVID-19 crisis, but it is likely to accelerate the reshaping of the industry. Airlines were already looking for alternative business models to lessen the financial burden of connectivity while providing a full broadband experience to its passengers. At the same time, the market for satellite operators is also becoming more competitive with evolving technologies and a massive increase and change of nature of the capacity supply in the next five years.

### PWC: Global media and entertainment industry to shrink by \$120 billion

The global media and entertainment industry is predicted to contract by 5.6 per cent during 2020 according to the annual *Global Entertainment & Media Outlook 2020–2024* report by PWC.

According to the analysts, amid a global recession, 2020 will see the sharpest fall in global E&M revenue in the 21-year history of its research, dropping more than \$120 billion in absolute terms. In 2009, the last year the global economy shrank, total global E&M spending fell by just 3.0 per cent.

However, the company does predict the industry's fundamental growth trajectory remains strong, and the report states that after the challenges of 2020, it expects the industry to reassume its growth, predicting that in 2021 entertainment and media spending will grow by 6.4 per cent.

Across the five-year forecast, PWC forecasts overall revenue growth running at a 2.8 per cent compound annual growth rate (CAGR).



With the surge in OTT revenues brought about by the worldwide lockdown, PWC predicts they will almost double in size from \$46.4 billion in 2019 to \$86.8 billion in 2024.

Not surprisingly given the rise of streaming, global data consumption is another beneficiary of the digital acceleration

powered by Covid-19. It will jump by 33.8 per cent in 2020, and will more than double from 1.9 quadrillion megabytes (MB) in 2019 to 4.9 quadrillion MB in 2024.

Werner Ballhaus, global entertainment and media industry leader at PwC, said: 'It's clear that Covid-19 has accelerated consumers' transition to digital consumption and triggered disruptive change – both positive and negative – across many forms of media. Yet it's equally evident that the E&M industry's underlying strengths and appeal to consumers remain as strong as ever.

### **Marlink's smart network technology enables SeaOwl's remotely operated vessel project**

Marlink, the leading provider of Smart Network Solutions, is providing a special purpose highly resilient satellite network



solution for the Remotely Operated Service at Sea (ROSS) project developed by offshore services operator SeaOwl. SeaOwl successfully demonstrated the concept to strategic partners including French energy major Total in early September. The ROSS project aims to bring down the cost of operations by remotely controlling a vessel from shore, initially in the offshore sector with potential application to other civilian and military craft.

The project has focused first on achieving the regulatory acceptance needed to operate without crew onboard. This has involved close work with France's Directorate of Maritime Affairs in order to secure the navigation license necessary for a demonstration voyage.

Marlink and SeaOwl held several engineering workshops to create a highly resilient and redundant connectivity and control system comprising a Sealink VSAT system with three antennas, dual satellite feeds and dual below decks equipment. The system features a unique customized dashboard interface for the ROSS system to monitor link key performance indicators including latency, jitter and throughput. The installation is built on a backbone of state-of-the-art technology and leverages Marlink's expertise in cyber security and network resilience, working closely in co-operation with Bureau Veritas ensuring compliance to meet statutory requirements.

### **ITU launches Connect2Recover to reinforce digital infrastructure in countries affected by COVID-19**

The International Telecommunication Union (ITU) has launched Connect2Recover with the support of the Ministry of Internal Affairs and Communications of Japan and the King Salman Humanitarian Aid and Relief Centre of Saudi Arabia to help countries recover from COVID-19 by expanding access to affordable and reliable connectivity. Connect2Recover will initially focus on selected countries in Africa which are some of the least well connected countries

and likely to be hit hard by the pandemic in socio-economic terms.

COVID-19 has highlighted that digital infrastructure is not just a convenience but an essential requirement for fully-fledged participation in society and the economy. Broadband connectivity has proved vital in helping countries' businesses and citizens adapt and respond to the pandemic, enabling them to access the latest health information and continue working, learning and socializing remotely. Connect2Recover seeks to expand access to affordable and reliable connectivity, which is an essential aspect of countries' COVID-19 recovery strategies.

### **Inmarsat sees in-flight broadband take off**

Rupert Pearce, chief executive of Inmarsat, a British satellite communications company, boasted record volumes of traffic over its European Aviation Network (EAN), a joint venture with Deutsche Telekom, which partners with terrestrial mobile networks.



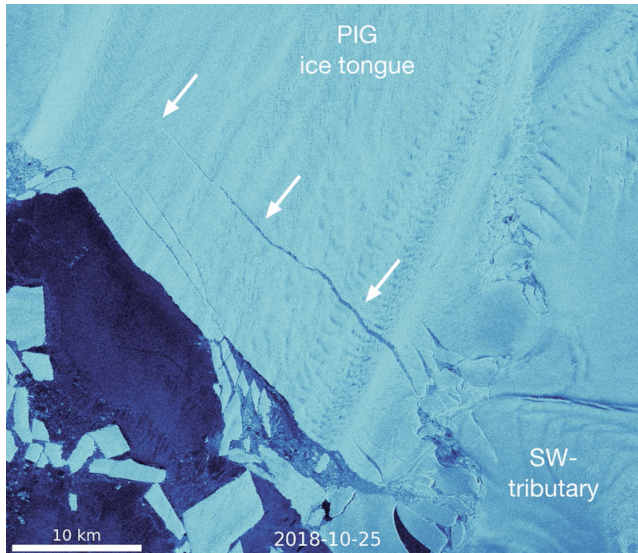
Despite global airline traffic down almost 80% in July, compared to 12 months previously, Pearce told Bloomberg that EAN data traffic hit new highs in volume during the final week of August.

The explanation, according to Pearce and Alexander Grous, an expert in airline strategy from the London School of Economics (LSE), is twofold.

First, said Pearce, there's been a bit of a pick-up in the number of short- and medium-haul flights following an easing of travel restrictions. "It suggests there's some semblance of normality beginning to return to some segments of the aviation market," he said.

Second, according to Grous, passenger habits are apparently changing. "Lots of users are basically two to three times more likely now to connect and stay connected on board than they were at the beginning of the year, before [COVIDS-19]," said the LSE man.

Pearce was nonetheless more than happy to talk up the



broadband aviation market as a whole, applauding a recent \$400 million move by rival Intelsat to acquire GoGo's in-flight Wi-Fi business.

The Intelsat-Gogo deal is "a logical move," maintained Pearce. Somewhat more vaguely, the Inmarsat CEO added that "there may well be assets that come up that make sense for us to agglomerate."

In an Inmarsat-commissioned poll of 500 professionals from across the global aviation industry between April and June, around 60% thought the sector would take between 18 months to three years to recover from COVID-19.

## Eutelsat and Paratus sign distribution agreement for EUTELSAT KONNECT capacity over South Africa

Eutelsat Communications and Paratus, have signed a multi-year distribution agreement to bring high quality network connectivity to South Africa. Paratus will leverage the unprecedented operational flexibility and power of EUTELSAT KONNECT, the new-generation high throughput satellite to bring connectivity to remote and rural locations across South Africa to businesses operating in farming, game farms and the SME segment and consumers, for home working, home schooling and general Internet use.

Launched at the beginning of September 2020, Paratus' offers, based around packages of 10, 20 and 30 mbps, with 24/7 technical support, and operating with small, cost-efficient dishes are already seeing a high level of demand, highlighting the strong need for high-speed connectivity in remote areas.

Commenting on the agreement, Managing Director, Paratus South Africa, Kallie Carlsen, said: "Getting connectivity in remote locations is not easy; while price is key to attracting customers, the quality of network – both connection and support – quickly proves more important. There is too often a disconnect between customer expectations and the delivery

of service. With the partnership between Paratus and Eutelsat we aim to overcome these boundaries and provide superior services for South Africa."

Guido Merien-van Sprundel of Eutelsat, Sales Director, Southern Africa, of Eutelsat added: "We are delighted to partner with Paratus to bring high quality, reliable connectivity to businesses and consumers in South Africa who are currently in the digital divide. This agreement reflects the significant demand on the African continent, and the unparalleled assets of the EUTELSAT KONNECT satellite in enabling it to be efficiently met. This contract also highlights the pertinence of Eutelsat's multi-channel distribution strategy."

## Globecast provides TV Everywhere OTT services to African broadcasters

Aiming to allow service providers to target viewers in the continent and also its global diaspora, Globecast has announced deals providing a range of TV Everywhere OTT services to multiple African broadcasters, including end-to-end project management. The global media solutions provider has created live streaming OTT services, including providing CDN capabilities, for a number of broadcasters. The roster includes francophone pan-African Christian channel Benie TV; Espace TV, the largest (by audience size) privately owned channel in Guinea; national public broadcast companies ORTN Télé Sahel in Niger and Télé Congo in the Republic of Congo.

Mobile/tablet/TV apps for Android, Apple and Amazon Fire TV,



which also deliver audience analytics, have been provided by Globecast as a feature when needed. Free VOD content from the channels' existing YouTube account and news feeds from their website and social networks are also included in the apps.

Globecast says that it has worked closely with each broadcaster to give them the shortest possible time to market courtesy of its TV Everywhere suite of services, project management and use of pre-approved apps

The result claims Globecast is that new and existing broadcast customers are recognising the benefits of using a single supplier for satellite and OTT delivery, from both a technical and customer service point of view. "While there are variations from country to country across Africa, internet access – and therefore OTT service access – is characterised by the use of mobile phones as the primary device to consume content, so services need to take this into account," said Frederic Torasso, Globecast, TV Everywhere product manager, explaining the commissions.

### ST Engineering iDirect powers IP Access International's new FUSION product line

ST Engineering iDirect, a company of ST Engineering North America, announced that its iDirectIQ Series Satellite Modems have been integrated into mobile and fixed satellite internet solutions provider IP Access International's FUSION product line, providing seamless, reliable and cost-effective connectivity that meets increasingly complex communications requirements.

As demand for always-on connectivity from commercial,



government and emergency services organizations continues to grow, solutions that enable seamless switching between different networks are becoming increasingly essential. FUSION utilizes the iQ LTE satellite modem, which features an integrated LTE cellular modem, to create a converged solution that automatically finds and connects to all available networks, including LTE, 4G/5G and multiple satellite networks, without user intervention. This delivers reliable data communication for several use cases where the physical path redundancy is critical.

This hybrid approach benefits markets, such as Government and Emergency Response, Oil and Gas, Mobile Banking, and Disaster Recovery, where connectivity is often limited due to their challenging operating environments.

"The iQ LTE modem and IP Access FUSION integration is a solution that enables customers to cost-effectively bring highly available and reliable connectivity to end users, opening up new business opportunities," said Bryan Hill, CEO, IP Access International. "The value of the IP Access solution lies in its

integrated design which removes the need for multiple rack units, addressing space constraints in confined command vehicles.

The iQ LTE is part of ST Engineering iDirect's DVB-S2/S2X modem series with a software-defined architecture for maximum flexibility and expansion. The integrated LTE modem offers fully automated VSAT/LTE failover and failback, WAN link affinity steering, advanced VPN connectivity, and an available SD-WAN option for robust enterprise-grade communications.

"We are delighted that IP Access has leveraged our technologies to enhance its products, enabling the best connectivity experience at the right cost point to customers doing critical work in the field. IP Access has been our long-time partner and we look forward to more opportunities for collaboration in the future," said Darren Ludington, Regional Vice President, Americas Sales, ST Engineering iDirect.

### UAE created Satellite Operations Center to cope with increased demand for distance learning

The COVID-19 pandemic has been the catalyst for a massive adoption of advanced technologies in the healthcare, education and telecommunications sectors as service providers abruptly switched to online platforms, according to speakers at the virtual edition of the Global Manufacturing and Industrialisation Summit (#GMIS2020) which is taking place from September 4-5.

Hussain Al-Hammadi, Minister of Education, and Edward Zhou, Vice President for Global Public Affairs of Huawei, convened on Saturday on a panel titled 'Pushing the limits in the healthcare, telecoms and education sectors: Bent, but not broken?' to discuss the impact of the pandemic on the education and telecoms sectors.

Al-Hammadi said the UAE was well prepared to make the shift to



distance learning platforms after the pandemic hit because in 2012 the country launched the Mohammed Bin Rashid Smart Learning Initiative which was established to offer a unique learning environment in schools through the introduction of 'Smart Classes' under which students will utilise smart devices and high-speed 4G networks as means of acquiring knowledge. The experience gained through this initiative has allowed the UAE to fine-tune educational curriculums into two versions – one for classrooms and the other for distance learning.

"We really invested a lot a long time ago in all these infrastructure requirements to enable us to continue educating in different scenarios," he said. "It's about building the best learning platform that is really smart, resilient, and meets modern requirements. Then you need to provide teachers and students with appropriate devices that enable them to enter the network and have the capabilities to use advanced applications and software to be embedded in the learning platform."

## Tunisia keen to bring broadband connectivity to schools

The Tunisian minister of education, Mohammed Hamdi, signed with Mohamed FadhelKraiem, the minister of communication technologies and digital transformation, an MoU to deploy high-speed connectivity in schools across the country.

The deal, which also includes the rehabilitation of the educational network, aims to meet the Ministry of Education's vision to digitalize and develop its working methods to improve access to knowledge for young people.

Through digital technology, the Ministry wants to give the different regions and their educational institutions the



maximum opportunity to access quality educational content. Mohamed FadhelKraiem stressed that the signing of this Memorandum of Understanding is timely, given the development of training and distance learning platforms that offer new opportunities for access to more knowledge. This partnership between the two ministries is also part of the "Digital Tunisia" strategic plan, whose objective is to achieve social integration and limit the digital divide through the popularization of access to broadband digital services.

## UAE launches mini satellite MeznSat into space

A miniature satellite, MeznSat that will monitor greenhouse gases over UAE was successfully launched into space. MeznSat lifted-off on board a Russian Soyuz 2.1b rocket from the Plesetsk Cosmodrome. The nanosat, weighing 2.7 kilograms, will be carried to the low Earth orbit altitude of 575km and the first signal is expected to come about eight hours after launch if the nanosat remains 'healthy and alive'. Developed by university students in the UAE, the nanosatellite will detect gases such as carbon dioxide and methane over the Emirates to help scientists reduce the impact of climate change. The satellite was launched into the skies along with 18 other CubeSats.

It was built by students at the Khalifa University and American University of Ras Al Khaimah (AURAK) and funded by the UAE Space Agency. "It is an honour for me to be part of developing our national nanosatellite programme," Abdulla Almesmari, a PhD student in mechanical engineering at Khalifa University who assisted with the testing and integration of MeznSat, told The National.

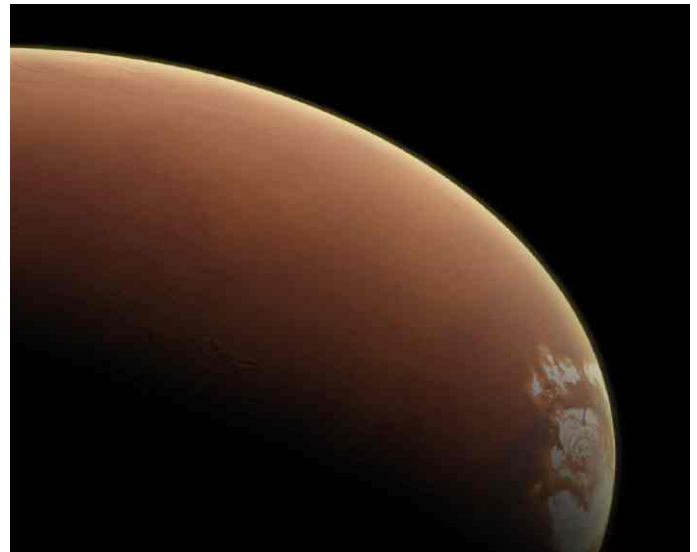
"MeznSat is a remarkable achievement for us, since it is the first UAE CubeSat with a 3-unit platform, carrying the short-wave infrared spectrometre. Looking forward to receive the first beacon from MeznSat." Maryam Saeed Al Nuaimi, an AURAK student who worked on the CubeSat's programming, said: "I am happy and proud of the success of the launch. Finally, MeznSat in space. We are waiting for the first contact." Students will use the YahSat Space Lab in Khalifa University as the primary ground station to process and analyse the nanosat's data, as well as the ground station in AURAK.

## Skytrac partnership to improve aviation satellite communications

Skytrac Systems Ltd., an Iridium partner for aviation, has become a Value-added Manufacturer (VAM) for the Iridium Certus™ 9810 modem. This expanded partnership will allow Skytrac to optimize and integrate the modem, as well as manufacture terminals leveraging the improved bandwidth of Iridium Certus.

The modem will be redesigned by Skytrac for size, weight, and power aviation grade optimizations to provide a streamlined fit for its new 2-MCU satellite communications (SATCOM) terminal, the SDL350™. Scheduled to be introduced to the market in 2021, the SDL-350 will be capable of achieving globally available broadband transfer rates of 352 kbps both to and from the aircraft.

"As a new VAM for the Iridium Certus 9810 and a valued long-time Iridium partner, Skytrac continues to produce fullservice, data-driven solutions to the aviation industry," said Bryan Hartin, Executive Vice-President, Sales and Marketing, Iridium. "We're excited to see Skytrac expand their product offerings by



designing, developing and manufacturing new products utilizing the Iridium Certus 9810 and Iridium Certus 9770 transceivers."

## Arabsat launches Tele Maroc exclusively- on BADR-5/Maghreb

Arabsat viewers in Maghreb can enjoy watching Tele Maroc - exclusively- on Arabsat BADR-5. Tele Maroc is a leading Moroccan satellite TV channel cast from the spinach capital, Madrid, showing fine entertainment, talk shows, documentaries, and sports.

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 30 years. Now one of the world's top satellite operators, and by far the leading satellite services provider in the Arab world, Arabsat carries over 500 TV channels over 200 radio stations, two pay-TV networks and a wide selection of HD channels reaching tens of millions of homes in more than 100 countries



across the Middle East, Africa, Europe, Central Asia—including an audience of over 170 million viewers within the 21 Arab countries alone.

Rachid Niny, founder of Tele Maroc, said: “We are delighted at Tele Maroc to be available on Arabsat BADR-5 over Maghreb. We rely on the remarkable improved and growing Arabsat video neighborhood across North Africa and its powerful footprint over Maghreb to ensure significant reach to our massive audience.”

“In the course of developing our partnerships and cooperation ties across North Africa; particularly in Maghreb; we are thrilled to announce today another remarkable milestone in improving Arabsat video neighborhood over Maghreb.” says Khalid Balkheyour, President and CEO, Arabsat. “We have now accomplished the distribution of Tele Maroc -exclusively- on Arabsat BADR-5, of which will join other leading channels from Maghreb active on the Arabsat BADR-5. This brings Arabsat audiences across Maghreb the best picture quality with an exclusive portfolio of top-ranked satellite TV channels.”

Operating a growing fleet of owned satellites at the 20°East, 26°East, 30.5°East, 39°East and 44.5°East positions of the geostationary orbit, Arabsat is the only satellite operator in the MENA region offering the full spectrum of broadcast, telecommunications and broadband services. This capacity will continue to expand with the launch of Arabsat’s new 6th-generation satellites, making the Arabsat satellite fleet the youngest in the region.

**Momentum announces appointment of Dr.**



**Fred Kennedy as President**

Momentum Inc. announced the appointment of Dr. Fred Kennedy as President of the Company, effective September 14, 2020. Momentum has gained significant traction since its founding in 2017, attracting dozens of customers ranging from private commercial space companies to the likes of Lockheed Martin and NASA, and penning important industry partnerships, most notably with SpaceX. Dr. Kennedy’s significant experience within the industry will help accelerate Momentum’s goal of becoming the leading transportation and infrastructure services company of the new space economy.

“We are pleased to welcome Dr. Fred Kennedy to the Momentum team,” said Mikhail Kokorich, Founder and Chief Executive Officer of the Company. “Dr. Kennedy has a proven track record of leadership and innovation throughout his career in the Department of Defense and brings a wealth of expertise in satellite systems and space technology to our team. We are confident that Dr. Kennedy’s extensive technical

experience and relationships across the aerospace and defense industry will support Momentum’s efforts to advance and deploy our leading-edge technology for low-cost satellite transportation.”

**SSPI names Dawn Harms of Momentum Inc. as the 2020 Mentor of the Year**

The Space & Satellite Professionals International (SSPI) announced that it will present its 2020 Mentor of the Year Award to Dawn Harms, Chief Revenue Officer at Momentum Inc. Dawn will be honored on October 6 at SSPI’s 15th Annual Future



Leaders Celebration for the attention, support and guidance she has provided to young professionals throughout her career. During the celebration, SSPI will also honor the “20 Under 35” space and satellite professionals to watch in the coming years and present three of them with its Promise Award for outstanding achievement.

“Dawn is known across the space and satellite industry for her leadership, her generosity and her willingness to dig in and solve problems, whether for her employer, her colleagues or young people needing a helping hand,” said executive director Robert Bell. “SSPI is privileged to be able to call attention to her work as a mentor to the next generation, which she values as highly as her many achievements in this demanding business.”

The 2020 Future Leaders Celebration will take place virtually via Zoom on Tuesday, October 6 in conjunction with the Satellite Innovation 2020 virtual conference, produced by SatNews publishers. The proceeds of the celebration go to fund SSPI’s educational, professional development and industry growth initiatives.

**ASECNA, NIGCOMSAT and Thales Alenia Space now offer African first early SBAS open service**

The Agency for Air Navigation Safety in Africa and Madagascar, ASECNA, has started to broadcast a SBAS (Satellite-Based Augmentation System) signal over Africa & Indian Ocean (AFI) region, providing the first SBAS open service in this part of the world via NIGCOMSAT-1R Satellite managed and operated by Nigerian Communications Satellite Ltd under Federal Ministry of Communications and Digital Economy of Nigeria.

This early open service is provided as part of the « SBAS for Africa & Indian Ocean » programme which pursues the autonomous provision over the continent of SBAS services, to augment the performances of the satellite navigation constellations GPS and Galileo. With improved accuracy to within a meter, and boosted integrity, availability and continuity of safety-related applications, these SBAS services will improve flight safety and efficiency in Africa, and also benefit to the

economy in many areas as land, sea and rail transport, as well as mass market applications, supporting user safety, cost-effectiveness and sustainable development.

The launched open service essentially aims to carry-out technical trials, and to undertake with partner airlines field demonstrations for aircraft and rotorcraft, to demonstrate the benefits of the future operational safety-of-life SBAS services, expected from 2024. It will also include early Precise Point Positioning (PPP) and emergency warning service to populations, which performance will be proven through other demonstrations.

The signal-in-space is generated by a dedicated system testbed, developed as part of the “SBAS for Africa and Indian Ocean” preliminary design phase, financed by the European Union and awarded to Thales Alenia Space, Joint Venture between Thales (67%) and Leonardo (33%). The “SBAS for



Africa and Indian Ocean” is based on the European EGNOS1 developed by the European Space Agency (ESA) acting under delegation of the European Commission and operated by the European GNSS Agency GSA.

The system prototype uses as reference stations network the SAGAIE network deployed by CNES and ASECNA with the support of Thales Alenia Space. The signal is broadcasted via the SBAS payload on NigComSat 1R GEO satellite of the Nigerian Communications Satellite Ltd and an uplink station deployed in Abuja (Nigeria). It is compliant to the Standards and Recommended Practices of the International Civil Aviation Organisation, and the Minimum Operational Performance Standard developed by the RTCA (Radio Technical Commission for Aeronautics) organisation. It will be visible in the whole Africa and Indian Ocean, up to the West Australian coast, and also in Europe.

**Ethiopia to complete privatisation of its**

**telecom sector next year**

Ethiopia has set a new deadline of February 2021 to complete the partial privatisation of the country’s telecommunications industry, with carriers such as Orange keen to expand into a market of more than 100 million people.

Prime Minister Abiy Ahmed’s administration is looking to auction two new mobile-network licences and sell a minority stake in the state-owned monopoly Ethio Telecom. The plan was set for earlier this year but was delayed by the Covid-19 pandemic, regulatory complexities and a thwarted attempt to hold national elections.

“We have a February, January timeline for both processes,” Eyob Tekalign, the state minister of finance, said after presenting an update on the process to government officials in Addis Ababa this week. “The reform is fully on track.”

Liberalisation of the telecom industry is at the forefront of what Mr Ahmed said in mid-2018 would be the wide-ranging privatisation of several industries, including sugar, rail and industrial parks. The plan was intended to bring in much needed foreign exchange and boost the economy, while improving connectivity across the Horn of Africa nation.

Orange is a strong candidate to win one of the two new licences, according to sources. A spokesman for the Paris-based company reiterated the carrier’s interest in entering the country and said



the firm is working on the right proposal.

**Egypt smartphone market defies COVID-19 effects, grows over 2% in Q2**

Egypt’s smartphone market grew 2.2% quarter on quarter (QoQ) in Q2 2020 to total 2.88 million units, according to the latest research conducted by International Data Corporation (IDC). While most markets in the Middle East and Africa suffered declines during the quarter, the pandemic did not hurt smartphone sales in Egypt as badly as expected. This growth was spurred by vendors focusing on pushing affordable phones into the market, while vendors also accelerated their shipments before new import taxes were introduced at the end of June.

Samsung was the market leader in Q2 2020 with 23.8% unit share, followed by Oppo in second place and Xiaomi in third. In terms of price bands, the quarter saw a remarkable shift to the ultra-low-end, with devices priced below \$100 growing their share of the market to 30.5%. In terms of screen size, the 6.5–7.0” band gained 12.4 percentage points QoQ to account for 45.4% unit share.

“While COVID-19 did not halt demand for smartphones in Egypt,

it certainly led to a change in market dynamics on both the supply and demand sides," says Taher Abdel Hameed, a senior research analyst at IDC. "The price band and screen size trends indicate that consumers were opting for more affordable phones due to tighter budgets, while vendors supplied affordable models with higher specs to cope with challenging sales conditions during the pandemic."

### **NOVELSAT, Spacecom demonstrate world's highest spectral efficiency over AMOS-17**

NOVELSAT and Spacecom have successfully demonstrated high capacity satellite transmission with spectral efficiency of 10.5 bit/Hz over AMOS-17 high performance HTS utilizing NOVELSAT DUET™ CEC™ (carrier-echo-cancellation) band reuse technology. Operating over AMOS-17 Ka HTS and Ku beams, NOVELSAT modems established a symmetrical link, reaching 64APSK modulation with 9/10 FEC rate and 2% roll-off, achieving data rate of 854Mbps over of 81.6MHz bandwidth and 753Mbps over 72MHz bandwidth, demonstrating spectral efficiency of 10.5 bit/Hz.

This extraordinary performance was achieved without any power backoff or additional satellite padding, and without requiring predistortion calibration. Connected to a 2.4m diameter antenna, the remote modem performed carrier-echo-cancellation, enabling simultaneous use of the same



bandwidth for both uplink and downlink with implementation loss lower than 0.01dB.

"NOVELSAT NS4™ waveform has proven to bring tremendous value to our customers and we are happy to demonstrate its outstanding performance over the advanced fully digital AMOS 17 satellite," said Aviv Ronai, VP Marketing and Product at NOVELSAT. "Our technological superiority makes our satellite connectivity solutions the ideal, go-to-choice for service providers worldwide who are looking to efficiently support their most demanding applications."

According to Amit Hoomash, Product Manager at Spacecom, "We were excited to demonstrate with NOVELSAT the very high throughput our customers can enjoy on AMOS-17, without having to compromise on solution complexity. The throughput and efficiencies of AMOS-17's beams are unique over Sub Saharan Africa. NOVELSAT'S modems and team proved this, while using one modem per site and small antenna. Together

with NOVELSAT, we are able to address important market segments with cost-effective, easy to deploy and maintain solutions."

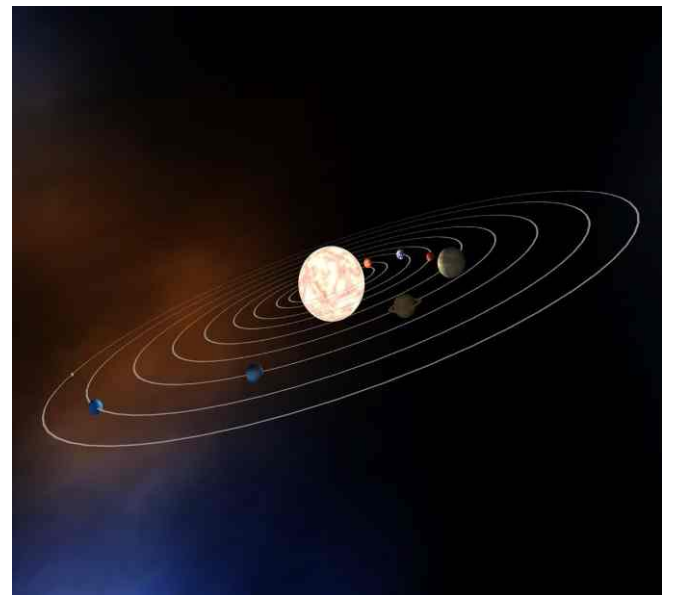
### **Airbus to build BADR-8 satellite for Arabsat, with optical communications payload TELEO**

Airbus has been contracted by Arabsat, one of the world's top satellite operators, to build BADR-8, their new generation telecommunications satellite. BADR-8 will replace and increase Arabsat's capacity and augment its core business at the BADR hotspot 26°E.

The BADR-8 satellite will be based on the state-of-the-art Airbus Eurostar Neo electric orbit raising platform giving access to a wide range of launchers.

BADR-8 will also include the innovative Airbus developed TELEO optical communications payload demonstrator. This payload will enable very high capacity analogue optical feeder link communications, as part of the development by Airbus of a new generation of optical communications technology in space to be integrated in its future commercial products, which is highly robust against jamming.

Jean-Marc Nasr, Head of Space Systems, said: "This important contract with our long-standing customer Arabsat has a special significance for Airbus Defence and Space. It is the first seventh-generation Arabsat satellite and the first Eurostar Neo satellite we are building for Arabsat after six previous Eurostar satellites. BADR-8 incorporates the best of our expertise and technologies, including a very innovative optical communications hosted payload. This further strengthens our continuing strategic partnership with the Arab Satellite Communications Organisation, which has been



connecting people by satellite across the Middle East and the world for more than 40 years."

### **SpacePath wins major order for Direct-To-Home digital satellite broadcast services**

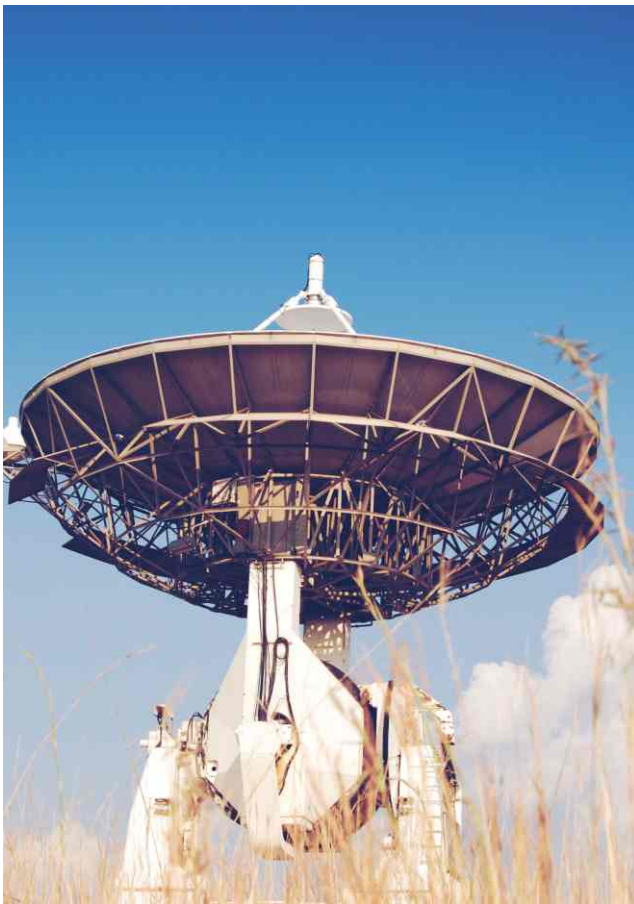
SpacePath Communications ('SpacePath') a dedicated, European-based, SATCOM amplifier manufacturer and equipment supplier, has won a major order for its small, lightweight travelling wave tube amplifiers (TWTA).

SpacePath Communications has signed an agreement with a leading African connectivity solutions provider to supply its

innovative, outdoor TWTAs. The small form-factor, high-power amplifiers will be used to provide DTH broadcast and data services to remote regions via a new digital satellite TV network.

The STA5000 series uplink amplifiers incorporate a unique compressed carbon air-cooling structure that is half the weight of copper and which does not compromise thermal performance. Additionally, new end user features include removable/washable air-intake filters for cost-effective and simplified maintenance, quick-release connectors for ease-of-use and ethernet connectivity for convenient remote monitoring and control.

Newton Burnet, managing director and co-founder, SpacePath Communications, said: "Our new outdoor SATCOM amplifiers were selected due to their compact size and weight which are critical factors when mounted in antenna hubs. While engineered to consistently deliver reliable, high



efficiency performance in any environment, the many innovations designed into our TWTAs are also intended to meet real-world broadcast needs that help streamline amplifier maintenance, drive down cost and simplify overall system operation.

### **"Intelsat entrusts Arianespace for the launch of three C-band satellites on Ariane 5 and Ariane 6**

Commercial launch services provider Arianespace and fleet operator Intelsat signed an agreement for two launches of three satellites, Galaxy 35, Galaxy 36 and Galaxy 37, on Ariane 5 and Ariane 6 launch vehicles. This contract continues the outstanding relationship that dates back to 1983 between Arianespace and its customer Intelsat, operator of the world's largest integrated satellite and terrestrial network.

Arianespace will launch the Galaxy 35 and Galaxy 36 satellites together as a stacked pair in 2022, and Galaxy 37 in 2023. Both launches will be performed from Europe's Spaceport in South America aboard an Ariane 5 and Ariane 6 launch vehicle, respectively. All three satellites will operate in the upper portion of the C-band spectrum, a range of wireless radio frequencies that is used for critical telecommunications and data connectivity around the world. With this mission, Intelsat will



meet the accelerated C-band spectrum clearing timelines established by the U.S. Federal Communications Commission (FCC) earlier this year, in order to make the lower portion of the C-band spectrum available to mobile network operators to further the rollout of critical 5G services. Maxar Technologies will build the three satellites, all using Maxar's industry-leading 1300-class platform, in its manufacturing facility in Palo Alto, California.

"We couldn't be more thrilled to sign this agreement to launch three payloads for Intelsat. It is a profound honor to see the perpetuation of this deep and lasting relationship with Intelsat while enabling the roll-out of 5G in the U.S. We are all the more honored that Intelsat has opted for an Ariane 6 vehicle for the first time," declared Stéphane Israël, CEO of Arianespace. "Intelsat looks forward to continuing our longstanding partnership with Arianespace to launch these satellites, which are critical to accelerating the clearing of the C-Band spectrum and ensuring the U.S. maintains its leadership in 5G and other advanced telecommunications technologies," said Mike DeMarco, the Chief Services Officer of Intelsat.

### **iKO Media Group ensures business continuity with DataMiner during COVID-19 pandemic**

Skyline Communications, the global leader in AI-powered end-to-end network management and orchestration solutions for the media & broadband industry, is proud to say that the DataMiner System deployed at iKO Media Group has helped them maintain an efficient and reliable operation, and ensured business continuity during the coronavirus pandemic.

iKO Media Group is an end-to-end media service partner for broadcasters and content owners who provide tailor-made solutions with dedicated services to a wide range of global and local networks. These services include content distribution, playout services, OTT & IP services and occasional use. Their state-of-the-art teleport in Rome has over 20 satellite dishes for receiving and transmitting. Uplink services are provided to broadcasters to distribute programming to cable and telco television headends, to satellite television facilities, to mobile operators, or directly to consumers over satellite (DTH) or over the top (OTT).

When interviewed about the operational impact of the COVID-19 crisis, RashminAbhani, Senior Technical Manager at iKO Media Group, commented, “DataMiner helped us to keep our operations up and running even with a very limited number of people on site. As the platform is providing us in-depth and end-to-end monitoring and control at our teleport and remote facilities, it was possible to keep the complete operation going with just a single on-site person. We experienced no operational impact at all. Using DataMiner, we can manage our system resources across multiple countries, across all products and software systems from many vendors, and across many



technology domains, from a single user interface in a secured manner. DataMiner has always been key in enabling us to efficiently deliver the highest possible quality of services, but it is at times like these that it truly shows how powerful and indispensable it is.”

### **Intelsat launches Cloud connect service enables enterprise users to securely and reliably access the cloud anywhere, anytime**

Intelsat, operator of the world's largest integrated satellite and terrestrial network, announced a new capability as part of its global managed networking service: Intelsat Cloud Connect, which helps enterprises realize the full value of their cloud investments by ensuring their end users can access their cloud applications anywhere, anytime—even where traditional terrestrial connectivity infrastructure is unavailable.

Initially available to Intelsat FlexEnterprise customers, Cloud Connect currently supports Microsoft Azure ExpressRoute connectivity via the FlexEnterprise managed service, providing network service operators, and the businesses they serve, with a new level of flexibility in adopting a growth-oriented cloud strategy.

Secure and reliable cloud access has become critically important as more enterprises turn to the cloud for mission-critical computing applications. Enterprises with geographically dispersed teams often face challenges in accessing their cloud services, preventing them from fully realizing the benefits and the value of their cloud investments.

For example, enterprise end users in remote or underserved locations may have limited or unsecured access to connectivity infrastructure, making it difficult—if not impossible—for them to access documents or connect to important supply chain or operations information, data analytics and even email on their enterprise networks.

Intelsat's Cloud Connect solves these access limitations for enterprises by providing a private gateway between a cloud service provider and cloud users, utilizing Intelsat's global integrated space-and-terrestrial network. This private gateway

helps enterprises quickly extend cloud-based applications to virtually all of their locations, and to their remote workers—without having to build costly new terrestrial network facilities or rely on less secure, less reliable public internet connections.

“With Cloud Connect, there are really two customers who benefit: our network service provider customers who can add a highly demanded feature to their enterprise networking offerings, and their enterprise customers, who can use it to quickly, cost-effectively and securely extend cloud-based applications where and when they need them—regardless of the condition of the local connectivity infrastructure,” said Jean-Philippe Gillet, general manager of Intelsat's networks business. Last year, Intelsat became an Azure ExpressRoute partner, enabling enterprises to private access Microsoft cloud services from anywhere with a more secure and consistent experience than the public internet offers.

### **NASA, UAE Space Agency Sign Historic Implementing Arrangement for Cooperation in Human Spaceflight**

NASA and the UAE Space Agency (UAESA) signed an Implementing Arrangement (IA) that outlines cooperation across a range of areas related to space exploration and human spaceflight. The document was signed by H.E. Dr. Ahmad Belhouli Al Falasi, Minister of State for Higher Education and Advanced Skills, and Chairman of the UAE Space Agency, and NASA Administrator Jim Bridenstine during a ceremony at the 69th International Astronautical Congress, being held in Bremen, Germany Oct. 1-5.

The IA falls under the overarching Framework Agreement signed between the UAESA and NASA in June 2016, which



established a framework for areas of cooperation in ground-based research; sub-orbital research; research and flight activities in low-Earth orbit (LEO); and human and robotic exploration in the vicinity of the moon, on the lunar surface, and beyond.

Bridenstine said, “As NASA builds cooperation for the return of humans to the Moon for long-term exploration and utilization, we welcome the opportunity to expand our partnership with the UAE Space Agency as it builds its significant capabilities on Earth, in low-Earth orbit, and beyond. UAE is currently working with U.S. universities to build an orbiter “Hope”, to launch in 2020 and reach Mars in 2021. I'm delighted to sign this agreement signifying our deepening relationship as we move forward into the next phase of exploration.”

## Azercosmos and ViewMedia establish partnership to deliver satellite solutions

Azercosmos has established a formal partnership with ViewMedia, which operates in the field of global broadcasting services and broadcasts television and radio channels over multiple platforms worldwide. ViewMedia will provide digital satellite services to its customers in the Middle East, Europe and Africa via Azerspace-1 satellite.

The company broadcasts more than 150 TV and radio channels worldwide from many terrestrial platforms and ensures easy distribution of video content to carriers through its high-quality infrastructure. "This partnership will enable us to provide uninterrupted distribution of popular channels to millions of our viewers, particularly in the African region," Safia Rana, ViewMedia's Commercial Director stated. ViewMedia's modern and high-tech broadcasting networks will guarantee customers optimal and efficient use of Azerspace-1 satellite's resources," noted Mark Guthrie, Chief Commercial Officer at Azercosmos.



## Azam TV Migrates Services to EUTELSAT 7C With Multi-year Contract Extension and Additional Capacity

Azam TV has completed the migration of its video platform from the EUTELSAT 7B to EUTELSAT 7C satellite, with a multi-year extension of the existing contract and an incremental capacity commitment.

One of Africa's leading pay-TV operators, Azam will leverage the enhanced performance of Eutelsat 7 C to distribute some 120 channels in a mix of standard and high definition across its footprint covering Tanzania, Uganda, Malawi, Kenya and Rwanda.

Commenting on the deal, Patrice Paquot, Deputy Regional Vice President, Sub Saharan Africa of Eutelsat said: "We are honored to continue to partner with Azam, one of our anchor customers at the 7° East position as it successfully expands its broadcast offer. 7° East has become a new DTH hotspot for Sub-Saharan Africa and a key pay-TV neighbourhood for Eastern Africa with some of the fastest growth rates in the region."

Jacob Joseph, Deputy Chief Executive Officer of Azam added: "Every Azam TV household will have the opportunity to enjoy a wide variety of local and international programmes with excellent signal quality. We are delighted to rely on Eutelsat to leverage the unparalleled reach of its 7° East position."

## NSR report: \$68B opportunity for top 5 non-GEO HTS constellation players

NSR's latest HTS Satellite Constellations: A Critical Assessment, 3rd Edition report deep dives into satcom feasibility for MEO and LEO orbits within a competitive scope of 5 players who lead the race to launch and showcase business viability. The report is a must-have for any player evaluating the LEO/MEO constellations market: end users, service providers, financiers, suppliers, competitors and governments across all regions.

The report bases the analysis on goal-based IRR's for each constellation to deduce necessary demand and revenue segments in order to close the business case. The report also depicts risk within each segment to objectively analyze each constellation on the basis of Architectural, CAPEX, and Competitive Strengths.

Given a range of technical and business complexities, LEO and MEO Constellations are inherently difficult to assess. NSR analyzes over 40 parameters to arrive at detailed business models and establishes under which conditions each constellation can succeed. As LEO/MEO constellations hold the promise of expanding the Total Addressable Market amidst a turbulent time for satcom, several challenges still exist in making this reality happen. NSR explicitly states these challenges in this report and the path to profitability. Internal Rate of Return (IRR), Cumulative Revenues, and Net Cash at End-of-Life are target metrics, from which NSR also derives Lifetime Avg. Fill Rates and Weighted Avg. Wholesale Pricing to give the user a clear perspective of fleet use and price elasticity within the system.

## Broadband Commission calls on world leaders to prioritize universal connectivity as fundamental to sustainable development & global recovery



Universal broadband access is the vital catalyst needed to drive global economic recovery and accelerate lacklustre progress towards the UN Sustainable Development Goals, according to a new report released by the UN Broadband Commission for Sustainable Development.

The COVID-19 pandemic has significantly underscored humanity's growing reliance on digital networks for business continuity, employment, education, commerce, banking,

healthcare, and a whole host of other essential services. Yet today, almost half the global population has still never accessed the internet, and hundreds of millions more struggle with slow, costly and unreliable connections, often through remote locations like internet cafés.

The Broadband Commission for Sustainable Development's 2020 State of Broadband report, released at the Commission's 10th anniversary meeting earlier today, includes a rallying call to world leaders and heads of industry to place universal broadband connectivity at the very forefront of global recovery and sustainable ..

## Russia to launch Angosat-2 telecoms satellite for Angola in March 2022



The Angosat-2 telecoms satellite that Russia is developing for Angola will be orbited in March 2022, Reshetnev Information Satellite Systems Company General Director Nikolai Testoyedov told TASS..

"We are due to launch the satellite in March 2022," the company's chief said. The company is now making the satellite platform, he added.

"The work on the payload of the European company Airbus is the project's most critical part. That is why, we have established all the necessary relationships, held meetings and are continuing this work. Simultaneously, we have started new work for the Angosat - our satellite platform," he stressed.

The company will create the platform very quickly using its accumulated potential and considering that its production process is highly unified. Now the work is proceeding according to the schedule approved by the customer, the chief said.

The Angosat-1 telecoms satellite was launched by a Zenit-2SB carrier rocket with a Fregat booster from the Baikonur spaceport on December 26, 2017. The contact with the satellite was lost on December 27 after its separation from the booster. Attempts to restore the contact with the satellite were made until mid-January 2018 while it stayed within the area of direct radio visibility from the territory of Russia. After that, the Angolan side recognized the Angosat-1 telecoms satellite as unserviceable.

At the same time, Russia's Energia Space Rocket Corporation reported that Russia and Angola had agreed on making the Angosat-2 satellite instead of the lost space vehicle. The Russian side will also provide C-and Ku-band frequency resources to Angola for communications while the second satellite is being manufactured.

The Energia Space Rocket Corporation reported in its consolidated financial statements in May that the work to develop and launch the Angosat-2 telecoms satellite for Angola to replace its predecessor Angosat-1 that was out of order had been assigned to the Reshetnev Information Satellite Systems Company.

The Angosat satellite will assist the telecommunication services such as television, internet, and contribute to digital inclusion and cohesion of all Angolans and creation of national competences in space engineering and technology..

With a planned lifespan of fifteen years, the satellite has sixteen C-band and six Ku-band transponders to provide telecommunications services to Angola. The coverage range of the C-band reception signal may reach all Africa and Europe.

At least 47 Angolan aerospace engineers, trained in Argentina, China, Brazil, Japan and Russia, guarantee the functioning of "Angosat", Angolan satellite to go soon into orbit. The engineers team is comprised of trained engineers in several sectors namely 13 in service channel, nine system analysis, seven in planning, six in network management, six flight directors, four ballistic experts and two project managers.

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### **New ITU study estimates US\$428 billion are needed to connect the remaining 3 billion people to the Internet by 2030**

The International Telecommunication Union (ITU) has published *Connecting Humanity - Assessing investment needs of connecting humanity to the Internet by 2030*, a comprehensive new study that estimates the investment needed to achieve universal, affordable broadband connectivity for all humanity by the end of this decade.

*Connecting Humanity* posits that nearly US\$ 428 billion is required to connect the remaining 3 billion people aged ten years and above to broadband Internet by 2030. It is an ambitious goal and a major infrastructure investment challenge.

"Meeting the investment necessary to bring every person online by the end of this decade will require an unprecedented and concerted effort from the public and private sectors," said ITU Secretary-General Houlin Zhao. "The new *Connecting Humanity* study led by ITU is the much-needed roadmap that will guide decision-makers on

the journey towards accessible, affordable, reliable, and safe digital technologies and services for all."

The study examines costs associated with infrastructure needs, enabling policy and regulatory frameworks, and basic digital skills and local content at both the global and regional levels, as well as how to mobilize the unprecedented levels of financing needed to extend networks to unserved communities.

Over the past several months, the COVID-19 pandemic has exposed different types of inequalities within and across countries and regions, including those related to quality of access, affordability and use of the Internet.

With so many essential services pushed online, there is a real and present danger that those without broadband Internet access could be left ever further behind. Hence assessing investment requirements to reach affordable universal connectivity is important to any country concerned with their ability to achieve the Sustainable Development Goals (SDGs).

### **Telia trials 5G-connected lighting for broadcasters**

A Telia Denmark trial with broadcast company TV2 and lighting specialist BB&S demonstrated how 5G could reduce production costs and complexity. BB&S provides lighting for Hollywood productions and TV studios all over the world. More than 100 lamps are typically used in studio lighting, and each lamp is connected with a power cable and control cable.

Telia, TV2 and BB&S successfully tested a lighting set-up using only one lamp and 5G connectivity to control lighting and all lamps wirelessly. The solution could significantly reduce costs as well as provide real-time performance data from each lamp to optimise the lighting. The technology could also make it possible to control lighting remotely



without the need for technicians to be on set.

"We have looked at the potential business value 5G can bring to our customers and the industries they operate in and found that it has the potential to substantially impact content distribution and content production," said Claus Berthou Madsen, 5G Program Lead, Telia in Denmark.

### **SES advances digital transformation with cloud-first strategy, expanded agreement**

SES announced plans to significantly advance its digital transformation across its enterprise, operations and development of new services for the cloud-scale era. As a cornerstone of the strategy, SES signed a multi-year agreement with Microsoft to be an Azure Orbital partner as well as to accelerate and expand the use of Microsoft Azure across its operations and jointly develop cloud-based video and data connectivity managed services.



As an Azure Orbital partner, SES will be co-locating and managing O3b mPOWER gateways with Microsoft Azure locations so its customers are always only “one-hop” away from their Azure cloud services anywhere in the world. In addition, SES customers will enjoy improved network performance, speed-to-market, flexibility and scalability to route over Microsoft’s global network and inject value-added, cloud-based managed services such as enhanced security, SD-WAN, and other network functions into the service chain.

Additionally, to support customers migrating to the cloud, SES has established a corporate cloud cross-functional team responsible for driving cloud adoption within its own enterprise and operations, and defining, developing and launching seamless cloud, content and connectivity



solutions across all of the company’s key market segments. These cloud-based solutions will enable SES customers to enjoy the agility, flexibility and cost-optimisation they require in capitalising on new revenue opportunities. Under the corporate cloud initiative, SES is also moving its IT systems and operations to cloud-based automated services and applications.

## Rack Centre announces \$100m expansion to create West Africa’s largest data centre

Rack Centre, the leading carrier neutral data centre operator in West Africa, has announced an expansion programme that will increase capacity to a total net lettable white space of 6000 square metres and allow for 13MW of IT power capacity in its Lagos campus. This will be in addition to the current expansion already underway to double existing capacity to 1.5MW and 1,200 square metres of white space in early 2021. The expansion will bring unprecedented carrier neutral scale to West Africa and is in response to increasing demand for data centre space from cloud uptake, telecommunication investment and outsourcing of IT facilities by enterprises in the region. In March 2020, Actis, a London private equity firm, announced an investment in Rack Centre, taking a controlling stake in the business alongside Jagal. The funding for this expansion will come from a \$250m pan-African data centre platform established by Actis and Convergence Partners, a leading ICT infrastructure investor in Africa. In addition to Rack Centre, the platform is also actively developing additional buy and build opportunities across Africa, to establish a network of carrier neutral data centres aimed at catering to carrier, cloud and hyperscale customers. Tim Parsonson, co-founder of Teraco Data Environments, the largest carrier neutral operator in Africa, joins the Board as Chairperson. The platform has also engaged Frank Hassett, a veteran of the

global data centre industry and previous Vice President of Infrastructure at Equinix, who brings over 1300MW of build and operate experience, to assist with hyperscale expansion.

“Africa is at the start of a critical time in its development, as the 4th industrial revolution offers the chance to leapfrog many of Africa’s challenges and harness the immense potential of its people. Convergence Partners is delighted to partner with Actis in accelerating the growth of high quality data centre infrastructure, an indispensable part of the foundation of this revolution in the region.” said Andile Ngcaba, chairman of Convergence Partners.

## Innovation Challenge for Africa’s Top Space-Tech Ideas

An Africa-wide innovation challenge, modelled on the successful SA EO Challenge, is seeking the best ideas in the downstream application of space technology. The Space-Tech Innovation Challenge 2020 will identify and provide business development support, as well as exposure to investors and markets, for the top 10 African innovators who are using geospatial intelligence to service African industries including agriculture, insurance, retail and conservation.

The African downstream space industry is one of the fastest growing markets in the world, representing a \$7bn opportunity, and yet only 0.5% of investments in space-tech globally go to African companies.

“There is massive room for investment into the African space-tech sector,” says Kamal Ramsingh, CEO of ZASpace, the industry body for the geospatial sector in



South Africa and the convenor of the Space-Tech Innovation Challenge.

“ZASpace is launching the Challenge, with the support of SANSA, to develop local talent and ensure that African businesses service African demand for geospatial intelligence,” says AndiswaMlisa, Earth Observations Managing Director at the South African National Space Agency (SANSA).

Examples of companies which have been through previous Challenges include Aerobotics, which just landed R100m in investment funding from Naspers Foundry and is opening a US office. Aerobotics uses aerial data to monitor crop health and support farmers in decision-making.

## INMARSAT, a critical catalyst for commercial UAV growth

These are exciting times for the unmanned aircraft systems (UAS) industry. Forecasts suggest the next

decade will see exponential growth in commercial Unmanned Aerial Vehicles (UAVs) – more commonly known as drones – and subsequently the entire ecosystem that ensures the safety of airspace for manned and unmanned vehicles.

Business Insider Intelligence states that UAV market size is expected to reach \$ 63,6bn by 2025 (up from \$4.4bn in 2018). This impressive outlook is fuelled by the growing number of vehicles expected in the sector. At present there are 1.1 million UAVs flying and this is predicted to rise to 10 million by 2027 – a tenfold increase, according to the Teal Group's World Civil Unmanned Aerial Systems 2019 Market Profile & Forecast.

Inmarsat is uniquely positioned to act as a catalyst for the safe and rapid growth of the commercial UAS industry,



thanks to its world-leading heritage in global communications and state-of-the-art satellite networks, built for mobility.

An important advantage comes from our market-leading expertise in the communication, navigation and surveillance (CNS) fields – in other words, keeping flying things apart and making sure their locations are known all over the globe – which is further augmented by our UAV experience with civil and military governments. This unique expertise lends itself perfectly to integration with Unmanned Traffic Management (UTM) – akin to Air Traffic Management (ATM) for aircraft. Inmarsat's military-grade cybersecurity and robust L-band network with its committed investment roadmap combine to make the best solution to connect unmanned aerial vehicles.

### **Cairo Film Festival to honour Mona Zaki with FatenHamama award**

Zaki is known for her roles in films including 'SeidyfeGameaAmrekiya', 'Africano', 'Taymour w Shafika', and 'Abu Ali'. The Cairo International Film Festival has announced that it will award Egyptian actress Mona Zaki with the FatenHamama Award for Excellence during the opening ceremony of the 42nd Edition in recognition of her career and outstanding body of work. The film festival is scheduled to take place from December 2 to 10. Zaki started her career early in her teens. She played her first role with the prominent actor and director Mohamed Sobhi in "Bel Arabi El-Faseeh".

Some of her films include SeidyfeGameaAmrekiya, Africano, Taymour w Shafika, and Abu Ali. Among Mona's iconic roles is the one she played in Cinderella. She also played a complex character of a kind and sweet femme fatale in Afrah Al Qobba. Zaki won an award for her role in Dam El Ghazal, where she portrayed the character of a young underprivileged neighbourhood sweetheart living

amidst political turmoil and terrorism. Aside from her acting career, Zaki is a UNICEF ambassador who has contributed to raising awareness on many national charity and advocacy campaigns, many child-related topics, including child labour, malnutrition, poverty, the effects of violence on children and FGM.

"Mona Zaki is the quintessential star of her generation. Through her work she has become a role model setting a great example of success for women working in Egyptian cinema," said Mohamed Hefzy, the festival's President. He also added, "With her daring and intelligent career choices, she has been able to achieve the difficult balance of both critical and commercial success. "She always knows when to say no, and therefore she retains her glamour and stardom in addition to the respect and appreciation of the public even if she is absent for some time. Cairo International Film Festival is happy to award her the FatenHamama Award for Excellence at the opening ceremony of the 42nd edition".

### **Algerian Alsat-1B satellite: four years in orbit**

The Algerian medium-resolution earth observation satellite Alsat-1B has just completed its fourth year in orbit since it was launched and placed in orbit on September 26, 2016 by the Indian launcher PSLV C 35, and continues its mission of observation of the earth in the best operational conditions, from its sun-synchronous orbit at an altitude of 670 km.

It is equipped with a powerful camera providing national users with high quality image products, according to five different levels of processing, in panchromatic (12 m resolution) and multispectral (24 m resolution in standard mode or 12 m in enhanced mode) modes. Alsat-1B provides scenes with a large swath: 140 km, covering a total area of 22,500 km<sup>2</sup>.

Since its launch, ASAL's teams of engineers have been monitoring it and verifying the nominal operating state of its various subsystems (on-board computer, camera,



radiofrequency modules, solar panels, thruster, etc. ...), In order to guarantee an excellent level of geometric and radiometric quality of the images for the benefit of national users, from the Alsat-1B ground segment, at the Oran Satellite Development Center. Since the launch of the Alsat-1B satellite in 2016 to date, 9,130 products have been generated covering a total area of over 205 million km<sup>2</sup>.

### **SpaceX's Starlink satellite broadband service nears public beta**

SpaceX CEO Elon Musk says the company is close to public beta testing on its Starlink satellite broadband service after the launch of 60 additional satellites aboard a Falcon 9

booster. "We will be able to roll out a fairly wide public beta [service] in northern US and hopefully southern Canada," he tweeted. "Other countries to follow as soon as we receive regulatory approval."

The satellites launched this week will first need time to reach their operational locations. Smallsat News reports: Normally it would take about 2-3 weeks following launch to place a flight of satellites into their designated positions. Musk's SpaceX rockets have launched around 775 satellites into orbit and is expected to place another 60 into orbit before the end of October. However, a batch of



satellites launched in May 2019 have been deliberately de-orbited. SpaceX has yet to give a reason for the de-orbiting. Spaceflight analyst Jonathan McDowell says that 39 satellites were de-orbited from that May 2019 launch.

## Eutelsat announces successful 8-year bond issuance

Eutelsat Communications announced the successful issue by Eutelsat S.A., of 8-year senior unsecured bonds (the "Bonds") for a total of €600 million.. Eutelsat has taken advantage of the current competitive market environment to raise long-term financing with an 8-year maturity on attractive terms. The transaction was well received by a diversified investor base, demonstrating the market's confidence in Eutelsat's long-term business model.

The Bonds will be issued at 99.619 per cent and will be redeemed at 100 per cent of their principal amount at maturity. They will have a coupon of 1.500 per cent per annum and will be cleared through Euroclear France, Clearstream and Euroclear. An application will be made for the Bonds to be listed on the Official List, and admitted to trading on the regulated market, of the Luxembourg Stock Exchange. The Bonds will mature on 13 October 2028. Delivery and settlement are expected on 13 October 2020.

The Bonds will be used to fully redeem the €500 million principal amount bonds issued in June 2016 at a fixed rate of 1.125 per cent per annum and due June 2021, as well as for general corporate purposes. The net proceeds of the Bonds will be temporarily invested in short-term, low-risk, liquid investments until they are used for their stated purpose.

## SpaceX provides satellite internet service to towns hit by wildfires

Residents in Washington state recovering from the wildfires are remaining online, thanks to SpaceX's satellite broadband network. The company's Starlink system has been supplying the emergency internet to residents in Malden, a town of about 200 people, where an estimated 80 percent of the homes have been destroyed by the wildfires. Washington's Emergency Management Department tweeted a photo of a Starlink satellite terminal acting as a

public Wi-Fi hotspot. "Malden, WA is an area where fiber and most of the town burned down. Without this equipment, it would have been much harder for folks to get internet in that area," the department added in a follow-up tweet.

"SpaceX provided seven terminals for our agency to use for free, where we saw the most need," the state's Emergency Management Department told PCMag. Other Starlink terminals are supplying emergency broadband around Bonney Lake, Washington, where some local residents were also forced to evacuate due to the wildfires.

"The terminals are being used for free public Wi-Fi, but we also used them for incident command vehicles out at the Bonney Lake, WA wildfire," the department added. "SpaceX has not given us a timetable on when they need the equipment back. They've been pretty generous."

The department declined to answer questions about the speed and latency rates for the emergency internet, and instead told PCMag to ask SpaceX. But according to CNBC, the latency rates have been reaching about 30 milliseconds, which is on par with ground-based internet.

"I have never set up any tactical satellite equipment that



has been as quick to set up, and anywhere near as reliable," Washington State Military Department's IT division head Richard Hall told CNBC in an interview.

SpaceX didn't immediately respond to a request for comment. But CEO Elon Musk responded to Washington's emergency management department in a tweet: "Glad SpaceX could help! We are prioritizing emergency responders and locations with no internet connectivity at all," he wrote.

Earlier this month, SpaceX revealed that Starlink is currently capable of delivering 100Mbps download speeds using around 700 satellites. However, the company plans on one day achieving 1Gbps internet speeds by launching thousands of more satellites into space with the goal of supplying fast broadband across the globe.

## Ethiopia readies to launch second satellite

Ethiopia is in the final stages of launching its second remote-sensing satellite into space, with the help of China, as the country seeks to advance its space science development. In an exclusive interview with The EastAfrican, the Director-General of the Ethiopian Space Science and Technology Institute (ESSTI), Dr Solomon

Belay, said that the country's second satellite will be launched on December 20, 2020, from China's Taiyuan Spacecraft Launch Site.

Named ET-SMART-RSS, the second earth observation nano-satellite was designed by Ethiopian engineers in collaboration with China's Smart Satellite Technology Corporation under an initiative co-funded by both Ethiopia and China.

The satellite, according to Dr Solomon, has improved resolution features that would enable it to capture and send high-quality images to its command centre in Addis Ababa. "The major mission of the second satellite is on flood and disaster prediction," he said, adding that "agriculture and environment are also its secondary missions."

Further, the satellite is expected to collect data in areas in Ethiopia not covered by the first one. "The first satellite couldn't cover all territories of Ethiopia but the second satellite will fill these gaps," Dr Solomon said. The first satellite, named ETRSS-1, was launched on December 20, 2019. It is used for weather forecast, environment, and crop



monitoring. According to the officials, the data collected from space is in high demand and is being used in universities and research centres.

Ethiopia is among several African countries that have built and launched satellites to advance economic development and scientific innovation in line with the African Union policy on space development adopted in 2017.

### **Thuraya's New Tracking and Monitoring Service Set to Boost Safety and Efficiency on Fishing Vessels**

Thuraya, the mobile satellite services subsidiary of the UAE's Al Yah Satellite Communication Company (Yahsat), is collaborating with FrontM to launch ThurayaSatTrack, a cloud-based tracking and monitoring service that significantly increases operational efficiencies on board fishing vessels. Designed for the top-selling ThurayaMarineStar voice, tracking and monitoring solution, SatTrack will be available to users very soon.

In spite of digitalization and increased influx of information, the high cost of integrating third-party services and solutions is limiting the growth of the fishing industry. ThurayaSatTrack is a low-cost turnkey subscription service that provides interactive, real-time fleet tracking to monitor vessels. It enables operations with detailed maps, up-to-date weather layers and customized alerts with position reporting. ThurayaSatTrack helps MarineStar users stay in command, gain vital market advantage and contribute to sustainable fisheries by improving compliance with national and international regulations.

### **SES Simplifies Live Broadcast and Sports Events with new IP Switch Solution**

At one point in time a major challenge in live news and sports production was to capture exciting moments and replay them in a matter of seconds. Today, the challenge has been upped. It's not just compelling content and speed that are important, but also simplicity when managing live content and the ability to deliver it to multiple platforms.

With that vision in mind, SES has taken on the challenge of upgrading the capabilities of its SES 360 live events management app. Ultimately, we wanted to make live feed management and IP distribution much easier with a new platform within the SES 360 ecosystem – SES IP Switch.

SES IP Switch comes at the perfect time. Live coverage of sports and events around the world is ramping up after temporarily being shut down due to the COVID-19 lockdown. Broadcasters, content owners, sports organizations, and media companies are looking for ways to increase efficiencies and speed up the distribution of live broadcast and sports through various channels. To find out more about the newly developed features, we asked Ariel Nishri, Vice President of Video Product Development at SES, to tell us about SES IP Switch and why it's a groundbreaking solution.

SES IP Switch is the ideal solution for content owners and broadcasters seeking additional options to satellite distribution, fiber networks, redundancy or proprietary transport solutions. The IP Switch combines complementary technologies with self-booking options, a strong service layer, live monitoring, 24/7 NOC, and add-ons to enhance the management and distribution of live feeds around the globe. One of our customers is a leading sports association. While they are based in the U.S., the sport itself is international and features players from all over the world. The customer wanted



to assist broadcasters with following players from their specific country or region as action is taking place simultaneously. They ended up setting up seven different cameras during a recent event, using SES IP Switch to deliver live feeds directly to takers in Asia via IP with almost nonexistent latency. This was a great solution for them, because fewer broadcasters could fly to the U.S. to cover the event due to the COVID-19 restrictions. Putting seven different feeds up on satellite would have been cost

## Yahsat signs contract with Airbus to build Thuraya's next generation system

Airbus has been selected by Al Yah Satellite Communications Company (Yahsat), the UAE's leading global satellite operator, to build Thuraya 4-NGS, the next generation mobile telecommunications system that will drive the continued advancement of Thuraya's L-band business. Thuraya 4-NGS will deliver higher capabilities and flexibility while increasing capacity and coverage across Europe, Africa, Central Asia and the Middle East, enabling next generation mobility solutions for all customer segments, including defense, government and enterprise.

This is a major milestone in Yahsat's commitment towards



transforming Thuraya and rolling out its next-generation system, which entails a complete overhaul of its space and ground platforms, enabling a new set of services, products and solutions, across a greater coverage area. The new capabilities will drive leadership across many strategic product lines, such as maritime, IoT, and data solutions offering a wide spectrum of throughput capabilities and the highest speeds available in the market, while reinforcing Thuraya's leading position in the MSS voice market.

Thuraya's next generation system will provide a world of opportunities to customers, service partners, hardware manufacturers and integrators, enhancing user experience across land, sea and air to support multiple customer segments, including government, consumer and enterprise.

Furthermore, an advanced portfolio of solutions to support government and defense users will accelerate Thuraya's leadership in this market, both within the UAE, regionally and globally. Meanwhile, all existing products and services will continue to be supported by Thuraya's space and ground segments, enabling service continuity during and after the transformation programme.

This latest commitment from Yahsat takes its total committed investment to date to well over US\$500 million, and more is anticipated in the coming years, including an option with Airbus to build Thuraya 5-NGS (an additional satellite identical to Thuraya 4-NGS), strengthening its coverage and capabilities across the Asia Pacific region.

Khaled Al Qubaisi, Chairman of Yahsat's Board of Directors and CEO of Mubadala's Aerospace, Renewables & ICT platform stated, "This commitment by Mubadala and the Government of Abu Dhabi underscores Yahsat's position as a market leader, pioneer and disruptor. Moreover, it is another key step in reinforcing the UAE as a front-runner in the global space and satellite industry, laying the foundations for sustainable growth and development in the sector for years to come."

## Momentus expands into Eastern Europe and the Middle East with new EnduroSat contracts

Momentus announced two contracts with EnduroSat, the European designer of spacecraft for business applications and space exploration missions, expanding Momentus' service offering into Eastern Europe and the Middle East. The 6U and 1U CubeSats missions will launch in February 2021 on the second Vigoride demo mission onboard a SpaceX Falcon 9 rocket.. The Shared Platform for Applied Research and Technology Affirmation (SPARTAN) is a 6U CubeSat that will carry a total of seven technology and commercial payloads on a single bus. This agreement marks the pilot new service mission for EnduroSat. By simplifying satellite technology, making it accessible and enabling shared missions in Low Earth orbit, the company aims to empower SMEs, universities and individuals to become active players in exploration and commercialization of space.

QMR-KWT is a 1U CubeSat intended to be Kuwait's first nanosatellite. The mission is funded by the Kuwaiti company Orbital Space in partnership with EnduroSat. The educational mission will allow students from around the world to learn more about satellite communications by writing software code to be uploaded and executed on one of the satellite's onboard computers in an out-of-this-world opportunity for students to Code in Space. This service agreement marks the first Middle East customer (indirectly) for Momentus.

## NSR: Satellite M2M/IoT continues on growth trajectory despite COVID-19

NSR's M2M and IoT via Satellite, 11th Edition report, published today, forecasts \$12.4 billion in revenues to be generated over the next 10 years. Although some M2M and IoT applications will be negatively impacted by COVID-19 in the short term, long term prospects look solid; given the overall value proposition and mission-critical features M2M/IoT services provide. The future growth story, and game change, rests with Smallsats, taking the industry from steady single-digit growth to highly robust CAGRs. Lower price points will unleash unaddressed use cases. Higher volumes



will likewise lead to higher ARPUs, changing the overall demand dynamics of numerous verticals. "That is not to say that MSS and VSAT offerings will lose their competitive edge or role in the marketplace. On the contrary, these longstanding platforms will continue to play an enduring role in the M2M/IoT growth story," states Alan Crisp, NSR Senior Analyst and report lead author.

In terms of key growth verticals to watch out for, Agriculture and Construction will witness the strongest increases. The more traditional vertical segments, notably Transportation & Cargo, along with Energy and Maritime, provide a solid revenue base. All verticals have specific requirements, and there is no clear line in the sand relegating one platform as the best fit for particular vertical over another. "The technology mix is evolving where the interplay between MSS, VSATs, and Smallsats lead to a competitive landscape where co-competition could lead to higher penetration of all platforms as customers

are given a diverse toolkit to service various requirements,” adds Crisp.

### SpaceCom and Ignite Power Partner to Provide Connectivity Solutions for e-Health in Africa

Israeli telecom satellite operator SpaceCom and Ignite Power (the pan-African developer and financier of solar solutions) announced the signing of a strategic cooperation agreement on October 13, 2020. The two companies have agreed to collaborate to provide connectivity solutions for e-health in sub-Saharan Africa.

SpaceCom will provide high-speed connectivity for its



AMOS-17 satellite while Ignite Power will provide its off-grid solar energy solutions and sustainable diagnostic systems. Combined, they will form an effective basic infrastructure for the delivery of digital medical services to communities and rural areas.

Local populations and medical teams will then have immediate access to medical specialists around the world, as well as to cloud-based data analytics. With the support of medical experts around the world, doctors and nurses in rural Africa will also have the opportunity to improve their knowledge of new medical treatments and procedures.

Dan Zajicek, CEO of SpaceCom, said that “providing Internet connectivity to rural areas in Africa is a major pillar of SpaceCom’s strategy to bridge the digital divide”.

He explained that the “partnership with Ignite Power is a big step forward to have a pan-African impact. Together, no place is too far away for us. It is an honor to be able to make a difference in people’s lives and it is invaluable to see the level of app

### Mercy Ships uses SES Networks' Maritime solution to bring healthcare to world's deprived regions

Mercy Ships, the leading humanitarian mission delivering vital healthcare and medical training in some of the world’s most economically deprived regions, has announced it will be using life-saving connectivity solutions provided by SES Networks to provide better healthcare services, the two companies announced today.

The *Global Mercy*, the newest and the world’s largest civilian hospital ship, will leverage SES Networks’ Signature Maritime Solution, bringing about a substantial change in diagnostics and treatment onboard for its patients. The high-performance connectivity services will enable the *Global Mercy* to fully implement remote viewing for a compact digital scope and CT scanner that enables specialist pathologists to remotely diagnose a raft of complex, life-threatening, or deadly diseases onboard.

Mercy Ships will also leverage the connectivity to expand services and leave local communities with sustainable skills to care for their own. The *Global Mercy* medical staff will

have the possibility to run live HD video training sessions from the operating room on board to deliver unparalleled medical training and support.

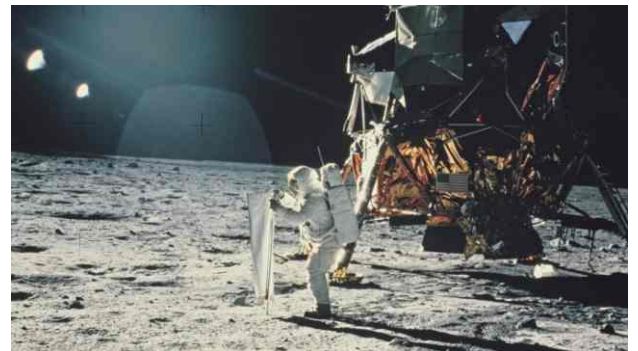
Dave Shwadlenak, Vice President of Information Services at Mercy Ships said, “By increasing our connectivity by 10-fold, we will have access to multiple gigabits of capacity, low latency and a lot more flexibility. SES Networks is fundamentally changing the level of services we offer and the legacy of sustainable healthcare we can establish before the *Global Mercy* departs. The majority of our patients have an income of less than USD \$2 a day and can’t access quality healthcare without Mercy Ships. Thanks to SES Networks we have been able to expand the life-transforming surgeries and medical care that we can provide, and I’m looking forward to seeing the difference it will be making to hundreds of people’s lives every single week.”

### Go for launch! Intelsat brings space STEM to students in Africa

Intelsat is now partnering with XinaBox to deliver space-focused STEM learning tools to teenagers across the African continent. Intelsat is sponsoring scholarships, each worth hundreds of dollars, for 20 students in Africa to access XinaBox’s dedicated space STEM kits and educational programs, which culminate in students designing, building and launching satellites into space.

“Building the pipeline of the next generation of satellite engineers begins with our partnership with XinaBox,” said Christell Meyers, Intelsat’s Sales Director in Africa. “Sparking that tech interest at such a young age inspires future leaders who will soon lead the way with advancements we never dreamed possible.”

XinaBox (pronounced “X in a box”) removes barriers to participation in the growing STEM academic field and economy. Its XinaBox Kits provide a rapid hardware



development platform, specifically designed and manufactured for STEM applications in schools and universities. Using commercial standard electronics components, students are able to design and build circuits, code using multiple formats and conduct experiments, without specialist equipment or lab.

Through building, experimenting, and creating working electronic devices, crafters, students and tinkerers learn critical STEM skills, including coding, electronics, data gathering and analysis, control, and all the principles of Internet of Things (IoT), while engaging with the sensory environment around them. This approach uniquely bridges the virtual worlds of software, the cloud, and big data, with students’ real-world surroundings.

“When the Intelsat team suggested supporting African students on our flagship program, we were excited and inspired. Our primary goal is to give access to space for all,” noted Judi Sandrock, one of the co-founders of XinaBox. “Intelsat’s values and ours are totally aligned, with the students and their futures at the core. Intelsat’s support will

allow the XinaBox Space STEM program to accelerate as we move into 2021.”

Intelsat is sponsoring 20 XinaBox Space STEM program scholarships, with successful candidates meeting the following criteria: between 15 and 18 years of age, born and currently living on the African continent, demonstrates a passion for, and knowledge of, science, technology, engineering and mathematics (STEM)

has a clear interest in all things “space”, access to the internet, and a smart device for virtual workshops, i.e. can run a browser-based collaboration tool (camera not essential),



browser skills and proficient in English (the first program will be delivered in English)

Students with an interest in the scholarship who meet these criteria are encouraged to apply before the deadline: November 30, 2020 at 5 p.m. SA. The application process requires completing an online form, a space quiz and submitting a short explanation building the case for why you should be selected for this unique program.

### **Africa wildlife tracking uses ORBCOMM's satellite IoT to support worldwide conservation efforts**

ORBCOMM Inc., a global provider of Internet of Things (IoT) solutions, announced that Africa Wildlife Tracking (AWT), the leader in tracking wildlife, is leveraging ORBCOMM's advanced satellite IoT technology to track and monitor animals of all sizes to support their conservation efforts. With the added threat of the COVID-19 pandemic and the need to supply local populations with food, poaching is likely to increase, making ORBCOMM's IoT solutions more important than ever in helping AWT protect endangered wildlife.

Headquartered in South Africa, AWT is utilizing ORBCOMM's state-of-the-art satellite modems to provide secure, near real-time GPS tracking and monitoring of large animals such as elephants in some of the world's most remote regions and densest forests. Radio-frequency identification (RFID) transmitters on smaller animals such as wild dogs and cheetahs communicate with the ORBCOMM devices on the elephants' collars and transmit data to AWT's proprietary software applications. The ORBCOMM modem's small size and low-power consumption transceivers have resulted in improved longevity and performance in the battery-powered elephant collars. By having access to near-real-time data, researchers, conservationists and game reserves can extrapolate and analyze the information, deliver insights into animal behavior and gain visibility into situations when animals are under threat of poaching through alarms, tamper detection and geofence alerts.

ORBCOMM's ubiquitous satellite connectivity is critical to enabling AWT to track and monitor animals in their natural habitats. ORBCOMM's ruggedized IoT devices can

withstand these complex environments, extreme weather conditions and tough terrain, which is often dusty, muddy and covered with dense forests. In addition, ORBCOMM's robust devices are highly reliable in the field, which is extremely important given the extensive costs, resources and logistics involved in putting tags and collars on the animals AWT tracks.

### **Human Settlements tracking for improved service delivery during and post a pandemic**

The outbreak of COVID-19 increased the need to fast track service delivery in informal settlements to ensure adherence to physical distancing measures and basic hygiene. The Government of South Africa established several interventions to fast-track the provision of shelter and services to informal settlements dwellers in efforts to curb the spread of coronavirus.

Data on the location of informal settlements is traditionally collected through ground surveys – mainly during censuses. Censuses are conducted every 5-10 years resulting in the data being outdated whilst the collection of data for special projects results in incomplete data, as the survey will target



only the area of interest.

Remote sensing technology provides an opportunity to map and monitor human settlement developments including informal settlements over a larger geographic area more frequently. The data can be used to support planning and targeted surveys whilst reducing delays in project implementation time. The National Department of Human Settlements has been working with SANSA towards the development of human settlement products and services to help create situational awareness on the location and status of informal settlements. SANSA created a dashboard using data derived from medium to high resolution satellite imagery. The dashboard shows the spatial distribution of informal settlements and quantifies the area covered by informal settlements per administrative boundaries. The information provided on the dashboard can be used during planning of services required by communities and to track progress made on the upgrade of informal settlements. The dashboard also provides information on informal settlements that are closer to rivers and wetlands. These settlements may be contributing to pollution or environmental degradation and hence may require urgent attention.

### **Kenyan Space Agency awards nanosatellite development grants to local universities**

The Kenya Space Agency (KSA) has awarded a research grant to eight public universities for nanosatellite development and operational space weather study under the Research Chairs (RC) programme. Following an evaluation by a panel of judges, the University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, Technical University of Kenya, Moi University and Kenyatta University were each awarded a research grant of \$ 9,189.33 (Kshs 1,000,000). The aim of the nanosatellite development project is to build the capacity of a local university to develop space systems and enhance their understanding of space science, technology and applications. The objective of the operational space weather project is to develop a space weather monitoring network that will provide real-time monitoring of space weather events to mitigate against adverse conditions in the space environment.



These events affect aviation safety, global navigation satellite systems, electric power transmission grid, pipelines, radio communications and surveying. Following evaluation by a panel of judges, the consortium of Taita Taveta University, University of Eldoret and Dedan Kimathi University of Technology was awarded a grant of \$45,946.66 (Kshs 5,000,000). The awards were officially presented during the launch of the Kenya Space Agency Strategic Plan 2020-2025 on October 21.

## Pioneering ship traffic detection from space

AISSat-1 Norway's first national satellite, was launched on the 12th of July 2010. It was one of the first satellites in the world to detect AIS signals in real time from polar orbit, and is still at work in space. AISSat-1 detects signals from the maritime collision avoidance system Automatic Identification System (AIS), mandatory for all vessels of 300 or more gross tonnage. These signals communicate a vessel's identity, speed and bearing, and may thus be used for monitoring ship traffic. Base stations along the coast receive AIS signals from ships at sea, but are only able "see" signals within its line of sight, and are thus restricted to monitor traffic in coastal waters.

AIS receivers on satellites high above the Earth have no such limitations and can monitor ship traffic anywhere on the globe. The data from Norway's AIS satellites are used by Norwegian authorities to monitor ship traffic, maritime resources, environmental crime, as well as to support anti pirate operations and search and rescue at sea.

## An operational success

AISSat-1 was developed by the Norwegian Defence Research Establishment (FFI), the Norwegian Coastal Administration (Kystverket), the Norwegian Space Agency, and Kongsberg Seatex of the Kongsberg Group. The satellite's original purpose was to test detection of AIS signals in space. But even the first data were so accurate that it was clear AISSat-1 could function

as an operational satellite. Soon, several Norwegian departments wanted access to these data and started using them in their day to day operations. ArveDimmen, director for the Department For Maritime Safety at the Norwegian Coastal Administration, likens it to switching on the light at sea to monitor the traffic there.

## From AISSat-1 to AISSat-2

Small satellites are smaller and less costly than typical-sized satellites, and are usually made from commercial off the shelf products meant for use on Earth. Thus, small satellites tend to have a shorter life span in space. However, AISSat-1 demonstrated that detection of AIS signals in space was possible, and that a small and cost effective satellite could handle this operational job.

This made Norway pioneers in using small satellites for operational services, and caught international interest and attention. Other countries wanted ship traffic data from space too. Today, the Norwegian Coastal Administration exchanges AIS data with several other nations, as well as the European Maritime Safety Agency, which monitors ship traffic in Europe.

With the success of AISSat-1, a twin satellite, AISSat-2, was developed and launched on the 8th of July 2014. This satellite has been another operational success for Norway. Another AIS receiver from Kongsberg Seatex was launched to the International Space Station (ISS) in an experiment called Vessel-ID. This experiment has been one of the longest on the ISS, and it was awarded by NASA, who even made a video about the project and its life saving results.

## A world leader in detecting maritime signals from space



The successful Norwegian AIS satellites have demonstrated for both authorities and decision makers that small satellites are a useful and cost effective way to test new technology, which benefits a wide range of user groups as well as society in general. Because the Norwegian small satellites and their payloads are developed in-country, they also increase the experience and competence of Norwegian industry and research. - During the development of AISSat-1 more than 10 years ago, we realized that the new international market for small satellites had a huge potential, and we aimed specifically for that, says Gard Ueland, CEO of KongsbergSeatex.. According to Ueland, this commercial market, based on miniaturized technology and often called NewSpace, has made it possible for even small countries to develop their own space-based solutions for national needs.

**Global market for Earth observation services to reach \$8 billion by 2029, from \$4.6 billion in 2019**



In its research report, "Earth Observation Data & Services Market," Euroconsult provides in-depth analysis of Earth Observation (EO) satellite systems, commercial EO data, and the value-added services that contribute to the sector. With a global market projected to reach \$8 billion by 2029, growth is expected to be driven by a mix of defense and new commercial markets, supported by the arrival of new constellation operators with low-cost solutions.

In 2019, the total value of the industry was \$4.6 billion with the data market reaching \$1.6 billion and value-added services (VAS) contributing \$3 billion. Defense accounted for 64% of the data market, while environmental monitoring was the largest user of VAS.

The research addresses the demand dynamics for nine vertical markets, including: defense, infrastructure, environment, natural resource monitoring, energy, location-based services, disaster management, maritime and finance. It also provides analysis of the demand dynamics of eight regions: North America, Latin America, Europe, Russia and CIS, Asia, Southeast Asia and Oceania, Middle East and Africa. In addition, aggregated figures of the data market are also broken down by sensor type and resolution as well as by customer type: U.S. defense, non-U.S. defense, nondefense market.

More than 50 companies have announced their intention to develop Earth observing constellations, representing roughly 1,800 small satellites, the majority of which are under 50kg. This proliferation of new constellations results from a record year for fundraising in 2019, with more than \$800 million invested. These new constellations will compete with the incumbent players for lower accuracy and higher revisit rate data which is expected to put pressure on pricing.

As data price points come down, especially for one-meter ground resolution that can be leveraged for value-added services, the data market is expected to slow, despite increased usage.

## Maroc Telecom: Growth of the Broadband Park continues



Maroc Telecom has just published its consolidated results for the third quarter of 2020, marked by continued growth in Fixed-line activities in Morocco. Over the first nine months of 2020, the activities in Morocco generated a turnover of 15,729 million dirhams, down 3.6% compared to the same period of 2019. This decline is explained over there fall in mobile revenue, which suffers from the impact of the crisis, in particular on international entry and roaming activities. This decrease is mitigated by the increase in Fixed income. As of September 30, 2020, the Mobile fleet amounts to 19.7 million customers, down 2.8% over one year because of decline in prepaid stock (-3.5%). The effects of the health crisis are exerting significant pressure on the Mobile

activities, which recorded a turnover down 5.5%, to 10,132 million dirhams.

At the end of the first nine months of 2020, the mixed ARPU amounted to 55.1 dirhams, down 6.1% over one year.

The fixed park, which grew by 6.7% over one year, now has nearly 2 million lines at the end of September 2020, while Broadband customer base improved by 10.4% to reach 1.7 million subscribers, driven by the Double-play and Fiber Optic offers. The Fixed Line and Internet activities in Morocco achieved a turnover of 7,093 million dirhams, up 2.0% compared to the same period of 2019, driven by Fixed Data

"In this context of a global health crisis and tougher competition, the international diversification strategy, initiated by Maroc Telecom several years ago, once again



demonstrates its success. International assets allow the Group to improve its resilience in this difficult environment. Maroc Telecom has also shown a great capacity to adapt to face the effects of the crisis, through the adoption, from the start of the pandemic, of cost optimization plans and optimized management. investments. The Group is also continuing to modernize its infrastructure and services in order to offer customers the best quality and the widest coverage in all countries of presence. Maroc Telecom, a committed operator, is positioning itself as a catalyst for digitization and the fight against the digital divide. " , declared Abdeslam Ahizoune, Chairman of the Management Board on the occasion of the publication of the quarterly results.

## Thuraya SatTrack to boost safety and efficiency on fishing vessels

Thuraya, the mobile satellite services subsidiary of the UAE's Al Yah Satellite Communication Company (Yahsat), is collaborating with FrontM to launch Thuraya SatTrack, a cloud-based tracking and monitoring service that significantly increases operational efficiencies on board fishing vessels. Designed for the top-selling Thuraya MarineStar voice, tracking and monitoring solution, SatTrack will be available to users very soon.

In spite of digitalisation and increased influx of information, the high cost of integrating third-party services and solutions is limiting the growth of the fishing industry. Thuraya SatTrack is a low-cost turnkey subscription service that provides interactive, real-time fleet tracking to monitor vessels. It enables operations with detailed maps, up-to-date weather layers and customised alerts with position reporting.

Thuraya SatTrack helps MarineStar users stay in command, gain vital market advantage and contribute to sustainable fisheries by improving compliance with national and international regulations.

Shawkat Ahmed, Chief Commercial Officer of Thuraya stated: "Thuraya SatTrack is an integral part of our SeaLite service portfolio that provides fishing operators a competitive edge within the maritime industry. As the demand for compliance and access to information soars, satellite connectivity and smart applications are the only realistic and affordable means of ship-to-shore and inter-ship communications. By packaging SatTrack with Thuraya MarineStar, our aim is to provide partners and customers a multifunctional, reliable and affordable end-to-end solution that delivers significant cost savings from improved onboard safety and efficiencies."=

Thuraya SatTrack provides critical updates about vessels anywhere within Thuraya's network that covers 80% of the world's fishing hubs. Subscribers can also use it to remotely exchange data, establish and monitor geofences as well as access fish-catch reports in real-time, thereby reassuring regulatory bodies and buyers that the catch brought ashore is both legally caught and fresh.

### ITU launches Innovation Challenges 2020

The International Telecoms Union (ITU, the UN agency for information and communication technology) has released details of its Innovation Challenges 2020, an open global competition platform for innovators and ecosystem builders to present their ideas and projects, empowering them to transform their communities into thriving digital societies.

Adopting a Covid-19 theme for 2020, this year's competition seeks entries designed to nurture an inclusive digital world.

The completion supports the ITU's drive for countries to have policies and strategies for ICT-centric innovation and calls on innovators, entrepreneurs, policy-makers, leaders and change makers to bridge the innovation divide

There are three challenges to choose from:

The Digital Change-maker Challenge covers a wide range of topics from cybersecurity and regulation, to digital inclusion and climate change, and calls for participants to provide innovative solutions to real-life problems faced by stakeholders in their communities, especially considering value chain competitiveness and global disruption due to



COVID-19.

The Ecosystem Best Practice Challenge looks for ecosystem builders to identify best practices that allow innovators to develop sustainable and resilient solutions to navigate technological change and bridge the digital divide.

The Women in Tech Challenge, in cooperation with the EQUALS Global Partnership, invites tech innovators to help and empower women in various sectors, including agriculture, fashion, and health.

### Spacecom and ST Engineering iDirect partner on HTS low power demonstration

#### on AMOS-17

Spacecom operator of the AMOS satellite fleet, and its long-term partner, ST Engineering iDirect announced the successful demonstration of VSAT return capabilities on AMOS-17.

The demonstration resulted in an exceptionally wide return link for a small VSAT of 40Mbps (15Msym) using the iDirect iQ 200 modem's Adaptive TDMA return over AMOS-17's high power C-band HTS beams. The combination of the 2.4m C-Band terminal and AMOS-17's high-performance beams generated a highly efficient solution. The large return data rate enabled simultaneous transmission of multiple high data streams from South Africa to Europe with a small antenna, resulting in the low-power Communications-on-the-Pause (COTP) solution. This opens up many operational and business opportunities to customers, such as emergency



deployments, government applications, coverage of events and backhaul services.

Conducted from the UK-based SMS Teleport, an AMOS-17 European Gateway partner, the modem and antenna were installed in a communications truck located between Johannesburg and Pretoria, South Africa. The truck was provided by Telemedia, a leading provider of broadcast and teleport services across Africa.

The iQ 200 is a DVB-S2/DVB-S2X modem with Adaptive TDMA returns, combining high-performance features with mobility, making it an ideal solution for real-time, cost-effective, small to medium enterprise applications, such as IP trunking for disaster response and emergency services as well as mobility solutions such as maritime.

### Nigeria to construct 6 ICT Parks around the country

Nigeria is set to construct 6 ICT Parks through the States Communications Commission (NCC) in the country's six geo-political zones in a bid to promote socio-economic transformation of the West African country. The Project basically encompasses the construction and equipping of fully-functional Tier-4 Digital Industrial Complex (DIC) in each of geo-political zones across the country.

The executive vice chairman (EVC) of NCC, Mr. Umar Danbatta said that the construction of four of the ICT parks has already begun in Abeokuta for the South-West, Enugu for the South-East, Maiduguri for the North-East and Kano for the North-West geo-political zones. Those for the North-Central and the South-South geo-political zones he said they are underway. Regarding the commissioning of Nigeria's construction of ICT Parks, Mr. Danbatta stated that that would take place at different times, hopefully beginning from the end of this year. He also insisted that based on the projects

national spread structure, no part of the country will be left out as beneficiaries of the initiative.

### **Airtel Africa partners Mukuru to facilitate cross-border money transfers within Africa**

Airtel Africa plc, a leading provider of telecommunications and mobile money services in 14 countries across sub-Saharan Africa and Mukuru, one of Africa's largest remittance organisations, announced a partnership which will enable Mukuru customers to instantly send cross-border transfers directly to Airtel Money customer wallets in 12 African countries.

This partnership will be particularly beneficial for customers making intra-Africa payments from Southern Africa where Mukuru has a leading presence. Customers also benefit from no longer having to physically go to an Agent to receive cross-border payments. Once Airtel Money customers receive the funds, they can be used to pay utility bills, goods and services, transferred to family or can be cashed out at any of Airtel Africa's exclusive branches, kiosks and agents.



Ragunath Mandava, CEO, Airtel Africa, commented "This partnership empowers those without a bank account to be included in the formal financial ecosystem and to move money conveniently, seamlessly and securely. At a time when intra-Africa cross-border payments are of strategic importance, we are pleased to be working together on cross-country mobile money transfers, while also supporting local economies."

Andy Jury, CEO, Mukuru, confirms, "This partnership exemplifies the collaborative spirit in which Mukuru is engaging with other industry leaders to provide universal access to cash and digital financial services across the continent. The enablement of digital money transfers between Mukuru and Airtel Africa customers means we can offer greater choice to the hardworking diaspora when providing for their families back home. The freedom to choose the solution best befitting your personal circumstances is pivotal to true economic empowerment"

### **MultiChoice Group unveil new initiatives Against covid-19**

The MultiChoice Group is proud to announce its latest initiative in the fight against COVID-19. The group has supported a number of initiatives in the fight against the spread of the

pandemic which continues to wreak havoc across the globe, and it is being acutely felt across Africa.

Early in the spread of the pandemic the organisation harnessed the power of its platforms to ensure that its subscribers across the continent were given access to credible and accurate information. As part of its ongoing efforts to raise awareness through information, the Group has come on board as an official supporter of the United Nations' global COVID-19 awareness campaign Pause which launched globally on 30 June.

The aim of the Pause campaign is to highlight the dangers of sharing false information related to COVID-19. The campaign asks everyone to pause, think and take care before sharing information which could be inaccurate or misinformed and may have harmful effects. "We are in a moment of global reckoning as COVID-19 and its social and economic consequences challenge the



world in unprecedented ways. Misinformation, hate speech and fake news are fueling and distorting all of these challenges and eroding the truth. We are very excited to have MultiChoice onboard as a supporter giving the launch of our campaign reach across Africa. They are uniquely positioned to deliver this important message to their diverse audiences across the continent" said Robert Skinner Senior Adviser for Global Communications at the United Nations.

"The dissemination of credible information has become critical to fighting this epidemic which continues to impact millions across the globe and our continent. We are therefore honoured to be able to utilise the continental reach of our broadcast and digital platforms across Africa to empower people with vital information" says MultiChoice Group Executive Chairman Imtiaz Patel.

MultiChoice continues to seek opportunities to use its platforms to combat the spread of COVID-19. Supporting initiatives such as the Pause campaign and airing educational and news related content aligns to the organisation's commitment to making an impact in the communities where it operates. The campaign launched globally on the 30th of June with critical information broadcast across Africa through the DSTv and GOtv on air and digital platforms, SuperSport and M-Net properties and Showmax.

# 5G Networks and Satellite Technology in Healthcare



Dr. Abiodun Olusesi  
Chief Consultant  
National Hospital, Abuja,  
Nigeria. West Africa

5G adoption is becoming universal. Today, over 30 networks are currently on 5G, at cost close to the cost of 4G technology. Now for the networks adopting the 5G mid-band, upgrading the existing towers can convert existing 4G network to 5G network. This lowers the cost significantly. 5G can support up to a million devices per square kilometre compared to 4G that support only up to 100,000 devices per square kilometer. **Dr. Abiodun Olusesi** says health care benefit of 5G technology include Telehealth and Telemedicine - which enables remote monitoring and treatment which are currently slow due to congestion and slow network speed

That economic and technological factors are changing the way medical practice is evolving is by now an understatement. Remote monitoring of patients using wearable technology is becoming commonplace. Remote treatment of medical emergencies in poorly accessible locations like the cruise ships in the high sea, and carrying out data crunching from data obtained from hospital information system are other examples.

This progress is made possible by advances in 3 fronts namely 1) location of patients (remote with pre-existing conditions, and in need of care), 2) at specialist service location (contains specialist with requisite knowledge), and 3) the communication system (capable of being used by non-specialist medical assistant with little or no specialist knowledge).

Communication involve the specialist physician being able to remotely access and review the stored or forwarded data obtained from the patient over both terrestrial and satellite internet connection. That implies that the medical data can be assessed in real-time and/or in store-and-forward manner. For the store-and-forward system, the remote medical assistant who is with the patient connects the patient to devices(digital thermometer, ECG, multi-monitoring devices, electronic stethoscope and digital camera). Data collected from these are downloaded to (software on a computer that can be accessed by the specialist physician. The telemedicine consultation can be captured by digitally recording the questions from the remote medical assistant and the answer from the doctor.

Terrestrial internet connection includes long range Wi-Fi and 4G data communication system, which provides a high-speed terrestrial internet connection featuring automated Wi-Fi to 4G fall over in a dual mode system. The linkage

module of this system is the transoceanic optical fiber cable links that connects terrestrial long-haul backbones and regional networks across the globe. Advances in the design and performance of optical fibers is responsible for successful implementation of these technologies.

Satellite internet connection implies an arrangement in which the outgoing (upstream) and the incoming (downstream) data are sent from, and arrive at, a computer through satellite, with each subscriber equipped with hardware (satellite dish antenna and a transceiver (transmitter/receiver). The technology operates in the microwave portion of the radio spectrum. This satellite-based system, though pricey, is the option for people in the rural areas where Digital Subscriber Line (DSL) and cable modem connections are not available. It can be safely utilized where most basic utilities are present.

The issue is the satellite technology has played catch up in healthcare delivery. And that is where 5G networks step in. 5G provides the opportunity for the satellite industry to break out of its niche and for satellite service providers to offer a much wider range of services, as well as enable mobile and fiber operators to leverage satellite connectivity to expand their coverage areas.

Large scale adoption of 5G technology began in 2019 and today virtually every telecommunication service provider in the developed world is upgrading its infrastructure to offer 5G functionality.

5G is the next logical evolution of telecommunication after 4G (LTE). It provides increased bandwidth well above the current 4G (LTE) could offer. Those around during the 2G rollout knew how frustrating it was to connect onto the network using a 2G dial up line. Your current smartphone on 4G download YouTube video at impressive speed but still not enough when you try to stream video or

videoconference. 5G promises browsing, download of files, and video streaming at blistering speed.

The unfortunate linkage of 5G network to COVID-19 is disingenuous and lacks scientific basis. It is illogical thinking based on weak reasoning: "Because China invented 5G technology, and because CORVID-19 STARTED IN CHINA, therefore, 5G technology is associated with CORVID-19. QED". This reasoning is so absurd. It is like saying "All land animals jump. The white whale jumps. Therefore, the white whale is a land animal, QED".

The 5G technology boasted a frequency spectrum that spanned 3 sections: millimetre waves, mid-band and low-band (from fastest to slowest). The millimetre wave (fastest) has difficulty penetrating many walls and windows, so indoor coverage is limited. 5G mid-band is therefore most widely deployed at frequencies from 2.4GHz to 4.2GHz. Over 30 networks are currently on 5G, at cost close to the cost of 4G technology. The low-band is adopted by some networks and performance is not significantly greater than 4G in the same spectrum. Now for the networks adopting the 5G mid-band, upgrading the existing towers can convert existing 4G network to 5G network. This lowers the cost significantly. 5G can support up to a million devices per square kilometre (compared to 4G that can support only up to 100,000 devices per square kilometre).

5G adoption is becoming universal. After China, the first country to adopt 5G on a large scale was South Korea (and it is not surprising that this large scale adoption paid off when confronted with CORVID-19 among S/Koreans). The following countries currently have 5G technology deployed: Australia, Argentina, Bulgaria, Canada, China, Finland, Germany, Hong Kong, India, Italy, Japan (about to roll out), Monaco, Norway, New Zealand, Pakistan, Philippines, Poland, Romania, Russia, San Marino, South Korea, Thailand, UK, USA, Uruguay, Vietnam, Qatar, and others (Sweden, Panama, Mexico).

The major issues with 5G technology include concern over interference with weather and earth observation satellites (Effort is ongoing to agree on standards to curtail this), political opposition (surveillance and environmental impact - reason why the ongoing US-Huawei scuffle), Security concerns (especially based on the number of connected devices that may fail to meet security standards) and human health concerns (some countries in Europe have raised concerns about this, though the scientific consensus is that 5G technology is safe).

The health care benefit of 5G technology includes Telehealth and Telemedicine - which enables remote monitoring and treatment (currently slow due to congestion and slow network speed). Also as internet of things (IoT) technologies continue to grow (digitally connected stethoscopes and vital signs monitor, etc), there is expected increase in the amount of data generated, the 5G technology can help in these areas: Quick transmission of large image files (MRIs, Endoscopy video, etc)

- Expanding telemedicine
- Delivery of innovative less-invasive treatments using augmented and virtual reality and spatial computing
- Reliable, real-time remote monitoring, and
- Use of artificial intelligence to determine potential diagnosis and decide on best treatment plan for a specific patient.

# Geospatial technology for good governance and anti-corruption in Nigeria



**SURV. TAIWO SAMUEL ADENIRAN**  
SURVEYOR-GENERAL OF THE FEDERATION

Surveyor Taiwo Samuel Adeniran  
Surveyor General of the Federation  
Office of the Surveyor General of the Federation  
Abuja, Nigeria

Corruption, the abuse of entrusted power for private gain, it is one of the major causes of many difficulties within the country. Taming corruption could either be reactive or preventive, punishing offender promptly as deterrent to other, partnering with stakeholders and good anti-corruption policy are effective panacea. **Surveyor Taiwo Samuel Adeniran** says geospatial technology has the capability to track everything from personal fitness to transportation to changes on the surface of the earth, and could be deployed to achieve good governance and curb corruptions in Nigeria.

Corruption is defined as the abuse of entrusted power for private gains. It is the process someone or something being morally depraved, decay or putrefaction. Corruption erodes trust, fairness and the rule of law; it weakens democracy, hampers economic development and further exacerbates inequality, poverty, social division, environmental crisis and in some cases, puts lives and property at risk. It could also be seen as dishonest, illegal behaviour, or criminal offense undertaken by a person or organization entrusted with a position of authority especially by powerful people (such as government officials or police officers), to acquire illicit benefit or abuse power for one's private gain. Corruption may include many activities including bribery and embezzlement, though it may also involve practices that are legal in many countries. Political corruption occurs when an officeholder or other governmental employee acts in an official capacity for personal gain, and this is presently seen as the second greatest public concern (next unemployment).

Corruption has become so widespread that it is broken down into several categories, based on the sector in which it occurs, and the amounts of money lost, or other damages it causes. Dishonest activities commonly engaged in could also include the hiring or advancement of certain people for personal or political gains. The effects of corruption on any society cannot be over emphasized, costing people their hard-earned resources and values.

## Good Governance

In international development, good governance is a way of measuring how public institutions conduct public affairs and manage public resources in a preferred way. According to former UN Secretary-General Kofi Annan,

"Good governance is ensuring respect for human rights and the rule of law; strengthening democracy; promoting transparency and capacity in public administration." This is measured by the eight factors of Participation, Rule of Law, Transparency, Responsiveness, Consensus Oriented, Equity and Inclusiveness, Effectiveness and Efficiency, and Accountability.

Good governance constitutes the processes and institutions produced results that meet the needs of society while making the best use of resources at their disposal. The concept of efficiency in the context of good governance also covers the sustainable use of natural resources and the protection of the environment and accountability. It is significant in public institutions to conduct and manage public affairs and resources to guarantee human rights in free of abuse and corruption, and with due regard for the rule of law. It is significant because it promises to deliver on the promise of human rights: civil, cultural, economic, political and social rights.

The concept of "good governance" thus emerges as a model to compare ineffective economies or political bodies with viable economies and political bodies. The concept centers on the responsibility of governments and governing bodies to meet the needs of the masses as opposed to select groups in society. Because countries often described as "most successful" are liberal democratic states, concentrated in Europe and the Americas, good governance standards often measure other state institutions against these states. Aid organizations and the authorities of developed countries often will focus the meaning of "good governance" to a set of requirements that conform to the organization's agenda, making "good governance" imply many different things in many different contexts. The opposite of good

governance, as a concept, is bad governance. Essentially, United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) has identified Planning, requisite geospatial information, finance and human capacity as required criteria for good governance.

### Taming Corruption

President Muhammadu Buhari observed that, if we don't kill corruption, corruption will kill us. Taming corruption comprises of anti-corruption. Just as corruption takes many forms, anti-corruption efforts vary in scope and in strategy, a general distinction between preventive and reactive measures is sometimes drawn. In such framework, investigative authorities and their attempts to unveil corrupt practices would be considered reactive, while education on the negative impact of corruption or firm-internal compliance programs is classified as preventive. New and tougher anti-corruption regulations continue to emerge worldwide; all institutions need robust anti-corruption measures and practices to protect their reputations and the interests of their stakeholders. One major way to tame corruption is to have an effective system that punishes offender without delay as this will serve as deterrent to others.

In 2011, the International Anti-Corruption Academy was created as an intergovernmental organization by treaty to teach anti-corruption topics. Many other intergovernmental organizations are working on the reduction of corruption without issuing conventions binding for its members after ratification. Successful anti-corruption efforts are often led by a 'coalition of concerned' – politicians and senior government officials, the private sector, and by citizens, communities, and civil society organizations.

Anti-corruption is referred to opposing, discouraging or punishing corruption. A model designed to eradicate or prevent dishonest or fraudulent conduct, especially in a political context. Pervasive corruption undermines political, judicial and electoral processes. In turn, corruption within these processes can have political, security and economic implications.

Government should partner with domestic stakeholders and influencers to identify, prioritize and create action plans to tackle anti-corruption. Good anti-corruption policy establishes zero-tolerance towards prohibited practices, such as fraud and corruption, and such policy must be adequately funded with operations and activities well managed. And where it is determined that fraudulent, corrupt, collusive or coercive practices have occurred in projects or organization, a range of sanctions, including disciplinary measures must be applied promptly.

### Evolution of Geospatial Technology

One of the biggest moments in geospatial history was the launch of Google Maps in 2005. It made mapping technology available to a mass audience. But the seeds for what we know of geospatial technology today were first planted in 1832. During a cholera outbreak in Paris that year, French cartographer Charles Picquet created one of the first heat maps to show where the incidents of illness were concentrated.

This was similar to Covid-19 map presently being produced by OSGOF since the inception of the Pandemic in Nigeria. When cholera struck London in 1854, physician John Snow built upon the Paris example. In addition to making a map that depicts the location of cholera deaths, he used spatial analysis of the data to show the connection between contaminated water

sources and cholera.

Today, most government programmes operate in silos, data or information in such environment that it is not operational with other dataset cannot achieve much. It is now mandatory by the UN-GGIM that all the country under the charter of the UN should establish Integrated Geospatial Information Framework (IGIF) which is the acquisition and management of spatial data across all sectors to take quick and informed decisions it is important to integrate information. So for example, land information can be integrated with urban solutions and determine how much property tax should be collected from a region? What is the housing deficit in an environment? Geospatial solutions facilitate such integrated views which can help the government increase revenues and deliver better services. It is no more news that if geospatial information is not integrated with SDGs activities the SDGs would not be realised. It was also discovered that it was the absence of critical information, which is geospatial information that hindered the realisation of the most of the Millennium Development

### Geographic Information System and e-Government

Geographic Information System (GIS), to this end, plays an important role in aiding e-governance by mapping the country, noting the changes and understanding the complex interplay of social order as well as economic growth. In today's digital era, geospatial technologies are being used to revolutionize the economy. Obtaining a better understanding and management of digital location-based data as well as services, when integrated with urban planning can enable much more efficient resource allocation so as to obtain better service delivery. However, Geospatial applications require accurate and current spatial data from different sources – Satellite imagery, Aerial Photograph, topographic maps and positioning data from GNSS.

Since location is an essential parameter in almost every aspect of government functioning, hence GIS is a critical component for most mission mode projects that have been implemented and conceptualized by the government.

For any sort of developmental program to be implemented at any level, there needs to be a lot of microlevel information available and planning, such as the identification of the right areas, target demography, allocation of funds, monitoring of activity, assessment of results etc. There have been myriad cases wherein development programs have faced challenges in achieving their objectives due to lack of appropriate technology to design the right plan – GIS allows the development of database of any spatially connected geographical area, which helps in every aspect of planning, monitoring as well as vision making. The unique microlevel plans and coordination done by the deployment of GIS when coupled with satellite imagery and digitized data banks can help in various aspects of planning in the state and governance.

A comprehensive information system that is integrated with GIS is the need of the hour for effective e-governance. A GIS-based information system can address various functions like property assessment and reassessment, tax collection status, property tax on maps, public grievance redress for utilities etc.

Knowing the location of things is essential for any

rational decision making in e-governance. For example, if a natural disaster like floods strikes, a platform that is GIS enabled would be able to provide a common operating picture to all the stakeholders involved, which could include agencies that are involved in the relief operations, NGOs, bureaucrats etc. this can really help in a much more informed decision making process. When it comes to the Smart City initiative GIS can help in integrating all the various systems like Command Control Centre, transportation, security, solid waste management with the government being set around a GIS-based service delivery platform.

By geo-enabling e-Governance projects and embedding geographical dimensions into all the services that are being provided to the citizens, decision-making can become more holistic and comprehensive. Some of the key factors that are imperative so that geospatial technologies can have a successful adoption across e-governance projects include: the availability of geographical information products which would include vector maps, satellite imagery, aerial photographs, drones etc. This would also mean the need for re-engineering of certain data sets by national mapping agencies, to make them GIS compatible; data collection technology such as GPS, Lidar, aerial photography, drones etc. will have to be adopted in order to capture data in a more accurate and faster manner. This also implies that the private sector will have a significant role to play in the creation of GIS data sets and also the dissemination of the services which would demand strong PPPs that can facilitate interoperability among various department and systems; there will have to be a re-engineering of the business processes that exist in government departments, so that the geospatial dimension can be embedded in the information systems; and capacity building is of the essence as a technical manpower that is capable of conceptualization, design, development and implementation of enterprise system that can leverage contemporary geospatial technology, will be at the core of the operations.

The bottom line is that geospatial technologies can play a pivotal role in creating a successful e-governance ecosystem in Nigeria. By providing a new paradigm for decision-making which will come from the enabling of geographical visualization representation of information, can help all the stakeholders in making much more informed decisions. This, in turn, will lead to the strengthening of governance, its transparency, as well as a marked improvement in the delivery of citizen services

### **Geospatial Technology and Anti-Corruption**

It is now a popular opinion that, digital revolution is gradually changing the rules of the corruption game; several countries are also resorting to geo-referencing and data visualisation technologies, such as to monitor corruption-prone infrastructure investment. Recently, the Office of the Secretary to the Government of the Federation has directed that coordinates of Government projects should be acquired as part of the information of the project to geo-locate or georeference it, this will check using an existing project as new project. In advanced clime, the semblance of corruption respite that they enjoy is as a result of the presence of digital technology, particularly geospatial technology and positional data.

Going digital and deploying geospatial technology,

progressive governments can also tackle corruption and eliminate red tape. New technologies and big data now allow government reformers and corruption busters to reveal, prevent and even predict corrupt practices that in the past could be hidden behind a veil of paper-enabled opacity. But it's politically difficult because it involves getting the governance of data right and figuring out who owns, controls, shares and secures public-sector data. This can always be taken care of by appropriate legislations and policies in as much as there exists the will power to achieve it.

### **Conclusion**

The versatility of Geospatial Technology in engendering good governance and putting corruption under control has been made bare. Achievement of the eight critical factors of good governance of Participation, Rule of Law, Transparency, Responsiveness, Consensus Oriented, Equity and Inclusiveness, Effectiveness and Efficiency, and Accountability is possible by the deployment of the appropriate digital technology of Geographic Information System (GIS), as it is Ubiquitous.

Knowing the location of things is essential for any rational decision making in e-governance, after all, all human activities happened somewhere that is, they all have geographic addresses thus making geospatial technology the appropriate tool for good governance and anti-corruption. However, requisite geospatial data in the right quality, quantity and format is a must for a geospatial enabled environment. It is also of equal importance that such data must be up-to-date, therefore there must be a policy in place for the regular updating of the spatial data. The Geospatial Technology is a human driven system, the human capacity and capability must also be developed on regular basis.



# Managing the effects of oil and gas spills on the environment using integrated ICT/Geospatial solutions



Musa Idris  
Director General/CEO  
National Oil Spill Detection  
and Response Agency  
NAIC Building,  
5th Floor,  
Plot 590, CBD  
Garki, Abuja, Nigeria;

The major streams of the oil and gas sector in Nigeria pose serious direct and indirect threats linked to oil spills and release of other dangerous liquid substances in the marine and terrestrial environment endangering environmental sustainability. The risks of oil and gas activities are very high and can cause irreversible environmental damages to the detriment of important ecological resources. According to **Musa Idris**, oil and gas pollution management can be smartly executed using digital platforms towards operationalising digital environmental management tools in line with evolving eGovernment and Digital Economy policies in Nigeria.



Shola Adesida  
Director, GIS/ICT  
National Oil Spill Detection  
and Response Agency  
NAIC Building,  
5th Floor,  
Plot 590, CBD  
Garki, Abuja, Nigeria;

Petroleum products derived from oil and gas activities are a major contributor to terrestrial and marine economy in Nigeria. They are one of the highly demanded and priced commodities in the extractive industry. Unfortunately, the processes involved in exploration, extraction and transportation of oil and gas petroleum products mostly impede on the environment with long-term impacts and cascading effects, according to a documented report. Consequently, oil and gas activities remain one of the human actions that exert numerous direct and indirect impacts on sensitive and important ecological landscapes in Nigeria.

Evidence have shown that environmental pollution emanating from oil and gas activities results in serious ecological damages causing marine organisms to die or flee and pollution of the atmosphere. This result in serious environmental and socio-economic costs, which is a major concern to environmental scientists and managers. For example, oil spillages occur in Nigeria through oil pipelines that is one of the major means of conveying refined petroleum products or crude oil from sources such as oil wells to destination mainly refinery. Over the years, oil spill incidents considered to be damaging to sensitive and vulnerable environment have occurred in oil producing regions of Nigeria. The alarming and persistent occurrence of oil spills with negative impacts causes pockets environmental devastation such as contamination of soil, land degradation,

pollution of underground water, persistent vegetation cover damage, marine ecosystems and public health issues in Nigeria. This has been confirmed by the independent assessment of the Ogoniland in 2011, based on UNEP report published in 2011. Similarly, the flaring of gas into the atmosphere is known to be a major environmental pollutant that has direct and cascading effects on human lives, animals and plants in the operational areas of oil Companies in Nigeria. This consequently explains the apparent anthropogenic Climate Change phenomena experienced in the oil producing regions of Nigeria. The catastrophic environmental and inexcusable health challenges such as occurrence of acid rain and reports of cancer related illness as well as infant mutation are some of the cascading effects of the continuous flaring of gas in the affected regions.

Of particular concern is how oil spill incidents are impacting the environment, especially the pace and direction of those caused by third-party interference. This analysis focused on oil spills occurring along oil pipelines in the Niger-Delta and how incidents are gradually spreading along oil pipelines into the hinterland of Nigeria

The impacts of the oil spillages on important natural habitat and how the ecological services provided by these environments are under immense attack. Here we describe an "oil spill tsunami" along petroleum products pipeline in Nigeria with focus on Nigeria's Niger-Delta and the hinterland of Nigeria (Figure 1). Locations experiencing oil and gas pollution (oil spills and gas flaring) in affected regions have drawn



Dr. Mahmud Ibrahim  
ICT/GIS Unit, National Oil Spill  
Detection and Response Agency  
NAIC Building,  
5th Floor,  
Plot 590, CBD  
Garki, Abuja, Nigeria;

intense scrutiny and concern lately and in the farthest past. The Nigerian Government document also revealed that occurrences of oil spills contravene environmental laws in Nigeria and does not meet international standards of environmental protection practices. The persistent occurrence of oil spills generally linked to failure to comply with the National Oil Spill Detection and Response Agency (NOSDRA) regulations derived from Act 15 establishing NOSDRA in 2006 and adoption of global best practices.

The increasing pace of oil spills in Nigeria threatens the continuity of a safe and healthy environment in Nigeria. Therefore, if balanced environment is needed that does not compromise the standards of living of current and future generations in tandem with environmental sustainability pathway and attaining the United Nations Sustainable Development Goals (SDG's), the Nigerian environment must be protected from future occurrences of oil spills and management of already impacted sites by oil spills must be well understood and managed in a spatially explicit context. This implies that urgent and robust ecological remediation activities towards environmental sustainability are needed for improved Oil and Gas operations in Nigeria. Although, extant literature has highlighted petroleum related risks anecdotally in Nigeria, evidenced-based spatially explicit analysis at fine-scale are still lacking on locational oil spill and gas flare impacts assessment in the context aligning regulatory frameworks towards environmental sustainability. Moreover, evidenced-based spatially explicit analysis such as this established the nexuses of using digital field data collection approach to promote data reliability and transparency in relation to the current eGovernance and Digital Economy agenda of Government.

The utility and availability of modern and digital geographical information sciences (GI-Science) and tools, and information communication technologies (ICT) is proven approach that is essential for improved understanding oil and gas pollution impacts to develop informed management strategy in a spatially explicit context. This analysis explored the applications of an array of Geospatial Information Technologies (GIT) comprised of Global Positioning Systems (GPS), Satellite Remote Sensing (SRS) and Geographic Information Systems (GIS). These tools have proven to be useful for pre and post impact analyses of oil spill and gas flare activities to enable environmental scientists, lawyers and managers provide sustainable environmental practices that support response, recovery, remediation and resilience concepts. Consequently, reducing the impacts oil spills on land and in marine environments that leads to degradation and loss of biodiversity as well as gas flare pollution accompanied by atmospheric perils injurious to humans requires evidenced-based approaches such as the use of GI-Science, ICT and GIT concepts to support the delivery of good environmental governance frameworks that are measurable through indicators such as the local performance indices, score cards and global targets of the UNSDG's.

### **Role of Satellite Remote Sensing for Tracking Gas Flare in Nigeria**

The phenomenon of gas flare could be tracked using satellite-based approach to measure and collect gas flare data through space-based satellite sensors. The aim of such as program could enable a lead regulatory Agency such as NOSDRA to accurately and reliably quantify gas flared by operating oil companies in Nigeria. Some of the benefits of operationalizing digital field data collection approach will enable NOSDRA to (i) compute CO<sub>2</sub> emissions generated from gas flared over a given period;

(ii) calculate the monetary economic value of gas flared and the Penalties payable by the operator; (iii) estimate Power Generation potential of flared gas usable by Federal Ministry of Power for strategic planning to restore the energy sector; (iv) support other Ministries Department and Agencies (MDA's) of government such as the Climate Change Unit with relevant input on the contribution of the Oil and Gas CO<sub>2</sub> emission and atmospheric pollution that result to anthropogenic climate change and (v) provide relevant information to the Federal Ministry of Finance on areas to focus on revenue generation from the Oil and Gas sector through payable fines and penalties. The Gas Flare Tracker (GFT) tool managed by NOSDRA is a demonstration of the Agencies readiness to key into the eGovernment and Digital Economy initiatives of the Federal Government of Nigeria

### **Tips of the Iceberg**

The Nigerian environment has diverse and important ecologies and sensitive landscapes that provide numerous ecosystems services to millions of human and animal inhabitants. Yet this very important and diverse landscape is under serious threats due to human pressures such as the prevailing oil and gas activities. As a direct consequence of the activities which include oil spill and gas flaring numerous perils detrimental to biodiversity conservation, environmental sustainability and climate change mitigation are escalating. Understanding the pace and extent of these complex environmental management challenge require evidenced based analysis to develop informed, efficient, effective, robust and innovative environmental management strategy is required. This can only be achieved using state-of-the-art geodata and information communication technologies to generate reliable and accurate geoinformation products and analytical techniques. Unless environmental monitoring tools developed with geo-visualization and geo-analytical capabilities are mainstreamed in the environmental management and safeguards implementation process of oil and gas impacts such as oil spill and gas flaring, the desired understanding of the direct and contextualised perils towards wider societal framework such the SDGs will remain unachieved.

Here, an integrating array of Geospatial Information Technologies (GIT) comprised the use of Global Positioning Systems (GPS), Satellite Remote Sensing (SRS), Geographic Information Systems (GIS) and ICT makes oil and gas operations fathomable in an end-to-end context. Results of this exploratory and foundational research analysis showed that oil spill pattern along pipeline is part of an expanding network of oil spill incidents in Nigeria. In the Niger-Delta alone, oil spills occur in both terrestrial and marine environments that threatens Land-Use/Land-Cover, biodiversity, wildlife and human security. At present, oil spill in the Niger-Delta is a major cause of contaminated land, food insecurity, surface and groundwater pollution, vegetation, farming, sediment, air pollution, public health and human well-being, industry conspiracy and institutional conflicts.

# How meteorological services drive sustainable Blue Economy in Nigeria



The oceans cover 71 percent of the Earth's surface, and ocean ecosystems generate at least US\$ 21 trillion in economic benefits each year. But a perfect storm of massive challenges, from collapsing fisheries to plastic pollution to ocean acidification, is threatening the integrity of marine ecosystems. These threats put at risk the essential benefits people receive from healthy oceans. According to **Prof. Sani Abubakar Mashi**, NiMet is deploying technology, increasing the density of the meteorological observation stations as well as broadening its services to cover greater areas thereby positively impacting on sundry environmental challenges.

Prof. Sani Abubakar Mashi  
Director General & Chief Executive  
Nigerian Meteorological Agency  
Nnamdi Azikwe International Airport  
Abuja, Nigeria



Oceans cover 71 percent of the Earth's surface, and ocean ecosystems generate at least US\$ 21 trillion in economic benefits each year. But a perfect storm of massive challenges, from collapsing fisheries to plastic pollution to ocean acidification, is threatening the integrity of marine ecosystems. These threats put at risk the essential benefits people receive from healthy oceans: sustainable fisheries, coastal protection, carbon sequestration, coastal economies and livelihoods, tourism and recreation and many others".

This no doubt accentuates the severity of the situation and its dire consequence if left unchecked. Perhaps in a bid to articulate and promote the concept in Africa, a Global Sustainable Blue Economy Conference (SBEC2018) was convened in Nairobi, Kenya from 26 to 28 of November, 2018 with the theme 'The Blue Economy and the 2030 Agenda for Sustainable Development'.

In the report on the conference, the participants outlined various sub-themes which include smart shipping; ports; transportation and global connectivity; employment, jobcreation and poverty eradication; cities, tourism; resilient coasts and infrastructure. Others are sustainable energy and mineral resources and innovative industries, management and sustaining marine life; conservation and sustainable economic activities; ending hunger, securing food supplies; promoting good health and sustainable fisheries; climate action, agriculture; waste management and pollution-free oceans; maritime security safety and regulatory enforcement and people; culture; communities and the inclusive blue economy.

Given the current global attention on harnessing the resources in the ocean and the vital role it plays in the socio-economic development of a nation, Nigeria cannot be left behind. With a coastal stretch of over 853 kilometers running through seven of the Southern States of the Federation, Lagos, Ondo, Delta, Bayelsa, Rivers,

Akwa Ibom and Cross Rivers bordering the Atlantic Ocean even to offshore, it becomes pertinent for the country not only to exploit the resources that abounds in the coastal region but to devise effective ways of sustaining it.

Science has proven that conditions on coastal areas is influenced by the weather condition prevalent over the surface of the sea, and this affects coastal users like marine transportation, fishing offshore, oil and gas operations and even those for leisure diving. Therefore, marine weather observation as a specialized aspect of weather observation for collecting data on the condition of the atmosphere over the sea surface important.

Not only does it measure and record conventional of weather elements such as air temperature, wind direction and speed, pressure, visibility, prevailing weather and cloud, the marine weather observation also measures Sea Surface Temperature (SST), tide levels and Sea state. Observing the marine weather and issuing marine weather forecasts for ocean going vessels, oil rigs and other maritime activities are among the statutory responsibilities of listed in Section 7 of NiMet Establishment Act.

Since 2003 when the Act establishing the Nigerian Meteorological Agency became effective, the agency has been strategic in its service delivery with a clear objective that supports the federal government's policy initiatives. Hence the recent clarion call by President Muhammadu Buhari for a concerted effort against insecurity in the Gulf of Guinea is worthy of note. He said this at the Global Maritime security Conference held from 7 to 9 October, 2019 in Abuja. This accentuates the global attention the concept of blue economy garners. From humble beginning of only 2 marine stations, NiMet preshas over 10 functional marine land stations spread throughout Nigeria's coast.

The Agency presently carries out quality marine weather observations at coastal land stations located at Eastmole, Victoria Island Lagos, Exxon Mobil terminal jetty at Ibenonear Eket in Akwa Ibom State, Marina resort Calabar, Onnewharf Port Harcourt, Koko wharf in Delta state, Aiyetoro mahin mud in Ondo State, Nigerian Institute of Oceanography and Marine Research (NIOMR), Lagos.

Other marine weather stations still at various stages of their establishment include; NPA ports Warri, Apapa Ports Lagos, NPA ports Calabar, and Rivers Ports, Port Harcourt. From these stations, data on Sea Surface temperature (SST), wind (direction & speed), ambient temperature, maximum and minimum temperature, atmospheric pressure, sea level, rainfall amount, cloudiness, and relative humidity are generated.

In this wide, data generated from these stations coupled with data from COSMO model, a high resolution Dynamical model run by NiMet, as well as other global models form major inputs in the production of the Agency's daily marine forecasts, quarterly marine bulletins, and other range of forecasts that are generated according to the user needs. These bulletins and early warning services are available on the Agency's website.

To further strengthen its services in the marine sector, the Agency has embarked on collaboration/partnerships with relevant stakeholders. The importance of collaboration/partnerships with relevant stakeholders is underscored the fact that the world is already a global village. One of such collaborations is with the Nigerian Ports Authority, where plans have reached advance stage of collaboration in harnessing their resources to develop and provide marine weather observatories and marine weather forecasts and other marine meteorological products and services for maritime resources.

Another inter-agency collaboration embarked upon by NiMet to strengthen its service delivery in Marine Weather Bouy the sector, especially with the Nigerian Maritime Administration and Safety Agency (NIMASA). Here, the collaboration include the setting up of marine meteorological observatories/stations in Nigeria and the provision of marine meteorological products, and services for maritime activities in Nigerian territorial waters amongst others.

NiMet's mandate transcends the marine sector. One of the most visible services NiMet renders is in the area of providing forecasts for the safe operation of aircraft in line with the Federal Government's drive for safety of air travellers.

This has been achieved with the deployment of state-of-the-art aeronautical meteorological equipment at various airports in the country. The Agency's service delivery in aeronautical meteorology attained international recognition when in 2017 it was certified by the International Standards Organizations (ISO) with the issuance of ISO 9001: 2015 certification. This made NiMet the first Meteorological Service Provider in Africa to acquire the certification. In the same year, the Agency reviewed and updated its strategic development plan to focus on green economy in line with the Federal Government policy on Agriculture, which targets food security and growth of GDP. The green economy strategy sees NiMet focusing services on energy, transport, agriculture, among others. The objective is to improve human well-being, while reducing environmental risks and ecological societies. It incorporates Certificate of Registration strategies to address climate mitigation and adaptation.

To achieve this, NiMet deployed technology to service various sectors. For instance, in the agricultural sector, the Agency's annual Seasonal Rainfall Prediction presents to the public science-based climate information on the onset and cessation dates of the rainy season, length of season, amount of rainfall, temperature forecasts and socio-economic Implications with over 70% accuracy.

The SRP has also been adjusted to include forecasts on increased occurrences of malaria. The document also contains advisories to farmers on crop selection to suit the predicted hazards e.g. drought to reduce losses in seedlings as a result of planting during false onset, save labor cost and finance. In 2011 NiMet began the down-scaling of the SRP through State level stakeholders' workshop, which follows immediately after the public presentation of the forecast each year. This is to ensure that the content of the prediction is adequately communicated to the relevant end-users for its effective utilization in the respective application-areas. For 2016 and 2017 Growing Season, NiMet down scaled the SRP in 28 states of the federation.

According to Prof. Mashi, the Director General CEO, NiMet, one of the drivers of this objective is that NiMet has increased the density of the meteorological observation stations from 54 to over 150. This, he noted has broadened the services of the Agency to cover greater areas of the country thereby positively impacting on their forecasts. In addition, NiMet through its Department of Applied Meteorological Services, is working towards providing sector-specific services such as the Agro meteorology and hydrometeorology that will meet the critical needs of Nigeria

This development will not only ensure improved services but will also support government policy on food security and will provide early warning advisories and mitigation. In this vein, NiMet plans to establish 18 integrated Principal Agro-climatological stations with experimental farms to achieve a fair coverage of Agromet stations across the 6 agro-ecological zones of the country. These research oriented agro-met stations will ensure improved service delivery. One of the ways employed is to embark on a number of collaborations with relevant stakeholders like State governments, Institutions and Development partners to facilitate broad-based grassroots services to many sectors of the economy.

At this juncture, about twenty MoUs have been signed with different universities and institutions which shows a clear sign of innovation, adding that the agency has gone ahead to establish weather stations even in places where MoUs have not been signed. Some of these partners include TAHMO, KSTG, UBIMET, USAID amongst others. It is worthy of mention here that NiMet is more than a weather forecasting Centre. Research and training is an integral part of the agency's function which however, has been under-projected in the media. NiMet is involved in research activities in meteorology and allied fields and committed carrying out customized research and development activities in relevant sectors.

The recent certification of the Agency's Regional Training Center, by WMO is an eloquent testimony to the drive and to make the Regional Training Centre one of the best in the world. The certification makes NiMet the first and only WMO certified Training Centre in Africa. The Regional Training Centre provides training to support the activities of NiMet to boost the professional manpower resources of the Agency.

# The role of Geoinformation in Africa's development



GSDI was dissolved as a legal entity in October 2018. Since its inception over 20 years ago, GSDI has delivered 15 World Conferences, provided funding of nearly US\$300,000 for Small Projects developing Spatial Data Infrastructures in nations around the globe, facilitated extensive knowledge-sharing across a international network of geospatial professionals, and published SDI news appreciated by many thousands of readers globally. Dave Lovell says its contribution to its mission 'to advance geo-information best practices, knowledge sharing and capacity building for the improved sharing and applications of geographic information' was the transfer of its residual funds to the United Nations Global Geospatial Information Management program.

Dave Lovell OBE FRGS CGeog  
President  
Global Spatial Data Infrastructure (GSDI) Association

Geographic information or Geoinformation (GI) provides the common language and reference system to establish linkages and balance between economic, environmental and social capital in order to improve upon the basis for societal response. Access to spatial data, and the policies governing that access, are crucial in shaping policies, programmes and projects. Geoinformation forms an essential part of the knowledge available in modern information and communications science. It is required at all levels of administration, the economy, and science and by the public at large. It is the basis for planning in numerous fields. It helps governments and communities plan for homeland security, ensure critical infrastructure, protect the environment and deal with public health and safety issues as well as day-to-day resource management decision making.

The Plan of Action of the World Summit on Sustainable Development (WSSD) recognized that the implementation of Agenda 21 and the achievement of the internationally agreed development goals, including the Millennium Development Goals (MDG) and the plan itself, requires the development of "information systems that make the sharing of valuable data possible, including the active exchange of earth observation data". This is equally true for the realization of objectives of NEPAD.

Planners and policy-makers will require a vast amount of geographic information to address the majority of the aspirations articulated by these goals and initiatives. There is a recognized need to facilitate access to public information and participation, to provide affordable local access to information, to integrate existing information systems on land-use practices, among other measures, to ensure public

participation in decision-making.

## Challenges and opportunities in Africa

At the moment, geo-spatial data and information in Africa are under-used. There are a number of factors that undermine the ability of a country or a group of countries to use spatial information effectively in the planning process. These factors include lack of awareness by decision-makers, low stock of base data, uncertain data discovery, access and exchange mechanisms, lack of interoperability among datasets, and insufficient human and technical resources.

Countries in the region probably need to revise their strategies for information management and adopt new criteria that ensure the inclusion of geographic information by governments and the society in all development decisions. Happily, new developments in geographic information management offers unprecedented opportunities for the interaction between producers and users, for the integration of GI into day-to-day activities of institutions and individuals, and have brought substantial changes in the concept itself of what spatial information is, and, consequently, in the way it is produced, stored, accessed, disseminated and used. Geographic data holdings are now regarded as national assets and not just as costly expenditures. The Internet has brought new dimensions in information and knowledge management.

Among its dramatic benefits, it allows selected data and information to be shared among users within countries and around the world. The Internet has extended its reach and applications to spatial information services. In the developed countries, Internet technology has been found

invaluable for users to identify and locate geographic data at widely dispersed sites, and for producers to disseminate their services and data and to assess users' needs.

### **Spatial Data Infrastructures**

The resources for the collection, management, dissemination, and use of geo-spatial data and information are being treated as part of the substructure or foundation of a society, resulting in the concept of Spatial Data Infrastructures (SDIs) with emphasis on co-ordination and partnerships to deliver spatial data and information products to decision-makers in an easy to use form. SDIs are increasingly recognized as an indispensable part of the national infrastructure of countries that need to be established and maintained as are other elements of the infrastructure. They are a robust response to the challenges that governments and societies confront in the use of spatial data and its transformation into information and knowledge that are needed for decision-making. SDI encompasses the policies, technologies and institutional arrangements involved in delivering spatially related information from many different sources to the widest possible group of potential users [FGDC].

They enable an unconstrained and transparent access to geoinformation by all members of society. In Africa, the establishment of NSDIs have been pioneered by a number of organizations and groups, encompassing UN organizations, professional associations and the private sector, notably EIS-Africa, GSDI, AARSE, FIG, ICA, ITC, ESRI, UNEP and ECA. A number of awareness raising and capacity building seminars and workshops have been organized regionally and nationally in the last two years to make understand what these infrastructures are, how are they build, how they work, and why they are important. Preparations of many others are underway.

### **GSDI Association in Transition**

Since its first international conference in 1996 and especially after its formal constitution in 2004, the GSDI Association led a global campaign to advance awareness and implementation of Spatial Data Infrastructures worldwide. Throughout this time, the Association's mission and purpose were to enable society to leverage the power of geospatial information and associated tools to improve decision making relating to, amongst other things, economic, social and environmental challenges that permeate local, regional and international boundaries. Today, many nations around the world have aligned with common SDI principles, practices and standards to facilitate improved collaboration and sharing of geospatial information across multiple domains and thus realized the benefits of doing so.

With a focus on prioritizing assistance to developing nations, the GSDI led educational programs and capacity building activities, and funded over 100 small grants to enable communities to benefit from SDI practices. GSDI members were first in creating knowledge resources like 'The GSDI Cookbook' in 2004 to help communities rapidly adopt SDI practices for creating, cataloguing, managing and delivering and exchanging geospatial information.

Former GSDI members look back with considerable satisfaction on the successes of their Association and the GSDI movement. Whilst acknowledging that additional work, particularly in the developing world, is still required to expand capabilities, and that practices worldwide must be continually updated to take advantage of developments in information technology and evolving policies, members see that their original core mission and purpose has been achieved in many areas of the world. The GSDI movement helped to produce a global network of professionals and

spawned a number of new organizations and initiatives dedicated to the continued advancement of the benefits enabled through implementation of spatial data infrastructures.

With creation of the United Nations Committee of Experts on Global Geospatial Information Management (UN GGIM), the UN now offers its member nations and GSDI professionals from across the public, academic and private sectors the opportunity to advance the very principles and practices that the GSDI developed and promoted since its founding in 2004.

The last service GSDI President, Dave Lovell OBE, FRGS, CGeog said: *"GSDI's members believe the time is right to recognize this moment of opportunity to offer our remaining resources to the UN-GGIM program and other initiatives which advance activities consistent with our purpose and mission. We therefore are announcing that we will be winding down the GSDI Association as a legal entity over the coming months and using our remaining financial resources to support the United Nations Committee of Experts on Global Geospatial Information Management and specifically to fund developing nation's attendance at this important forum."*

*"We believe and sincerely hope that the GSDI mission will continue through the thousands of professionals around the world who have contributed to and benefitted from GSDI. The GSDI website will continue for as long as possible to provide a rich information resource for those implementing Spatial Data Infrastructures."*

### **Further investment in spatial data infrastructures**

In recent developments, the Global Spatial Data Infrastructure (GSDI) Association has announced a donation of almost US\$40,000 to continue to stimulate the implementation and improvement of spatial data infrastructures globally. Their financial support, specifically targeted at low and lower middle income countries, will be administered by the Global Geospatial Information Management Section, of the UN Statistics Division.

This donation represents a further and final investment to add to the very significant contribution made by the Association since its inception over 20 years ago. GSDI has delivered 15 World Conferences, has provided funding of nearly US\$300,000 for Small Projects developing Spatial Data Infrastructures, facilitated extensive knowledge-sharing across an international network of geospatial professionals, and published SDI news appreciated by many thousands of readers globally. Closure of the Association has resulted from a growing recognition that its vision and mission has, increasingly and to a great extent, been adopted by internationally resourced organizations such as the United Nations, the World Bank and the Open Geospatial Consortium. In early 2018 the Board, Members and Executive of GSDI decided that these international organizations have the traction and funding needed to take Spatial Data Infrastructure development and deployment to the next level and, as a result, after long and careful deliberation, agreed that GSDI Association should wind up its operations during 2018.

# Leveraging Geospatial solution for COVID-19 management in Nigeria



As part of our disaster response management with location intelligence solution, we created an operational dashboard which has been adopted by the Nigerian Center for Disease Control, NCDC, featuring data from the NCDC, World Health Organization (WHO), among other authorities, visualized in real-time with specific attributes of varying locations. **Akua Aboabea Aboah**, Managing Director of Sambus Geospatial Limited observes that the real time locational data provides information on where the disease was recorded, maintain an accurate assessment of contact tracing and helped to curb the spread of covid-19 quickly

Precious Chinwe Aniekwena  
Communications & Marketing Officer  
Sambus Geospatial Nigeria Limited  
No. 19 Ebitu Ukiwe street,  
Jabi, Abuja, Nigeria

Africa as a whole has moved swiftly in recent years, in the use of Geographic Information System (GIS) to improve functionalities on location and smart business decisions. This is perhaps, as a result of increasing awareness about the effectiveness of geographic information for business and governance and close on the heel, the emerging new technologies that improves geospatial activities.

In Nigeria, history reveals that the use of geospatial technology dates back several decades. Its popularity increased remarkably in the 80s. Currently, Nigeria is waking up on a large scale to the implementation of GIS integration in several facets of its development. This came at the helm of realization by the government that no sustainable development is possible without geospatial information structures established and functioning as seen in the developed world.

Industry giants such as National Space Research and Development Agency (NASRDA), were introduced around 1998 for the purpose of creating “fundamental policy for the development of space science and technology”. The organization is currently one of the biggest creators of national space data resource inventories in Africa. Over the years, there has been an increase in the availability of spatial data from both primary and secondary datasets made available by the risen number of practitioners.

The Geoinformation Society of Nigeria (GEOSON) founded since 2001 is another national body formed by the geo-practitioners in the country for development, advancement and applications of geoinformation technologies. The organization has been a strong advocate for the implementation of the National geospatial data infrastructure development. Currently,

amidst setbacks, Nigeria enjoys the progress of geospatial data production which has provided access to relevant information for national development.

## Practical Application of GIS in Recent Time in Nigeria

Earlier this year 2020, the announcement of the corona virus/covid-19 pandemic came in as a shock to most countries in the world. There arose a need for survival and quick response to the disaster surge, the world came in desperate need for information. This created another ground for the efficient use of GIS technology as a fundamental source of data collection and management. As a result, GIS applications became a strong technology in risen demand for health organizations, responders of various types, and individuals who were eager to have quality information on the evolution of the virus spread.

In Africa, although the pandemic crept in slowly, the level of preparedness was at the rock-bottom compared to other continents. This however is no surprising due to the gap in development and technological advancement. Nigeria, the most populous nation in Africa, according to Statista publication June, 2020 currently houses 206,140 million people measuring high compared to the average population of the other countries in Africa with cases of Covid19. Recording her first case of covid19 on the 28th February, 2020 Nigeria came under pressure for the virus management plan. With a Gross Domestic Product (GDP) of 446.543 Billion USD as quoted by the World Bank 2019, Nigeria is currently moving at a decline rate of economic growth in recent times compared to what level of stability required in the preparedness of countries fighting covid19. On the other hand, the Nigerian Bureau of Statistics (NBS) posited in 2019 statistics that

technology investment contributes to 13.8% of the GDP which is somewhat improved compared to years back. Notwithstanding, developed countries investing hugely in technology were getting a head start in best practices for economic growth and disease control. That being so, with technology advancement, it was easier for these countries to engage geographical data collection and analysis to arrive at relevant facts and figures in a quicker means possible to handle covid-19 pandemic. In Nigeria, the Centre for Disease Control (NCDC) which is the major source of information on covid-19 spread across Nigeria also became a major sector in the country requiring more effort in accurate data gathering. Correspondingly, Samburg Geospatial Nigeria Limited (Samburg Nigeria), the sole distributor for Environmental System Research Institute (ESRI) suites of software, authorized dealers for Trimble devices, ENVI products and Wingtra drones in WestAfrica

began to provide support to government agencies, health departments, non-profit organizations and industries monitoring covid19. Samburg Nigeria as part of her corporate social responsibility and the donation of software resources by ESRI provided 5million Naira worth of software and technical support, rendering GIS solution in support to the NCDC fight against Covid19 spread in Nigeria. Disaster response management is enhanced with location intelligence solution hence, the organization created an Operational dashboard which has been adopted by the NCDC. The platform designed by the organization, features data from the NCDC, World Health Organization (WHO), among other authorities, visualized in real-time with specific attributes of varying locations. The data is thereby affected in a GIS application known as ArcGIS and represented in an Operations Dashboard that enables access to Covid19 spatial data.

This includes data on infected locations, number of reported cases, active and recorded cases, as well as deaths across the country. Mrs. Akua Aboabea Aboah, the Managing Director of Samburg Geospatial Limited stated that the real time locational data is how the public will know where exactly the disease was recorded, help to maintain an accurate assessment of contact tracing and curb the spread of covid-19 quickly. Following trends, several researchers and organizations are making giants strides in the use of GIS technology for map projects and applications developments among other things. This development would not have come easy at a time when Nigeria government operated policies that are not familiar with the development of the GIS technology. Research experts on the other hand, had noted that technology advancement in Nigeria can only firm up with practical government policies which are not alien to developing technologies of the new age and streamlining their functioning.

As predicted by the cursory analysis carried out by Nairametrics Research, Nigeria could hit a whopping 240,000 thousand Covid19 reported cases by December, 2020. Contrary to this report, Nigeria has managed to move at slower rate ever since except for the recent Nationwide protest on police brutality which has drastically proliferated the daily toll for positive cases. As at today the 2nd of November, 2020 the current infected cases run at 62,964 cases of corona virus.

Interestingly, although still far behind compared to developed world, new technologies are swiftly creeping into Nigeria. With the development of covid-19 and

lockdown restrictions, the people have seen the light in business automation and latest technological applications for economic growth and survival. GIS applications is one of such emerging technologies that hugely effects sustainable impacts in achieving human development and economic growth.



# The Eurisy “Space for Cities” Initiative



The Eurisy “Space for Cities” initiative aims at fostering the use of satellite-based services where most people live, exploring current and potential uses of satellite applications to make our cities healthier, cleaner, safer, and more efficient. So far, satellite-based services that emerged from the “Space for Cities” initiative were identified in the sectors of transport and mobility, energy, air quality monitoring, urban planning and infrastructure management, according to **Jean-Jacques Tortora**

Jean-Jacques Tortora  
Secretary General  
Eurisy

The Eurisy “Space for Cities” Initiative The Eurisy “Space for Cities” initiative aims at fostering the use of satellite-based services where most people live, i.e. in urban areas. The initiative aims at exploring current and potential uses of satellite applications to make our cities healthier, cleaner, safer, and more efficient, and at promoting the development of increasingly efficient and user-friendly satellite-based services. Within the Space for Cities initiative, Eurisy has identified and analysed several cases of cities using satellite-based services operationally. In partnership with local and regional authorities, the association has organised events in which these examples were showcased and discussed and has published several short articles that are accessible on the Eurisy website. At the same time, Eurisy has also identified a number of research institutes and private companies working with cities to co-develop software, methodologies and tools relying on satellite data to support decision-making at the local level. These entities work closely with local authorities to propose satellite-based solutions increasingly efficient, user-friendly and economically viable. To bring the “Space for Cities” initiative to a larger audience, Eurisy also leads the Geospatial Cities initiative within the Smart Cities Marketplace, which aims at promoting the use of spatial data from different sources to improve city management and foster a sustainable urban development.

## From innovation to operation

The satellite-based services that emerged from the “Space for Cities” initiative as being more mature and adapted to city needs were identified in the sectors of transport and mobility, energy, air quality monitoring, urban planning and infrastructure management. In such sectors, satellite navigation and imagery provide concrete advantages to the public and private entities using them. Nevertheless, while satellite navigation is today broadly available to private and public entities, satellite imagery still remains a relative incognito for professionals without a scientific background. And if

examples of cities using satellite imagery to improve decision-making exist, these are still considered as “pioneering experiences”. Indeed, despite the many successful examples of use of satellite-based services at the regional and local levels, and despite the programmes implemented at national and European scales to make available funds to develop increasingly sophisticated services, satellite-based solutions are still considered as “innovation” rather than “practice”. This online workshop has been organised with the aim of bringing together representatives of local administrations, SMEs, research centres and space organisations to discuss opportunities and challenges related to the operational uptake of satellite-based service in cities. This objective has been achieved only partially, as out of the 83 people who attended the workshop, 27% worked for universities and research institutes, 17% for companies providing services in cities, and only 10% for city administrations, the remaining 46% serving in other kind of institutions, mainly within the space sector (indeed, three quarters of the audience had already used satellite data or services based on satellite data). While this demonstrates the interest of the space sector towards the transfer of space technologies to city administrations, it also pinpoints the difficulty of engaging public administrations into scientific discourses through online events. The workshop included three sessions, each showcasing two emerging services relying on satellite applications to support cities: a) managing solar energy production; b) monitoring geohazards and urban infrastructure; and c) monitoring urban health.

## The need for better communications

The need to better communicate about the existence and the potential of such services among public administrations has been highlighted by Eurisy since the beginning of its User programme more than ten years ago and it is still extremely relevant today. Since then, space agencies and the European Commission have been working to better communicate about the availability and the potential of Earth observation data, but these efforts still fail to reach out to the general public. This is particularly

true when considering the awareness of the general public of the portals providing access to the satellite-based data they would need. If satellite-based data are available and experts know where to find them, the information carried by Earth observation data still remains difficult to find for the local managers who could use it to better manage their cities.

“People need to see the benefits for their everyday life through TV commercials and interviews, with no scientific and complex concepts. They just want simple solutions for effortless benefit and profit. The urban planners and decision makers necessarily follow the popular trends, so public opinion is the first to be convinced of the viability of satellite-based services. It’s not an easy task.” Panagiotis Kosmopoulos, National Observatory of Athens Academics and researchers are not always able to explain the functioning and benefits of satellite-based services to their intended users. They spend a good part of their life learning the technical jargon and they are used to interact with other people who understand it. Nevertheless, they also have the ability to engage public administrations in the development and testing of innovative services embedding satellite data. Indeed, the proximity of universities and research centres with local administrations makes them quite aware of their needs and often favours relationships of trust that can allow them to cooperate on research projects and to test innovative solutions. In this sense, universities and research centres can make the link between the space sector and civil society and they often favour the creation of spin-off companies that will turn R&D into marketable products. If researchers struggle to communicate on satellite-based services to cities, also private companies face challenges to convince local administrations of the reliability and cost-efficiency of such solutions. During the implementation of the “Space for Cities” initiative, we could appreciate the important role played by private service providers to bring satellite-based services to the market. Indeed, private companies are often responsible for both convincing local administrations of the usefulness, viability and cost-efficiency of their satellite-based services, and for training them to use them. Also, service providers often work with local administrations to create custom-made solutions adapted to their specific needs. Recognising the importance of private companies to create innovative and appealing services based on satellite data, space agencies and the European Commission have also launched many initiatives to sustain private actors through awarding, funding and incubation mechanisms. Nevertheless, the real challenge for private companies selling products based on satellite data starts once the products are developed and they need to be marketed to their potential users. The main difficulty reported by private companies when trying to sell their services to local administrations is their resistance to trust products that are not yet of common use. Culture and resistance to change are hence identified as important issues to be addressed to stimulate the uptake of innovation in cities.

### **Many cities would need support to procure satellite-based services**

“When a city is eager to use a service, they need an expert to assist in drafting the technical specifications of their procurement tenders and to make sure that they get the best service for limited resources.” Carl Pucci, Urban Innovation Expert Services based on Earth observation are still far from being mainstream, which makes it difficult for local administrations to consider them when writing their procurement tenders. Moreover, even when city administrations are interested in satellite-based services,

procuring them might not be obvious. Cities also often lack in-house experience to write the technical specifications to procure them and to select the service that would better respond to their needs. Despite such challenges, pioneering experiences exist, and the case of Amsterdam is proof of it. In October 2020, the Engineering Department of the City launched, together with the Ministry of Economic Affairs and the Netherlands Enterprise Agency, an innovation competition for solutions to regularly survey all the infrastructure and detect early warning signals. Even if the tender does not call specifically for satellite-based services, it reflects the awareness of the Department of Engineering of the capabilities offered by Earth observation data, calling for solutions that are scalable and sharable among different city services. To support the procurement of innovative solutions, the EU currently offers different supporting schemes, including Horizon 2020 funding for consortia of buyers and the EAFIP (European Assistance for Innovation Procurement) initiative, which provides free of charge technical and legal assistance to individual buyers and the COSME Programme (Competitiveness for Small and Medium Enterprises), especially conceived to support SMEs accessing the public procurement market.

### **Key to turn innovation**

The key to turn innovation into operation is to focus on needs “Profitability is fully related to usefulness, and the notion that cities do not fully take up satellite, as well as other non-satellite ICT-enabled services, is surely founded on the failure to meet user requirements in the sphere of smart city urban governance.” David Ludlow, CURE project “Copernicus for Urban Resilience in Europe” “I think that all panellists agreed on the importance of focusing our products on societal needs, and to me that is a step in the right direction.” Pablo Ezquerro Martin, Spanish Geological and Mining Institute (IGME) The cost-efficiency argument is of paramount importance to convince cities to invest in innovation. When the use of products developed within pilot projects is discontinued after the end of the projects themselves, the reason might be that they failed to pass the cost-efficiency test. This does not mean that such projects were not worth funding, as R&D is made out of trials and tests, and all experiences contribute to future improvements. Eurisy’s experience shows that the satellite-based services that are most likely to be used operationally and sustainably by local administrations, are those that are conceived to respond to their specific needs and that can be easily embedded into their operations, requiring little maintenance or technical skills. To focus on needs means to involve city administrations actively in all phases of R&D projects, which requires a prior process of mutual education between city administrations and service providers (be them research institutes or private companies). On the one hand, service providers need to learn about the priorities and needs of city departments, and about their current structure, capabilities, and operational functioning. On the other hand, public administrations need to understand what parameters satellites can monitor, at what resolution and how often, and need to be aware of the time and resources they are expected to invest to obtain a viable service. A lot is still to be done to turn innovation into operation, but the will to do so is very real among all the stakeholders involved in this process. The speakers contributing to our workshop are well aware that the transfer of satellite-based services to cities can only happen if these are clearly adapted to the operational needs and capabilities of local administrations.

# Can satellite and mobile co-exist?



Over recent years, there has been a lot of discussion within the satellite industry about the threat to all-important spectrum, in particular from the pending launch of 5G and re-allocation of spectrum to the mobile industry. While this is undoubtedly important to our industry, we should consider whether this is the right approach. Luciana Camargos of GSMA signalled that the mobile industry certainly sees a role for satellite to help extend that reach as well as providing coverage in those hard to reach areas. To this end, **Helen Weedon** argues that the key to the two co-existing is getting the engineers from both industries together to discuss the challenges and come up with the solutions.

Helen Weedon  
Managing Director  
the Satcoms Innovation Group

Over recent years, there has been a lot of discussion within the satellite industry about the threat to all-important spectrum, in particular from the pending launch of 5G and re-allocation of spectrum to the mobile industry. While this is undoubtedly important to our industry, we should consider whether this is the right approach. In fact, as the Satcoms Innovation Group, we have long been banging the drum for a more coordinated and all-inclusive approach. We have often said that in order to solve the issues surround this tricky subject, we need to engage with the mobile industry at a technical level.

A recent panel we recorded for ConneCTechAsia, we managed to do just that. We were joined by the GSMA and Lynk Global, a company that is bridging the gap by launching satellites in Low Earth Orbit to act as mobile towers. Satellite has unique capabilities that will extend the reach of 5G networks in a way that no other technology is capable of. It can enable the hosting of 5G services, cope with high capacity while being both reliable and resilient. However, for the two technologies to work together effectively, we need to resolve a number of significant unanswered question.

## How Do We Regulate the Use of Spectrum?

It is clear that spectrum will be auctioned for 5G deployments. As pointed out by Alexis Theodotou of Avanti, we will need clear criteria around existing c-band operations. He highlighted that there must be ways to protect operations in terms of a combination of parameters, including ensuring there are exclusion

zones, as well as having criteria based on elements such as transmission densities and height of towers etc. He also commented that regulators will need to take a balanced approach to spectrum allocation and use.

The other side of the regulation coin is that of satellite services being launched to enable a cell in the sky. If they are being launched using bands allocated to terrestrial services, how do you regulate that?

## How Do we Stop Interference?

The risk of interference has been one of the most significant arguments against sharing C-band spectrum. How can we ensure that spectrum is shared effectively without detriment to either group? Even in the case of satellite enabling that 5G, we clearly need both these technologies to be able to work uninterrupted to ensure 5G is delivered and accessible to all.

We know from history that you can have lots of tools, technology, and processes in place yet interference will still happen. The important thing is to limit it as much as is feasible while also having the right processes in place to manage it when it does occur. The Satcoms Innovation Group was of course initially setup to tackle interference and we still see interference mitigation as an important part of our remit. Within the satellite industry, many of the engineers working at the forefront of interference mitigation are involved in our group and those personal connections they have made have dramatically improved the process of resolving that interference when it does occur. When it comes to interference between mobile and satellite services, we



will need to look at new procedures to make that run smoothly. That drive should likely be spearheaded by the satellite industry, after all we have the experience of managing satellite spectrum and cooperation for interference mitigation. However, it needs to be done in conjunction with the engineers working in the same roles within mobile if we want to ensure a smooth process that will work for all parties.

### **Is the Technology Ready to Share?**

According to Alexander Jeuck sharing spectrum sounds quite simple but in fact it is more complex. He commented that it will require agreeing on certain waveforms as those currently used in mobile do not work well on satellite. Considerations such as different behaviours of non-linear amplifiers need to be taken into account and how these can be compensated. Alex highlighted that this will need additional processing power. At the same time, he does champion collaboration, citing that 5G cannot be delivered by the terrestrial network alone.

When it comes to satellite as an enabler, the concept is certainly not new. As James Alderdice from Lynk Global pointed out however, the problem historically has been that the user has always been required to purchase a separate device to use the satellite service, whether that is a backpack, terminal, satellite phone, or maybe a sleeve for an existing phone. Lynk's approach is interesting because it is about putting satellites in LEO that act as mobile towers, meaning the consumer just uses their phone. It doesn't matter to the consumer where the connection is coming from, just that they are connected.

### **How Do We Ensure Better Cooperation?**

Luciana Camargos of GSMA signalled that the mobile industry certainly sees a role for satellite to help extend that reach as well as providing coverage in those hard to reach areas. However she also signalled that until now there really hasn't been any open dialogue with both sides seemingly reticent to discuss with each other. She also commented that the mobile industry had seen a role for satellite in the rollout of 3G but that never came to fruition. The ball is in the court of the satellite operators who need to engage with mobile operators and ultimately deliver an integrated technology to help support 5G.

It is certainly true that every meeting or discussion I have heard about within the satellite industry seems to exclude the mobile experts. Surely the key then is to get the two camps together. At the same time, there is a lot of politics in play here. Rafael Kargren of N@TSAT commented that it has become a management issue, whereas engineers just get on and solve things.

### **Achieving Co-existence**

Martin Coleman, SIG Board Member summed it up well when he said: "managing spectrum is key to making everything work well." We need to start with technology. I have always believed that the key to the two co-existing is getting the engineers from both industries together to discuss the challenges and come up with the solutions. This is something I see SIG facilitating over the coming months.

# The Nigerian Space Program and its economic development model



With the advent of the International Space Station and its use for research and development, space is increasingly becoming a major force in seeking far-reaching solutions to critical challenges facing humanity on planet Earth. It became imperative, therefore, to develop a model that will make the space program sustainable and responsive to the nation's socioeconomic challenges. As a result, within the public–private partnership framework, NASRDA will provide upstream services from the communication satellites launched by the agency, while limited liability companies will provide downstream services to consumers, according to Dr. Francis Chizea

Dr. Francis Chizea  
Acting Director General/CEO  
National Space research & Development Agency  
Obasanjo Space Centre  
Airport Road, Abuja  
Nigeria

In recognition of the role and relevance of space science and technology to national development, Nigeria declared its space ambition to the Economic Commission for Africa and Organization of African Unity member countries during an intergovernmental meeting in Addis-Ababa in 1976. However, this declaration did not evolve into a space program. Nevertheless, in 1987, the National Council of Ministers' approved the establishment of a National Centre for Remote Sensing. Within the same year, the Federal Ministry of Science and Technology constituted a National Committee on Space Applications. This was followed in 1993 by the establishment of the Directorate of Science by the National Agency for Science and Engineering Infrastructure (NASENI). The mandate of the directorate included space science and technology. NASENI later constituted a nine-person committee of experts that produced a draft national space science and technology policy. Based on the draft policy, the National Space Research and Development Agency (NASRDA) was established on May 5, 1999.

The National Space Science and Technology Policy After the establishment of NASRDA, the National Space Policy was approved by the Federal Executive Council of Nigeria in May 2001, thus creating an enabling environment for the actualization of the nation's space program.<sup>1</sup> The goals of the policy are Nigeria's attainment of self-reliance in space technology development, particularly in the areas of indigenous critical mass of trained space engineers and scientists; the utilization of space-derived data and products for national development; and the improvement of the quality of life of Nigerians. As a result, the major thrust of the space policy is to make space

research and developmental activities integral part of the overall strategies for sustainable national development. In addition, the policy provided for the establishment of research centers of excellence.

NASRDA's Centers of Excellence Given the need to develop research and commercially viable spinoffs and spin-ins in all the facets of space technology, NASRDA established six research centers of excellence. The centers are the Centre for Remote Sensing, Jos; Centre for Satellite Technology Development, Abuja; Centre for Geodesy and Geodynamics, Toro; Centre for Space Transport and Propulsion, Epe; Centre for Basic Space Science and Astronomy, Nsukka; and Centre for Space Science and Technology Education, Ile-Ife. Centre for Remote Sensing, Jos This center became operational in 1996 and was saddled with the responsibility to pursue the development and application of space science and technology for the socioeconomic benefits of the nation. The center is currently involved in pure and applied research in remote sensing and geographic information systems (RS/GIS) and related technologies; acquisition, storage, and publication of information on the availability of remote sensing data in Nigeria; and operation of remote sensing ground receiving station that is capable of receiving data from diverse remote sensing satellites.

## Centre for Satellite Technology Development, Abuja

The Centre for Satellite Technology Development,

based in Abuja, has the primary responsibility of developing satellite technology competence so as to indigenously design, test, and fabricate geostationary and nongeostationary satellites. For example, the center collaborated with the Surrey Satellite Technology Limited (SSTL), the United Kingdom, in the fabrication and launching of Nigeria's first orbital satellite, NigeriaSat-1. In addition, the engineers and scientists at the center have successfully built an earth observation satellite (NigeriaSat-X) using the facilities of SSTL in the United Kingdom. The Centre for Satellite Technology Development is currently collaborating with specialized agencies, institutions, and companies in capacity building as well as the development of the following: satellite subsystems design, laboratory and assembly plant, and satellite subsystem test.

### **Centre for Geodesy and Geodynamics, Toro**

The establishment of this center dates back to 1984, when a National Technical Committee on Earthquake Phenomena was inaugurated by the Federal Ministry of Science and Technology after reports of occurrences of earth tremor in Ijebu-Ode and Ibadan, southwestern Nigeria. The center became functional in January 2002 and is currently involved in the development of applied capacity to address the following national issues: surveying and mapping; remote sensing for mineral exploration; monitoring of coastal deformation and subsidence; monitoring of global mean sea level; and the monitoring of seismic activities in collaboration with other international organizations.

### **Centre for Space Transport and Propulsion, Epe**

One of the backbones of any space-faring nation is the ability to build and launch its own rockets. As a result, the Centre for Space Transport and Propulsion was established to develop capacity in rocketry and space launch vehicles. The center is implementing this mandate through the development and acquisition of the technology to carry out the following: manufacture the necessary components for rockets; develop various types of fuels for rocket propulsion; and develop the technological capability and launch vehicle to launch rockets for civil applications.

### **Centre for Basic Space Science and Astronomy, Nsukka**

This center was established in 2001 with the responsibility of conducting fundamental research in space science as well as coordinate similar research activities in Nigerian universities and research institutes. Consequently, the center has been involved in the following: conducting research to expand the frontiers of knowledge in atmospheric science and astronomy; designing, fabricating, and patenting space technology instruments and products, and appropriate hardware and software; and researching in the fields of astronomy, solar terrestrial physics, cosmology and origin of life, meteorology and climatology, ionospheric physics, geomagnetism, and communication physics.

### **Centre for Space Science and Technology Education, Ile-Ife**

This center is an educational and research institution set up to train the trainers in the fields of space science and technology. As a result, the center admits candidates with basic knowledge of space science and technology. The center is currently involved in the following: development of skills and knowledge of university educators, research scientists, and other personnel in the following four principal focal areas: RS/GIS; satellite communication and global positioning system; meteorological satellite applications; and basic space and atmospheric sciences. In addition, the center serves as the African Regional Centre for Space Science and Technology Education—in English Language, a United Nations Office for Outer Space Affairs capacity development program.

### **Nigeria's Strategic Roadmap to Space (2005–2030)**

After the establishment of research centers of excellence, the federal government of Nigeria in 2006 approved the 25-year strategic roadmap for space research and development in Nigeria. Some of the major benchmarks of the roadmap are as follows: to produce a Nigerian astronaut by 2015; to launch a satellite manufactured in Nigeria by 2018; and to launch a satellite manufactured in Nigeria from a launch site in Nigeria on a launch vehicle made in Nigeria by 2025.

### **The economic development model**

The implementation of the economic development plan for the Nigerian Space Program is divided into the short-term, medium term, and long-term plans. Short-Term Economic Development Plan The objective of the short-term economic development plan is the establishment and funding of major infrastructures and human resources for space science and technology development in Nigeria by NASRDA under the auspices of the Federal Ministry of Science and Technology. Consequently, within the short term, NASRDA established two companies as shown in Figure 2: Nigeria Communication Satellite Limited, Abuja, and GeoApps Plus Limited, Abuja.

### **Nigeria Communications Satellite Limited**

The Nigeria Communications Satellite (NigComSat) Limited was incorporated under the company and allied matters act of 1990 in Nigeria as a limited company in April 2006 in Nigeria. The company was set up to manage and sell products from NigComSat-1 communication satellite and provide communication satellite services within the extant rules and regulations guiding the provision of such services in Nigeria. However, the company was transferred from NASRDA to the newly established Federal Ministry of Communication Technology on August 15, 2011, as a downstream service provider.

### **GeoApps Plus Limited**

GeoApps Plus Limited (previously called Nigeriasat Imageries and Consultancy Services Limited) was incorporated under the company and allied matters act of 1990 in Nigeria as a limited company in September 2007. The company was set up to serve as a commercial arm of NASRDA for the marketing of earth observation satellite products and applications

### **Medium-Term Economic Development Plan**

The goal of the medium-term economic development plan is the partial commercialization of NASRDA's products and

services developed during the short-term economic development plan. During the medium-term development plan, the management team of NASRDA's companies and centers is encouraged to generate revenue to ensure their long-term sustainability. For example, the two companies (GeoApps Plus Limited and NigComSat Limited) have been well equipped to generate revenue through commercial activities.

As a result, GeoApps Plus Limited is currently selling images from NigeriaSat-1, NigeriaSat-2 and NigeriaSat-X satellites in Africa. In addition, the DMC International Imaging Limited has been appointed to market images from NigeriaSat-2 and NigeriaSat-X satellites covering the whole world with the exception of Africa. Furthermore, GeoApps Plus Limited is involved in short-term commercial training in Remote Sensing and Geographic Information Systems. Similarly, NigComSat Limited was involved in the marketing and sale of products from the NigComSat-1 communication satellite before it was deorbited in 2008. The company is currently marketing and selling products from NigComSat-1R satellite. Similarly, rigorous research is currently going on in the six NASRDA centers to develop commercial products as well as spin-offs that can be used by both space and non-space-related industries. For example, the center for satellite technology development is currently developing an Assembly Integration Testing and Design Centre. When completed, tests for satellite components and precision instruments as well as satellite integration will be carried out at the center. In addition, the center is developing microcontroller-based solar tracking system as well as the construction of a nickel hydrogen battery that can generate power for several applications. Furthermore, the Centre for Basic Space Science and Astronomy has been able to perfect the technology for the production of solar panels as one of the spin-offs from the national astronomical telescope development program. The center has also developed a comprehensive satellite-based tracking system for cars and other moving objects.

### **Long-Term Economic Development Plan**

The goal of the long-term economic development plan is the implementation of the public-private partnership program as a follow-up to the medium-term economic development plan. Public-private partnership is broadly defined as any arrangement between the private sector and the public sector in which the private sector assumes more responsibility than is traditional for infrastructural planning, financing, design, construction, operation, and maintenance. On the contrary, the traditional approach to infrastructural development involves the private sector developing an infrastructure but takes no responsibility for its long-term performance and management. The concept of public-private partnership in space research and development is relatively a new concept. Nevertheless, the concept is gradually being accepted and adopted globally. A classical example of public-private partnership in space research is the development of the German satellite project TerraSar-X. The project was jointly funded by the German Aerospace Center (DLR) (public sector) and EADS Astrium GmbH (private sector). In the contractual agreement, the German Aerospace Agency (DLR) was responsible for the management of the entire project and, together with DLR research institutes, paid 80% of the satellite's cost; on the other hand, EADS Astrium GmbH built the satellite and financed the remaining 20%. Within the Nigerian long-term space economic development plan, the public-private partnership will be implemented within the framework of the provisions of the National Space Research and Development Agency Enabling Act (NASRDA Act 2010).<sup>2</sup> Within the provisions of the act, one of the functions of

NASRDA is to "develop satellite technology for various applications and operationalize indigenous space system for providing space services and shall be the government Agency charged with the responsibility for building and launching satellites." The implication of this provision is that all upstream developments in space science and technology in Nigeria financed by the federal government must be implemented by NASRDA. Consequently, the national investments in upstream components of space science and technology in Nigeria cannot be privatized and thus will continue to be managed by the public sector. Components of the upstream sector include space systems design, manufacturing, launch, and in-orbit control.

### **Capacity Building**

Within emerging space-faring nations, there is the issue of bridging the scientific, technological, and the know-how gap in space science and technology. This can be addressed only through enormous investments in space science and technology education. As a result, there is investment opportunity in this sector. One approach will be the establishment of a space science and technology university jointly funded by the government and the private sector. Existing NASRDA's centers of excellence can provide scientists and engineers as well as laboratory facilities to support such a university. Rocket and satellite launch. Nigeria is located within the equatorial region and remains the leading space agency within the subregion. Therefore, Nigeria is naturally endowed with certain space resources peculiar to the equatorial region. This is particularly true since access to the geostationary orbit from equatorial plane is more energy efficient and cheaper compared with satellite launch missions originating from nonequatorial planes.

Existing NASRDA's centers of excellence can provide scientists and engineers as well as laboratory facilities to support such a university. Rocket and satellite launch. Nigeria is located within the equatorial region and remains the leading space agency within the subregion. Therefore, Nigeria is naturally endowed with certain space resources peculiar to the equatorial region. This is particularly true since access to the geostationary orbit from equatorial plane is more energy efficient and cheaper compared with satellite launch missions originating from non-equatorial planes. Hence, investment opportunities exist for the private sector in satellite transport services in collaboration with the existing NASRDA's Centre for Satellite Transport and Propulsion. In addition, the private sector can also participate in satellite launch insurance services.

### **Satellite design and developments**

Today, the Centre for Satellite Technology Development is involved in several development initiatives such as development of infrastructures and technical know-how to successfully design, fabricate, test, and launch series of satellites for various missions; development of a standard laboratory, clean room, and assembly integration unit for the fabrication and assembling of various space systems; and establishment of a standard ground station for mission control and operation, receiving and sending telemetry and telecommand, satellite tracking, receiving of payload data, and processing of such payload data. The private sector can play a key role in marketing the products from this center and in addition participate in satellite development insurance services.

### **Earth observation satellite image acquisition and marketing**

The framework for implementing earth observation satellite image acquisition and marketing has already been established. Within the long-term economic developmental plan, GeoApps Plus Limited company would have been completely privatized. The company will provide earth observation satellite data applications and services such as data sale and distribution, data application, and consultancy. As a result, NASRDA will provide the earth observation satellite imagery requirements of GeoApps Plus Limited under contractual agreements.

### **Spin-offs and allied industries**

Space technology development involves series of research and exploration. Today, several technologies designed for space exploration have found applications in the areas of computer technology, consumer goods, public safety, health and medicine, transportation, and the environment. For example, the technology developed to detect chemicals during planetary and comet exploration have been adapted for handheld devices that detect explosives and chemical agents. In addition, the miniature mass spectrometer designed to search for life on Mars was adapted by the Open University and the London School of Hygiene and Tropical Medicine to provide a quick, accurate diagnosis of tuberculosis in Africa. Given these spin-offs from space science and technology, in the long run, the investing public as well as existing allied industries will benefit from the spin-offs developed during space engineering research conducted at NASRDA's centers of excellence.

### **Information and Communication Technology Enterprises**

Information and communication technology remains one of the bedrocks of the socioeconomic development of any nation. As a result, within the public-private partnership framework, NASRDA will provide upstream services from the communication satellites launched by the agency, while limited liability companies will provide downstream services to consumers. Such services include telecommunications (e.g., basic urban and rural telephony, trucking services between continents and countries, provision of mobile and paging services platform, provision of broad bandwidth); broadcasting (e.g., direct to home services, multimedia, video streaming); Internet (e.g., video conferencing, voice over Internet protocol-VOIP); real-time monitoring services (e.g., grid line monitoring, shipping and freight handling, rapid deployment for disaster monitoring); and global navigation systems of systems (e.g., automatic vehicle location, maritime and aviation applications).

### **Conclusions**

Given the global trend of government budget cuts to space technology development, it is imperative that the sustainability of space exploration rest in the development of a robust space economic development plan. As a result, over the last 10 years, the Nigerian space economic development model has transitioned from the short-term economic development objectives to the medium-term objectives. Within this period, six research centers and two companies were established. The experience from the implementation of the short and medium-term plans has developed a robust framework for the implementation of the public-private partnership program in the long-term economic development plan.

Given the provisions of NASRDA Act 2010, the development and control of the upstream space segment will be carried out by NASRDA (public sector), while the downstream segment will be implemented by private-sector companies that will provide qualitative services to consumers. However, it is noteworthy that the private sector may decide to fund and operate the upstream and downstream space development segments in the country provided that government funds are not involved in such a venture. In this scenario, the implementation of both the upstream and downstream space segments by the private sector will be regulated by NASRDA.



# Space activities overview in Egypt



On top of the development of new Agency, Egypt also won the bid to host the African Space Agency, above proposals from Nigeria and Ethiopia, strengthening its position of pushing forwards a space sector. However, failures of the EgyptSat-2, which was built predominantly by Egyptian expertise and yet failed within a year of being in orbit, and EgyptSat-1, which lasted only 3 years of operation, caused an upset in the progression of Egyptian space capabilities have become the nation's challenges. Nowadays, Egypt has a great infrastructure in the field of space and its applications, owning satellites and organizing potential space activities for future young generations

Prof. Dr. Mohamed Al-Qousy,  
Chief Executive Officer  
Egyptian Space Agency

The Egyptian Space Agency is an Egyptian public economic authority established in August 2019, with a legal personality and affiliated with the President of the Arab Republic of Egypt. Established by the Law No. 3 of 2018 which aims to create, transfer space technology development, localization and own self-capabilities to build & launch satellites from Egyptian territory. In 2019, The Egyptian President Abdel Fattah Al-Sisi announced the appointment of Dr. Mohamed ElKoosy as the CEO of the Egyptian Space Agency.

Although newly emerging as a space actor in its own right, Egypt has been involved in space activities for several decades. The National Authority for Remote Sensing and Space Sciences (NARSS) is an organization under the State Ministry of Scientific Research to promote the use of space technology for ongoing development in Egypt and promoting the use of high-tech capabilities for various applications. It covers two major areas: remote sensing, to produce maps and spatial data for evaluating and monitoring natural resources, natural hazards and environmental management; and space sciences, which looks at the development of sensors for EO and the challenges of how to monitor communication with satellites and receive the data for processing.

Egypt is now aiming to develop a more integrated space sector, including establishing an Egyptian Space Agency. In August 2019, the President of Egypt ordered the formation of the Board of Directors for such an agency. The objective is to develop the space sector in order to support the country's national security and development goals. The Agency will also have the responsibility of developing a national space technology program, improve the capacity to launch nationally built satellites, and train a skilled workforce. On top of the development of this new Agency, Egypt also won the bid to host the African Space Agency,

above proposals from Nigeria and Ethiopia, strengthening its position of pushing forwards a space sector

At the beginning of 2019, Egypt launched the EgyptSat-A, its third remote sensing satellite, which was built jointly by NARSS and RKK Energiya in Russia. It was also reported that China would grant US\$72 M for the satellite programme, following an initial grant of US\$23 M in 2016 and a second grant of US\$45 M in 2015. Egyptian-Chinese cooperation in space, aviation and other high-tech areas is continuing to develop, and Egypt is a key actor in China's Belt and Road Initiative (BRI), with significant China investment coming into the country and many IT, telecom, transport and other Chinese companies establishing themselves in Egypt. NARSS and the Chinese Academy of Sciences have established a MoU for remote sensing applications.

As the space program matures, Egypt is set to launch a program for the manufacturing of small satellites in universities across the country in a collaborative effort led the Egyptian Space Agency (EgSA), the Academy for Scientific Research and Technology (ASR) and the Supreme Council of Universities.

The program is one of the pillars contained in the National Strategy for Science, Technology and Innovation 2030 which was released in December by Egypt's Higher Education and Scientific Research aimed at improving the country's competitiveness in science research and development of indigenous technologies. The strategy document, obtained by Space in Africa, outlined the Ministry's intention to "establish a laboratory for educational satellites, electronic tests and space photographs processing."

Egypt's Higher Education and Scientific Research Minister Khaled Abdel-Ghafar yesterday confirmed plans for the launch of the program while chairing the maiden meeting of the Egyptian Space Agency board alongside Mohamed El-Qosi, EgSA Chief Executive Officer.

Abdel-Ghafar further disclosed that the ministry will welcome a delegation from the French Space Agency to discuss space cooperation between both countries. Both parties will be looking to sign a memorandum of understanding on space cooperation.

The program for the manufacturing of small satellites in universities across Egypt is a reflection of the country's recent drive to revitalize its space sector and its ambition to become a space power in the Middle East and Africa.

Last year, Egypt launched four satellites into space, of which two were developed locally by Egyptian engineers at the National Authority for Remote Sensing and Space Sciences (now the Egyptian Space Agency). With a record nine satellites launched into space from 1998 to 2019 by Egypt's Nilesat and the Egyptian government, Egypt currently tops the chart for the highest number of satellites launched by an African nation.

Egypt is also investing in other space infrastructure including a satellite assembly, integration and testing (AIT) centre, ground station facilities and the China-funded MisrSat II Earth observation satellite in collaboration with the Chinese government. Located in the iconic Egyptian Space City near the New Administrative Capital in Cairo, the space facilities, when completed, will boost Egypt's competitiveness in space science research and technology development.

Nowadays, Egypt has a great infrastructure in the field of space and its applications, owning satellites and organizing potential space activities for future young generations. The Egyptian government, under the leadership of President Abdel Fattah al-Sisi, has agreed upon draft legislation that will eventually create a national space agency. The announcement was made on 3 August 2016, and aims to harness space technologies for the purposes of economic development and for national security. More generally, an Egyptian national space agency will be given the responsibility of devising and implementing a national space policy and programme for the short, medium, and long-term.

Within the scope of the International Planetarium Society Conference held at the BA in June 2010, an agreement was signed between the BA, represented by its director, Dr. Ismail Serageldin, and the National Authority for Remote Sensing and Space Sciences, represented by Dr. Ayman Desouky and Dr. Farouk El-Baz, Director of the Center for Remote Sensing at Boston-University. The agreement established a framework for cooperation in the applications of space technology and remote sensing, scientific and academic training, scientific visits, cooperation in research and development, and joint scientific research. The agreement will be useful to Egypt, particularly to the Ministry of Scientific Research and Higher Education and the Ministry of Education. The program aims to help youth pursue their studies and careers in this field to build a generation of space technology scientists and researchers. It supports the development, construction, launch, and operation of small satellites as well as the distribution and analysis of the scientific data. The Space Technology Program organized the Systems Engineering Training provided by NARSS instructors during 23 July-1 August 2011 directed to 52 students from the Faculty of Engineering and the Faculty of Science. The training covered a number of topics such as power systems, thermal analysis, testing, communication, and satellite payload and satellite management.

Moreover, the Astronomical Society of Mostafa Mahmoud Mosque (ASMM) and The Astronomical Observatory at the School of Sciences and Engineering, American University

in Cairo, both offer telescope observations of celestial phenomena and public lectures and exhibitions on astronomy and space topics and events. All observatory's activities are open to the public. The observatory tailors its activities to enhance the scientific literacy of the society and to excite interest about science and technology among youth and children. The observatory also offers news releases and expert analysis on contemporary issues and events pertaining to astronomy and space science including the sighting of the crescent moon.

### **Egyptian university satellite**

This project aims at developing the first Egyptian satellite that is locally developed by Egyptian universities students guided by Egyptian space experts of EgSA. The developed satellite will be a pico-satellite in the form of 1U CubeSat. The system design, integration, testing, launching, and operation will be performed by EgSA experts, while the satellite subsystems development, the prototype manufacturing will be performed by students as their graduation projects under supervision from their university supervisors and EgSA experts, then the rest of the developing phases are performed by EgSA specialists.

In addition, the MisrSat-2 is not a commercial project, but it is implemented through a grant from the Chinese government to support Egyptian space ambitions. The project objects are, first, to obtain an in-orbit optical high-resolution satellite in the visible light spectrum for civilian application, second, to participate (hands-on work with the supervision of contractor team while on job training is provided) in the project full lifecycle, and third, to confirm our space-proven capabilities and functionalities in the real operational environment with experimenting Egyptian developed devices as auxiliary payloads for MisrSat-2. The satellite Payload is a High-Resolution Camera with Resolution of Panchromatic: 2m and Multispectral: 8m with Swath of 33km. the satellite Platform is CAST100 of Mass  $\leq 350$ kg, Lifetime of 5years, and Reliability of 0.62 @EOL. The GS supports MisrSat-2 for mission planning, remote sensing data receiving, producing of levels 0-2 standard image products, data storage managing, and typical application system.

### **International Partnerships**

A cooperation protocol was signed between the Egyptian Space Agency (EgSA) and the French Space Agency (CENS) His Excellency Minister / Mohamed Elkoosy, CEO of the Egyptian Space Agency and Mr. Jean-Yves Le Gal, head of the French Space Agency, in the presence of His Excellency Minister Khaled Abdel Ghaffar, Minister of Scientific Research and Higher Education, signed cooperation protocol for satellite developments, training and exploration of outer space

Dr. Khaled Abdel Ghaffar stated that this protocol is very important for cooperation between Egypt and France in the field of space technology and science and that there is fruitful cooperation in the past in many fields between Egypt and France. Dr. Mohamad Elkoosy stated that the French Space Agency is considered the second most important space agency in the world and this is an opportunity that we gain experiences through this protocol from them, and this is not the first time that we cooperate with France, and the French Space Agency offered cooperation with Egypt in the manufacture of a satellite, training and outer space exploration.

# Growing South Africa's satellite industry



The South African Government recognises the potential role of Space Science and technology to deliver on a wide spectrum of national priorities including environmental and resource management; urban planning and rural development; economic growth and global competitiveness; food security and health; job creation and poverty alleviation; human capital development; technology development and innovation; science advancement amongst the youth and public engagement in science; and fostering global, according to **Dr Valanathan Munsami**

Dr Valanathan Munsami  
Chief executive officer  
South African National  
Space Agency

South Africa aspires to become a leading player in space technology on the continent and although South Africa has invested in space over the past few decades, the country's competitiveness remains slow across the space value chain. In order to pollinate the fledgling space industry, SANSA set local industry contractual targets during the development of EO-Sat1. The local industry is being developed through the acquisition of the satellite programme which employs 47 people.

South Africa's advances and ambitions in Space Science and technology warrant co-ordination, and as such the Department of Science and Technology (DST) has established the South African National Space Agency (SANSA) to implement this co-ordination driven by the department's national space strategy, as determined by the Minister.

SANSA's mandate revolves around promoting the peaceful use of space; supporting the creation of an environment conducive to industrial development in space technology; fostering research in Space Science, communications, navigation and space physics; advancing scientific, engineering and technological competencies and capabilities through capital development outreach programmes and infrastructure development; and fostering international co-operation in space-related activities.

The development of the satellite has resulted in unique intellectual property which the country can leverage through commercialisation of these technologies and creation of new market opportunities. The consortium of Cape Peninsula University of Technology (CPUT), Stone Three and Clyde Space is involved in the development of a South African constellation of low cost nanosatellites to facilitate South African Marine Domain Awareness (MDA), as required by Operation Phakisa which is an initiative by the Government to address issues within the NDP, by

supporting international maritime communications, ranging from the current Automated Identification Service (AIS) standard to the future VHF Data Exchange System (VDES) standard.

The MDA constellation will provide South Africa with security and control of its AIS and VDES maritime data with associated improved control over data cost and access. In addition, with its flexible communications platform, the MDA nanosatellite constellation will also enable various other satellite-based services for South Africa and the greater continent. The Satellite programme forms a critical benchmark for shaping the industry and developing core capability within the country. Without long term commitment on a NSP, the country risks losing this core capability and opportunities that exists within the broader space industry. It has become increasingly critical to ensure the sustainability of a local space programme to enable participation in the global space economy.

In 2017 SANSA was contracted to Transfer-orbit support services (TOSS) for the QZS - 2 satellite for 'Launch plus one day'. To successfully carry out this task, SANSA had to utilise the HBK-07 KU antenna, which was originally installed in 1998, with its control system approaching the end of its operational life-span and without any support from manufacturers.

The high customer demand of the KU band antenna necessitated an urgent system upgrade which under normal circumstances would take a few months. Taking into account the technical requirements and a very strict installation period in which the upgrade and commissioning had to be done, the project was finalised within one month enabling SANSA to continue to service the industry with the high quality it is known for.

### Satellite development programme

South Africa's technology demonstrator satellite, SumbandilaSat was launched in 2009 and provided much knowledge on satellite development and paved the way to understanding the mission for the development of the next Earth observation satellite, EO-Sat1. The limited number of spectral bands on SumbandilaSat will be increased on EO-Sat1 and the ground sampling distance advanced from about 6.25m to 2.5m indicating a big shift in the payload design. SumbandilaSat suffered damage from solar emissions two years into operation and, as a result the on-board computer on EO-Sat1 will be upgraded using radiation tolerant components. The torque/volume ratio of the reaction wheels will be doubled and the angular momentum increased by a factor of five as an added advantage. The data transmission rate will be tripled allowing for more efficient data downloads that influences the effectiveness for users.

The new, internationally accepted, Landsat 8 and Landsat 5 processing software developed by SANSa scientists will significantly cut down on software purchasing and licensing costs. This will help support Near Real Time Landsat applications and fast track delivery of Landsat image products to South African community.

EO data is acquired at the SANSa Space Operations division. This data download is acquired from Landsat-7, Landsat-8, Aqua, Terra, Spot-6, Spot-7 and CBERS-4B satellites. Over the past year, 4412 satellite overpasses were successfully acquired. The sum of data acquired from all overpasses is 10767.95 minutes with no lost minutes, SANSa conforms to international standards by analysis of the quantification of a acquired overpasses.

### Amazon Surveillance System

In the past decade, African governments and organisations are acting in an isolated way, sometimes carrying out similar kinds of activity without sharing the obtained knowledge and without optimising the use of resources. As a result, maritime players know little about the vast region and there is no effective control over criminal activities such as sea piracy, terrorism, illegal fishing, and related criminal activities at sea. As a result, maritime domain awareness was implemented to establish better control in the region and is a powerful network for the collection and processing of information.

The satellite system gathers information of the maritime environment, processes and integrates this information in large databases, allowing organisations to share data and knowledge. In this way, the waste of effort that exists today can be minimised and can be adapted to the correct use of procedures and resources available for the development of the maritime industry. The year 2000s witnessed a number of unlawful activities, such as illegal bunkering, robbery, piracy, and theft of ships, and the occurrence of a series of other crimes. In fact, with the difficulties of communication and control in the region, it was very difficult for African government to measure the scale of illegal activities happening in the sea. Over the years, the situation has worsened and countermeasures had to be taken.

The project was funded by the Department of Science and Technology (DST), with supports Operation Phakisa. The DST's entity, the South African National Space Agency (SANSa), in cooperation with the University of Montpellier, the French Embassy, while the Paris Chamber of Commerce, manages the project.

### Biggest solar flare in a decade threatens communication

SANSa provides space weather knowledge, expertise, products and services through the SANSa Space Weather Centre, which is the only Regional Warning Centre for Africa under the International Space Environment Service (ISES). The Centre services a unique client set, and provides forecasts and warnings of adverse space weather that can negatively affect modern day technology such as communication and navigation systems, power grids, mobile phones and avionics to name a few.

In September 2017 saw the Centre go to high alert when the strongest solar flare in over a decade was recorded. The resulting intense space weather event caused high frequency (HF) radio blackouts across the daytime side of Earth affecting HF communication over Africa, Europe and the Atlantic Ocean. The solar flare was accompanied by a coronal mass ejection (CME) which travelled towards Earth at a speed of over 1200km per second impacting the Earth's magnetic field. The impact of the CME sparked a strong (G3) geomagnetic storm on Earth that affected HF communication, navigation systems such as GPS, and communication systems such as DStv, mobile phones and internet connectivity.

Warnings and updates were issued during the storm to national power facilities, the South African National Defence Force, the aviation sector and other clients as well as creating public awareness through media interviews and press releases.

### Mapping our cities

SANSa researchers braved the cold winds and encroaching darkness of the Karoo desert, working with sophisticated cameras and near-real-time data feeds they hunted thunderstorms in search of illusive sprites. A rare atmospheric phenomenon that has been observed sporadically since the late 1980s. Sprites are gas discharges caused by lightning strikes and South Africa is a good place to study sprites as the country is a global lightning hotspot during the summer months. 2018 marked SANSa's third year of observing sprites - first from Sutherland where the initial images were captured and this year also in Canarvon, in the Northern Cape. The Team hope that observing a sprite from two locations simultaneously will allow them to triangulate the sprite and get the position and height, to determine how it relates to the position of the parent lightning strike. Both the triangulation and the estimation of the electron energy in a sprite would be world firsts. Within three nights during February 2018, the team recorded in excess of 150 sprites - an unusually high number. This is just the beginning for sprite research in South Africa. Future plans include setting up a low-frequency electric field array in the Karoo to record lightning strikes in real-time and with greater accuracy (right now researchers rely on South African Weather Service data on lightning strikes). This would help establish which type of lightning strikes cause different types of sprites, and shed light on the mechanisms of sprite formation.

# KSA provides leadership and advisory in policy, legislation and programmes in space sector



John Njoroge Kimani  
Acting Director General/CEO  
Kenya Space Agency (KSA)  
Pitman House, 4th Floor, Jakaya Kikwete Rd  
P.o. Box: 7046-00200 NAIROBI, KENYA

In May, 2018, Kenya became a space nation with the launch of its first, very own, cube satellite, designated “1KUNS-PF” which stands for “First Kenyan University Nano Satellite-Precursor Flight”. The 1KUNS–PF project has created the opportunity for the University of Nairobi to work with JAXA as the satellite launch partner, Sapienza and Kyushu Institute of Technology of Japan as the technology partners for human resource development in satellite design, manufacture and testing to meet the quality standards set by JAXA for nanosats launch from ISS using JEM KIBO, according to **John Njoroge Kimani**

The Kenya Space Agency was established and mandated under the Kenya Space Agency Order of 2017 to co-ordinate, regulate and promote the development of the space sector, and to provide leadership and advisory in policy, legislation and programmes related to space sector. It promotes, coordinates and regulates space-related activities to enhance utilization of space technology for socio-economic development. Therefore, the Agency is expected to position the country to tap into regional and global opportunities including entering into bilateral and multilateral agreements. The Kenya Space Agency replaced the National Space Secretariat that was established via Gazette Notice No. 5563 of 5th June 2009.

## Our history

Kenya's history of space activities date back to the 1960s with the establishment of a Satellite Launching and Tracking Base at Malindi, in collaboration Italy. Over twenty sounding rockets and nine satellites were launched from the facility between 1967 and 1988. Kenya also built the Longonot Earth Station which became operational in 1970 and provided international satellite communications to the entire East African Community. Other Earth station were later built in Kericho and Nairobi. Today there are several Earth stations in the country including submarine cables that facilitate international communications.

On 12th December 1970, the first satellite specifically designed for X-ray astronomy, Small Astronomical Satellite 1 (SAS-1), was launched from the San Marco Platform in Malindi. This National Aeronautics and Space Administration (NASA) satellite was christened “Uhuru” to commemorate the seventh anniversary of Kenya's independence and in recognition of the hospitality of the Kenyan people. Uhuru was a scanning mission that performed the first comprehensive survey of the entire sky for X-ray sources and ended in March 1973. In 2009, the National Space Secretariat (NSS) was established as the precursor to the

Kenya Space Agency, to be the central coordinating body for all space related activities. The Agency was eventually established in 2017 with the mandate to promote, coordinate and regulate space related activities in Kenya. Kenya's first satellite named 1st Kenya University Nano Satellite - Precursor Flight (1KUNS-PF) - was deployed into orbit from the International Space Agency on May 11, 2018. This is part of the capacity building and research programmes in space science and technology currently conducted in Kenyan universities. Kenya's entry into the space arena is for socio-economic development and all the activities will be guided by existing international treaties. The strategic plan provides a clear roadmap and firmly anchors Space science, technology and related applications as key drivers for development in tandem with the national aspirations, political, social and economic goals.

## KSA priority areas

### Delivery of Space Services

KSA will seek to enhance the access to Space services and grow the demand for the Space services through effective and efficient service delivery and industry coordination. The Agency has identified five (5) Space programmes of service including: Earth Observation, Navigation and Positioning, Satellite Communications, Space Operations and Systems Engineering and Space Science and Astronomy.

- Earth Observation (EO) programme entails monitoring Earth from Space using remote sensing techniques. This will help us to monitor our environment, natural resources, disasters and understand the changes happening in our country.
- Navigation and Positioning programme entails determination of the route to a desired geographic location. This will help us tap into possibilities of precision agriculture, route mapping, addressing systems and other related geolocation services.
- Satellite communications programme entails the

transmission of signals using the electromagnetic spectrum between ground receivers and transponders on telecommunication satellites. This will help us to provide communication redundancy in case of disasters, connect remote locations, support telemedicine and tele-education.

- Space Operations and Systems Engineering programme entails all the services related to the development, launch and operations of spacecrafts in space. The programme will entail satellite manufacturing, mission and operations control, telemetry, tracking and command services as well as launch services.
- Space science and Astronomy programme deals with scientific disciplines in Space exploration and study of natural phenomena and physical bodies occurring in outer space. This will help us observe outer space, provide services on space weather and astronomy.

### **Developing National Space Capability**

KSA will seek to develop national capability promoting space sector growth for sustainable national development. This will be implemented through assessment of space potential, investments in human capacity, acquisition of critical infrastructure, promotion of research and undertaking education and public awareness. It will also promote uptake of space science, technology and applications (SSTA). This will require that the Agency develops a capacity building framework to: develop human resource competencies; acquire critical assets and infrastructure; promote growth in research, innovations and applications in space science and technology; and promote public awareness of the Space sector activities and potentials including the relevance, benefits and opportunities.

### **Sector Coordination and Leadership**

KSA will seek to establish sector coordination and leadership mechanism that will enhance synergy among stakeholders and enhance service delivery. The national government and county governments have various activities that require the support of Space technology enabled services. Proper coordination and leadership will ensure that stakeholders are well guided for effective investments, impact and value for money. Among the key strategies the Agency will implement include: leadership, sector planning, developing an enabling policy and legal environment, creating networks and linkages, and establishing communications and knowledge management framework for effective and efficient coordination of the sector initiatives and activities.

### **Corporate Positioning and Sustainability**

KSA will seek to undertake three (3) main initiatives namely: corporate positioning, resource mobilization and institutional sustainability. Staffing, asset acquisition and corporate competence development will involve corporate branding and corporate communication. Under resource mobilization, the Agency plans to establish a Space Industry Development Fund; develop resource mobilization policy and strategy; identify strategic partners for resource mobilization; identify various sources of financial support and respective programmes; identify sources of non-financial support including land, buildings, machinery, equipment and infrastructure provided in-kind, and technical support or expertise. On institutional sustainability the Agency will focus on: resource efficiency, risk management, regular monitoring and evaluation, generate internal revenue, strategic management of partnerships, staff retention and management of assets.

## **Implementation and coordination framework**

KSA is seeking to establish a strong foundation to enhance implementation and coordination of programmes and activities for effective and efficient achievement of the targeted outputs and outcomes.

**Organizational Structure:** KSA has developed an organizational structure that has been informed by its mandate stipulated in the Kenya Space Agency Order (2017) and the strategic themes in this strategic plan. The structure comprises of the Board, Director General, 4 Directorates and 19 departments/units.

**Human Resource Strategy:** KSA will have a staff establishment of one hundred and forty-six (146). The Agency will endeavour to competitively fill these positions based on available funding in the next few years as it seeks to develop adequate human resource capacity to effectively deliver on its mandate.

**Financial Strategy:** KSA has conducted cost estimation assessment per each strategic theme derived from various activities, which will be implemented to achieve the various strategic objectives, strategies and targets. The agency will develop a financial resource mobilization strategy that will identify the sources and partners at local, regional and international levels, including Government and non-government sources to cover the projected cost estimates.

**Capacity Development:** KSA will assess the capacity needs for effective exploitation of the Space potential in the country. This assessment will cut across the human skill sets and gaps, financial deficits, infrastructure deficits, and critical systems. This will inform the resource requirements, priorities and guide decision making on mobilization strategies.

**Risk Management:** KSA has identified potential factors and events that could threaten the implementation of this strategic plan. KSA will conduct regular comprehensive risk assessment, ascertaining the likelihood of the risks and severity to inform decisions on the relevant controls.

**Workflow and Responsibility:** KSA will establish a quality assurance system for the purpose of service delivery, responsibility and accountability. The Agency will develop annual corporate plans reflecting the annual targets for respective years. The agency will seek for ISO certification in quality management during the plan period.

**Resource Mobilization Strategy:** KSA will put in place an effective resource mobilization strategy for financial and non-financial needs, human resource needs and infrastructure. Some of the sources of finance will include: funding from National and County Government space related services, income generated space related services, donations and/or grants from development partners as well as non-financial sources.

**Communication Strategy:** KSA will communicate its mandate and services to all stakeholders, for effective implementation of the plans and activities envisage in this plan. Effective and efficiency in communication will require that the Agency diversifies its channels of communication by exploiting technology and observing cost efficiency.

**Institutional Linkages and Coordination:** The mandate of KSA requires the Agency to take lead in coordinating the affairs of the Space sector. KSA is cognizant that the Space sector players operate at different levels in the value chain of the Space ecosystem, which are intertwined across international, regional, national and local fronts. KSA will ensure coordination and interlinkages with the international and regional Space industry and stakeholders as well as those in the private sector, civil society and non-government organizations.

# Angola: A new African country in space



At the beginning of the 21st century, the Angolan government embarked on a major effort to revamp the nation's telecommunications infrastructure and switch local TV channels from analog to digital format. In order to improve and expand communications across all 117 municipalities and to link the nation to the rest of the African continent using Angosat-1. Following the loss of Angosat-1 satellite, **Engineer Zolana Rui** says Angosat-2 satellite is a replacement satellite in an agreement with the Russian company.

Engineer Zolana Rui  
Classical Administrative Complex of Talatona,  
Rua do MAT, Building nº 3, 6th Floor, Belas –  
Luanda, Angola

The Angolan National Space Program Management Office (GGPEN) was established with the mission of promoting the peaceful use of space, as well as conducting strategic studies aimed at establishing cooperation agreements with technical and scientific institutions in the space domain. In addition, GGPEN works towards ensuring the creation of national technological and human competencies and the transfer of technology and know-how within the scope of the Space Program.

With this mission, GGPEN is the primary space institution in Angola and is the institution in charge of all Angola satellites (already launched AngoSat-1, and future satellites like AngoSat-2 and AngoSat-3). The institution, led by Zolana Joao has been successfully driving space program in the country in the past years and was instrumental to the development of the Angolan National Space Strategy.

To promote space education and outreach in the country, GGPEN has been supporting several startup companies offering products and services to support its mission. Through its training, workshops and support for events like the Angola ICT Forum (ANGOTIC), an event for knowledge sharing and a networking hub for government entities, industry players and emerging mobile service providers, GGPEN has been able to identify and groom few startups offering products and services to support space education and outreach, as well as other services in the industry value chain.

ANGOSAT is a presidential initiative project, out of resolution No. 2/06 of 11 January, of the Council of Ministers. The project is the result of an in-depth study, carried out by the Interministerial Commission for the General Coordination of the Multisectoral Support Satellite Telecommunications Project (CISAT), created by Presidential Order No. 21/06 of 21 June, on the feasibility of construction, launch and operation of an Angolan satellite. The study, counted on the Russian Consortium, led by the

company ROSOBONEXPORT, RSC Energia (satellite builder).

In 2009, the Contract was signed between the Government of the Republic of Angola, represented by the Ministry of Telecommunications and Information Technologies (MTTI) and the Russian Federation, for the Construction, Launch and Operation of the Angosat-1 satellite.

The construction agreement was renewed between the aforementioned parties in Luanda, on the past April 23, 2018, having started the next day, in Mocoço, capital of Russia, the works for the construction of Angosat-2 (to be launched in 2022), which corresponds to an updated version of the Angosat-1 satellite, to offset the investment made in the construction of Angosat-1, in orbit since December 2017, but with no signal, until the present date.

ANGOSAT is the name of a project that is an integral part of the National Space Program (PEN), with the main focus on ensuring the construction, launch and operation of geostationary Angolan satellites, which provide opportunities for expansion of satellite communication services (internet, radio), telephony and television broadcasting), throughout the national territory and provide revenue collection. Angosat-2 will cover all of Africa and part of Europe. Within the scope of the space industry, the project is divided into the following segments:

**Space Segment:** Referring to the construction of satellites for telecommunications purposes. The ANGOSAT-2 satellite is currently under construction; **Land Segment:** Includes the construction and equipping of the Control and Mission Center (in English MCC), expansion and modernization of the Inframat network and creation of national competences in the field of space technologies.

The perimeter of the National Space Program (PEN) occupies an area of 52,254m<sup>2</sup>. In this area, a Satellite Mission Control and Mission Center was built from scratch, it occupies an area of 2,207m<sup>2</sup> of the 6,617m<sup>2</sup> of the

surface already built. It is a 3-storey building, with 47 fully equipped compartments, equipped with a fire detection and fighting system, intrusion system (CCTV), centralized technical management system (BMS) and carbon monoxide extinguishing system.

The MCC is a center that technologically represents a landmark for Angola and at the level of Africa, it also represents an imposing infrastructure in what concerns the activity of space exploration. It was designed to work uninterruptedly, that is, 24 / 24h and is equipped with engineering systems that make it possible to receive, process and send information to the satellite. The center has 45 national technicians, who have been certified to operate satellites. The launch segment comprises launch logistics, as well as the rental of the orbital position and assignment of operating frequencies.

### **The Angosat-1 communications satellite**

The Angolan satellite or Angosat-1 was designed to be the first national communications spacecraft for the African country of Angola. In part thanks to extensive political, economic and military ties between Russia and Angola dating back to the Soviet period, the Russian firm RKK Energia won the contract for the development of the Angosat-1 satellite.

At the beginning of the 21st century, the Angolan government embarked on a major effort to revamp the nation's telecommunications infrastructure and switch local TV channels from analog to digital format. In order to improve and expand communications across all 117 municipalities and to link the nation to the rest of the African continent, the Angolan Ministry of Telecommunications and Informational Technologies planned to launch the first Angolan communications satellite, Angosat-1.

The spacecraft, which was expected to carry up to 40 C- and Ku-band transponders, could be used for all forms of modern communications including TV broadcasts, telephone service, the Internet and secure electronic services for the government. According to the African press, the Angolan government gave high priority to the project, estimated to cost around \$300 million, despite limited financial resources.

In June 2009, Rosoboroneksport, a Moscow-based entity specialized in sales of Russian defense-related technologies reached an agreement with the Angolan government to build and launch the Angosat-1 satellite. The deal was probably sweetened by the fact that Russian banks had agreed to lend the money for the venture. The actual job of building the spacecraft was delegated to RKK Energia, which had pioneered satellite communications in the USSR in the 1960s and returned to this line of work in the 1990s. After preliminary studies, the practical implementation of the project started in December 2012.

RKK Energia based the design of the Angosat satellite on a standard platform, which had previously served as a basis for the Yamal communications satellite series and the military EKS Tundra early-warning spacecraft. By the standards of modern commercial communications satellites, which reach up to six tons in mass, Angosat was a relatively small spacecraft. The initial mass of the satellite was reported to be around 1,550 kilograms, but shortly before the completion of the project, RKK Energia quoted its mass as 1,647 kilograms, which is a modest increase likely resulting from various design changes during the course of the development.

The company reported that the service module of the Angosat satellite could provide an onboard communications payload with up to seven kilowatts of power with electric current available at 28, 50 and 100 volts. RKK Energia also said that the platform had consisted of Russian-made components and the company's newest virtual reality design center assisted in the development of the satellite, however, the spacecraft's

communications payload was apparently supplied by the European consortium Airbus Defense and Space. The communications payload aboard Angosat included 16 C-band and 6 Ku-band transponders, whose antennas could provide communications across Angola, but also cover the entire African continent.

Like other satellites in the Yamal series, the Angosat was equipped with electric thrusters which could be used to maneuver the satellite to its operational orbit after launch and then maintain the correct orbital parameters.

In addition to the spacecraft itself, Russia also agreed to help Angola build the primary ground control station for Angosat near the Angolan capital of Luanda and a backup facility in Korolev, Russia, as well as train local engineers to operate the satellite in orbit. In 2017, the total cost of the Angosat project, including ground infrastructure, was reported to be \$327.6 million.

### **Building Angosat-1**

In 2011, Moscow-based banks, including Vneshekonombank, VTB and Roseksimbank, extended a \$278.46-million credit to the Angolan Finance Ministry for 13 years to fund the Angosat project.

The full-scale development of the Angosat satellite officially started in November 2013 and was expected to last 36 months. Around that time, RKK Energia began work on the design documentation and it was also preparing for a formal approval of the preliminary design of the spacecraft and its ground complex. That phase was followed with the development of the production documentation and, finally, the production of components for the spacecraft.

In the middle of 2014, RKK Energia said that the planned work for building the satellite and its ground infrastructure was underway.

By 2015, the company reported that the development of the Angosat-1 had passed the critical design review and the design of the ground segment had been submitted to the customer. The project officials were also working on securing necessary communications frequencies for the operation of the satellite.

At the end of June 2015, the Angolan Ministry of Communications announced laying the foundation for the satellite control center in Funda, municipality Cacuaco, near Luanda. According to the Interministerial Commission Coordinating the National Space Program, GGPEN, the prime factor for choosing that particular location was the low level of electromagnetic interference in this largely rural area. The center's communications equipment included a 7.6-meter ZS SKU flight control antenna and a 4.9-meter support antenna. The facility also included two power generators, two electric transformers and a fuel storage, enabling its operation in case of a power outage. A water-treatment plant located five kilometers away on the Bengo river also supported the center. The futuristic three-story building of the satellite control center, designed by Moscow-based 2K Engineering Company, was completed by September 2016.

### **AngoSat-2 to be launched by March 2022**

Angola's Angosat-2 satellite is getting ready to be launched into space for 2022. The telecoms satellite is being developed in Russia by Reshetnev Information Satellite Systems Company. Reshetnev Information Satellite Systems Company General Director, Nikolai Testoyedov mentioned that "We are due to launch the satellite in March 2022 the company is now making the satellite platform". "The work on the payload of the European company Airbus is the project's most critical part. That is why, we have established all the necessary relationships, held meetings and are continuing this work. Simultaneously, we have started new work for the Angosat – our satellite platform".



# Conducting scientific and applied research, connecting with the purposes of development



Khalid Ehaimer  
General Manager  
Sudasat

In 2011, a Cubesat project was established in the Department of Electrical and Electronic Engineering, as the first educational project in the field of space generally and specially in Satellites field in Sudan, targeted to support capacity and awareness building about the space and satellites. Today, Sudan's Remote Sensing Authority has become the focal point for institutional capacity building in remote sensing and GIS, supporting a number of institutes and ministries for services like project formulation, image processing, enhancement and analysis, GIS software handling, database management, map design and production and GPS applications.

Remote Sensing Authority (RSA) was established in 1977, as a National Remote sensing Center (NRSC) within the National Council for Research, Ministry of Higher Education and Scientific Research. In 1996 the Remote Sensing Center was renamed to Remote Sensing Authority and affiliated to the National Center for Research, Ministry of Science and Technology. While Sudan is anticipating for a Space Agency, NRSC is responsible for space activities in the country.

Remote Sensing Authority (RSA) was established in 1977, as a National Remote sensing Center (NRSC) within the National Council for Research, Ministry of Higher Education and Scientific Research. In 1996 the Remote Sensing Center was renamed to Remote Sensing Authority and affiliated to the National Center for Research, Ministry of Science and Technology. The Seismological Research Unit was established in 1995, after that and according to National center for research rule and condition that unit was promoted into the Seismological Research Institute. In 2013 both RSA and the Seismological Research Institute were merged to one body under the name of Remote sensing and seismology Authority. RSA is doing research in the field of remote sensing, geo-informatics and GPS technology applications for natural resources, environment and disasters. The Institute provides value-added services in natural resources management, remote sensing, GIS, GPS and technology transfer. About 45 full time enrolled candidates are serving the RSA in its different departments. Staff members are of different qualifications (PhD, MSc and BSc) and backgrounds (geology, geography, agriculture, engineering, forestry, computer science, etc.). In addition to the permanent staff, the RSA cooperates with highly qualified local and regional expertise on demand.

The National Center has its administrative and academic structures, based on its law, which work together to provide scientific research inputs, develop and implement its strategy, programs and multiple research projects through a number of

research and service institutes, bodies and centers that are distinguished by their uniqueness, multidisciplinary and complementarity. Based on the decision of the Minister's Council meeting held on 5/14/2014 AD, the new organizational and functional structure was approved on the first of Sha'ban for the year 1434 AH corresponding to 6/10/2013.

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While the institute of Space Research and Aerospace (ISRA) was established according to the State Minister of Science and Communication resolution and has been launched and became active on 27th Rajab 1434, 6th of June 2013 so as to

nationalize the research and development of the different fields of space science and technology in Sudan. The institute aims to make use of local and abroad Sudanese researchers, scientists and engineers to establish space science and aerospace engineering, as well as space vehicles and sensors, and to develop integrated systems through independent efforts and cooperation and partnerships with related local and international organizations. The institute also acts on to familiarize the nation with space science and aerospace and train the Sudanese researchers and engineers and upgrade the academic programs in universities and colleges in the related fields of space science and aerospace engineering.

In Sudan, the Environment and Natural Resources Research Institute (ENRRI) was established in 1992. The need for a body to carryout applied research in the field of conservation and development of natural resources and their sustainable utilization as well as environment protection was the main reason for establishing ENRRI.

ENRRI (1992- 2013) succeeded to conduct research and to apply technologies in the fields of biofertilization, alternatives to pesticides and biological control, monitoring and removal of pollutants and waste recycling. In addition to the research in the field of honey bee rearing, indigenous plants and fisheries. Recognizing the importance of desertification as the main environmental problem in Sudan and cognizant with United Nation's Convention to Combat Desertification (CCP) and the government of Sudan commitment to combat desertification, the Desertification Research Department in ENRRI was promoted to become a separate Institute with the name of Desertification Research Institute (DRI) in 2002. As from (2002-2013), DRI conducted basic and applied research as well as studies on the biological, physical and socio-economic problems of arid and semi arid regions. Elreweakeeb Dry land Research Station was taken as a site to conduct search on methods to control Desertification.

In recent years, the pressures on natural resources have intensified and desertification has become a serious problem facing Sudan, especially after the separation of the southern part of Sudan, when the percentage of dry areas to wet areas decreased tremendously and the forest area became 12% of the total area of North Sudan compared to 27% before the separation of the south. Therefore, it was agreed that scientific efforts, research facilities and experience of researchers should be dedicated to conduct applied research aiming at resolving problems related to environmental pollution, combat of desertification and sustainable utilization of natural resource for the betterment of the society and the environment. Again in 2013, with the aim to sustainable use of the meager resources and for more consolidation of research efforts, the Institute of Environment and Natural Resources together with the Institute of Desertification were amalgamated to form the current institute (ENDRI).

### **UofK Cubesat Project**

In 2011, a Cubesat project was established in the Department of Electrical and Electronic Engineering, Faculty of Engineering at University of Khartoum. It was the first educational project in the field of space generally and specially in Satellites field in Sudan. The main target was to get involved in this field and then start capacity building and raise the awareness about the space and satellites. The university started to assign the engineers and researchers from different specializations, who had the intensive interest to add value for this project and who got the real intention to make something unique. The figure shows the Cubesat prototype that designed, implemented and fabricated in the university.

### **UofK Educational Ground Station**

A professional educational ground station was installed and till now operating by the university engineers and undergrad students. It succeeds to track many universities Cubesats and small- satellites and also succeed to send commands and receive data from different types of satellites that are active in its orbit. The University of Khartoum educational ground station doesn't focus only on tracking and commanding the educational small satellites or Cubesat, it also used in tracking and receiving data from other types of application satellites. After receiving the data, the ground station engineers decode this received information using the ground station decoding programs and then analyze and study the result.

### **UofK Space Research Center roles in public awareness**

Since the establishment of the Cubesat project, and then the Space research Center, there were periodically workshops and training sessions presented by the space center researchers for the interested university students and young professionals to make them aware about the newest technologies and ideas in the field of space and satellites (specially the small satellite), even the high school students were involved in these workshops and training sessions. Also many events and competitions related to educational satellites were organized and sponsored by the Space Research Center. The goals of all these events is to spread the awareness of the space and satellites benefits and effectiveness on our daily life and also to illustrate that, the small and educational satellite can do missions and collect useful data same as the professional satellites.

### **Space Research Center Impact on Sudanese Engineers Development**

Every year, numbers of interested researchers from different disciplines and specialization join the space research center. Nowadays, and in order to accomplish and achieve the target mission of the University small satellite to serve the agricultures in Sudan, the space research center has communication, electronics, power, control, software, mechanical engineers. Those engineers are working in the both sections, the educational ground station and also the designing of the UofK Small-sat. The communication engineers deal with the different types of antennas and modulations techniques, transceivers and how they can send and receive the data from the ground stations. Software engineers deal with the decoding and tracking programs and with the on-board computer subsystems. Electronics engineers deal with the antenna tracking system calibration and measurements and with different types of electronic circuits. Power engineers deal with power system for all devices and system in the ground station and on the Small-Sat subsystems. Control engineers deal with the mechanism of antenna rotator control and also the design of the attitude control for the Small-Sat and the mechanical engineers deal with the mechanical parts of antennas and rotator control and also responsible of the process of manufacturing and fabricating the spacecraft body and skeletons.

This diversity in specialization and the nature of tasks that required to install and operate small satellite educational ground station and also the knowledge need to designed and implement a fully functional Small-Sat affect directly in the human capacity building in the field of space and satellite science and technologies here in Sudan.

# Space science and space technology for socio-economic development



In 2004, the establishment of the Ethiopian Space Science Society (ESSS) became a major step to revitalize the development of space sector in the country. Ethiopia has the ambition to establish competent space program with an aspiration to realign the sector to socio-economic development plans in order to effectively exploit the benefits that can be acquired from space science, space technology and their applications.

Beza Tesfaye  
General Manager  
Ethiopian Space Science Society  
Addis Ababa

Ethiopia is facing various socio-economic challenges. The most pressing ones are food insecurity, nutrition deficiency, low level of mineral exploitation; lack of good land governance and well established land information system as well as inadequate access to quality of health, education and clean water provisions. Space solutions such as ground-based, air-borne and space-borne technologies would contribute a lot to address these challenges. More specifically, space technology and applications are important to inform wise decision making processes for: yield forecasting and risk assessment of crop and livestock farming practices; expand basic geological surveying and mapping to enhance the mining sectors; enable the realization of dynamic rural and urban land administration and the provision of smart healthcare and educational services. In this regard, the ability to utilize space technology and applications to tackle these challenges is not well realized. The following goals and strategies are set to address such gaps.

Land, soil, water, solar energy, forests, minerals, range lands, different forms of agro-diversity and biodiversity resources with diverse varieties of wild animals are the most common natural resources in Ethiopia. Space science and space technology applications play an important role for managing different natural resources. Over the past couple of decades the advance of space instruments from space and new platforms of earth observation technologies have been proven the applicability of space science and space technology in natural resources management. Currently, earth observation data provides services that require synoptic or periodic observations for a natural resource inventory, surveying studies and management programmes. However; in Ethiopia space science and space technology based natural resource management systems are not well

established yet. This policy maximizes the use of space science and space technology application to effectively manage natural resources.

However, dependable key economic infrastructure such as energy and water supply networks, reservoirs, dams and transportation facilities (i.e., roads, railways, tunnels, bridges, irrigation canals, airport facilities and telecommunication networks) are crucial for the efficient economic growth and development. Space science and space technology and applications can significantly contribute to the planning, surveying and design of the different economic infrastructures in a cost-effective way. In addition, space science and space technology and its products are proven to be utilized for monitoring compliance to safety requirements of dams and reservoirs, tunnels, bridges, highways, and canals. Furthermore navigation, positioning, and communication system are essential for safe landing, takeoff and inflight operation of aircraft. However, the current practices of planning, surveying and designing activities of these infrastructures are not effectively utilizing space science and space technologies and applications in Ethiopia. A number of Strategies are designed to enhance the use of space science and space technology applications in building economic infrastructure.

Ethiopia has the ambition to establish competent space program with an aspiration to realign the sector to socio-economic development plans in order to effectively exploit the benefits that can be acquired from space science, space technology and their applications. To guarantee this, the ESSTI has been instructed by the Council to formulate space policy. During the preparation of the policy national survey and situational analysis were conducted to identify the major challenges and critical

demands. According to the findings of the survey, some of the major challenges are: the low scientific base, a lack of skilled human resources, almost non-existent space technological capability, weak space infrastructure, absence of a space affairs regulatory environment, non-alignment with national development programs; little utilization of the huge employment opportunity from the space sector, limited awareness and insufficient space popularization activity, lack of financing and incentive schemes, weak cooperation among local actors, and limited international collaborations and partnerships. Accordingly, the Ethiopian space policy is formulated to overcome the challenges outlined above and serves as a tool to realize the development and effective utilization of a national space programme.

On the basis of this, the policy is organized into three 'layers'. The first 'layer' is considered as the 'basis' of the space policy, and consists of space science, technology capability building, human resource and infrastructure development, and the development of a space affairs regulatory framework. The second 'layer' is devoted to aligning the space sector to national development programs and it contains strategic policy issues namely: space for economic and social development, space for resource management, space for infrastructure development and safety management, space for climate change and environmental disaster monitoring, and space commerce. The third 'layer' consists of policy issues that reinforce the first and second layers such as: local collaborations, regional and international cooperation, space awareness, finance and incentive scheme, and active engagement of civic societies and professional associations. Use of space for defence and security is also dealt with one component of this policy. Besides, the policy also deals with roles and responsibilities of different actors, institutional arrangements, continuous realignment of the space sector, and monitoring and evaluation system of the space

### **Space Technology Capability Building**

Ethiopia is investing considerable resources, purchasing satellite products and services to meet its national demands for earth observation, communication and broadcasting services. The cost of these services will become ever more expensive to meet the demands of rapid economic development, urban expansion and population growth. Therefore, there is a definite need to create a robust space technology base that is able to meet national needs and generate income by providing services for end users, locally and abroad. By its nature, the development of capability in space technology requires high level of technical capacity such as proper knowledge and skills as well as huge investment. In Ethiopia, except for some practice in operating optical telescopes and radar stations, the capability in space technology is almost non-existent. The Ethiopian space program is also characterized by lack of skills and experience required to operate telescopes, satellites, groundbased satellite data receiving stations, radar stations, Satellite Laser Ranging, Lunar Laser Ranging, and Very Long Base Line Interferometry. Further challenges include: lack of technical capability in designing and critical design review, manufacturing, assembling, integration, testing and verification of satellites; data processing, archiving and software development; and maintenance and servicing of telescopes. Given all these challenges, Ethiopia is committed to accumulate technological capability in the field that ranges from simple operation to complex manufacturing of satellites of different sizes and purposes, and ground-based space infrastructure, earth stations, and astronomical telescopes.

### **Space Commerce**

Though space sector is recognised globally as an area of investment that demands huge fixed cost at the beginning but it can generate high economic return in the long term. Space leading nations have a good track record in demonstrating the sector's contribution to their GDP growth, employment opportunity creation, and stimulating other manufacturing and service sectors. In particular, with the growth of communication and broadcasting services, communication satellites are becoming an attractive and profitable business area. In Ethiopia the space sector is not well recognized as an industry. Given the low level of the manufacturing sector industries pertinent to space sector such as optics, electronics, satellite operation and space related commercialisation activities are almost non-existent. Local communication and broadcasting companies rely on expensive rental service of foreign owned communication satellites. Different government agencies and private entities spend significant amounts of money to purchase satellite images for different purposes. This policy designs strategies that realize the space sector's contribution to create job opportunities and generate revenue while being developed as an integral part of Ethiopia's structural economic transformation.

### **Space Infrastructure**

The development of a space program requires huge investment to establish key infrastructures that support research and development in space science and technology. Such infrastructure includes the development of astronomical observatories (radio and optical telescopes), space telescopes, atmospheric and space weather laboratories, space radar laboratories, Assembly, Integration and Testing (AIT) facilities, clean room, satellite mission control centre, facilities for manufacturing of satellite as well as establishment of scientific observatories and laboratories earth receiving stations, geostationary ground stations, space segments, high computing facilities, laboratories, and workshops and launching and flight centres. In Ethiopia, these facilities are not yet developed and it is necessary to establish a centrally planned common space infrastructure that can support the national space program and strengthen competency of the country in space industry. The construction cost of these facilities is very expensive and they also have high maintenance costs. Therefore, it is essential to ensure effective and efficient use of public money while developing space infrastructure.

### **East Africa Office of Astronomy**

East Africa Regional Office of Astronomy for Development (Eaf-ROAD) is one of OAD offices in Eastern Africa hosted by Ethiopia. Eaf-ROAD office was opened in Ethiopia in 2014 as an East Africa Regional node of OAD under agreement between IAU and Quadrilateral Parties in Ethiopia: Ethiopian Space Science Society (ESSS), Ministry of Education (MOE), Addis Ababa University (AAU) and Ministry of Science and Technology (MOST). Currently the agreement is amended and Eaf-ROAD is hosted by the newly established Ethiopian Space Science and Technology Institute (ESSTI) and accountable to Ministry of Science and Technology (MOST) with direct supervision of both ESSTI and MOST.

The main objectives of the office is to further the use of astronomy as a tool for development by mobilizing the human and financial resources necessary in order to realize the scientific, technological and cultural benefits to society and implementing the IAU's strategic plan and missions of OAD.

# CRTS promotes exploitation and development of remote sensing applications in Morocco



Space oceanography covers several areas of interest relating to marine and coastal areas. The use of satellite images at different spatial and temporal scales combined with in situ data makes it possible to meet the needs of a rational management of the national marine, fisheries and coastal sectors. Several operational applications have been developed, in particular The Moroccan Atlantic coast, which stretches over 3,000 km, is one of the coasts richest in exploitable marine resources. As part of the upwelling action of the GERMA project, of the APPUIT program co-funded by the EU and in partnership with the INRH, the use of low-resolution space observation data has enabled the CRTS to develop a system.

Dr Driss El Hadani. Driss El Hadani  
The Royal Space Remote Sensing Center  
21 Angle Avenue Sanawbar and Avenue  
Allal El Fassi - Hay Riad district - Rabat - Morocco

The Royal Centre for Remote Sensing (CRTS) is the national institution responsible for the promotion, use and development of remote sensing applications in Morocco. CRTS coordinates and carries out the national program of remote sensing in collaboration with ministerial departments, private operators and universities. CRTS uses operational systems to collect, produce and analyze data from Earth observation satellites and other sources. It also runs the national archiving facilities.

CRTS develops applications and methods in space technologies and related disciplines (remote sensing, GIS, positioning, telecommunications,) CRTS also provides training and education opportunities in space technologies, and maintains partnerships for research actions and programs with universities and research institutions.

Created by decree in December 1989, the CRTS was mandated to promote the exploitation and development of remote sensing applications in Morocco. The CRTS coordinates and carries out the national remote sensing program in collaboration with the ministerial departments, private operators and Moroccan universities. The CRTS is responsible for the acquisition, archiving and dissemination of data and images, Earth observation, carrying out projects and developing methodologies in Remote Sensing and Geographic Information Systems and related fields. It also provides a Continuing Education program in the field of space techniques and participates in research programs and actions in partnership with national and foreign research institutions.

Internationally, the activities of the CRTS fall within the framework of cooperation and partnership relations with several national and international institutions and agencies. He actively participates in the work of COPUOS and several regional and international organizations (EURISY, IAA, IAF, ISU, ...)

Since 1992, the CRTS has developed experience in continuing education adapted to the needs of the Kingdom and the Region and addressed to various users: decision-makers, managers, executives, engineers and technicians. The CRTS has trained executives and professionals from the public, semi-public and private sectors as well as foreigners from Africa and the Middle East of Côte d'Ivoire, Burkina Faso, Mauritania. Each year, the CRTS carries out an annual continuing education program in the form of modules or schools, dealing with operational applications of spatial remote sensing and GIS: natural resources and the environment, development, network mapping, etc. In addition to this training program, the CRTS organizes targeted training at the request of users or at the request of regional or international organizations. The CRTS offers 'project training' for managers and technicians involved in the implementation of thematic projects and who are responsible for ensuring their continuity.

Research and development is also an essential component of the CRTS training program. Indeed, in collaboration with universities and national and foreign research centers, the CRTS welcomes and supervises student-researchers during their end-of-study internships or their theses. Just as university researchers participate in projects led by the CRTS. 'Tailor-made' internships and stays are also organized for the benefit of staff from national or foreign institutions to meet specific needs.

## Business areas

Since its creation, the CRTS has implemented several projects integrating remote sensing and GIS to meet the needs of users in terms of inventory and management of natural resources and environmental protection and land use planning. These projects are part of national development programs and are carried out in different forms (study contracts, pilot projects, national development projects, etc.). The applications developed constitute a

strategic support for decision-makers and concern several areas:

To meet the needs of users in remote sensing and GIS, the CRTS offers a service offering ranging from the supply of satellite images to the implementation and setting up of projects. It also ensures the production of digital geographic data and the performance of geomatics work.

The CRTS is the official distributor in Morocco of SPOT, Landsat, ERS, NOAA, and other satellite images. Thanks to its own archive, its direct access to the archives of SPOT IMAGE (France) and EURIMAGE (Italy) and its contact network (reception stations), the CRTS carries out catalog research and studies for the choice of the best satellite images, adapted (date, zone, type). Guidance and research procedures are put in place in the form of data acquisition sheets to assist users. This procedure allows users to benefit from access to the various image catalogs, at better prices, with rapid acquisition and delivery of satellite data as well as quality control of the images received.

The CRTS assures the assembly and the realization of operational applications and specific to the needs of the users: definition of the needs, development of methodologies, selection and acquisition of images, data processing, monitoring of projects and their evaluation. Achievements take the form of expertise, cooperative projects or specific contracts. A team of multidisciplinary specialists, in a specialized hardware environment, works and develops new tools in order to best meet user needs and also to integrate the latest technological developments.

In addition, CRTS provides an annual continuing training program in remote sensing and geographic information systems, the modules of which are spread over one or two weeks depending on the case. This program aims to initiate or improve the knowledge of national or foreign users on the opportunity and the contributions of these tools in the management of natural resources. These modules are led by CRTS specialists and national and international experts. The CRTS also provides training targeted to the needs of institutions by designing, setting up and running modules specific to the themes relating to each user. These trainings are structured around theoretical courses, practical work on machines as well as the realization of mini-projects.

### **Maghrebian drought alert systems project**

As part of the LIFE-Third Countries program funded by the European Union, Morocco is participating in a regional project for the establishment of a Maghrebian Drought Early Warning System (SMAS) in three countries on the shore, southern Mediterranean coordinated by the Sahara and Sahel Observatory (OSS)

The SMAS project is part of an integrated approach for the establishment of an observatory of environmental degradation caused by drought through the improvement of crisis diagnosis and the development of strategies for adaptation in order to reduce its impact by using an early warning system allowing the regular monitoring of environmental changes in Tunisia, Algeria and Morocco. This project will be extended in a second phase to the two other Maghreb countries Libya and Mauritania.

This project is coordinated by the Sahara and Sahel Observatory (OSS). In Morocco, the consortium includes the following partners: the CRTS (lead partner), the Directorate of National Meteorology, the High Commission for Water and Forests and the fight against Desertification, and the Directorate of Plant Production of the Ministry of Agriculture.

The project start-up workshop was organized at the CRTS on March 9 and 10, 2006 in the presence of all the partners representing the three countries participating in the project and the OSS. The first stage in the implementation of the project will be focused on carrying out a synthesis study on the existing systems dealing with the problem of drought and the organization of national workshops for the definition of the indicators that will be retained by the SMAS projects. For Morocco, the expert study is currently underway with a view to organizing the National Workshop at the end of May 2006.

### **Water resources**

On a global scale, the issue of the rational management of water resources arises acutely given the scarcity of this vital resource and the many factors of degradation. Earth observation techniques and geographic information systems contribute to a better global and local knowledge of the distribution of this resource on the earth's surface as well as to a better understanding and analysis of hydro-geological phenomena. Several practical applications of these tools can help managers and decision-makers in mapping, monitoring, inventory, prospecting and development. At the CRTS, several projects carried out or in progress, show the contribution of space techniques in the field of water resources.

As part of their cooperation actions, CRTS and SPOT IMAGE carried out on behalf of the DRPE a pilot project on groundwater prospecting in arid zones in the Guelmim zone. The objectives of this study were to identify and position deep drilling sites that meet the needs of groundwater prospecting in the Guelmim area. These objectives are located upstream of the traditional chain of groundwater prospecting. The proposed approach makes it possible to efficiently orient the subsequent geophysical surveys while avoiding unnecessary and costly surveys for the user.

### **Integrated water resources management**

As part of the TIGER Initiative, the CRTS is currently carrying out two projects in partnership with the Sous-Massa Hydraulic Basin Agency. Current projects aim to introduce, at the scale of the Sous-Massa hydraulic basin, an integrated approach including the use of satellite data, traditional territorial data and Geographic Information Systems (GIS) as sources of information, and analytical tools in the water resources management process. The contribution of these new techniques for acquiring and producing information will consist on the one hand in contributing to better management of water resources in lowland areas in a situation of overexploitation of groundwater, and on the other hand the release of new resources in the undernourished mountainous areas. Ultimately, this cooperative action should enable the Sous-Massa Water Basin Agency (end user) to have a more complete database and to develop endogenous capacities for the use of techniques and products of observation of Earth. This action is carried out in two parts: Support from the European Space Agency (ESA) which provides the benefit of a radar data set and financial support granted by the Canadian Space Agency (CSA) to a consortium made up of IES and UQUAM (Canada), CRTS and ABHSM (Morocco).

# Applications of space technologies in health management



According to UNOOSA, combating epidemics and pandemics require a coordinated response, integrating a global alert system. However, information derived from satellite earth observation combined with GIS and GNSS systems has been used in epidemiology allowing for better spatial analysis. **Atanilson Tucker Cachinjumba** explains that the new millennium has witnessed space technologies becoming more and more applicable and relevant in our daily lives, bringing an increase in awareness of the importance of space applications

Atanilson Tucker Cachinjumba  
Aerospace Engineer, Department of Space  
Sciences and Applied Research,  
GGPEN

The space age began, in 1957, with the launch of the first Sputnik 1 satellite. Soon after this event, the UN declared that space should be used exclusively for civilian purposes and to improve the quality of life for all peoples, regardless of its socioeconomic degree or its scientific development (UNOOSA.ORG, 2012). In the following decades, the applications of space activities expanded rapidly, contributing to socio-economic development in several areas, such as communication, oceanography, urbanization, mapping, health, disaster management, food security, sustainable agriculture, environmental monitoring and resource management. There are two categories of space applications, one of which brings benefits that are considered public and are not easily offered to individual or private buyers, being provided by states using public funds. Examples of such applications include meteorology, navigation and military national security (Logsdon, 2020).

The other category of space applications are products and services that can be marketed by private individuals or institutions. These applications are the pillar of the commercial development of the space sector and the private sector, as highlighted by Logsdon (2020). Examples of commercial space applications include telecommunication and satellite data transmission, as well as remote sensing. Other applications such as space tourism, space-based power generation,

The United Nations has recognized the importance of using space-based information and has a vital role in promoting the use of space technologies for the benefit of the population. Therefore, the United Nations program for space applications was created, this program encompasses seven main areas of work: Ecosystems and Biodiversity, Climate Change, Disaster Management, World Health, Global Navigation Systems, Monitoring of the Environment and Natural Resources and Satellite Communication.

## Global Navigation Systems (positioning, navigation and timing)

In 1957, the scientists responsible for tracking Sputnik, observed that they could trace the satellite's orbit with high precision by analyzing the Doppler effect on the frequencies transmitted by the satellite signal in relation to a fixed position on the earth. They deduced that reversing this process would make it possible to obtain the precise position of an object on earth using satellites (Logsdon, 2020).

This discovery together with the need to establish the position of submarines that carried ballistic missiles led the United States and the Soviet Union to develop navigation systems based on satellites, GPS and GLONASS, respectively. Although the original purpose of these systems is military, today these systems are available for civilian use. Civilian use includes precision agriculture, tourists, farmers, transportation, insurance companies, among others.

Additionally, the information from atomic clocks on GPS satellites is used by computers on the internet to manage and control the flow of information (ibid).

Since the world is increasingly dependent on GPS systems, some countries are concerned that these systems are controlled by military forces from two countries (USA and Russia), this led Europe to develop its own navigation system called Galileo to be controlled by civilian agencies, other countries like China and Russia are also developing their own navigation system (ibid).

### **Natural Resource Management and Environmental Monitoring**

Earth observation satellites play an important role in monitoring natural resources. The analysis and visualization of information derived from space, offer great subsidies in the decision-making process worldwide, according to UNOOSA.ORG (2012) can become vital in reaching the internationally agreed sustainable development goals, especially in developing countries.

Observation satellites carry instruments capable of producing the image of the surface on board as they travel their orbit around the earth, the images are used, for example, to estimate agricultural production, or to monitor deforested areas (Deforestation) as stresses

Climate change is one of the main challenges of our times. Initially in meteorology, satellites were designed to observe clouds and provide warning of impending storms. Satellites were not expected to be vital for general weather forecasts. And with the development of sensors used in satellites, it is now possible to obtain three-dimensional characteristics of variables in the atmosphere such as temperature, humidity and wind speed, crucial variables in climate forecasts (Logsdon, 2020). Satellites are an important means of climate observation systems from a global perspective. In addition, satellites contribute to the monitoring of greenhouse gases that are related to deforestation and industrial processes, changing ice in the polar ice caps, rising sea levels, changes in temperature and other essential climatic variables. Therefore, long-term observations of the earth from space contribute to the detection of climate change (UNOOSA.ORG, 2012).

### **Disaster risk reduction and emergency response**

Disaster managers collect satellite information at all stages of the disaster management cycle using remote sensing, communication and navigation satellites. Communication satellites enable communication in an emergency situation and navigation satellites help locate helicopter landing sites and other means of rescue.

Before the occurrence of satellite observation disasters guide urban planners to prepare risk maps, infrastructures and route maps in rural regions, ensuring evacuation planning (UN-SPIDER, 2020).

Examples of space applications used for disaster risk reduction are drought and flood monitoring, another practical example is UN-SPIDER (United Nations Platform for Space Applications for Disaster and Emergency Management and Response) - as the name suggests is a platform with information on spatial solutions to support disaster risk management, and emergency response (UNOOSA.ORG, 2012).

### **Applications of space technologies in Health**

To combat epidemics and pandemics with a coordinated response, there is a need to integrate a global alert system. Information derived from satellite earth

observation combined with GIS and GNSS systems has been used in epidemiology allowing for better spatial analysis by identifying ecological, environmental and other factors that contribute to the spread of vector-borne disease by locating the most affected sites, monitoring disease patterns and defining areas that need control and planning (UNOOSA.ORG, 2012). Data collected by satellites and validated by experts are used extensively to monitor changes in disease behavior and to outline risk areas (ibid).

In short, the new millennium has witnessed space technologies becoming more and more applicable and relevant in our daily lives, bringing an increase in awareness of the importance of space applications. At the same time, the reduction in the costs of space products and equipment has contributed to growth in various sectors in developing countries, integrating space technology in their development programs (UNOOSA.ORG, 2012).

As we have seen, in integrated or individual contexts the use of information provided by satellites has a major role in several sectors. When complemented with other converging technologies, they offer a wide range of systems and / or services in different sectors such as transport, agriculture, defense, urban planning, etc. Examples of such services include: maritime traffic surveillance systems, asset security and critical infrastructure protection (CIP), earth observation services for emergency and crisis management, value added services for users of meteorological information, satellite-based geoinformation products for forest management, geographic services for precision agriculture, crop supervision and chlorophyll and biomass maps,



# Wildlife Computers and Astrocast Take to the Far Seas in Phase One of Pilot Program



Tracking animals in the wild is no easy task. Wildlife Computers tracks the behavior of a variety of free-ranging animals including marine mammals, sea turtles, fish, penguins, and even birds weighing as little as 650 grams. Many of the animals we are tracking range globally. **Melinda Holland**, argues that Astrocast already has a satellite constellation and some of the infrastructure in place, so we set up the developer's kit within 24 hours and within two weeks had everything up and running.

Melinda Holland,  
CEO  
*Wildlife Computers.*

IoT devices have expanded throughout the world giving us access to information from the furthest reaches of the earth. Wildlife Computers has been in the IoT business for more than 30 years. They know the powerful insight we can gain when we gather critical data from some of the world's most challenging locations. Recently, Wildlife Computers joined the Astrocast Pilot Program and began the first phase in aligning the Astrocast IoT Nanosatellite Network with the specific needs and challenges their company faces.

"At Wildlife Computers, we design, manufacture, sell and support a wide variety of telemetry instruments (tags) for wildlife studies. Our tags are deployed on free-ranging animals and track movement and behavior, as well as provide information on the environment the animals are traveling through. The reason "Computers" is part of our name is because we were one of the first animal telemetry companies to use microprocessors in our devices," said Melinda Holland, CEO of Wildlife Computers.

## Wildlife Computers At Sea

The key to Wildlife Computers' success is the ability to send and receive small amounts of data at undetermined intervals. And more importantly, these tags capture more than just animal behavior. Holland clarified, "We make an animal-borne CTD tag. It measures conductivity, temperature, and depth and is used by the oceanographic community to measure the temperature and salinity profiles of the water that the animal is moving through. This is really important right now for scientists studying climate change." "This is really important right now for scientists studying climate change."

Holland went on to explain that climate change isn't just affecting the ocean's surface and marine life. "Ocean temperatures are rising and it's not only the sea surface temperature but it's the actual heat content. Because the animals dive, you can profile the temperature during a dive and then calculate the energy that the water is actually holding. That is important for things like weather prediction and hurricanes. Conductivity, or salinity, is an important parameter around the high latitudes, the Arctic areas, and the Antarctic areas because that's a measure of how much the polar ice is melting. Knowing how the seawater has been diluted gives insight into where, when, and how much of the polar ice caps are melting and impacting the ocean.

In addition, salinity impacts not only the environment that the animals have to go through, but it drives a lot of the oceanographic processes. These things are of interest to industries, such as shipping and knowing where the currents are going for ocean-bound shipping lanes. If they just move a little bit so they're not going against the current that can really save a lot of energy. It's also of interest again for a weather prediction. Energy companies are often interested so they can prepare some of their offshore facilities in case severe weather is coming."

## The Astrocast network – availability, size and power

Tracking animals in the wild is no easy task. Tracking animals in the wild is no easy task. Wildlife Computers tracks the behavior of a variety of free-ranging animals including marine mammals, sea turtles, fish, penguins, and even birds weighing as little as 650 grams

What makes our application really challenging is these tags have to be as small as possible so we can put them on the widest variety of species. The goal of many of our customers is to study the behavior of free-ranging animals at sea. In order to monitor true animal behavior, we need to and reduce the impact of the tag as much as possible so it does not bias the data. Many of the animals we are tracking range globally. They won't necessarily stay in the range of a local ground-based telemetry system or even a cellular network so we need to make small tags that will work around the globe. Finally, since most of our tags go on marine animals that don't spend a lot of time at the surface, we might only have a few seconds to get data transmitted.

In order to send telemetry data from the tags to home base so marine scientists, climate scientist,s and even shipping companies can leverage the data, Wildlife Computers needs a nanosatellite network that is designed to receive telemetry in the most challenging of environments, in the shortest amount of time, and from anywhere in the world. Wildlife Computers needs a nanosatellite network that is designed to receive telemetry in the most challenging of environments.

"All the telemetry happens as the animal breaks the surface of the water," Holland explained. "The time it takes to make that connection and download the

information needs to happen quickly. What makes Astrocast particularly interesting is the nanosatellite availability, specifically the network coverage from anywhere in the world. You can't program an animal and tell it to come up to surface when there's a satellite in view. They aren't that cooperative."

Across the globe there is a push to use animals as oceanographic platforms because they're traveling in areas of high change and they're responding to those changes in the ocean environment. Holland explained that the Arctic and Antarctic are difficult areas for ship-based measurements or even autonomous underwater vehicles or drones.

"It's a really rough environment where ice can prevent vessels from traveling freely. Whereas animals, this is where they live. For example, elephant seals will dive up to 2000 meters, which is about a mile deep and you get these beautiful temperature profiles. And this is where Astrocast comes in. One of our technologies has the ability to take a very quick GPS snapshot in less than 50 milliseconds when the animal surfaces. So now we get a nice oceanographic profile and we get a GPS-quality location. Astrocast will receive these data when the animal surfaces and that information will be packaged up and transmitted through the nanosatellite network."

The Astrocast IoT Nanosatellite Network is a bi-directional, low cost, and low power network that leverages the L Band frequency which enables the use of miniaturized antennas and operates in all weather conditions.

The Astrocast IoT Nanosatellite Network is a bi-directional, low cost, and low power network that leverages the L Band frequency which enables the use of miniaturized antennas and operates in all weather conditions. For Wildlife Computers, this was an important part of the Astrocast Pilot Program.

"What we were looking for are systems that have high availability, as well as low power, and the ability to pick up transmissions from low-power transmitters without requiring really long handshakes and acknowledgments. With many of the animal applications, it's a balance of how much information we can get through for the least amount of energy. In the next phase, we're looking forward to more satellites in the network."

### **Engineering That Listens**

"What really helped us with the pilot program was that Astrocast's engineers are open to hearing about our specific requirements. Astrocast was interesting to us because of all the features—it already had a satellite infrastructure going, and it had a developer's kit. Our interaction with Astrocast and its engineers is very positive. The support is there and the development kit—both for the Wi-Fi and satellite—is there too, well documented, well presented, and written as such that it was easy to implement the different microprocessors. We set up the developer's kit within 24 hours and within two weeks had everything up and running. The support was excellent. And the fact that Astrocast already has a satellite constellation and some of the infrastructure in place, so we could actually do a pilot study, was very important."

# Africa wildlife tracking addresses poaching with ORBCOMM's tracking technology



Headquartered in South Africa, AWT is utilizing ORBCOMM's state-of-the-art satellite modems to provide secure, near real-time GPS tracking and monitoring of large animals such as elephants in some of the world's most remote regions and densest forests. By having access to near-real-time data, researchers, conservationists and game reserves can extrapolate and analyze the information, deliver insights into animal behavior and gain visibility into situations when animals are under threat of poaching through alarms, tamper detection and geofence alerts, according to **Marc Eisenberg**.

Marc Eisenberg  
CEO  
ORBCOMM

With over 25 years' experience tracking wild animals in 40 countries, Africa Wildlife Tracking (AWT) has seen it all. With a passion for the conservation of the natural environment, the South-Africa headquartered team provide GPS tracking and monitoring for wildlife of all sizes. Working primarily in Africa, they also track animals in India, Malaysia and Borneo wherever there are elephants! AWT's customers include governments, conservation organizations, universities, researchers and game reserves. AWT helps to reduce and address poaching, monitor and protect animals and deliver insights into animal behavior.

ORBCOMM's ubiquitous satellite connectivity is critical to enabling AWT to track and monitor animals in their natural habitats. ORBCOMM's ruggedized IoT devices can withstand these complex environments, extreme weather conditions and tough terrain, which is often dusty, muddy and covered with dense forests. In addition, ORBCOMM's robust devices are highly reliable in the field, which is extremely important given the extensive costs, resources and logistics involved in putting tags and collars on the animals AWT tracks.

Poaching is an ongoing threat to all kinds of wildlife. According to the African Wildlife Foundation, at "current poaching rates, elephants and rhinos and other iconic African wildlife could be gone within our lifetime." Elephants are threatened by illegal poaching for ivory or meat. Illegal ivory traded as jewellery, figurines or utensils can fetch high prices. Often an animal is slaughtered for a single part of its body like

the tusk or skin. In addition, the destruction of habitats is of ongoing concern, with animals forced to move as forests or natural landscapes are cleared for human consumption. In recent times, the threat from COVID-19 has become a real concern too, as now, some animals are being hunted for their meat.

AWT works with its customers like wildlife rangers and conservationists to track, monitor and intervene if necessary where animal welfare is concerned. It ensures scientists can take direct action in preventing poaching and understanding and protecting animals. By using intelligent location tracking, AWT can work to identify other areas where wildlife can be protected. Rangers can track animals if they cross into at-risk areas. Accelerometers monitor sudden changes in movement, indicating a possible incident, and sensors can report back on the health of animals in real-time.

AWT tracks all kinds of animals, from elephants to wild dogs to cheetahs. It can even equip turtles and pythons with RFID tags. Animals are fitted with tags or trackers. For bigger animals, this is a collar, or in some animals, trackers can be ingested.

In the case of elephants, their collars serve an extra purpose. When equipped with a collar, an elephant also becomes a mobile base communicator. Each of the trackers 'talk' to the elephant collar, that sends data via satellite to the back-end systems. AWT has close to 6,000 animals collared, and every piece of

data is collated and documented.

### The solution

Working with ORBCOMM's sophisticated OGi modem technology, AWT delivers vital conservation data and helps to prevent poaching throughout Africa and beyond. Originally AWT started with radio-frequency identification (RFID) tracking technology. By attaching RFID tags to animals, it started monitoring animal movements, habits, feeding spaces and other essential information.

As technology grew, so did AWT's equipment. Martin Haupt, who set up AWT with his wife Sophie, says that "in the early days, ORBCOMM had a unit for tracking containers. I took that unit and modified it a bit and put it on an elephant. Originally, we only worked with it on elephants due to the size, because it was fairly big at that stage."

The collars work for elephants, while RFID transmitters are used on smaller animals like wild dogs, cheetahs and even turtles. The RFID transmitters talk to the devices in the elephant collars and the data is transmitted to AWT. The elephant collars become communication hubs, transmitting the RF data from smaller animals, allowing researchers and conservationists to extrapolate and make observations on the information.

AWT then progressed to using ORBCOMM's IDP terminals, which enabled remote tracking and monitoring management in some of the world's most isolated regions with global satellite connectivity over the ISATData Pro network. AWT stripped the IDP terminal and built it into an elephant collar with further intelligence such as collar temperature monitoring, transmitting the data back to AWT's proprietary software applications. "Where it proved to work very well was with satellites; we got really good coverage in the forests," says Martin. "So, anywhere along the equator, we picked up (coverage) much better than most of the others" (solutions on offer).

In 2019, AWT started to switch to ORBCOMM's OGi modems. Providing secure, near real-time GPS satellite tracking with over-the-air updates, the OGi modem's smaller size and low power consumption transceiver have resulted in improved longevity in the battery-powered collars. The IDP network along with ORBCOMM satellite devices has provided very good communications in some of the densest forests where elephants are found. The transmitters emit a pulse that can be monitored by the elephant collar over a range from a few hundred meters to several kilometres, depending on the terrain. The data is then delivered via the satellite system to AWT's backend platform. The tracking data returned includes alarms, location information, collar temperature, tamper detection and geofence information. AWT now uses approximately 150 OGi modems and more than 500 IDP terminals in the field.

### Preventing Poaching in the Future

The data that becomes available through monitoring gives a bigger picture to animal researchers. While poaching is hard to predict, the collars help to identify incidents with alarms and by sending data that can indicate if the animals are under threat.

Haupt says: "You can understand, especially now, the emphasis (for the company) is on anti-poaching. You need a reliable unit that will report regularly. If you don't get a report, you know there's something wrong. If you have a unit which can't send through trees and forests, you're not getting good data back." Researchers use the information around how elephants move to identify where poaching takes place: "We look at the cross-border movements. For instance, you have Kruger Park and Mozambique bordering on one another.

The elephants move freely between the two. On one side

they get poachers, the other side they don't." If one area is suffering from poachers more than another, conservationists can act in that area. Data Points the Way for Conserving Habitats In addition to poaching, habitat destruction and fragmentation is an ongoing concern. As human populations change, the habitat for wild animals is shrinking. AWT says the data provided from the collars is used to predict habitat corridors and provide safe areas for the animals. Haupt says, "One of the big things now is the habitat is getting smaller and smaller, you're getting a lot of disconnected areas. The collars can be used to look at the corridors between these areas. For instance, you have a reserve in Zambia and a reserve in Mozambique or Namibia. What you can then do is look at the corridors between these reserves, where the elephants migrate and where you get a gene transfer between them. A lot of researchers looked at these, and it's one way to establish where these corridors should be."

### The future

AWT is looking at the constant evolution of tracking solutions in an ever-changing world. Overall, Haupt sees the evolution in technology as a very positive force in helping to protect animals in the future. "Technology is making collecting the data a lot easier, it's making verification a lot easier. The projects that AWT is working on all involve data and IoT technology is key in driving results. The units are smaller, the data travels by satellite and there's more live information than ever before."

This evolution of technology is leading to new innovations in what AWT can track. A future use of the collars in protecting herds will be in identifying gunshots via acoustics detection. "On an elephant, you can detect gunshots, what rifle has been fired and from what direction, just by picking up the sound. You can determine when the gunshot goes off and you know which animal is wearing the collar. For a herd, you don't have to use ten collars, you can use one. The big trick is to see how far away from the animal the shot is picked up and it's not an easy thing to pick up in a herd of elephants," says Haupt. AWT has also recently started tracking pythons. An RF device, which the python swallows, can sit in the stomach for years, gathering intelligent data about it.

While AWT's projects will change, the aim remains the same. The challenge today for AWT and conservationists around the world is in staying one step ahead. With the added threat of COVID-19, Haupt thinks tracking and monitoring wild animals will be more important than ever. COVID-19 has led to the absence of tourists. Without tourism revenue, wildlife games reserves are in danger of closing and being replaced by farms to supply local populations with food. Haupt says, "for me, the biggest problem is this COVID-19 issue. I think poaching will pick up drastically here in Africa, it's a question of food. We need to do something, and if we don't do it now, we're not going to have a lot of the endangered animals like rhino, elephant, things like that. They're going to disappear."

# With additional satellites, SatADSL extends its coverage across Africa



With remote branches, mobile workforce and customers across the world, business continuity depends on uninterrupted connectivity for their IP applications – regardless of location. Satellite communication is the best and only way to achieve this level of global connectivity at a reasonable price. **Michel Dothey** explains that SatADSL enables enterprises to achieve true broadband connectivity for voice, data and video services in any location with better operational efficiencies and lower costs. We offer end-to-end enterprise solutions, including VSAT equipment and a full set of managed services.

**Michel Dothey**  
Chief commercial officer  
SatADSL  
Brussel, Belgium

Based in Brussel in Belgium, SatADSL is a **market-leading managed satellite service** provider, **offering secure global IP communications** that help enterprises to grow. Our network and applications support international and local businesses with connectivity wherever and whenever they need it.

With local partners on the ground in more than **45 countries**, our team goes further by providing an end-to-end solution such as hardware and connectivity solutions, to support the day-to-day operations that leading international businesses need. SatADSL supports a variety of **adaptable bandwidth solutions**. Our networks are available at various service levels and configurations, offering much-needed bandwidth in the most cost-effective manner.

We offer two **service packages**, a recurring monthly subscription plan with four main options that can provide dozens of possibilities, and a top up plan with vouchers which offers different options such as volume and duration, with different bit rate options.

Banks, microfinance institutions and money transfer companies are just some of the businesses within the financial sector that have specific needs and connectivity requirements. SatADSL offers secure and custom-made solutions to overcome these challenges, particularly in rural areas.

Whether its connecting the home or the business, it's simple with SatADSL. At the end user office, a PC or LAN can be connected to the SatADSL modem with an Ethernet cable. In the office, the end user – with the help of a partner-distributor if needed – will install the antenna on the roof of the premises. The Point & Play

tool enables self-installation thanks to a pointing assistance system.

There's no need for a software or driver, so the user can start browsing right away. The data is transmitted from the modem to the satellite via an encrypted radio signal. The satellite then bounces the data down to a hub station located in Europe. The latter is connected to the IP backbone through reliable, high data-rate connections. From then, the end user can access any server connected to public networks and available on the cloud.

SatADSL designs tailor made service plans customized to each client's specific needs. Our packages offer a variety of capacity, volume and contention associated with additional services (VPN, VoIP, etc.), all to serve this industry best. For smaller sites where only a few workstations need to be connected mainly for transactional traffic,

SatADSL offers a very cost effective solution. Whether it's a sub-contractor involved in minor activities that needs a relatively small bandwidth for transactional traffic generating small data volumes or simply a site where volume can be kept under control, our high quality solution is our Business services offering unlimited volume with Fair Usage Policy. Business services are offered from 256/64Kbps up to 6Mbps/1Mbps with monthly volumes ranging between few Gbytes to 60Gbytes. SatADSL can always design customised service packs to satisfy specific user needs.

Our solution established a Private Network between new remote exploration sites and European HQ as well as the regional HQ in Accra. It enabled the real-time

sharing of information between all locations for improved decision-making, bypassing unreliable local Telco networks. All communications between remote sites, regional quarter and headquarters are secured through VPN tunnelling using private IP addresses and traffic encryption.

SatADSL can offer services on the whole sub-Saharan Africa including the Gulf of Guinea, the coastal areas along Angola, Namibia and South Africa up to around 200Km from the shore, the east coast from South Africa to North Mozambique and then up to the Gulf of Zanzibar up to south Somalia. SatADSL is extending its coverage by adding additional satellites to its fleet and starting early 2015 will allow service in Northern East Africa (Sudan, Somalia Ethiopia, Eritrea, south Egypt) including Gulf of Aden and most of Red Sea up to the area of Quseer (Egypt). Madagascar including Comores and Mayotte, Reunion and most of the Channel of Mozambique will also be covered.

As banks and other financial institutions look to expand their presence and increase their clientele, improving their offerings in remote and rural areas is key. However, ground infrastructure is often limited which creates significant challenges, preventing banks from offering reliable and cost-effective solutions for the services they provide, such as ATMs.

To meet these challenges, SatADSL offers a turnkey solution to securely connect remote branches, including agents and ATMs, ensuring they can process vital transactions easily. Radio and television broadcasting companies worldwide need to broadcast their programs across the entire nations, contents and beyond reliably, and at an affordable price. This is also a challenge facing private network operators offering e-learning services to schools and universities.

SatADSL's multi-cast solution for streaming audio and video is the answer to that challenge. Multi-cast communication enables the simultaneous streaming of a bundle of audio or video channels to a group of satellite terminals, with bit rates ranging from a few Kbps to 20 Mbps. The solution is easy to use and exceptionally reliable thanks to the use of Adaptive Modulation and Coding (AMC) technology that mitigates potential weather conditions and is fast to install.

Satellite costs are also cut significantly thanks to information being sent in a single transmission, regardless of the number of satellite terminals. The two-way satellite terminals also allow for the monitoring of the entire multi-cast service, including real-time visibility on all connections.

In today's world, broadband connectivity is an important asset for the mining, construction and oil and gas industries. With remote branches, a mobile workforce and customers across the world, business continuity depends on uninterrupted connectivity for their IP applications – regardless of location. Satellite communication is the best and only way to achieve this level of global connectivity at a reasonable price.

SatADSL enables enterprises to achieve true broadband connectivity for voice, data and video services in any location with better operational efficiencies and lower costs. We offer end-to-end enterprise solutions, including VSAT equipment and a full set of managed services.

## Implementation

SatADSL is capable, thanks to its proprietary Service Delivery Platform, to design new services to respond to the specific requirements of users in the Oil & Gas sector.

The standard Newtec Sat3Play terminal SAT2200 is composed of an MDM2200 modem, and an outdoor unit (ODU) including a 1m or 1,2m antenna and an integrated receiver/ transmitter called iLNB. Easy to install, this standard terminals is very well suited for smaller sites with a limited number of users behind the terminal and data rate requirements limited to 512Kbps in the uplink. A maritime version of such a set up is also available using the KNS A12 Antenna

For larger sites, where a more powerful modem and higher data rates are required, SatADSL proposes the SAT3100 equipment composed of an MDM3100 modem, a 1,2m or 1,8m antenna, a standard LNB and a 4W BUC. The MDM3100 modem can also work with off-the-shelf antenna and LNB/BUC provided they are type approved by the satellite operator. For maritime applications SatADSL has already installed the MDM3100 with the KNS Z12MK2 fully tracking antenna. This is the ideal solution for larger ships that need to ensure continuous connection of a LAN with more than 10-15 working stations. Depending on the degree of mobility required, SatADSL can offer various solutions in conjunction to the MDM3100 modem for the maritime, mobile and transportable markets. SatADSL provides operators with a unique and innovative solution, the Cloud Services Delivery Platform (C-SDP). The C-SDP brings satellite IP connectivity to operator customers without the need to invest time and money.

## Customer management tools

SatADSL provides operators and their clients with a Customer Management Tool (CMT), where operators can activate, suspend or manage subscriptions for their customer user terminals in real time and in accordance with client needs. Additional functionalities of the CMT include real-time monitoring of satellite antenna pointing, service availability and connection quality, measuring the connection speed and many other parameters.

To guarantee service continuity, SatADSL monitors the status of the links and transmits this information to the Internet Service Provider (ISP) partners. Although connectivity problems or hardware failures are highly unlikely, this constant monitoring gives peace of mind to users who require constant connectivity, such as banks, as automated alarms are triggered in real-time should there be a disruption to services. This enables a quick reaction to decreased potential service downtime.

# Africa's leading video entertainment platform



Calvo Mawela  
Chief Executive Officer  
MultiChoice Group

Since launching the first pay-TV operation outside the US in 1986, we have grown into one of the leading video entertainment operators on the African continent. Today, we are one of the fastest growing pay-TV broadcast providers globally, entertaining over 13.5 million households in 50 countries across multiple platforms, including digital satellite and terrestrial television, as well as through online solutions. **Calvo Mawela** says MultiChoice Group played an important role in making information and entertainment easily accessible to the people of Africa

The MultiChoice Group operates video entertainment subscriber platforms in South Africa and sub-Saharan Africa (50 countries in total) and offers DTH, DTT, over-the-top ("OTT") and on-demand online video and other video entertainment services. Video entertainment is a commercial service that provides packages of video and audio programming to consumers, typically for a monthly charge. The video entertainment business model generates revenue primarily through subscription fees and, to a lesser extent, through advertising revenue. Video entertainment operators contract with content providers such as motion picture distributors, sports federations, event promoters, and other programming rights holders for the right to distribute programming to subscribers on an exclusive or non-exclusive basis for various platforms. Some video entertainment operators also have their own production facilities or commission content producers.

Since launching the first pay-TV operation outside the US in 1986, we have grown into one of the leading video entertainment operators on the African continent. For over 30 years, we have been telling stories that are as rich and diverse as Africa itself. Today, we are one of the fastest growing pay-TV broadcast providers globally, entertaining over 13.5 million households in 50 countries across multiple platforms, including digital satellite and terrestrial television, as well as through online solutions.

The main distribution channel in South Africa is predominantly digital satellite television. In sub-Saharan Africa, the Group operates both digital satellite television and DTT. In addition, the Group has launched its subscription OTT services, Showmax and DStv Now. Showmax is a subscription video-on-demand ("SVOD") service (currently provided free of charge for premium DStv

subscribers or as a standalone pay service to non-premium DStv subscribers) and DStv Now is a complementary value-added service to DTH subscribers, free of charge for premium DStv subscribers.

In our view, South Africa is one of most attractive video markets on the continent due to (i) the size of its economy (which is the largest in Africa), (ii) the rising middle class, (iii) the leading position of TV as a platform and (iv) the pay-TV penetration growth potential. We address the entire market from mass segment to premium, and cater to all genre preferences. In that respect, we follow a customer-centric approach and operate a comprehensive video entertainment ecosystem that comprises traditional pay-TV, OTT and other products (e.g. movie rentals and music streaming).

Our DStv brand, which is a household name in South Africa, has high awareness and consumer support. We also take advantage of our multi-channel distribution and diverse payment networks. As a group, we have a strong focus on delivering the best customer experience, which, we believe, results in strong performance in customer satisfaction metrics. The Group has notably been able to increase its Net Promoter Score from +49% in 2016 to +57% in 2018, an industry-leading loyalty score. All of the above underpins our growing subscriber base, which expanded from 5.7 million subscribers in March 2016 to 6.9 million in March 2018. Our blended monthly ARPU declined from R339 in FY2016 to R335 in FY2018, driven by the mixed effect of growing in the growing mass market and mid-market segments.

South Africa, our division that offers digital satellite television and SVOD services to 6.9 million subscribers in South Africa as at 31 March 2018. Connected Video, which

forms part of the South Africa segment from a financial reporting standpoint, delivers online video entertainment services to subscribers in South Africa; Rest of Africa, our division which offers digital satellite, online services and digital terrestrial television services to 6.6 million subscribers across Africa as at 31 March 2018; and Technology, which includes our leading digital platform and application security division, Irdeto.

In sub-Saharan Africa, we are the leading pay-TV operator, with strong positions in key markets, benefiting from scale and a diversified presence across geographies, platforms and segments. We consider our markets in Rest of Africa to be attractive and well positioned for strong growth in the future. In particular, we see an upside driven by (i) rising population, (ii) improving affordability, (iii) electrification and (iv) higher pay-TV penetration. In our view, Rest of Africa markets differ from South Africa on the back of multiple factors: (i) diverse income levels with a large and fast growing mass market segment, (ii) a largely unbanked population, (iii) virtually no fixed broadband infrastructure, and (iv) multiple local languages. We target the full market with our products, including premium, mid-market and crucially the large and fast growing mass market segment. Alongside DTH we have invested in DTT infrastructure. DTT allows us to serve the mass market segment at a lower cost, it has greater flexibility to tailor local bouquets (crucial for our diverse markets), and does not require incremental content spend. We have built extensive on-the-ground operations tailored to our diverse markets, with local marketing, distribution, payment and technology infrastructure. To do this, we partner with local entities in most markets to enhance our capabilities and reduce the complexity inherent in running a 50-country platform.

Currently, South Africa and the top 12 sub-Saharan Africa markets comprise approximately 58 million TV households (“HSLDs”), of which 40 million are considered to be addressable pay-TV HSLDs. It is estimated that TV HSLDs will rise to a total of 68 million by 2022, of which 46 million are considered to be addressable pay-TV HSLDs. The demand for pay-TV in African countries is under-developed compared with other emerging countries and developed countries. The main reason for under-penetration is affordability, driven by low disposable income. In the future, however, the Group expects pay-TV demand to grow mainly due to demographic and macroeconomic factors, which are the most important growth drivers for the pay-TV market.

The MultiCoice Group competes with several electronic audio-visual services providers in Africa. This is due to the entry and growth of a number of pay-TV operators such as StarSat, Zap TV, Zuku TV and Azam TV. These operators all have the necessary broadcasting knowledge and experience, business models, existing content, brands and resources to compete with the Group. The Group's primary pay-TV competitor is, however, the Chinese provider StarTimes (StarSat). StarTimes is a subsidiary of the company Pan African Network Group, a multinational media company and has a DTT and DTH offering. The company has been expanding geographically and is now present in more than 15 markets. It has continued its approach of engaging with governments (e.g. Uganda, Mozambique and Zambia), offering to fund digital migration and using the government network to run its service on an exclusive basis. StarTimes is also growing outside its existing core African footprint (e.g. Cote d'Ivoire, Democratic Republic of Congo). However, it has not been as successful to date in markets like Zambia or Kenya where the Group has a strong base. Overall, it is

smaller than GOtv by total subscribers.

The Group also competes for subscribers with OTT platforms as a consequence of the growth in broadband infrastructure and connected devices as well as the availability of varied, quality electronic audio visual content. These offerings can be broadly categorised into global OTT services (e.g. Netflix, Amazon Prime Video, Google Play, Apple, YouTube, Facebook, Twitter, iflix, Hulu and Snapchat), regional and local OTT services (e.g. IROKOTV, DEOD, BuniTV, and Kwese Play), direct-to-consumer content providers (e.g. HBO and Disney) and domestic telcos OTT services (e.g. offered by Cell C, Telkom, Vodacom, Safaricom and MTN).

Finally, the Group competes with FTA TV broadcasters in Africa; in particular, the public broadcasters (e.g. SABC) as well as local commercial broadcasters (e.g. e.tv and Kwese). FTA broadcasters generally offer extensive, popular local general entertainment content and broadcast a wide range of local and international sport. FTA broadcasters are also well-positioned to now offer more than analogue channels and are able to launch multi-channel FTA digital satellite DTH services (e.g. e.tv's OpenView).

## Video entertainment global trends

Apart from North America, pay-TV subscriptions increased globally. At the end of 2017, the global video entertainment market exceeded 1 billion subscriptions. The growth is delivered by pay-TV, and even more so, by internet protocol television and/or OTT services, which are growing much faster than pay-TV. Traditional pay-TV operators have adopted various strategies as the consumer landscape changes.

Sports content is a significant feature of pay-TV, and surveys show that it remains an important criterion for subscribers. Global marquee sports events such as the Olympics, FIFA World Cup and other international championships, consistently draw large audiences and extend linear viewing time during the occurrence of each sports event. Streaming sport and viewing on mobile devices have both grown around the world, and significant investment is being made into delivering high-profile events OTT. As a result, the cost of sports rights for such events has increased over the past years.

Another important feature of pay-TV is local content. Local content is key for the success of a pay-TV operator. In the context of the African continent, it represents a large share of overall viewing (e.g. 33% share of viewing in South Africa). In addition, having tailored local content is important because consumption varies by country due to, among others, indigenous languages and local preferences.

## DTH

DTH is television delivered by means of a communications satellite and received by a satellite dish and decoder (also known as a set-top box, “STB”). This distribution channel is particularly popular in both remote/rural and urban areas to reach where cable and, in some cases, terrestrial television services are limited or non-existent. DTH provides additional functionality combined with high-quality and reliable viewing, as its signals are received directly from satellites.

DTH transmission begins at a broadcast centre, which converts all of the video entertainment operator's programming into a compressed digital stream. The content is then encrypted in order to limit consumption to paying users and prevent piracy. Encryption scrambles the digital data in such a way that it can only be decrypted if the receiver has the corresponding decoding satellite receiver with decryption algorithm and security keys. Once the signal is compressed and encrypted, the broadcast centre sends it



directly to one of its satellites. The satellite picks up the signal, amplifies it and sends it back to Earth, where viewers can receive it via a satellite dish. Video entertainment subscribers in Africa buy decoders from the Group or from various third-party distributors.

## DTT

DTT broadcasts terrestrial digital signals from multiplex transmitters, allowing the reception of multiple channels on a single frequency range. To date, the Group has established DTT networks in eight African countries spanning 130 cities with 163 sites. DTT is economically viable in dense/urban areas where the population density justifies the infrastructure investment required. In rural areas, due to low population density, the volumes would not justify the fixed investments. DTT has significant expansion potential in Africa where the technology allows for relatively inexpensive entry-level programming packages. Additional drivers for DTT expansion are the ongoing Analogue Switch-Offs (ASO) in some of the largest African countries such as Nigeria and Ghana.

## Content

As a pioneer in the African pay-TV ecosystem, we played an important role in making information and entertainment easily accessible to the people of Africa. As a leading business in the region, our investments have brought both social and economic benefits to the communities where we operate. Today, we employ more than 9 000 people on the continent and indirectly create economic prosperity for more than 20 000 people who are employed by our various partners and suppliers. We remain committed to broad, socio-economic transformation in South Africa. This is exemplified most notably through our B-BBEE share scheme, which is aimed at empowering local communities.

Content is at the core of what we do. Today, we believe we have become Africa's leading destination for video entertainment. This is the result of our substantial portfolio encompassing local, sports and international content. Firstly, we have the leading local content offering, which covers all major genres and formats. Our local content has won multiple awards and performs very well in terms of audience share. Our local content is exclusive to our platform in Africa, and we produce some of it ourselves. Local content is a key pillar of our strategy because it is a strong differentiator against competition and is cost-efficient. Secondly, we have a leading sports offering – we own major sports rights in certain markets – both local and international. We have extensive production capabilities for local sports events making us an important partner for the local federations. Thirdly, we have access to international content from 10 of the top 13 US studios, including movie and kids content, which is crucial for retention. Critically, we utilise our pan-African scale to secure content rights across the continent in a cost-efficient way. We have an extensive portfolio of local, international and sports content

## Technological infrastructure

Third-party international content is received at three head end facilities via satellite or cable in the UK (note that we lease the satellite from a third-party) and Spain. Proprietary channels' content from M-Net and SuperSport, FTA content and other third-party channels are received at a head-end facility in Randburg, South Africa, which we own and operate. This content is received physically or via third-party satellite transmission

or fibre optic cables.

The head end facilities are technical processing centres, where channel feeds are multiplexed (the bundling and aggregation of content), compressed and encrypted in order to enable onward distribution in accordance with bouquet and scheduling requirements. State-of-the-art encryption services are provided by Irdeto.

The multiplexed signal is then delivered to two co-located satellites (E36 B&C from EutelSat and IS20 A&B from IntelSat, which capacity we lease) through four uplink facilities, which are located in the UK, Spain and South Africa. Satellite transponder capacity is leased from the satellite providers, which then feed the DStv service to subscribers via their home installed satellite dishes across the African continent. The signal is eventually decrypted by subscribers' decoders.

In respect of GOtv, two other satellites (IS901 and IS33E) beam the signal to transmission towers located at 163 sites across Africa, which are owned and operated by us. GOtv subscribers receive the GOtv transmission from the transmission sites using external antenna connected to their decoders. GOtv is the only operator in Africa to operate Single Frequency Network, ensuring fewer frequencies in use and providing harmonious integration of overlapping signals.

For Connected Video, we have put the necessary infrastructure in place to deliver seamlessly live and on-demand content to our subscribers online, on their connected televisions, computers, smartphones or tablets, wherever the subscribers are.

# Taking connectivity to people anywhere, everywhere



Satellite can serve vehicles, trains, vessels and aircraft. In addition to distance learning, satellite can also be utilized to push video content to moving vehicles. Terrestrial networks are simply not available in the middle of the ocean or at high altitude, yet passengers and crew expectations of their video experience are the same as if they were at home. As we move into a more converged era with new and emerging technology and a need to take connectivity to people everywhere, satellite has a critical role to play in a wider OTT ecosystem says **Hans Massart**

Hans Massart  
Head of Media and Broadcast  
ST Engineering iDirect

In recent months, this has been imagined as people on every continent have dealt with the effects of the COVID-19 lockdown, faced with months of isolation. The go-to entertainment solution has been streaming services and this has been reflected in a sharp rise in subscriptions. According to Grand View Research, the global video streaming market size was valued at US\$ 42.6 billion in 2019 and is projected to grow at a compound annual growth rate of 20.4% from 2020 to 2027. In some parts of the world, OTT has overtaken traditional pay TV. It's a meteoric rise, but with demand burgeoning in every region, how do telcos and service providers ensure they can satisfy demand by reaching new subscribers and deliver high quality of experience (QoE)?

Furthermore, in addition to OTT as an entertainment tool, what other purposes can video streaming be used for?

In order to extend reach and assure a wrinkle-free service, providers will need to look beyond traditional methods of connectivity. Ongoing innovation and technological advancement will be required to meet the growing expectations for exceptional video quality and performance. There is no one-size-fit-all solution for OTT delivery, and it will involve an ecosystem of connectivity mediums to create a seamless experience. One of these delivery methods is satellite, and it has been overlooked for far too long in terms of OTT distribution.

The satellite has always been associated with Direct-to-Home (DTH) TV delivery. This has been its traditional stomping ground and satellite has been very successful in this area. However, times are changing and it's time to start to think out of the box. Traditional TV as we have always known it is in decline, and therefore it's now time to look at the ways in which satellite technology can cost-

effectively and reliably benefit providers of video streaming services. Satellite can also help DTH providers to migrate to deliver OTT services using specially adapted set-top-boxes, enabling them to be agile and respond to market demand.

In a survey conducted by Access Intelligence on behalf of ST Engineering iDirect in 2020, we posed the question to a group of telcos, mobile network operators (MNOs) and service providers: What are the primary ways that MNOs plan to leverage satellite as part of a converged network? Out of the responders, 34.5% said that they would use satellite to provide OTT video content distribution. The appetite to utilize satellite is very evident as it offers capabilities that no other form of connectivity can.

Providing the connectivity for streaming services, especially for live content such as sports and news coverage - which are both huge potential growth areas - to a wide audience doesn't come without its challenges. For instance, facilitating the required amount of bandwidth must be done efficiently and, equally, sound traffic management and minimalization is crucial to ensure unblemished streaming. With so many factors to consider, it's no surprise that service providers are under increasing pressure when it comes to choosing the right connectivity technology for their networks. So, what makes satellite so unique in the case of OTT delivery?

## No More Buffering

Satellite has the ability to reduce buffering by feeding the Content Delivery Network (CDN). As growing traffic presents a fundamental challenge to telcos and CDN streamers, bandwidth must be used efficiently, and traffic minimized while offering the best possible QoE to consumers. At peak times especially, terrestrial networks can experience severe

congestion. We are all familiar with the frustration of buffering that interrupts our viewing and perhaps causes us to give up watching altogether. Satellite may be used to significantly reduce distribution backbone traffic and ensure efficient use of bandwidth. By distributing content spatially relative to end users, the CDN achieves high performance, thus reducing buffering. This is especially significant for live events such as sports where downtime can't be tolerated. Furthermore, as telcos work to expand their reach to more remote areas, satellite enables them to offer high-quality video streaming to isolated communities that would not have previously had access due to its geographical reach.

### **Unlimited Scaling**

Satellite can scale rapidly and cost effectively. The beauty of satellite is its ability to reach anywhere on the planet. A

When a satellite's footprint covers a vast geographical area and therefore allows service providers to deliver multicast content to many more subscribers in ever more remote locations. For viewers in areas where there is no terrestrial access, this opens up a new world of entertainment and access to other important content such as governmental broadcasts and educational programming. This ability to reach anywhere also translates into mobile access for those who have no terrestrial connectivity or where connectivity is patchy and unreliable, such as passenger vehicles, trains and planes. Satellite's ability to reach a growing population of receivers in a cost-effective way makes it the perfect choice for OTT on the move. However, scalability does not relate to simply geography alone. Satellite can address scalability in terms of receivers. A network of receivers can increase rapidly and dramatically, yet satellite will not struggle to reach each receiver due to its ability to multicast. When an operator decides to increase both its footprint into more isolated regions and augment receivers, satellite can support this new coverage with ease.

### **Providing Critical Educational Links With OTT**

Satellite enables broadcast distribution in OTT format. With schools around the world closed due to the COVID-19 pandemic, educational content must be distributed to children at home. The impact of the lockdown has had a detrimental impact on children around the world, but for those in emerging regions especially, the lack of access to education has hit them hard. In order to combat this challenge and to provide education for all children, the academic sector has been using video to enhance at-home learning and schools are creating multimedia content to deliver information in the form of presentations. This makes the learning process much more effective and also gives children the incentive to learn as they are being taught by their teacher, and not by a parent. Many households, however, do not have access to an internet connection but they do have a TV set. Using a specially adapted set-top box, OTT content can be pushed to these households using satellite. The content may be viewed either on a TV or on a mobile device such as a tablet. The ability of satellite to reach to even the most remote places on the planet, means that no child needs to forego their education and can even enjoy interactive classes through bidirectional satellite links.

### **No Geographical Restraints For Mobility**

Satellite can serve vehicles, trains, vessels and aircraft. In addition to distance learning, satellite can also be utilized

to push video content to moving vehicles. Terrestrial networks are simply not available in the middle of the ocean or at high altitude, yet passengers and crew expectations of their video experience are the same as if they were at home. Though COVID-19 has dealt a blow to the aero market, NSR predicts that planes will require ever more connectivity once air travel resumes to pre-pandemic levels which will see a market opportunity twice as large as 2019 with US\$5 billion in annual retail revenues by 2029. Though plans for IFC are largely delayed, they are not cancelled. The opportunity is still very much alive. The cruise market, also hit hard by COVID-19, will be forced to change the way in which it operates but NSR sees sustained demand for connectivity on a per-vessel basis. The question will be how many vessels will be active and what will the occupancy levels look like? Will there be more or fewer sailings? Whatever the outcome, NSR predicts that "demand for satellite services will continue to increase." Traffic does pick up, streamed content can be cost-effectively distributed via satellite and can provide entertainment as well as informational services to passengers and crew.

### **Pushing Innovation In OTT**

ST Engineering iDirect is constantly innovating and developing strong technological partnerships that enable us to spearhead satellite's place in the OTT ecosystem. With our heritage in video and IP and our leading position in the broadcast market, we continue to forge the path to the future of OTT, enabling providers to deliver content anywhere and for a multitude of use cases. As we move into a more converged era with new and emerging technology and a need to take connectivity to people everywhere, satellite has a critical role to play in a wider OTT ecosystem.

# Vodacom broadens access to affordable voice and data services



Vodacom is a leading African communications company providing a wide range of communication services, including data, mobile and fixed voice, messaging, financial services, Enterprise IT, and converged services to 115.5 million customers (including Safaricom). From our roots in South Africa, we have grown our mobile network business to include operations in Tanzania, the DRC, Mozambique, Lesotho and Kenya. **Phillip Jabulani Moleketi** says Vodacom is committed to accelerating socioeconomic development in the country by broadening access to affordable voice and data services, and by driving further innovation in its digital service offerings in such areas as education, health, agriculture and active citizenry

Phillip Jabulani Moleketi  
Chairman  
VODACOM AFRICA

In these extraordinarily uncertain times, the need for business leadership has never been greater. Those companies and organisations that will survive and prosper in this uncertainty are those that have the resilience to adapt rapidly to changing circumstances, and that have the right commitment and culture to deliver broader societal value. Vodacom's strong growth over the last 26 years is founded on its capacity for innovation, underpinned by the substantial societal value it has provided through voice and digital connectivity, inclusive finance, and innovative new solutions in digital education, health and agriculture. These are the characteristics that I believe will ensure Vodacom's continued resilience and growth.

## Responding to COVID-19

The global COVID-19 outbreak in 2020 presents profound risks for the countries and communities in which we work, and for our activities as a company. While there remains much uncertainty regarding the full social and economic impact of the pandemic, all scenarios indicate a significant downturn in economic activity globally, for at least the medium term. Enforced quarantines, physical distancing measures and travel restrictions will put profound pressure on business viability, as well as on banking and financial systems, and will potentially prompt increased levels of social unrest. With more people now working and entertaining themselves from home, the recent lockdowns have prompted a marked increase in demand for data and digital services, highlighting the particular responsibilities that we as an ICT company have in maintaining essential connectivity. In this context, it has been encouraging to see the proactive measures that Vodacom has taken in response to COVID-19, ensuring the safety of its employees and contractors, investing in the stability of its network, working

with government in the development and implementation of effective response measures, and providing additional data services to consumers, including most notably through its e-School platform. We face some very challenging months ahead, but I am confident that Vodacom will continue to demonstrate leadership and innovation, both in ensuring the resilience of Vodacom, and in helping individuals, companies and communities to adapt to the changing conditions.

## South Africa

This was another challenging year in our largest market, South Africa, with a sluggish economy negatively impacting consumer demand, and continuing political and macroeconomic uncertainty denting business and investor confidence. Consumer spending was constrained throughout the year by low GDP and wage growth and high unemployment and consumer debt levels, with significant added pressure following the national lockdown in April. During the year, the business felt the added impact of increased regulatory pressure on pricing, as well as a period of sustained electricity supply constraints that affected network availability. The recent Moody's downgrade, with high rand/dollar volatility, will constrain the government's ability to kick-start the economy after the lockdown, and suggests challenging market conditions ahead. Given this tough operating environment, performance in South Africa was very positive, with an encouraging improvement in service revenue growth throughout the year, off the back of continued growth in data services. In December 2019, the Competition Commission released its data services market inquiry report, with

various recommendations on reducing data prices to promote greater economic and social inclusion. Vodacom was quick to respond to the recommendations, proactively reaching agreement with the commission on introducing price reductions across its monthly bundles and increasing free access to certain essential data services in line with Chairman's statement. In my opening statement last year, I suggested that Vodacom was operating in a very dynamic sector and region at a particularly interesting time, with rapid changes in technologies, consumer behaviour and markets, and with growing expectations for businesses to deliver a social purpose. Since then, we have experienced unprecedented disruption at a global, national and personal level. Phillip Jabulani Moleketi our price transformation strategy. This will put R2.7 billion back in consumers' pockets. Vodacom's data pricing transformation strategy has resulted in significant savings for customers and contributed to a 9.7% increase in the number of data customers and a 66.0% increase in overall data usage.

This growth was further aided by the platform strategy aimed at growing the reasons to consume data, with digital service offerings in video, music, gaming and sports all gaining momentum. Vodacom Financial Services delivered another strong performance, and is looking to build on its existing offerings in insurance, payments and lending by expanding into the savings, investment and trading services market, with a focus on driving improved financial inclusion and meeting the needs of SMEs. Building on its demonstrated leadership in promoting black economic empowerment in South Africa, Vodacom is committed to accelerating socioeconomic development in the country by broadening access to affordable voice and data services, and by driving further innovation in its digital service offerings in such areas as education, health, agriculture and active citizenry. For this potential to be realised, it is critical that we have a regulatory and policy framework that encourages long-term investment in network infrastructure, and that provides the access to spectrum needed to increase connectivity and bring down prices. There have been encouraging signs regarding spectrum allocation, with the regulator announcing that spectrum will be allocated/auctioned before the end of the year.

### **International operations Vodacom's**

International operations had another pleasing year, with growth in revenue and customer numbers underpinned by the continued success of the M-Pesa financial services offerings and strong uptake in data. This has been aided by a more favourable operating environment in most markets, as well as the effective execution of strategy across the operations. We saw further expansion this year of the M-Pesa ecosystem, with the launch of various new products and services, and a strengthened merchant and distribution network. The successful incorporation of Vodacom's M-Pesa joint venture with Safaricom positions Vodacom well to accelerate investment in M-Pesa and enable a range of mobile financial services and payments for consumers, agents and merchants. The substantial investment in expanding network coverage and improving network performance has ensured good levels of 4G coverage in all markets, as well as valuable increases in 3G coverage in many previously unconnected rural areas. Offsetting this generally strong performance, there were some significant regulatory and policy challenges throughout the year. In Tanzania, the national biometric-based registration of all customers, integrated with the country's National Identification Agency system, resulted in 2.9 million SIM cards being barred by Vodacom Tanzania, with a profound negative impact on revenue and customer numbers. This comes on top of the troubling incident at the end of the previous financial year, when several executives of Vodacom Tanzania were detained following a customer's alleged illegal

use of network facilities. Although Vodacom Tanzania's Board and executive team acted swiftly and appropriately in responding to this development, and have cooperated closely with authorities, it was troubling for all of us to see the harshness of the penalty and the manner in which it was applied.

In Lesotho, we have been having ongoing engagements this year with regulators regarding enforcement proceedings by the Lesotho Communications Authority relating to an alleged breach of Universal Access Fund obligations and an alleged lack of independence of Vodacom Lesotho's external auditors. These and other regulatory developments across the markets have resulted in a heightened focus on ensuring even stronger governance processes and compliance measures across the Group, as well as an accelerated emphasis on implementing the Vodacom Social Contract initiatives. Looking ahead, we anticipate that the significant upside potential to monetise data will contribute to continued strong growth in all our markets, with Tanzania remaining under pressure. An important unknown, however, is how the COVID-19 pandemic will play out in the region. With most consumers earning a daily income in the informal sector, there are profound social risks in seeking to enforce a lockdown, as well as the worrying potential for a rapid spread of the virus. As part of a group-wide response plan, Vodacom is engaging with the government in each market to assist in developing and delivering mitigation measures.

### **Vision 2025 strategy**

This year, the Board engaged with the Vodacom executive team and senior managers in a comprehensive two-day review of Vodacom's strategy. Following the largely successful execution of Vodacom's 2020 strategic plan, we engaged with the team in reviewing the proposed Vision 2025 strategy and its ambitious roadmap to transform the business from a conventional telco into a purpose-led digital technology company. The revised strategy is underpinned by an explicit Social Contract – to promote a duty of care to customers, ensure fairness and inclusivity, and maintain a reputation for responsible leadership and innovation – and by specific commitments to promoting digital inclusion, providing innovative digital services and reducing its environmental impact. The Group's performance against its 2020 strategy, and its specific commitments through to 2025, are reviewed in more detail throughout this report.

# Will TV and radio ever be replaced by the internet or new media?



Maxwell Loco  
Managing Director  
NTA TV Enterprise

The convergence of telecommunication technology allowed for manipulation of all forms of information, voice, data and video with seemingly limitless capacity, creating enormous possibilities, including audience interactivity. The social media is a driver of the convergent sector. It offers opportunities for individuals to engage in communication from one-to-one, one-to-many, and many-to-many. However, for Generation Z, digital and media convergence is part of new reality at the expense of traditional TV and radio. **Maxwell Loco**, argues that the bubble is yet to burst, even if it does, TV and radio would not be entirely replaced by the internet or new media.

My favourite definition of Media Convergence is Jekin's (2006) where he defined Media Convergence simply as the flow of content across media platforms, the cooperation between multiple media industries, and the migratory behaviour of media audience who would go almost anywhere in search of the kinds of entertainment experiences they wanted". In other words, media convergence is the fusing, or converging", of distinct technologies into one

Today's Smartphone is a perfect example of convergence of communication, computing, and content (referred to in convergence theory as the three Cs), where a single device offers us the opportunity to communicate while viewing and sharing content and also functioning as a computer. Hitherto, we would have required three different devices to accomplish each task separately.

Media convergence has no doubt changed the way media practitioners do their jobs. The three CS earlier mentioned, is a direct consequence of the digitization of media content and the popularization of the Internet

You can read your emails on your TV via a connected Smartphone; you can as well watch a streaming movie on your Smartphone. Telecommunication Companies can now offer TV services and vice-versa. You can read your newspapers and magazines online, radio is no longer just in the audio business but can produce long-form text, supplement the audio with pictures, and even carry short live videos (in DRM, this is called diveemo), satisfying the needs for depth and raising curiosity. The line has blurred As recent as 1995, a television and a mobile phone were completely different devices.

Technology tends to move from a large number of highly specific tools towards a small set of flexible tools with broad application. Thanks to technological convergence.

In no distant past, traditional media such as television and radio, were broadcasting networks with passive audiences. The convergence of telecommunication technology allowed for manipulation of all forms of information, voice, data and video (Triple play), with seemingly limitless capacity, this capacity also creates enormous possibilities, including audience interactivity which morphs the passive audience of the past into an engaged audience.

The social media is a driver of the convergent sector. It offers opportunities for individuals to engage in communication from one-to-one, one-to-many, and many-to-many. This has given rise to Online communication services that include the social network like Face-book, Twitter, YouTube, Instagram, Whatsapp, etc, offering various services ranging from Social networking, micro-blogging, video sharing and blogging.

These platforms have eaten deep into the viewership of Traditional television. Digital media use as a result of technological convergence is increasingly not simply supplementing, but also supplanting television viewing. Face book in 2016 had 1 billion monthly global users that watch a total of 100 million hours of video every day. Netflix has over 75 million global subscribers and stream an average of 116 million hours of videos every day. Television news as we know it, from evening bulletins to 24 hour news channels increasingly serves the past, not the future, and television news producers have to experiment with new format and forms of distribution if they wish to remain relevant. According to an American

media scholar Howard Rheingold, there are three core characteristics in my opinion constitute the greatest threat to linear traditional television. These are:

- (1) social media makes it possible for everyone in the network to be simultaneously a producer, distributor, and consumer of content. The asymmetrical relationship between broadcast media producer and audience that characterized 20th century mass communication has been radically changed.
- (2) Social media's power comes from the connections between its users.
- (3) Social media allows users to coordinate activities between themselves on scales and speeds that were not previously possible.

In order to remain relevant and reach a younger audience, traditional television providers will have to embrace a whole new range of digital platforms and experiment with on-demand distributed, and mobile video news.

In conclusion, digital convergence ' just like the others much repeated set of labels such as the digital revolution , virtual reality, hybrid reality, artificial intelligence, etc Digital and media convergence is a part of reality in which Generation Z (those born after 1995 are using at the expense of traditional TV and radio. The bubble is yet to burst, even if it does, TV and radio would not be entirely replaced by the internet or new media. A word of caution though Old media would not be able to survive in its splendid analog' isolation. We must hurry, and begin to implement convergence where it works and stop podcasting.

There is an important shift associate with convergence and social media. This is, the rise of User- Generated Content, with users changing from audience to participant, where the tools of content creation becomes cheaper and simpler to use, and the distribution between amateurs/'fakes' and professional/truth becomes blurred. The Organization for Economic Co-operation and Development has identified this phenomenon of User- Generated- Content as significant disruptive force....(that) creates both opportunities and the challenges for establishing market participants and their strategies".

Media convergence has also thrown up new challenges for policy; especially broadcast regulators are having a herculean task of imposing sanctions and regulating content

Different levels of regulations were once upon a time, based on media content delivered through particular platform; television, radio, newspapers, magazines, cinema, etc .whether children could access the content were distributed in public or consumed in private and so on. The environment in which regulators operate has radically shifted as users now control their own media environment particularly, the younger digital natives' who are often most familiar with convergent media technologies. They are incidentally in the majority.

It is however, not all gloom. There are limitless opportunities for linear media in the era of convergence. New media" do not arise spontaneously and independently- they emerge gradually from the metamorphosis of old media.

Whenever forms of communications media emerge, the older forms usually do not die they continue to evolve and adapt. Fiddler (1997) uses the coinage metamorphosis to denote the process of transformation or metamorphosis of old media.

Social media, such as Youtube, Face book, Twitter, Instagram, Whatsapp and others are now increasingly prevalent and becoming more popular, therefore, traditional television can do well to see them as opportunities rather than threats by collaborating with them to increase their visibilities through compelling content offerings. The linear television media relying on advertising as the only source of income should look for other alternatives in order to survive and remain competitive. Given the accelerating shift away from television and towards an environment where digital media grows more important ,it therefore , becomes crystal clear that the future of linear television becomes more of how it can benefit from the rise of on – demand, mobile videos viewing on digital platforms.

# The place of integrated television services in Nigeria's digital terrestrial television



The National Broadcast Commission, NBC licensed ITS as the National Broadcast Signal Distributor responsible for Content Aggregation and Distribution conveying the contents of Nigerian Television Authority, NTA and other broadcasters to the viewers' screen. To every broadcaster, ITS comes handy to source, acquire, train and integrate the right and up-to-date studio, outside broadcast and short-range transmission equipment says **Engineer Sadiq Omeiza**, the Managing Director and Chief Executive

Engr. Sadeeq Omeiza  
General Manager  
ITS, Nigeria

INTEGRATED TELEVISION SERVICES (ITS) is a Federal Government Company created out of Nigerian Television Authority (NTA) by the Government via Presidential Advisory Committee (PAC) white paper on digital Migration. In the Light of this, National Broadcast Commission Licensed ITS as the National Broadcast Signal Distributor in 2015 to be responsible for Content Aggregation and Distribution. ITS responsibility is to convey the CONTENTS of NTA and other broadcasters to the viewers' screen.

ITS uses land-based network of Digital Transmitters to Broadcast Digital signals on a Single Frequency Networks. The same size of Analogue Transmitter with same space of airwave (Bandwidth) that use to convey just a channel (content) is now been used to distribute multiple channel by multiplexing.

An analogue transmitter of 8MHz bandwidth can only transmit a channel (content) while a digital transmitter of the same bandwidth carries and distribute 8-16 channels depending on the compression format and video resolution. For DVB-T2 type of our transmitters, it requires MPEG-4 OR H264 video compression format and videos resolution of Standard Definition, High Definition or Ultra-high definition. The wider the bandwidth, the more the channels that will be carried, multiplexed and distributed. It was incorporated in 2015 by the Corporate Affairs Commission.

When analogue transmission is switched off (Analogue Switched off ASO) eventually off transmission infrastructure of Nigeria Television Authority (NTA) are to be inherited by integrated Television Services and the

Analogue Terrestrial Transmitter (ATT) replaced with Digital Terrestrial Transmitters (DTT). These include all the masts/towers, transmission path, power supply appliance, buildings and land where those infrastructures are situated. This implies that NTA and other Broadcasters will no longer be producing content and at the same time transmitting but would rather restrict themselves to providing content only.

In Nigeria, ITS is currently distributing content in 30 TV channels including information channel according to broadcasters' license on coverage areas in four state using 2.5 kilowatts DVB-T2 digital transmitter. The state are Jos-Plateau state, Ilorin-Kwara state, Oshogbo-Osun state and Enugu- Enugu state.

Though, the coverage areas in each of these states is between 55-65percent depending on the topography of the state. It is our desire to deploy more transmitters to these states to serve as repeaters and have 95percent coverage in each state before deploying low power gap-filler transmitters to cover the remaining blind spots.

This involves the use of digital TV services direct to viewers know as Direct to Home (DTH), where the terrains are swampy or rocky and cannot accommodate DTT gap fillers. We have also made available Push Video on Demand (PVOD) in Enugu, Osogbo and Ilorin while Jos will soon come on stream. This technology will afford viewers to subscriber and watch videos not distributed at the normal channel but have to be access at a fee. Contents so distributed by the Broadcast Signal Distributors (BSD) under the digital migration ecosystem are free to view with only a yearly Digital Access Fee (DAF).



The ITS signal comes in digital format those with analogue Television must acquire a digital to analogue converter device called a decoder or Set Top Box (STB) before the channels are displayed on their analogue TV screens. The boxes come with Keys called encryption that secure the boxes against piracy and protect the contents as well as monitor the expiration of the annual DAF of the decoder. The cost of the encryption (Conditional Access) and Set Top box firmware determines the unit cost of the STBs. The Conditional Access provider in our ecosystem incorporated an encryption called Niagara-vision in the existing set-top boxes resulting in high cost of the boxes after the initial government subsidized price. Another CAS provider recently licenced by NBC promised to bring the cost of Set Top boxes to an affordable rate close to government subsidized price using another encryption called verimatrix.

### **ITS expectations from content providers**

It is expected that high-quality Contents of international standard are to be created by the Broadcasters since their major nightmare has been taken over by the BSDs. They now have all the time and resources at their disposal to concentrate in producing varieties of high-grade contents. It is very imperative for the content providers to acquire digital production and post-production equipment that will generate contents which conforms with video format and resolution that is compatible for digital transmission. In other words, all the cameras, editing systems, mixers, playout stations, servers, routers/matrix, distribution amplifiers, monitors, graphics, recorders etc must be digital compliant with video signals compression in MPEG-4 and resolution in Standard definition or Higher definition or Ultra high definition. Once these expectations are met, the Content so generated, aggregated, multiplexed and distributed will be clean, clear, crisp and noiseless. ITS comes handy to assist the broadcasters to source, acquire, train and integrate the right and up to date studio, outside broadcast and short-range transmission equipment etc. We do this perfectly well because of our versatile experience and very long fruitful years of equipment specification and integration.

Broadcasters should ensure that they have adequate programmes Content to avoid blank channel. They are expected to be on air 24hrs daily as disobedience will attract stiff penalty from the regulator.

To keep the BSDs in business, the Content providers are expected to encourage the BSDs by regularly fulfilling their obligation of paying their Carriage fee in as at when due. Carriage fee in as at when due. The carriage fee is structured according to broadcaster transmission licensed area of coverage. The payment of carriage fee may be monthly, quarterly or annually as the Broadcasters may find it comfortable. The BSDs proposed rate card for the broadcaster's carriage fee is far less than their present expenditure cost on Analogue Terrestrial Transmission (ATT) platform. Though, the carriage fee that will be bored by the content provider will be made available when approved by NBC.

### **Categories of Content Distribution by the BSDs**

Broadcasters are licensed by the regulator according to their areas of signal coverage. The categories of coverage areas as licensed by NBC are Community License, State License, Regional license and National license.

ITS has proposed maximum of three 2.5 kilowatts digital transmitters per state, this was arrived at as a result of

Transmitter radiation pattern survey conducted. Deployment of transmitters depends on the topography of the areas . after deployment of Transmitters depends on the topography of the areas. After deployment of the numbers of transmitters earmarked, other area where signal reception are very weak or not available at all, a very low power transmitters will be deployed as gap fillers on same frequency to cover such areas.

A Community Licensed broadcasters is expected to have its content distributed within that community. It is expected that such content are conveyed from the production centre to our head-end or site using any form of transmitting devices that would not degrade the video and audio quality of the contents.

We also provide devices to broadcasters to convey their contents to our head-end for a fee. If they so wish to acquire such integration of the devices also for a fee. Where any broadcaster cannot afford to lease our devices or acquire, we make available at our head-end very high capacity automated playout servers to upload as much of their contents and playback for a fee.

The carriage fee for this type of broadcaster is usually the smallest because the content is distributed by a Transmitter. The State Licensed broadcaster is expected to transmit within its state territory and the carriage fee would be markedly different from community broadcaster license.

Regional broadcaster license essential entail the carriage of the broadcaster's content by the BSDs for transmission within a particular region. For example, South-east or North-West region, etc. also the carriage fee will be remarkably higher than that of the community and state license broadcasters.

The national licensed broadcasters will cover the whole country like NTA network. It is important to state that at present, NTA remains the only broadcaster license by NBC in this category.

In conclusion, I still want to maintain that in the digital era, the instrumentality to measure viewership is very handy necessitating the need to produce relevant and quality content to draw the required eyeballs needed to attract brand patronage.

More so, let me emphasize that ITS and all broadcasters including NTA have a lot in common and it is our firm believe that this synergy will produce the desired result that will ultimately keep us at the top in the industry.

# The Importance of the 6 GHz Band for Unlicensed Access and Wi-Fi 6



Martha Suárez  
President  
DSA

In 2021, Wi-Fi 6 will increase network efficiency by more than four times and deliver up to 40% higher peak data rates for a single client device. And therefore, the introduction of Wi-Fi 6 would expand the possibilities for connection not only in well-developed areas of the world, but also in less-developed countries wherein connectivity is sparse, yet crucial for improving citizens' quality of life. **Martha Suárez**, caution regulators to conscientiously allow a license-exempt use of the 6 GHz band, enabling Wi-Fi 6, to ensure that the accessibility of this new, vital technology has no limitations and reaches its full potential and audience



According to Ofcom UK, the growing use of Wi-Fi is causing heightened expectations from consumers as to the capacity of their broadband as they begin to access ultrafast and full-fibre technology. This comes as a result of the arrival of innovative applications such as Augmented Reality (AR), Virtual Reality (VR) and Ultra High Definition video in residential, corporate and public environments. As the popularity of wireless devices increases among society, so too does the demand for connectivity, high throughput and low latency. The 6 GHz band presents a golden opportunity to address such demand immediately.

Making this band available for Wi-Fi and other related wireless technologies on a license-exempt basis is crucial to enable new, innovative applications and address some existing problems of slow speeds and congestion. For example, Wi-Fi 6 will increase network efficiency by more than four times and deliver up to 40% higher peak data rates for a single client device. Such technologies will also bring with them important security improvements, battery life extension in client devices and the possibility to handle many more devices in the same network.

## Laying Foundations for the Next Generation

Wi-Fi currently carries over 70% of data traffic. To keep up with such demand and technological advancements, Wireless and Radio Local Area Networks (WLAN/RLANs)<sup>1</sup> can now utilize wider channels to provide wireless gigabit broadband inside homes and buildings, which was not possible with previous generation wireless technologies. In doing so,

WLAN/RLAN will offload data from cellular 5G technologies; a process that is expected to increase from 74% to 79% by 2022. This will lower the costs of network deployment for mobile operators and for edge investment by neutral hosts and third-party providers (e.g., cable companies, enterprises that want to build private 5G networks to run factories). Furthermore, combined with high capacity backhaul, it will also allow gigabit class networks to be deployed in rural and suburban environments.

Consumer costs will definitively be lowered. The 6 GHz band (5925 – 7125 MHz) presents an important opportunity for more efficient spectrum use; it is crucial to allow unlicensed access in this band to lay stable foundations for innovation. As technology advances, regulators have the opportunity to utilize the emerging spectrum sharing techniques to address the increasing demand for unlicensed wireless devices and Wi-Fi 6 whilst also protecting incumbents in this band, i.e. fixed and satellite links that are key for backhaul and coverage. Three different unlicensed operating classes have been identified in the 6 GHz band: Very Low Power Portable (VLP), Low Power Indoor (LPI) and Standard Power. The Federal Communications Commission (FCC) and several European spectrum authorities have studied a variety of mitigation techniques and proposed rules for the protection of incumbent services, allowing for those services to grow while meeting the demand for wireless broadband services. By enforcing appropriate sharing conditions within the 1200 MHz of the 6 GHz band, more spectrum can be freed for use by other services without interference.

One of the most anticipated advancements by consumers is next-generation Wi-Fi 6, offering stronger connections, wider reach and lower latency. Using the 5.9 GHz and 6 GHz bands to support its deployment by tripling the Wi-Fi spectrum, Wi-Fi 6 networks can be implemented in several environments, including home, business and leisure settings, providing users with constant connection.

### The Importance of Wi-Fi 6

A slow internet connection without a feasible solution results in a disrupted service and dissatisfied users. The disruption also draws the applications industry to a halt as they become unwilling to release ground-breaking apps without a reliable platform.

Wi-Fi 6 eases this cycle of expectations by implementing Orthogonal Frequency-Division Multiple Access (OFDMA) to allow the transmission of multiple signals at any one time by splitting them and sending them over different frequencies. By allocating each signal its own specific frequency to streamline the transmission, congestion is alleviated. This combined with the upgrade that Wi-Fi 6 will bring to MU-MIMO technology results in an increased number of communication routes, meaning that more data can be transmitted. In fact, the technology offers speeds up to 40% faster than its predecessor and allows for multiple devices to be operational at once without disruption. This will revolutionise Wi-Fi technology and, therefore, the connection experience for users, especially in densely populated areas such as cities, conferences, stadiums, apartment buildings and office spaces.

The introduction of Wi-Fi 6 will bring with it security upgrades following last year's implementation of the new Wi-Fi Alliance WPA3 security protocol as a standard requirement for all Wi-Fi 6 devices. Wi-Fi 6 also brings increased efficiency to the battery life of devices by introducing Target Wake Time, allowing the device to plan its communications with the router to ensure that it is only actively updating and receiving transmissions when required.

As the number of IoT devices rises, projected to reach 13.4 billion devices and connections per capita in the US and 3.6 billion worldwide, Wi-Fi 6 is vital to bridging the gap in connectivity that exists globally. The Automated Frequency Control spectrum sharing technology that Wi-Fi 6 utilises makes it a complimentary service to many other technologies including CBRS and 5G, which ultimately supports a network that establishes and upholds strong, broad coverage. With the amount of Wi-Fi 6 hotspots expected to grow 13-fold globally to 628 million by 2023 – accounting for 11% of all public hotspots – this will increase the global reach of internet connectivity, impacting communities worldwide, as well as increase the potential for connectivity in already digital societies. Ultimately, Wi-Fi 6 is a crucial contributor to this next generation of dynamic spectrum management.

### The Future of Wi-Fi 6

The future of Wi-Fi 6 sees the utilization of the spectrum being broadened with the use of larger bandwidth channels in the 6 GHz band; easily expandable from the already heavily used 5 GHz band. By harnessing larger bandwidth channels, this new Wi-Fi frequency will act as an instant pathway to faster connection speeds free of congestion. This increased range and efficiency of data transmission will therefore be boosted further, allowing for a greater potential of Wi-Fi usage to be realised in the industry. With operators now embracing the introduction of Wi-Fi 6 to their networks and routers, its roll-out to the mainstream consumer is moving rapidly. It is expected that a multitude of Wi-Fi 6 compatible devices will see their release throughout this year, with 56% of new devices harnessing the technology by 2022. This indicates that a range of brand new, cutting-edge technologies will also

be released in the future, eliminating the barriers that gaming, smart home and IoT industries previously faced.

### Wi-Fi 6 and the DSA

The DSA advocates for policies that promote unlicensed and dynamic access to spectrum to unleash economic growth and innovation. Spectrum authorities should target a balanced regulatory approach between licensed, license-exempt (unlicensed), and lightly licensed, to enable making unused spectrum available for broadband. The DSA advocates for more unlicensed spectrum to be allocated to Wi-Fi networks and wireless devices. This is important to future innovations in augmented and virtual reality (AR/VR), as well as advanced peripherals and in-car connectivity that will accelerate the deployment of 5G capable networks. A large number of new use cases, including these and beyond, will emerge from the evolution of Wi-Fi 6 and the harmonization of 6 GHz, positively impacting citizens and businesses.

The introduction of Wi-Fi 6 would expand the possibilities for connection not only in well-developed areas of the world, but also in less-developed countries wherein connectivity is sparse, yet crucial for improving citizens' quality of life. Regulators should conscientiously allow a license-exempt use of the 6 GHz band, enabling Wi-Fi 6, to ensure that the accessibility of this new, vital technology has no limitations and reaches its full potential and audience. This way, it is far more likely that those who need connection most will receive it without it being capitalised upon. Wi-Fi has rapidly become a crucial tool in our global society and is no longer a luxury. Wi-Fi 6 has the potential to improve lives worldwide, relieving and meeting the needs of both developed and developing countries.

# GPS: African military perspective



In fact, soldiers have been using night skies for ages to find out direction but their location on ground cannot be determined. Today, GPS receivers are fast replacing the conventional compasses in a soldiers' kit. Special forces and crack teams also use these to reach and destroy vital enemy installations. Further, gun positions can be occupied quickly using GPS, as in modern warfare, artillery batteries must move often to keep pace with assault troops and to avoid being hit by counter fire. Convoy movements can also be tracked and planned effectively using GPS devices. **Cdre WO Kayode** says GPS offers coordinates at any point on the earth's surface, and its applications and deliverable to the military are almost limitless

Cdre WO Kayode, DSS psc ndc (bd) fdc(+) MSc MoSS MPhil MNIM MRIN  
 Director, Navigation Positioning & Timing  
 Defense Space Administration  
 Nigeria

Global Navigation Satellite System (GNSS) is a system that provides geo-location and time information to a Global Positioning System (GPS) receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The Global Positioning System (GPS), originally Navstar GPS, is a space-based radio navigation system owned by the United States government and operated by the United States Air Force.

The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

The GPS project was launched by the U.S. Department of Defence in 1973 for use by the United States military and became fully operational in 1995. It was allowed for civilian use in the 1980s. Advances in technology and new demands on the existing system have now led to efforts to modernize the GPS and implement the next generation of GPS Block IIIA satellites and Next

Generation Operational Control System (OCX). Announcements from Vice President Al Gore and the White House in 1998 initiated these changes. In 2000, the U.S. Congress authorized the modernization effort, GPS III.

In addition to GPS, other systems are in use or under development, mainly because the US government can selectively deny access to the system, as happened to the Indian military in 1999 during the Kargil War, or degrade the service at any time. The Russian Global Navigation Satellite System (GLONASS) was developed contemporaneously with GPS, but suffered from incomplete coverage of the globe until the mid-2000s. GLONASS can be added to GPS devices, making more satellites available and enabling positions to be fixed more quickly and accurately, to within two meters. There are also the European Union Galileo positioning system, China's BeiDou Navigation Satellite System, India's NAVIC and Japan's Quasi-Zenith Satellite System.

## Principle of operation of GPS

Any Satellite Navigation system has three parts namely the Space Segment, the Control Segment and the User Segment. All these parts operate together to provide

accurate three-dimensional Positioning, Velocity and Timing (PVT) data to users worldwide.

### The space segment

The GPS system constellation has 24 satellites in six 55° orbital planes, with four satellites in each plane, with room for spares. The orbit period of each satellite is approximately 12 hours at an altitude of 20,183 kilometres. With this constellation, a user receiver has at least six satellites in view from any point on earth. Other systems use satellites in different orbits and orbital periods. The signal the satellite broadcast contains data which identifies the satellite and provides the positioning, timing, ranging data, satellite status and corrected orbit parameters of the satellite.

GPS satellites transmit on two frequencies; one at 1575.42 MHz, known as L1 and the other at 1227.60 MHz, known as L2. The L1 carrier is modulated by the Coarse/Acquisition code (C/A) and the Precision code (P code). P code is encrypted for military and other authorized users. The L2 carrier is modulated only with the P code. Similar signals exist for Galileo and GLONASS, although both systems differ in the way signals are delivered. New L2C and L5 signals are being added to the system as new satellites are launched.

### The control segment

The GPS control segment or the Operational Control System (OCS) consists of a Master Control Station located in the state of Colorado, five monitor stations (each equipped with atomic clocks and distributed around the globe in the vicinity of the equator), and three ground control stations transmitting information to the satellites. Other configurations are possible for other satellite navigation systems. The base stations track and monitor the satellites via their broadcast signals. These signals are passed to the master control station where orbital parameters and timing corrections are computed. The resulting corrections are transmitted back to the satellites via the data up-loading stations.

The tasks of the control segment are Observing the movement of the satellites and computing orbital data (ephemeris), monitoring the satellite clocks and predicting their behavior, synchronizing on-board satellite time, relaying precise orbital data received from satellites, relaying the approximate orbital data of all satellites (almanac) and relaying further information, including satellite health, clock errors etc.

### The user segment

User receivers, can be referred to as the User Segment, and consist of equipment which track and receive the satellite signals. User receivers must be capable of simultaneously processing the signals from a minimum of four satellites to obtain accurate position, velocity and timing measurements. However accuracy and reliability is enhanced as the number of visible satellites increases. The radio signals transmitted by the GPS satellites take approximately 67 milliseconds to reach a receiver on Earth. As the signals travel at a constant speed (the speed of light), their travel time determines the exact distance between the satellites and the user. Speed of light is however a function of the medium it is travelling through.

Four different signals are generated in the receiver, each having the same structure as the signals received from the 4 satellites. By synchronizing the signals generated in the receiver with those from the satellites, the signal time shifts of the four satellites are measured as a time mark. The measured time shifts of all 4 satellite signals are then used to determine the exact signal travel time. These time shifts multiplied by the speed of light are called pseudo-ranges.

All GPS receivers have a similar core operation. This includes collecting the data broadcasted by the satellites, measure the signals, and compute position, velocity, and time (PVT). The

antenna and a radio-frequency (RF) receiver (often called the RF front end) collect and amplify the incoming very low-power GPS radio signals. The digital signal processor detects (acquires) and tracks the unique signals from multiple satellites. The signal processor also measures various parameters of each tracked signal. In most receivers, an individual "channel" is assigned for each satellite signal. Most modern GPS receivers have at least 12 channels; some have many more. Using the measurements, the navigation processor calculates the PVT solution (often called a position "fix"). Once the solution is known, the receiver displays it in an appropriate form or sends it on to the rest of a larger system in which the receiver may be operating.

There are several different methods for obtaining a position using GPS. The method used depends on the accuracy required by the user and the type of GPS receiver available. Broadly speaking, the techniques can be broken down into three basic classes namely:

- a. Autonomous Navigation. Autonomous navigation involves using a single stand-alone receiver. Used by hikers, ships far out at sea and the military. Position Accuracy is better than 100m for civilian users and about 20m for military users.
- b. Differentially corrected positioning. Differentially corrected positioning which is commonly known as DGPS, this gives an accuracy of between 0.5m-5m. It is used for inshore marine navigation, GIS data acquisition, precision farming etc.
- c. Differential Phase position. Differential Phase position gives an accuracy of 0.5-20mm. Used for many surveying tasks, machine control etc.

### Calculation of position by receiver

A user receiver calculates its location on the earth's surface using the known positions of the satellites being tracked, in effect measuring the distance to each satellite and then triangulating a position. With as few as four satellites in view, the position of the receiver, in three dimensions, can be determined. Only one receiver is needed to achieve position accuracies in the order of 20 metres. Basic positioning may be improved to within less than 1 metre or even to within a few centimetres using more complex processes, which include augmentation by ground based networks and re-transmitted corrections by both radio and satellite, and by using the phase portion of the signal.

### Error sources in GPS

Up until this point, it has been assumed that the position derived from GPS is very accurate and free of error, but there are several sources of error that degrade the GPS position from a theoretical few metres to tens of metres. These error sources include ionospheric and atmospheric delays, satellite and receiver clock errors, multipath, dilution of Precision, Selective Availability (S/A) and Anti-Spoofing (A-S)

### Ionospheric and atmospheric delays

As the satellite signal passes through the ionosphere, it can be slowed down, the effect being similar to light refracted through a glass block. These atmospheric delays can introduce an error in the range calculation as the velocity of the signal is affected. (Light only has a constant velocity in a vacuum). The ionosphere does not introduce a constant delay on the signal. There are several factors that influence the amount of delay caused by the ionosphere. Some of these factors include;

- a. **Satellite Elevation.** Signals from low elevation satellites will be affected more than signals from higher elevation satellites. This is due to the increased distance that the signal passes through the atmosphere.
- b. **The density of the ionosphere.** The density of the ionosphere is affected by the sun. At night, there is very little ionospheric influence. In the day, the sun increases the effect of the ionosphere and slows down the signal. The amount by which the density of the ionosphere is increased varies with solar cycles (sunspot activity). Solar flares can also randomly occur and also have an effect on the ionosphere.
- c. **Water Vapor.** Water vapor contained in the atmosphere can also affect the GPS signal. This effect, which can result in position degradation, can be reduced by using atmospheric models.

#### Satellite and receiver clock errors

Even though the clocks in the satellite are very accurate (to about 3 nanoseconds), they do sometimes drift slightly and cause small errors, affecting the accuracy of the position. The US Department of Defense monitors the satellite clocks using the Control Segment and can correct any drift that is found.

### Multipath errors

Multipath occurs when the receiver antenna is positioned close to a large reflecting surface such as a lake or building. The satellite signal does not travel directly to the antenna but hits the nearby object first and is reflected into the antenna creating a false measurement. Multipath can be reduced by use of special GPS antennas that incorporate a ground plane (a circular, metallic disk about 50cm (2 feet) in diameter) that prevent low elevation signals reaching the antenna. For highest accuracy, the preferred solution is use of a choke ring antenna. A choke ring antenna has 4 or 5 concentric rings around the antenna that trap any indirect signals. Multipath only affects high accuracy, survey type measurements. Simple handheld navigation receivers do not employ such techniques.

### Dilution of precision

The Dilution of Precision (DOP) is a measure of the strength of satellite geometry and is related to the spacing and position of the satellites in the sky. The DOP can magnify the effect of satellite ranging errors. The range to the satellite is affected by range errors previously described. When the satellites are well spaced, the possible error margin is small and when the satellites are close together, the uncertainty of the position increases. Different types of DOP can be calculated depending on the dimension.

- a. **Vertical Dilution of Precision.** Vertical Dilution of Precision (VDOP) gives accuracy degradation in vertical direction.
- b. **Horizontal Dilution of Precision.** Horizontal Dilution of Precision (HDOP) gives accuracy degradation in horizontal direction.
- c. **Positional Dilution of Precision.** Positional Dilution of Precision (PDOP) gives accuracy degradation in 3D position.
- d. **Geometric Dilution of Precision.** Geometric Dilution of Precision (GDOP) gives accuracy degradation in 3D position and time.

The most useful DOP to know is GDOP since this is a combination of all the factors. Some receivers do however calculate PDOP or HDOP which do not include the time component. The best way of minimizing the effect of GDOP is to observe as many satellites as possible. Remember however, that the signals from low elevation satellites are generally influenced to a greater degree by most error sources.

### Selective availability

Selective Availability (S/A) is a process applied by the U.S. Department of Defense to the GPS signal. This is intended to deny civilian and hostile foreign powers the full accuracy of GPS by subjecting the satellite clocks to a process known as dithering. Dithering alters their time slightly. Additionally, the ephemeris (or path that the satellite will follow) is broadcast as being slightly different from what it is in reality. The end result is degradation in position accuracy. It is worth noting that S/A affects civilian users using a single GPS receiver to obtain an autonomous position. Users of differential systems are not significantly affected by S/A.

### Anti-spoofing

Anti-Spoofing (A-S) is similar to S/A in that its intention is to deny civilian and hostile powers access to the P-code part of the GPS signal and hence force use of the C/A code which has S/A applied to it. Anti-Spoofing encrypts the P-code into a signal called the Y-code. Only users with military GPS receivers (the US and its allies) can de-encrypt the Y-code.

Military receivers are more accurate because they do not use the C/A code to calculate the time taken for the signal to reach the receiver. They use the P-code. The P-code is modulated onto the carrier wave at 10.23 Hz. The C/A code is modulated onto the carrier wave at 1.023 Hz. Ranges can be calculated far more accurately using the P-code as this code is occurring 10 times as often as the C/A code per second. The P-code is often subjected to Anti-spoofing (A/S). This means that only the military, equipped with special GPS receivers can read this encrypted P-code (also known as the Y-code). For these reasons, users of military GPS receivers usually get a position with an accuracy of around 5m whereas, civilian users of comparable GPS receivers will only get between about 15-100m position accuracy.

### Using GPS in Nigeria

Although the earth may appear to be a uniform sphere when viewed from space, the surface is far from uniform. Due to the fact that GPS has to give coordinates at any point on the earth's surface, it uses a geodetic coordinate system based on an ellipsoid. An ellipsoid (also known as a spheroid) is a sphere that has been flattened or squashed.

An ellipsoid is chosen as it most accurately approximates to the shape of the earth. This ellipsoid has no physical surface but is a mathematically defined surface. There are actually many different ellipsoids or mathematical definitions of the earth's surface. The ellipsoid used by GPS is known as WGS84 or World Geodetic System 1984. A point on the surface of the earth (not the surface of the ellipsoid) can be defined by using Latitude, Longitude and ellipsoidal height. An alternative method for defining the position of a point is the Cartesian coordinate system, using distances in the X, Y, and Z axes from the origin or Centre of the spheroid. This is the method primarily used by GPS for defining the location of a point in space.

Just as with GPS coordinates, local coordinates or coordinates used in a particular country's maps are based on a local ellipsoid, designed to match the Geoid in the area. Usually, these coordinates will have been projected onto a plane surface to provide grid coordinates. The ellipsoids used in most local coordinate systems throughout the world were first defined many years ago, before the advent of space techniques. These ellipsoids tend to fit the area of interest well but could not be applied to other areas of the earth. Hence, each country defined a mapping system/reference frame based on a local ellipsoid.

In Nigeria the reference ellipsoid currently in use is Clark 1880. The geodetic reference system is based on Minna Datum which is a local datum. The origin of the coordinate

system is at station L40 (the Northern terminal of the Minna base of the Nigerian primary triangulation network) with the following adopted geodetic coordinates:

Latitude,  $\phi = 09^{\circ} 38' 09''$  N

Longitude,  $\lambda = 06^{\circ} 30' 39''$  E

Height,  $H = 279.6$  meters above the Geoid.

The centre and origin of the reference system are not coincident with the earth's centre of mass. Rather the origin is one of the triangulation stations located roughly at the centre of the associated triangulation network. When using GPS, the coordinates of the calculated positions are based on the WGS84 ellipsoid. Existing coordinates are usually in Nigerian coordinate system and therefore the GPS coordinates have to be transformed into this local system.

The nature of GPS also affects the measurement of height. All heights measured with GPS are given in relation to the surface of the WGS84 ellipsoid. These are known as Ellipsoidal Heights. Existing heights are usually orthometric heights measured relative to mean sea-level. Mean sea level corresponds to a surface known as the Geoid. The Geoid can be defined as an equipotential surface. This means the force of gravity is a constant at any point on the Geoid. The Geoid is of irregular shape and does not correspond to any ellipsoid. The density of the earth does however have an effect on the Geoid, causing it to rise in the more dense regions and fall in less dense regions.

As most existing maps show orthometric heights (relative to the Geoid), most users of GPS also require their heights to be orthometric. This problem is solved by using Geoidal models to convert ellipsoidal heights to orthometric heights. In relatively flat areas the Geoid can be considered to be constant. In such areas, use of certain transformation techniques can create a height model and Geoidal heights can be interpolated from existing data.

## Transformation

The purpose of a transformation is to transform coordinates from one system to another. Several different Transformation approaches exist. The one that you use will depend on the results you require. The basic field procedure for determination of transformation parameters is the same no matter which approach is taken.

Firstly, coordinates must be available in both coordinate systems (i.e. in WGS84 and in the local system) for at least three (and preferably four) common points. The more common points you include in the transformation, the more opportunity you have for redundancy and error checking.

Common points are achieved by measuring points with GPS, where the coordinates and orthometric heights are known in the local system, (e.g. existing control points). The transformation parameters can then be calculated using one of the transformation approaches. It is important to note that the transformation will only apply to points in the area bounded by the common points. Points outside of this area should not be transformed using the calculated parameters but should form part of a new transformation area.

## Deliverables to the military

The applications and deliverable of GPS to the military are almost limitless, but some typical ones include provision of satellite navigation, position and timing information to military ships, aircrafts and terrestrial vehicles, provision of navigation data for target precision and guidance, provision

of position information in support of troops in Search and Rescue (SAR) operations, dispatch and monitoring of emergency services, tracking of personnel, vehicles, high value targets, equipment, fleet and asset management, geodetic surveying, mapping, geo-referencing, production of augmentation and error correction of GPS signals and other satellite navigation systems, air traffic navigation and control with their related accuracy and integrity enhancement infrastructure, navigation systems for remotely piloted air, land and vessels, automation of container location and tracking to increase the efficiency of ports, road and rail traffic monitoring, automated car and truck guidance systems and accurate timing systems for communications and commerce.

## Conclusion

GPS is a United States government owned GNSS launched by the U.S. Department of Defence in 1973 and operated by the United States Air Force. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. Other systems in use include The Russian GLONASS, the European Union Galileosystem, China's BeiDou, India's NAVIC and Japan's Quasi-Zenith Satellite System.

GPS has three parts namely; the Space Segment, the Control Segment and the User Segment. A user receiver calculates its location on the earth's surface through triangulation with as few as four satellites in view. There are several sources of error that degrade the GPS position from a theoretical few metres to tens of metres. In Nigerian, Existing coordinates are usually in the 1880 Clark coordinate system and therefore the GPS coordinates which are in WGS84 have to be transformed into this local system.

The advantages of GPS to the military include provision of satellite navigation and position information for fleet management, guided munitions and SAR operations. It also has the capability to carry out geodetic surveying, mapping, geo-referencing and production of augmentation/error correction of Positioning, Navigation and Timing (PNT) data.

# YahSat 1A

## 52.5° E

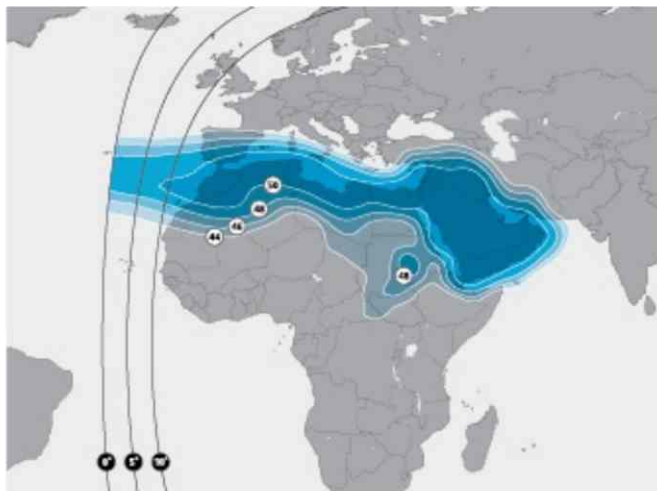
Orbital location



Coverage

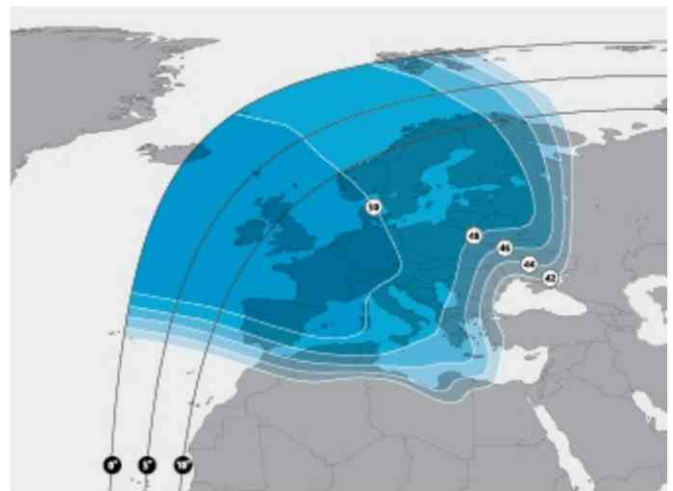
| North Africa | Europe

Yahsat 1A West Beam



○ EIRP ● Elevation angle

Yahsat 1A Europe Beam



○ EIRP ● Elevation angle

Yahsat 1A is part of the joint venture named Yahlive combining both the energy and values of Yahsat and SES. The satellite provides capacity mainly for the transmission of broadcast services. Yahsat 1A is located at 52.5° East covering the Middle East, North Africa, Southwest Asia and Europe.

**Launch date**

22 April 2011

**Launch Vehicle**

Ariane 5 ECA

**Design life**

15 years

**Satellite manufacturer**

EADS Astrium

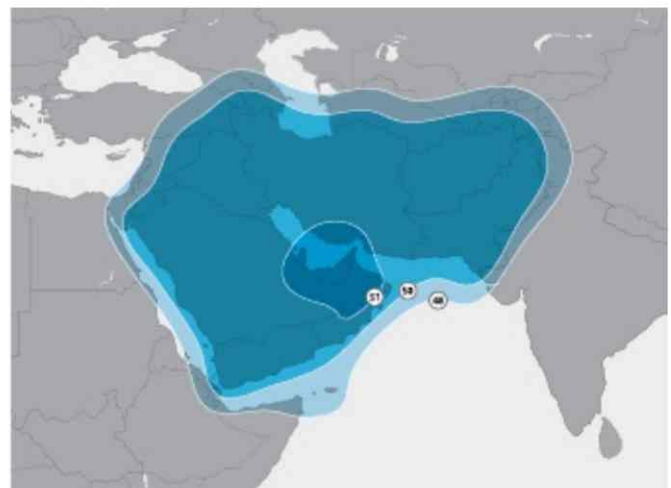
**Polarisation**

Ku-band: Linear

**Total transponders**

Ku-band: 23

Yahsat 1A East Ku-band Beam



○ EIRP ● Elevation angle



# Beidou Satellite Navigation System Construction and Development



At the just-concluded sixth plenary meeting of the ICAO Navigation System Expert Group, all 189 performance indicators of the Beidou-3 global system passed the technical verification, marking that the Beidou-3 global system has entered the core and most important part of the ICAO standard work, laying a solid foundation for the comprehensive promotion of Beidou aviation applications. Looking up at the starry sky, according to **Wu Yanhua**, the Beidou is shining; down-to-earth, steady and far-reaching, officially entering a new era of global service.

Wu Yanhua  
Deputy director  
National Space Administration  
Beijing, China

On July 31, General Secretary Xi Jinping announced to the world the official opening of the Beidou-3 global satellite navigation system, marking the successful completion of Beidou's "three-step" development strategy and Beidou entering a new era of global service. Construction of Beidou-3 was launched in November 2009. For more than 10 years, after five stages of key technology research, experimental satellite engineering, minimal system, basic system, and complete system, the global constellation deployment was completed six months in advance and the full system service was opened.

At present, Beidou system has provided two categories and seven services of navigation and positioning and communication data transmission. Specifically include: facing the world, providing positioning and navigation timing (RNSS), global short message communication (GSMC) and international search and rescue (SAR) three services; in China and surrounding areas, providing satellite-based augmentation (SBAS), ground-based augmentation (GAS), precise single point positioning (PPP) and regional short message communication (RSMC) four services.

## Positioning and navigation timing service.

The Beidou system's spatial signal accuracy is better than 0.5 meters; the global positioning accuracy is better than 10 meters, the speed measurement accuracy is better than 0.2 m / s, and the timing accuracy is better than 20 nanoseconds; the positioning accuracy of the Asia-Pacific region is better than 5 meters, and the speed measurement accuracy is better than 0.1 m / Sec, the timing accuracy is better than 10 nanoseconds.

In accordance with the International Search and Rescue Satellite Organization standards, it forms a global mid-orbit

search and rescue system with other satellite navigation systems, and provides Beidou characteristic return link services, which greatly improves search and rescue efficiency and capabilities. Serving China and surrounding areas, the capacity has been increased to 10 million times per hour, the transmission power of user machines has been reduced to 1-3W, and the length of a single message is 1,000 Chinese characters. At present, the construction of the regional short message service platform has basically been completed, and the organic integration of short messages and mobile communications has been promoted, and the advantages of Beidou system converged service will be further utilized.

## Satellite-based augmentation services

The system is built in accordance with the International Civil Aviation Organization standards to serve users in China and surrounding areas. It supports two enhanced service modes, single-frequency and dual-frequency multi-constellation, to meet the relevant performance requirements of the International Civil Aviation Organization. At present, the service platform of Beidou-based enhanced system has been basically completed, and the verification and evaluation of civil aviation applications will be launched soon.

In terms of ground-based enhancement services, 155 frame network reference stations and more than 2,200 regional network reference stations have been built in China, providing real-time meter-level, decimeter-level, centimeter-level and post-processing millimeter-level enhanced positioning services.

Currently, the system has passed 3 Ke GEO advertised Precise point positioning satellite signals. The actual

measurement level of positioning accuracy is better than 15 cm, the elevation is better than 30 cm, and the convergence time is better than 15 minutes.

Before 2035, China will build a more ubiquitous, more integrated, and smarter national integrated positioning and navigation timing system to provide global users with unified benchmarks, seamless coverage, safe, reliable, convenient and efficient PNT services, which will be intelligent, Unmanned development provides core support.

### Application Promotion

At present, a complete Beidou industrial chain integrating chips, modules, boards, terminals and operation services has been built. In the past 10 years, the overall output value of China's satellite navigation and location service industry has increased by more than 20% annually, reaching 345 billion yuan in 2019, and it is expected to exceed 400 billion yuan this year.

The 22-nanometer process radio frequency baseband integrated chip that supports the new signal of Beidou-3 has entered the mass production stage, and its performance has reached a new level. As of the end of 2019, the domestic Beidou navigation chip module shipments have exceeded 100 million. Beidou basic products have been exported to more than 120 countries and regions. The Beidou system has fully served transportation, public safety, disaster relief, agriculture, forestry, animal husbandry and fishery, urban governance and other industries, integrated into infrastructure such as electricity, finance, and communications, and widely entered the fields of mass consumption, sharing economy and people's livelihood, and profoundly changed people's production Lifestyle, produce significant economic and social benefits.

In transportation, the Beidou system is widely used in key transportation process monitoring, highway infrastructure safety monitoring, port high-precision real-time positioning and dispatching monitoring and other fields, which significantly improves the efficiency of comprehensive traffic management and transportation safety. As of the end of October 2020, nearly 7 million road service vehicles have been installed and used Beidou system, accounting for 96% of operating vehicles; 31,400 postal express vehicles have been installed using Beidou system, accounting for 88%; about 1,400 official ships have been installed and used The Beidou system accounts for 75% of the total; about 300 general-purpose aircraft are equipped with the Beidou system, accounting for 11%. In particular, it successfully realized the first application of Beidou on transport aircraft.

In addition, Beidou has also been widely used in China-Europe railway transportation, the construction and operation of Beijing-Zhangjiakou high-speed railway, Haoji, Shanghai-Kunming and other railway testing and monitoring, empowering the high-quality development of railway transportation.

In the agricultural field, the Beidou-based agricultural machinery automatic driving system has been promoted and applied nearly 45,000 sets, saving 50% of labor costs; the Beidou-based agricultural machinery operation supervision platform and the Internet of Things platform have provided services for nearly 400,000 sets of agricultural machinery equipment. Improve the efficiency of operation management. In the field of forestry, Beidou positioning and short message communication functions are widely used in forest fire prevention, natural forest protection, forest nature investigation, and pest control. In the field of fishery, it provides services such as ship position monitoring, emergency rescue, information release, and management of fishing vessels in and out of ports for

fishery management departments and fishing vessels.

In terms of disaster reduction and relief, based on Beidou's navigation, positioning, and short message communication functions, it provides real-time disaster relief command and dispatch, emergency communications, and rapid disaster information reporting and sharing services, which significantly improves the rapid response and decision-making capabilities of disaster emergency rescue. A three-level platform of ministry, province, and city (county) has been built, achieving six-level business applications and promoting more than 45,000 Beidou terminals. Hunan, Jiangsu, Guizhou, Guangxi, Sichuan and other places used Beidou /GNSS high-precision technology to establish a geological disaster monitoring and early warning system. During this year's floods in the south, they successfully forecasted landslides and other disasters to ensure the safety of people's lives and property.

In the fight against the new crown pneumonia epidemic this year, Beidou also helped it. Provide accurate mapping for the construction of Wuhan Huoshenshan and Leishenshan hospitals; Beidou-based drones and unmanned vehicles have been applied to the distribution of medical supplies in epidemic areas; Beidou-based vehicle networking promotes intelligent and precise transportation during the epidemic.

In terms of public security, a three-level Beidou public security application system has been established at the ministry, province, and city (county) levels. More than 400,000 Beidou police equipment has been deployed across the country; the Beidou police time service has unified the public security information network time base, and the Beidou system is in command It has played an important role in public security work such as dispatching, counter-terrorism, and anti-drug eradication.

Beidou's high-precision services are just like water and electricity, becoming public services within reach and on-demand, protecting the daily life of the public. Mainstream chip manufacturers at home and abroad have introduced integrated communication and conduction chips supporting Beidou. The first smart phone that supports Beidou high-precision positioning has been released. It supports receiving Beidou ground-based enhanced service signals and can provide high-precision positioning information for car navigation and other mass consumption. It has been tried out in some domestic cities. According to statistics, in the first half of 2020, 80% of smartphones applied for network access to support Beidou positioning. Most models of Huawei, Xiaomi, VIVO, OPPO and other brands that account for the vast majority of the domestic market share support Beidou functions.

While Beidou has injected new momentum into traditional industries, it is also accelerating its entry into new infrastructure. Deeply integrated with new technologies such as next-generation communications, blockchain, Internet of Things, and artificial intelligence, Beidou application of new models, new formats, and new economies continue to emerge, which is stimulating endless innovations and changes.

In terms of policy and environmental protection, the national level strengthened the overall policy design and released the "China Beidou Satellite Navigation System" white paper, which systematically interpreted the development concept and policy proposition of the Beidou system. Various industry departments and local governments continue to follow up on supporting

policies. As of September 2020, more than 30 departments of the State Council have successively issued more than 180 policy documents related to the Beidou system, and more than 30 provinces, cities and regions have issued guidance related to Beidou applications. file 500 more than pieces.

In accordance with the relevant requirements of the State Council's legislative work plan, the "Regulations on Satellite Navigation of the People's Republic of China" has completed the work of soliciting opinions and is being revised and improved for reporting.

At present, the Beidou system has been applied in more than half of the countries and regions in the world, providing services to more than 100 million users. The Beidou-based land right confirmation, precision agriculture, digital construction, vehicle and ship supervision, and smart port solutions have been successfully applied in ASEAN, South Asia, Eastern Europe, West Asia, and Africa.

### International Cooperation

As one of the four core suppliers of global satellite navigation systems, Beidou Systems adheres to the development concept of open cooperation and resource sharing, actively and pragmatically carry out international exchanges and cooperation, and promote the development of global satellite navigation.

**Sino-Russian cooperation:** The two parties continue to carry out extensive and in-depth cooperation in the fields of system compatibility and interoperability, system enhancement and station construction, monitoring and evaluation, and joint application. The China-Russia satellite navigation intergovernmental cooperation agreement was signed and entered into force, providing legal and organizational guarantees for China-Russia satellite navigation cooperation. The sixth and seventh meetings of the China-Russia Satellite Navigation Major Strategic Cooperation Project Committee were successfully held last year and this year. The two sides overcome the impact of the epidemic, effectively implement the Sino-Russian satellite navigation cooperation agreement, promote the signing of a time interoperability agreement between Beidou and GLONASS systems, implement Sino-Russian joint station construction, cross-border transportation, precision agriculture and other cooperation projects, and launch the "2021 to the 2025 Sino-Russian cooperation in satellite navigation roadmap" joint fiction work.

**Sino-US cooperation:** Coordinate and complete the application for the ten-year extension of the PRN number of the Beidou-based augmentation system. And reached a consensus on signing a joint statement on the interoperability of Beidou B2a and GPS L5 signals.

**Multilateral cooperation:** China actively participates in international activities under the framework of the United Nations and other international organizations and related multilateral mechanisms. Continue to participate in the series of activities of the 14th General Assembly of the International Committee on Global Navigation Satellite Systems, propose Chinese solutions in the fields of satellite navigation legal construction, GNSS time difference monitoring methods, and low-orbit navigation enhancement, and actively contribute Chinese wisdom to the development of world satellite navigation.

During the 62nd United Nations Office for Outer Space Affairs, an exhibition of ancient Chinese navigation with the theme of "From Compass to Beidou" was held, exhibiting China's long-standing navigation culture and modern advanced navigation technology, and actively promoting cooperation with the United Nations Office for Outer Space Affairs. Carry out comprehensive cooperation.

Ongoing Arab satellite navigation cooperation under the

framework of Sino-Arab Cooperation Forum, write the contents of a number of cooperation Beidou "China-Arab Cooperation Forum 2020 Nian Zhi 2022 -year action implementation plan."

This year, the International Electrotechnical Commission issued the first international standard for Beidou shipboard receiving equipment testing, and the International Mobile Communications Organization issued the first batch of 5G standards that support the Beidou-3 B1C signal. At the end of this year, the International Maritime Radio Technology Committee will also release an RTCM standard protocol that fully supports all public signals of Beidou-3.

China Satellite Navigation Conference. It has been held for eleven consecutive sessions, with more than 3,000 annual participants. It has become a high-level, international comprehensive communication platform in the field of satellite navigation, and is playing an active role in the development of world satellite navigation technology and applications.

# WRC-19 addresses over 30 agenda items



In 2019, the WRC-19 concluded by outlining the works of future conferences and the need to recognise future growth of the telecommunications industry, adopting agenda items for WRC-23 based on the results of the ITU-R studies, and considering the spectrum needs for the following allocations: IMT in the bands. **Dr Ali R. Ebadi**, shares his thoughts on the The World Radiocommunication Conference 2019 (WRC-19).

Dr Ali R. Ebadi  
Advisor, board of directors,  
MEASAT Satellite Systems

Attended by more than 3,500 participants, WRC -19 addressed over 30 agenda items related to frequency allocation and frequency sharing for the efficient use of spectrum and orbital resources, covering a wide range of radiocommunications services including mobile broadband, satellite delivery, TV broadcasting, scientific services and emergency services. The conference was officiated by the President of Egypt, Abdel Fattah el Sisi, and chaired by Dr Amr Badawi of Egypt.

Pertinent discussions included: 1. New spectrum allocation for the International Mobile Telecommunication (IMT) – Agenda 1.1 3 24.25 -27.5GHz Global Identification for IMT 37-43.5GHz Global Identification of the whole band or portions thereof 45.5-47GHz Identification in Region 1 (R1) and Region 3 (R3) in accordance to the footnote 47.2-48.2GHz Identified for IMT in Region 2 (R2) and countries in footnote R3 and R1 66-71GHz Identified for IMT in R1 and R3, and countries in footnote in R2 Additional allocation in C –band in IMT: 3400-3500MHz for Malaysia, Thailand, Brunei and Indonesia added to footnote 5.432B 3500-3600MHz for Indonesia and Brunei added to footnote 5.433A.

2. New allocation to Fixed-Satellite Service (FSS) – Agenda 9.1.9 In all ITU regions, the band 51.4 - 52.4GHz is allocated to the FSS Feed - er Link with antenna size of 2.4m. 3. Allocation of C band to Non- GSO (NGSO) Satellite – Agenda 9.1.3. The conference decided that no allocation is given to the NGSO sat - ellite in the C -band frequency.

4. To consider the new allo -cation to Earth Station in Motion (ESIM) in Ka-band

WRC - 19 approved operation of earth stations in motion (land, aeronautical and maritime) com - municating with geostationary FSS space stations within the frequency bands 17.7 -19.7GHz (space to Earth) and 27.5 -29.5GHz (Earth to space) shall be subject to the application of a new resolution. Under this resolution, ESIM shall protect terrestrial services and the notified administration is required to submit commitment to the Radiocommunication Bureau (BR) to re - solve any interference issue upon receiving report of unacceptable interference.

5. High-altitude platforms (HAPS) new allocation – Agenda 1.14 The following frequencies were agreed for the application of HAPS services 21.4-22GHz and 24.25 -27.5GHz Region 2 31.3GHz, 38 -39.5GHz World – wide 47.2 - 47.5GHz and 47.9 - 48.2GHz Worldwide.

6. Bringing into Use (BIU) for NGSO – Agenda 7 issue A BIU frequency assignments to all NGSO systems, and consideration of a milestone -based approach: By the deployment of one satellite (for 90 days) into one of the notified orbital planes within seven years of the date of receipt of the advance publication of information (API) or request for coordination, as applicable. This milestone -based approach would provide an additional period beyond the seven -year regulatory period for the deployment of the number of satellites, as notified and/ or recorded, with the objective to help ensure that the Master Inter - national Frequency Register (MIFR) reasonably reflects the actual deployment of such NGSO systems.

Milestones timing (years) percentage 1st 2nd 3rd 1st 2nd 3rd  
2 5 7 10 50 100

7. Appendix 30B, Resolution for application for developing countries – Agenda 7 Issue E Addresses the issue relating to difficulties faced by an administration wishing to convert its national allotment in Radio Regulations (RR) Appendix 30B to assignments with characteristics beyond those of the initial allotment or wishing to introduce a new network. Applies measure and procedure as an enhancement of equitable access to spectrum/orbital resources for developing countries to facilitate the processing of their submission in RR Appendix 30B.

8. Modified regulatory procedure for non-GSO satellite systems with short duration missions – Agenda 7 Issue I  
The resolution is developed to detail the regulatory procedures for frequency assignments to NGSO satellite networks or systems identified as short -duration mission. The network or system shall operate under any space radiocommunication service on frequency assignments that are not subject to coordination, and the maximum period of operation and validity of frequency shall not exceed three years from the date of bringing into use the frequency without any possibility of extension. The total number of satellites shall not exceed 10 satellites, of with the typical mass of each satellite should not normally exceed 100kg.

9. Resolution 40, satellite hop ping and review of 90 days BIU period for the FSS – Agenda 9.2 There were not enough data at the BR data centre to address the above issue. WRC-19 decided to differ this issue to the WRC-23 conference and as such “No Change to the Radio Regulations”.

10. Request by administrations for extension of satellite filings – Agenda 9.1. WRC-19 decided to accede re - quests by Bulgaria for the slot of 1.8°E, African countries for retention International Telecommunications Satellite Organization (ITSO) heritage satellite under Intelsat 328.5°E, China for Asiasat AK, AK1 and AKX, Indonesia for extension of filings date for PSN 146°E, Palapa 113°E and Garuda 123°E, Cyprus for extension of KYOROS-SAT 3 at 39°E, India for INSAT plan band at 82.5°E, Mongolia for 113.6°E plan band and Egypt for the extension of filing of EGY-N-SAT.

11. Decision on extension of filing due to co-passenger delay under force majeure – Agenda 9.3 An administration shall provide the following information to the Board in support of a request for extension of regulatory deadlines due to co-passenger delay. Satellite manufacturer and satellite summary, status of construction, launch vehicle contract and manifest, confirmation of launch delay and reason for the delay by launch vehicle contractor, and sufficient detail to justify the length of extension.

12. Requests from developing countries that do not qualify as force majeure or co-passenger delay – Agenda 9.3

ITU-R is invited to study the matter of requests for extensions of regulatory time limits from developing countries that do not qualify as force majeure or co-passenger delay and to develop the specific criteria and conditions upon which the Radio Regulations Board (RRB) could consider granting an extension of the regulatory deadline to a developing country.

13. Article 48 of Constitution, Installation of National Defence

Services – Agenda 9.3

The Board considered concerns raised by some administrations regarding the appropriateness of other administrations' application of Article 48 of the ITU Constitution. Taking into account the report of the Board on Resolution 80 (Rev. WRC-07), and the contributions and comments related to the report, WRC-19, in accordance with Article 21 of the ITU Convention, invites the 2022 Plenipotentiary Conference to consider the question of invocation of Constitution Article 48 in relation to the Radio Regulations raised at WRC-19 and take necessary actions, as appropriate.

14. Other issues

The Conference also addressed regulatory provisions in the existing Radio Regulations on issues such as harmonisation between APP 30, APP 30A and APP 30B (plan bands), reduction of coordination arc, new allocation to NGSO satellite above 30GHz improvement to procedures in the Radio Regulations as well as addressing difficulties/inconsistency in the application of the Radio Regulations.

### **Paving the way for future conferences**

WRC-19 concluded by outlining the works of future conferences and the need to recognise future growth of the telecommunications industry, adopting agenda items for WRC-23 based on the results of the ITU-R studies, and considering the spectrum needs for the following allocations: IMT in the bands 3300-3400MHz (R1 & R2), 3600-3800MHz (R2), 6425-7025MHz (R1), 7025- 7125MHz (global) and 10.0-10.5GHz (R2) Band 3600-3800MHz to Mobile service in primary basis in R1 High altitude platform stations as IMT base stations (HIBS) in the IMT in the bands below 2.7GHz Earth Stations In Motion (ESIM) in the plan band (APP30B) 12.75 -13.25GHz communicating from aircrafts or vessels with GSO FSS for the broadband communications for passengers FSS (space-to-Earth) in Region 2 in the band 17.3 - 17.7GHz ESIM communicating with NGSO in the bands 17.7-18.6GHz and 18.8 -19.3GHz and 19.7-20.2GHz (space to Earth) and 27.5-29.1GHz and 29.5 -30GHz (Earth to space).

# AsiaSat gearing up efforts to ensure C-band satellite service and 5G service to co-exist harmoniously



Over the past few months, AsiaSat has started installing bandpass filters (BPFs) on its C-band receiving antennas to prepare for the arrival of 5G service in Hong Kong. These bandpass filters, jointly developed by AsiaSat with local microwave experts, have been extensively tested and deployed at reception sites across Greater China and in other Asia-Pacific markets. Roger Tong observes that these new filters have proven to be effective in suppressing interfering signals from nearby 5G base stations, thus preserving the quality of satellite reception.

Roger Tong  
AsiaSat  
Chief executive officer

In light of the roll-out of 5G in Hong Kong, AsiaSat has accelerated efforts to provide the necessary protection for its C-band TT&C (Telemetry, Tracking and Control) and TVRO antennas against potential interference from 5G deployment, to ensure the continuity of satellite operation and uninterrupted service to customers.

There are currently a total of 30 C-band antennas installed at AsiaSat's Tai Po Earth Station in Hong Kong, with 10 C-band antennas of size ranging from 4.5m to 11.3m to support the TT&C activities of AsiaSat's satellite fleet, and the remaining TVRO antennas for monitoring TV programmes delivered on AsiaSat as well as for teleport service to customers.

As the lower C-band spectrum originally used for satellite service, i.e. the 3.5 GHz band for Hong Kong market, has been reassigned for 5G, it is important that satellite operators, broadcast stations, VSAT networks, hotels and numerous commercial and residential buildings receiving satellite TV via SMATV systems or TVROs take steps to protect their existing satellite services to minimise the chance for satellite reception from the entire 3.4 to 4.2 GHz band to be affected. In Hong Kong alone, there are more than 1,400 C-band SMATV systems and 859,000 outlets, and additionally several C-band teleports and VSAT terminal hubs operating throughout the territory.

Over the past few months, AsiaSat has started installing bandpass filters (BPFs) on its C-band receiving antennas to prepare for the arrival of 5G service in Hong Kong. These bandpass filters, jointly developed by AsiaSat with local microwave experts, have been extensively tested and deployed at reception sites across Greater China and in

other Asia-Pacific markets. Results from field tests and customer site installations have been positive and demonstrate that AsiaSat BPF's insertion loss provide minimal link performance degradation while providing the required suppression of 5G signals. These new filters have proven to be effective in suppressing interfering signals from nearby 5G base stations, thus preserving the quality of satellite reception.

Among AsiaSat's bandpass filters, the BPF-3700S model was the first in the series launched and designed for the 5G spectrum requirements for Hong Kong SAR and China markets. Other models include BPF-3800R and BPF-3800S for South Korea and Australia, BPF-3900S for the Middle East, with models BPF-3664, 3600, 3700T and 3900S lately introduced for other Asia-Pacific markets, providing optimised rejection and passband to reject 5G spectrum up to 3.6, 3.7 and 3.8 GHz.

C-band is critical for satellite services that require high availability and wide area coverage, particularly indispensable for establishing communication links in sparsely populated and geographically remote areas, as well as for mission-critical operations such as disaster recovery. AsiaSat has been working to explore various mitigation measures including the use of this new bandpass filter that will work effectively in protecting our satellite operation as well as our customers and satellite users' C-band services against interference from 5G transmissions in adjacent bands. This serves to prove that C-band satellite service and 5G mobile service can co-exist harmoniously with the right technologies, proper planning, testing and

implementation to create value for all industry players, and ultimately benefit all customers and satellite users.

### **AsiaSat is 30**

As AsiaSat continues its transformation to exceed customer expectations, COVID-19 has brought out the dimension that is necessary for our transformation: true partnership with our customers to ensure the survival of the industry through this avalanche of economic changes.

Without our customers, partners and supporting industries, the satellite communications industry and AsiaSat cannot flourish. With this, I am happy to acknowledge the encouragement and support we have received while working with our partners over the last few months in light of the rapidly escalating economic decline. I am sure the short-term pain will strengthen our relationships and improve our operation efficiencies in the long run.

During the second half of 2019, AsiaSat completed its strategic initiatives in privatising the company and delisting the shares from the Hong Kong Stock Exchange, collocated our business, technical and operations teams into our wholly-owned facility, and established our overseas presence in selected countries. We are fortunate to have completed all the above prior to the COVID-19 outbreak, and able to continue our business operations without significant adverse effects.

With the uncertainty on the assignment of the 5G spectrum by different countries finally settling, the realisation of the technical limitations on using terrestrial infrastructure to stream high quality video and the business model challenges on Low Earth Orbit (LEO) satellite communications, I anticipate the industry will realign with less speculative possibilities and will lead to a healthy development in the area of natural fit for satellite communications.

Taking into account all the unprecedented events in 2020, we expect the years ahead will be challenging for AsiaSat and the industry. We will continue to build upon our early successes demonstrated in entering new markets, providing new services, and creating new partners through the balance of 2020 despite the mobility and social distancing restrictions. We are fully committed to working with our partners on our transformation into a fully-integrated customer service-oriented company that leverages our satellite communications infrastructure to provide the highest quality services.

# Africa's biggest oil producer is the leading end user of VSAT in Nigeria



The Nigerian National Petroleum Corporation, NNPC deployed a FaraWay network connecting its Abuja headquarters with two hubs and 44 remote sites throughout Nigeria, while the solar oriented network provides high density mesh telephony and fax and data interconnectivity. The network, originally deployed several years ago, by Gilat's partner SEC, was recently upgraded with additional sites and features. New satellite data hotspots are helping remote work crews stay connected on and off the cellular grid with seamless voice, email and text capabilities, according to **Malam Mele Kyari**

Malam Mele Kyari  
Group Managing Director/CEO  
Nigerian National Petroleum Corporation  
CBD, Abuja, Nigeria

Nigerian National Petroleum Company (NNPC) is the leading oil and gas company in Nigeria with more than 60% market share<sup>68</sup>. In addition to its own projects, the company holds a major share in a number of major oil and natural gas projects, which are funded through joint ventures (JV) between international oil companies (IOCs) and NNPC. The international oil companies include Shell, Exxon Mobil, Chevron, Total and Agip. IOCs participating in onshore and shallow water oil projects in the Niger Delta region have been affected by the instability in the region.

The Nigerian National Petroleum Corporation (NNPC) established its first VSAT (Very Small Aperture Terminal) network to provide communication link to its locations not covered by the NNPC Corporate Telecoms Network (CTN) and to serve as a thin back-up network for the CTN in event of any system failure on its transmission backbone which consisted primarily of fiber optic cable (FOC) and microwave radio links in 1999<sup>7</sup>.

According to the NNPC, the corporation's VSAT network was based on Gilat's Faraway system which supported essentially analogue telephony of four voice circuits per station and in-band data of very limited throughput. The initial network coverage extended to 45 NNPC locations inclusive of NNPC head office, Refineries, Pipelines & Products Marketing Company (PPMC), Nigerian Petroleum Development Company (NPDC), Nigerian Gas Company (NGC) and offshore locations. The network coverage was later extended to 5 other locations. The Bandwidth utilized then was 4MHz on Intelsat 907. Gilat satellite has began the deployment of several Nigeria two-way satellite data and voice communications networks

based on its FaraWay VSAT platform. The Nigerian National Petroleum Corporation NNPC, deployed a FaraWay network connecting its Abuja headquarters with two hubs and 44 remote sites throughout Nigeria, the solar oriented network provides high density mesh telephony and fax and data interconnectivity, NNPC controls 60 per cent of the Nigeria's oil exploration and production and is a major generator of the country's income. The network, originally deployed several years ago, by Gilat's partner SEC, was recently upgraded with additional sites and features.

SEC, in a joint venture with Philips Centre procure a FaraWay Network from Gilat for a large petroleum company, which includes fifty on and offshore locations throughout Nigeria. The Network includes a hub in Lagos has nodal stations especially in Portharcourt and Warri and 28 remote sites in the initial phase, and will provide data and telephony services. "Our objective was to provide a comfortable and convenient environment for our staff at any location. They must be able to keep in contact easily with their family and friends at home. The physical and mental wellbeing of our staff is a primary concern to us," he says. "For this reason, we have to provide additional services, such as web browsing, inexpensive phone services and enhanced personal e-mail." "VSAT has improved social communication and increased welfare for our staff".

The Corporation currently has approximately 50 remote C-band sites managed by global service provider Gilat Satcom, mainly for pipeline monitoring. The sites are spread across the country including presence in all 36



states. The company uses 2 to 5 Mbps C-band links to connect their eight nodal stations and also 512 to 1000 Kbps links to connect their 42 petrol stations, utilizing in total around 20 MHz of C-band capacity. The number of sites has grown by about 25% in the past five years. The company is currently in the process of adding 300 more sites by the end of 2014, to connect their retail franchise petrol stations. These new sites will be carrying comparatively lower data rates at 256 to 512 Kbps and will be increasing the current bandwidth usage from 20MHz to 36MHz of C-band capacity.

### Design of corporate VSAT Network

The design of the NNPC VSAT network is a star topology. To ensure high availability, therefore, there are central hubs installed with 6 Nodal Centres geographically located in Kaduna, Lagos, NPDC, Warri, Port Harcourt and NGC Warri, he said. Therefore, traffic from all locations are automatically diverted to the fail-over hub should there be any major fault with any of the hub. All 6 Nodal and 43 Remote Stations in a Mesh Configuration with each other. A satellite transponder in orbit deployed by a satellite service provider such as INTELSAT IS23 facilitates the communication between earth stations with a bandwidth of 20MHz is used to support the network. The satellite transponders provide VSAT interconnectivity to earth stations located at different points of the earth where the satellite has footprint). The VSAT Hub provides a minimum throughput of 5Mbps and 2Mbps on the outbound and inbound channels respectively to our various communication nodes, to support a myriad of NNPC business processes. The Nodal Stations process more data because they serve as the traffic interface for other NNPC locations in the various zones to the hub in Abuja. The Remote Stations carry relatively lighter voice and data traffic on a combined data rate of 2Mbps on the outbound and 1Mbps on the inbound channels. There are plans to expand this network to all NNPC operational sites to extend coverage to over 300 locations. In 1999, the Nigerian National Petroleum Corporation (NNPC) commenced a change management programme to position it to discharge its mandate with the goals of ensuring efficient service delivery and safeguarding critical infrastructure, promoting a sound oil and gas industry.

This programme was anchored on the redesign of the business processes and deployment of appropriate technology infrastructure to support the business processes. The redesigned processes gave rise to the need to integrate and centralize the operations of the corporation. For instance, NNPC business units maintained their independent database of their transactions and only made return to the Head Office at the end of the business day for consolidation.

### The Oil and gas industry

In addition global satellite service provider ITC global manages around 40 sites in Nigeria for oil and gas companies using around 95 MHz capacity. Also, a European satellite service provider has stated that they manage around 50 C-band sites for oil and gas companies in Nigeria. Approximately half of these sites are i-Direct TDMA sites and the rest are SCPC sites. In total, the sites use around 20 MHz capacity (40 Mbps), including another 15 sites for mining construction companies.

Furthermore, Hughes manages fewer than 50 sites in Nigeria for oil and gas construction companies. According to HNS, their customers typically have around a few dozen VSATs per network. One Nigerian service provider stated that it has three sites for their customer CONOIL. The sites are 3E1 (~7 Mbps) links and use around 11 MHz of C-band capacity in total. The company now plans to add a few more sites (less than five) for CONOIL and also for a new oil and gas customer in the

coming months. A leading satellite provider in the region, SkyVision, has won a five-year contract from South Atlantic Petroleum (SAPETRO) in 2014 to provide voice and data solutions and services to connect the company's offices and operational sites<sup>75</sup>. Anticipating the growth potential in the oil and gas market, SkyVision has been in the process of the establishment of hubs and PoPs in Lagos and Abuja over the past decade.

Another international firm, Nigerian Agip Oil Company Limited (NAOC), also intends to expand their C-band VSAT connectivity for national operations and invited RFPs from service providers in February 2013<sup>76</sup>. Shell has released an RFP in July 2012, for provision of two C-band hubs and around 25 remotes including bandwidth provisioning, for connecting its offshore sites with hubs in Port Harcourt and Lagos<sup>77</sup>.

Chevron Nigeria Ltd invited an RFP in May 2011 for provision of a 6 Mbps international VSAT link for two years with an option of one more year of expansion. The minimum SLA requirement for the link is 99.99% availability per month.

We estimate that the C-band VSAT market for the oil and gas segment counts up to 550 units including those for exploration, construction, production and distribution. The majority of the sites (65%) will be used in the distribution segment, including 300 new TDMA sites installed by NNPC to connect retail petrol stations by December 2014. Other companies should mainly use SCPC links with data rates typically above 1 Mbps to connect to their exploration and production sites.

The government has also liberalized the DRP (Department of Petroleum Resources) and VSAT license regime in the country, allowing international service providers to provide satellite connectivity services directly to customers in the country. Typically, international energy companies operating in Nigeria, requiring satellite or fiber networks, earlier were forced to use small, local providers with limited capacity. C-band usage for connectivity should increase as customers are able to leverage one vendor for their connectivity requirements in Nigeria and in the rest of Africa. Global VSAT provider EMC was awarded the first DRP license in October 2013. However, future the developments of the new projects will still depend on passing the Petroleum Industry Bill, which would have removed the regulatory uncertainties, making deep water exploration projects financially unviable.

# UAE Mars mission represents a new phase towards space invasion and exploration



His Excellency  
Dr. Mohammed Al Ahbabi  
Director-General  
UAE Space Agency

On 2nd December 1971, the day the UAE was formed, the world's space community celebrated the first successful soft-landing on the Red Planet, after receiving a radio-transmission from the Mars 3 Soviet probe. Since that fortuitous coincidence, the UAE's space odyssey has come a long way in a short span of time, with the country aiming in the short-term to land the country's and the Arab world's first probe on Mars in 2021 and pursuing a long-term strategy which envisions the construction of the first inhabitable

The UAE's space ambitions can trace its origins back to the founding father of the UAE, the late His Highness Sheikh Zayed bin Sultan Al Nahyan. He was gifted a tiny fragment of Moon rock from US President Richard Nixon in 1972, a year after the official birth of the UAE, as a symbol of the unity of human endeavor. The rock is on display in the Al Ain Museum.

Sheikh Zayed always demonstrated tremendous curiosity towards space exploration and the impact of the scientific results on humanity, according to Egyptian-American space scientist Dr Farouk Al Baz, who worked with NASA to assist in the planning of scientific explorations of the Moon and has met Sheikh Zayed on three occasions.

The first meeting took place in June 1974, after the Apollo lunar exploration mission, when Dr Al Baz presented him with a map of the surface of the Moon that detailed the six landing sites. The second meeting took place in January 1975 and was also attended by Apollo 15 astronaut James Arron. Sheikh Zayed inquired with keen interest about the atmosphere on the moon, breathing techniques, food and sleep. At the third meeting in February 1976, Sheikh Zayed welcomed Dr Al Baz and three American NASA astronauts from the historic US-Russia Apollo venture that linked-up in orbit with a Soviet Soyuz spacecraft. They presented him with a gift of a replica space shuttle.

Sheikh Zayed's meetings sparked a national focus by sending a prominent message to his people and the region that Emirati curiosity and ambitions knew no boundaries in space, and he set the foundations for the UAE to build a vibrant space sector.

## Satellites

The first milestones in the UAE's space journey were in the satellite industry. In 1997, Thuraya Communications Company was established in Abu Dhabi. Its mobile satellite communication services enabled connectivity in remote regions beyond the range of terrestrial communication networks and gave subscribers the freedom to roam across countries with uninterrupted

service. In 2000, they launched Thuraya-1, the Middle East's first mobile telecommunications satellite, as well as the first satellite phone. The Thuraya-2 and Thuraya-3 satellites, launched in 2003 and 2008 respectively, expanded its geographical reach across Africa, Asia, Australia and Eastern Europe, while widening the range of its satellite services such as high-speed data and broadband modem. The award-winning company currently operates 2 geostationary satellites that provide telecommunications coverage in more than 161 countries. In 2007, the UAE's status in the satellite sector was further cemented when Al Yahsat Satellite Communications (Yahsat) was established. Fully owned by Mubadala, the Abu Dhabi government's strategic investment company, it was the first company in the Middle East and Africa to offer multi-purpose satellite services, commercially for the private sector as well as strategically for the UAE government – providing secure satellite communications for the UAE Armed Forces.

Yahsat has launched three satellites – Al Yah 1 in 2011, Al Yah 2 in 2012 and Al Yah 3 in 2018 – manufactured by a European consortium and is now connecting more than 140 countries.

Global Space & Satellite Forum (GSSF) was launched by UAE in 2008 as a high-level gathering of the industry's stakeholders from around the world. The Congress supports the region's ongoing space projects and initiatives and establishes the region as a key contributor to the global industry of space exploration through its support for pioneering projects, space education and research, commercial space applications and scientific and commercial missions. It was re-launched as the Global Space Congress in 2017 in order to reflect its stature as the premier space event in the region.

On 15 February 2017, the UAE launched Nayif-1, its first ever nanosatellite designed and manufactured by Emirati engineering students. The mission was a partnership between American University in Sharjah, Innovative

Solutions in Space – one of the world's leading companies in the development of space components and nanosatellite systems – and the Mohammed bin Rashid Space Centre (MBRSC), hosting the integration in its “Clean Rooms”. It was aimed at transferring knowledge to students and providing universities with an educational platform, offering Emirati students from various engineering disciplines hands-on experience at designing, testing and operating a communications satellite. Nayif-1, with a standardized and simplified cubic design (10 cm cube, 1.3 kg), produces a communication footprint ranging from 5,000 - 5,500 km and can orbit at an altitude between 450 km and 720 km for up to three years.

### Institutions and Programs

As part of the vision to transform Dubai and the UAE into a knowledge-based economy, the Government of Dubai established the Emirates Institution for Advanced Science and Technology (EIAST) in 2006 as a future-focused entity that would inspire younger generations to explore the field of space research and promote a culture of advanced scientific research and technology innovation in the country.

Through a hands-on approach in the form of designing, manufacturing and operating Earth Observation satellites, EIAST acquired knowledge and technology through transfer programs with South Korea before building facilities in the UAE to manufacture satellites. EIAST also shared its own experience in establishing a space industry as a model to other developing countries and its vision has been recognized globally as a major contributor to the space industry.

In 2010, Sheikh Mohammed bin Rashid Al Maktoum, UAE Vice-President and Prime Minister and Ruler of Dubai, announced the UAE Vision 2021, an innovation policy and strategy to position the UAE among the best countries in the world by the Golden Jubilee of the Union. It emphasized the importance of innovation across all sectors, including the space sector: “Innovation, research, science and technology will form the pillars of a knowledge-based, highly productive and competitive economy, driven by entrepreneurs in a business-friendly environment, where public and private sectors form effective partnerships.” To this end, the National Innovation Strategy was launched in 2014 with a four-fold goal of developing and stimulating innovation at an institutional, government, private sector and individual levels. It prioritizes seven sectors to drive future innovation. Space has an important role to play in the UAE's economic diversification strategy and transformation from a resource-based to a knowledge-based economy.

In 2014, a major institutional milestone was reached when the UAE Space Agency (UAESA) was established to supervise and organize all space activities – especially the Emirates Mars Mission– to develop the sector, ensure knowledge transfer, enhance the UAE's standing as a global player in aerospace and maximize the contribution of space industries to the national economy.

UAESA has entered into agreements with leading international space organizations allowing the UAE to become the first Arab state to join the International Space Exploration Committee and become a member of international organizations including the United Nations Committee of the Peaceful Uses of Outer Space, the International Astronautical Federation and the Group on Earth Observation. Its comprehensive strategy includes developing the space sector, preparing and regulating its policies and guiding national space programs that will benefit the national economy. By focusing on industry and inspiration through its education outreach programs, the agency aims to encourage the UAE's children to pursue

STEM fields in a variety of new industries.

Highlighting the UAE's Year of Innovation (2015) was the establishment of the Mohammed bin Rashid Space Centre (MBRSC), headquartered in Dubai and to which the EIAST is currently affiliated. The Centre contributes to the establishment of the National Space Sector in the UAE and oversees preparations and implementation of all phases of the UAE's Mission to Mars. The Chairman and Crown Prince of Dubai, Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum launched a 15-year strategic plan to develop resources, knowledge and to expand its space exploration capabilities, reiterating the Centre's strategic importance within the long-term vision of the leadership for Dubai and the UAE.

With the Mars Probe announcement, a seven-year agreement was signed between EIAST and UAESA to develop the knowledge, skills and infrastructure needed to build the first Arab Islamic probe and reach Mars. The building of the probe is fully financed and supervised by UAESA and undertaken by EIAST's engineers.

The UAE has become the sixth nation to launch Mars missions after the US, Russia, Europe, India and China. The spacecraft will start operations mid- 2021 and last for two years, with the potential to extend for another two years. The mission's goal is to obtain the first truly global picture of the Martian atmosphere. Al-Amal will be Mars' first true weather satellite as previous probes only took snapshots of the climate at certain times of the day.

In 2016, a formal National Space Sector Policy was launched by the UAESA to underline the vital role of the space sector as a catalyst in the development process and its direct and indirect influence on strategic sectors of the economy and international cooperation. The policy's main principles are to enhance the lives of UAE citizens; support UAE national interests; support the growth and diversification of the UAE economy; promote collaboration and support the UAE's international status while respecting international laws and treaties. At the 5th World Government Summit in 2017 held in Dubai, the UAE took a giant step further with the announcement of the Mars 2117 strategy, unveiled in the presence of representatives of 138 governments.

After the success of the UAE astronaut Hazza Al Mansouri at the International Space Station (ISS), a new phase in the United Arab Emirate's mission towards space invasion and scientific exploration has begun. Hazza Al Mansouri spent eight days at the ISS which is over 3.4 million miles away from the Earth. The success of the mission is considered a turning point in UAE's Space Mission and marks a great achievement in the area of space exploration, which made Sheikh Zayed's dream a reality, and is an immense contribution to the UAE's space program and specifically in space and scientific research. Hazza's step is the beginning of a thousand-mile journey. His journey inspires Emirati youth to follow the path of space knowledge and aim to innovate to become the best in the field of space sciences; the field of which major countries in the world are competing to be listed in the top ranks. Hazza's achievement for the country symbolizes the leadership's vision and hope for the youth and hands the responsibility of the UAE's reputation to the youth who will carry the flag to beyond the space station and towards Mars and the moon. The establishment of the UAE Space Agency and the Mohammed bin Rashid Space Center signify the importance of achieving the aspirations and wisdom of the UAE leadership, to bring forth great opulence in the future to come.

# More power and reach to tell breaking news and event live, anytime, anywhere



In a world constantly on the move, the ability to cover natural disasters, conflicts and other breaking news and events anywhere, anytime as they happen, can make all the difference. Aware of the overwhelming demand for anytime-anywhere live coverage as well as program exchange between stations, Arabsat has dedicated massive capacity on our state of the art satellites, the largest and youngest satellite fleet in the region to let broadcasters easily tap into capacity set aside for this purpose as and when they need it instantly, says **Khalid Balkheyour**

Khalid Balkheyour,  
CEO and President  
Arabsat,

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 30 years. Now one of the world's top satellite operators, and by far the leading satellite services provider in the Arab world, Arabsat carries over 500 TV channels over 200 radio stations, two pay-TV networks and a wide selection of HD channels reaching tens of millions of homes in more than 100 countries across the Middle East, Africa, Europe, Central Asia--including an audience of over 170 million viewers within the 21 Arab countries alone.

Operating a growing fleet of owned satellites at the 20° East, 26° East, 30.5° East, 39° East and 44.5° East positions of the geostationary orbit, Arabsat is the only satellite operator in the MENA region offering the full spectrum of broadcast, telecommunications and broadband services. This capacity will continue to expand with the launch of Arabsat's new 6th-generation satellites, making the Arabsat satellite fleet the youngest in the region.

On Feb. 8, 1985, the first Arabsat satellite launched into orbit aboard a French rocket, marking the Arab world's entry into space. While Arabsat-1A malfunctioned, it was soon followed by Arabsat-1B, deployed by Saudi Prince Sultan bin Salman on his historic trip to space aboard NASA's Discovery shuttle.

Saudi Arabia is the headquarters of the Arab Satellite Communications Organization which has operated the Arabsat GEO telecommunications system since 1985. With more than 20 member countries, the organization fills a vital role of communications in North Africa and the Middle East for many nations which do not need nor can afford dedicated satellite networks. By the end of 1994, the Arabsat system had been reduced to only one spacecraft, but a new generation of satellites is planned for launches

beginning in 1996.

The three Arabsat 1 spacecraft are based on the Aerospatiale and MBB Spacebus 100 platform which was also employed for the EUTELSAT 2 series. Ranging from nearly 600 kg to almost 800 kg at the start of life in GEO, the spacecraft measure 1.5 m by 1.6 m by 2.3 m with a solar array span of about 21 m for 1.4 kW of electrical power. The primary communications payload consists of two S-band transponders and 25 C-band transponders. The nominal design life was seven years.

ARABSAT has positioned itself as the premier provider of satellite communication quality services in the Arab world. Its market was mainly intraregional links in and domestic services to some country members in C, Ku and Ka bands. With the introduction of Ku transponders in its fleet, ARABSAT has also moved towards video services. It has also opened its customer base since foreign countries have utilized the ARABSAT satellites to transmit TV or radio content towards Arab world. In addition, broadcasters from Arab countries have also used ARABSAT to transmit national or regional programs to their expatriates within the Arab world and in the South and West of Europe.

Arabsat 1A was launched by Ariane on 8 February 1985 but immediately suffered a solar panel extension malfunction. Other failures quickly relegated the spacecraft to backup status until late 1991 when the vehicle was abandoned. Arabsat 1B was launched by the U.S. Space Shuttle and was operated near 26 degrees E from June, 1985, until the summer of 1992 when it, too, no longer continued station-keeping operations. Arabsat 1C was launched by Ariane on 26 February 1992 and was still on station near 31 degrees

E at the end of 1994.

As a stop-gap measure to maintain network services until the Arabsat 2 spacecraft become available, the organization leased the Canadian Anik D2 spacecraft (November, 1984) in 1993. Renamed Arabsat 1D, the vehicle was moved from the Western Hemisphere during April August 1993 to a position at 20 degrees E. Arabsat 1D is based on a Hughes HS-376 bus and originally carried 24 active C-band transponders.

A contract for two Arabsat 2 spacecraft was signed with Aerospatiale in April, 1993. The spacecraft will utilize Aerospatiale's Spacebus 3000 platform to carry 22 C-band transponders (including eight 52 W moderate power transponders) and 12 Ku-band transponders. Arabsat 2 spacecraft will have a mass of more than two metric tons on station. The maximum dimensions of the spacecraft bus will be 1.8 m and 2.3 m, and the solar array span will be 25 m for a 5 kW electrical power capacity. The launch of Arabsat 2A is scheduled for 1996 with Arabsat 2B to be followed as needed to maintain a strong 2-satellite constellation. Although Arabsat 2A will be launched by Ariane, the Proton booster is being considered for Arabsat 2B.

Saudi Arabia is an active member of the International Telecommunication Union (ITU). It is also a permanent member of the World Administrative Radio Conference (WARC), now the World Radiocommunication Conference (WRC), and presided over WARC-95. Saudi Arabia maintains a close relationship with national and international organizations in the field, such as the Arab Satellite Communications Organization (ARABSAT), the International Telecommunications Satellite Organization (INTELSAT) and the International Mobile Satellite Organization (IMSO).

### **Affordable Uni-directional Broadband**

Until today billions of people cannot access internet due to infrastructure deficiencies in emerging markets, and rural areas in industrialized countries. Arabsat Broadband is a hybrid system, powered by FORSWAY, using satellite for downstream data to end users, and terrestrial networks such as mobile networks for upstream data. The terrestrial networks does not need to cater for high data speeds, as the return data channel normally is limited in bandwidth.

Our broadband services offer reduced latency, easy-to-install, affordable and no VSAT license needed before use. We offer the full HTS, Ka/Ku-Band based portfolio of services either through ARABSAT managed or virtual Network Operator (VNO) options to all market segments (ISPs, telecom operators, Enterprise, and Small Office Home Office).

According to UK Ofcom opportunity report released in May 2018, over 925,000 households and businesses are still unable to reach download speeds of 10-Mbps. Therefore, we believe internet Booster program via KA-spotbeam is going to be the solution to the demand. By combining and optimizing different technologies for data traffic we can achieve low latency and high bandwidth.

### **COVID-19 Pndemic**

In response to the elevated risk level from the coronavirus disease (COVID-19) pandemic, various hospitals in industry players have accelerated telemedicine health services, offering secure and virtual face-to-face interactions with doctors. Patients can now easily access medical consultations from the comfort of their homes. The telemedicine services have come handy at a time when the Kingdom is fighting the COVID-19, and physical

distancing is the norm to break the virus's spread.

Individuals can book their appointments with their hospital's doctors using various communication channels, including their call center number, website, and mobile apps. Speaking to Arab News, Dr. Shaikh Abdullah said: "During this global pandemic, telemedicine is emerging as an effective and sustainable solution for prevention and treatment to contain the spread of COVID-19." Specialists speak to patients over an audio/video call and advise necessary courses of treatments or investigations required, and medicines can be collected or are delivered to homes. In response to the public health emergency, Johns Hopkins Aramco Healthcare, Dhahran (JHAH) has accelerated the launch of primary care and psychiatric video sessions.

Dr. Al-Jishi told Arab News: "Tele-psychiatry began in the 1950s when teleconferencing was used for group therapy and consultation liaison psychiatry. In the 1990s, video visits spread further to provide psychiatric care in underserved areas around the world. In the decades since, studies have shown 'telehealth' options to be equivalent to in-person psychiatric care in diagnostic accuracy, treatment and effectiveness." Video visits provide a secure, safe, face-to-face, model of psychiatric intervention during the COVID-19 pandemic, he added.

"Our personal experience so far is very positive, but we will need some time to fully assess the benefit in Saudi culture. With that said, I think it is very promising; I am optimistic that it will be an important option for our patient psychiatric care in the future," he said.

### **Inmarsat launches services in Saudi Arabia**

Inmarsat has announced that it will bring its maritime, aviation and enterprise connectivity solutions to customers based in Saudi Arabia through new partner agreements. The company additionally announced that it has secured new spectrum licences to deliver both its narrow-band (L-band) and high-capacity broadband (Ka-band), Global Xpress (GX), services in Saudi Arabia, enabling Saudi-based businesses to deploy these services for the first time.

Fixed and mobile satellite telecommunications distributor Sada Al Ammah and Global Beam Telecom have been appointed as Inmarsat's first distribution partners in Saudi Arabia and the region and they will work closely with Inmarsat's Maritime, Aviation and Enterprise businesses to roll-out services in the region. Inmarsat's Maritime business will partner with Sada Al Ammah to distribute connectivity services for merchant and offshore vessels operating in Saudi waters, providing full access to Inmarsat's Fleet Xpress services. It has also signed a separate installation agreement with service company Master Systems.

# Wherever it is difficult to get access to the internet, EgyptSat steps in



Ahmed El Beheiry  
CEO  
Telecom Egypt  
24 Ebour Buildings  
Salah Salem road  
Cairo  
Egypt

EgyptSat owns the biggest two-way satellite antenna in Egypt in Ku-band offering the most stable service for clients in remote area under any weather conditions. The system transmits the traffic over vast areas due to the wide deployment of the satellites operating in this band while resisting all the kind of signal fade degradations such as rain fade, snow, ice, fog and all the combination of wet weather conditions. EgyptSat has always been the pioneer in the Satellite communication not only in Egypt but in the whole of the Middle East, & first company to offer two-way Internet in Egypt, according to **Ahmed El Beheiry**

Last year, Egypt's new satellite Tiba-1 arrived at its targeted orbit, at an altitude of 35,786 kilometres, a specialist at the International Telecommunication Union (ITU). The telecommunications satellite was launched last Tuesday from a space centre in French Guiana in South America." Launched by an Ariane 5 rocket, Egypt's first telecommunication satellite was initially scheduled to launch last November, but the launch was postponed twice due to a malfunction followed by bad weather conditions.

EgyptSat has been providing high-speed Internet connection, using the Express AM22 satellite, which offers a hot spot beam pointed just over the Middle East, from the Indian Ocean to the Atlantic Ocean coast. This extensive coverage for all countries in the Middle East, Europe and Africa provides customers with an excellent range of geographic locations. Due to the strong signal obtained from the satellite, a fairly small antenna is used to get a reliable and fast Internet connection.

EgyptSat is one of the leading providers of global satellite communication solutions for corporate, governmental, customers, carriers and service providers. We offers Satellite Internet, Marine Internet, Self-Deploy, VoIP, Video Conference, Distance Learning, Cyber Cafe, Network security, Acceleration, Content distribution and SCADA systems. EgyptSat has always been the pioneer in the Satellite communication not only in Egypt but in the whole of the Middle East, & first company to offer two-way Internet in Egypt when EgyptSat signed as a VAR for Hughes at 2002 (with a turnover of 5,000,000 USD during the first year). It's the First company to own and operate an iDirect hub in the ME as they bought a first iDirect hub at 2004 & a S3P Newtec hub in the ME as they bought a S3P hub at 2008.

EgyptSat is the only company in Egypt to own and operate four hubs as they bought their second hub at

2006, third at 2008 and the fourth at 2010. It's the first company to own and operate an iDirect hub in the ME as they bought a first iDirect hub at 2004 & a S3P Newtec hub in the ME as they bought a S3P hub at 2008.

## EgyptSat Satellite Internet

.EgyptSat Provide Two-way satellite Internet service involves both sending and receiving data from a remote very small aperture terminal (VSAT) via satellite to a hub telecommunications port (teleport), which then relays data via the terrestrial Internet. The company operates the latest Evolution VSAT hub from iDirect (the industry leader in satellite-based broadband access solutions) that offers a highly advanced VSAT solution and provides many features as a satellite communication solution such as built in QOS, Natting and routing, TCP acceleration and multicasting. It is an ideal solution for small to medium enterprise customers with basic remote networking needs. Able to deliver broadband access as per customer needs. Lately, it is transforming the way the world gets and stays connected. The company's satellite based IP communications technology enables constant connectivity for voice, video and data applications in diverse and challenging environment.

Whether it's ship-to-shore maritime communications, Internet access for remote, rural classrooms, or vital data and communications for petroleum operations, satellite applications meet a broad range of needs. Communication satellites are used in fixed or mobile wireless communications to receive and transmit radio signals from an orbiting satellite to another terrestrial location. There have been such advances in bandwidth utilization and reliability of communications that satellite service now provides affordable, always-on, high-speed, quality connectivity.

As a network provider, Egypt Sat own Network Management System (NMS) which allows us to monitor your systems remotely, provide reports on usage and problems. Satellite Broadband is always on, meaning you can enjoy your internet connection 24/7.

The communication satellites (Geo Stationary Satellite GEO) are positioned at a stationary location 36,000 KM above Earth's equator. When there are two locations on earth thousands of kilometers away where the earth concave or obstacles and buildings in between are not allowing a light of sight between those two locations to establish a wireless connection, then the satellite will act as a repeater for the wireless connection to connect those two sites.

The high altitude of the satellite overcomes the problem of existing any obstacle between the communitarian points. More over the satellite will cover a huge area that allows a fast and easy deployment of the connection simply by pointing two VSAT devices with a send and receive antenna (usually 1.2 m diameter) at each location, which can be implemented in less than an hour, on the other had it will take several months and cost a lot to lay a fiber cable between the two location. The only drawback can be in the extra delay of the data communication due to the longer distance, where the data has to go through to reach the other point after traveling to the satellite. This will increase the delay to 255 ms in case of UDP traffic such as voice and video streaming or 510 ms for TCP application. Such delay is hardly noticeable unless the application is very sensitive to delay, then special configuration can be made for those type of application. Different type of satellite called MEO (Medium Earth Orbit) and LEO (Low Earth orbit) are used on lower distance from the earth which keep rotating to offer satellite communication, and due to the lower distance data transfer delay is much less than GEO satellite and antennas used are much smaller, similar application are satellite phone and mobile data system using Inmarsat and Iridium network.

This simple next diagram shows how data moves through a satellite network. The orbiting satellite transmits (and receives) the information to a location on Earth called the Network Operations Center or NOC; The NOC itself is connected to the Internet (or private network).

## World Fastest Auto Deploy Antenna

Today, there is a great demand for communication from anywhere and at any time. This is especially true in remote areas, or wherever disaster recovery teams or news organizations need to get connected to send or receive data to other locations. In these circumstances, satellite is the only reliable communication method. For the first time in Middle East, **EgyptSat Telecom** developed a sophisticated VSAT system called it **Pure Mobility** used during crises, With a Satellite receiver dishes in order to link the location of the event and decision makers at high speeds through satellites in no more than one minute. The system is installed on a four-wheel drive, allowing it to reach remote places while Critical crises, The system has been equipped with a mobile wireless camera that enables transferring all the current events at the event site and create a direct link by videoconference technology for ten Egyptian airports through the crises management system at the Ministry of Aviation.

## Satellite communication for Banking

### system

One of the key factors in the infrastructure setup for a bank, anywhere in the world, is connectivity. This entails a dedicated internet-type connection that allows the banks and their various branches to feed information off a single server and provide unified information access to their customers from where ever they may be. In a developed country, this is easily achieved.

In Egypt, however, connectivity through Mobile Telephony or Broadband in the rural parts of is limited, with some locations showing no forms of connectivity at all. Banks however have explored Satellite Communications in the form of Very Small Aperture Terminals for their connectivity and this is proving to be a boon in more ways than one. We delve deeper into the business of VSAT and analyses how feasible this technology is.

## Satellite communication for Oil & Gas

Invariably drilling and production sites are either offshore or in areas of low population and as a result often lack national communications infrastructure, particularly in the early days of set up and production. VSAT becomes the only practical choice and Egyptsat can provide solutions for all phases of the oil and gas field development, whether it is iDirect® based mobile antennas or small fixed systems for the exploration and survey teams, which can be rapidly deployed and easily relocated, or larger SCPC installations required for the construction and production phases.

At Egyptsat, our solutions feature the latest modem technology. We provide an end-to-end fully Managed Service, which includes 24/7 monitoring, monthly reporting and Service Level Agreements guaranteeing the highest level of availability with Suitable service for programs used in the sector.

Supervisory Control and Data Acquisition (SCADA) systems are an integral part of every industrial operation, EgyptSat SCADA connectivity solutions enable cost-effective monitoring and remote management of critical equipment, in some of the most remote areas of the world. EgyptSat Solutions enables the collection of equipment data from remote SCADA sites and converts it into actionable intelligence using cost-effective and reliable satellite and cellular communications. This makes it easier to reduce maintenance costs and site visits, minimize downtime and maximize output of a variety of critical equipment. EgyptSat offers multiple solutions and products to facilitate SCADA systems communication.

## Egypt's first satellite assembly centre

Egypt announced plan to launch its first satellite assembly centre, CEO of Egyptian Space Agency Mohamed Al-Qousi said, noting that the agency is currently in the final stages of adjusting the subsystems of Tiba 1 satellite to be ready for operation. The assembly centre will be located in the under-construction space and satellite technology city in the Fifth Settlement. The space city, to be built on an area of 123 feddan, will also accommodate the African Space Agency's headquarters, a research and development centre, Space Academy, Space Museum, a planetarium, a library, a conference centre, and a hotel for foreign delegations. The planned satellite will be tasked with measuring the percentage of carbon dioxide in the atmosphere, he explained. Carbon dioxide is the main cause of the greenhouse effect. Al-Qousi pointed out that a meeting will be held to determine each country's contribution from the technical and financing respect, as well as the project's time plan. Moreover, Egypt is currently completing an action plan to send an Egyptian astronaut to space, where a competition

# The Nigerian Communication Satellite Ka band System



NIGCOMSAT Ltd, remains the first satellite operator to provide Ka-band resources over African soil, driving national ICT revolution via the provision of cost effective and affordable solutions involving: broadcasting, telecommunication connectivity, and backbone and IP trunking. **Dr. Lasisi Salami** explains that Ka-band multimedia services and applications with international distribution networks and local service providers is the new window to success in driving the new and enhanced satellite service business including new market opportunities such as Internet-in-the-sky, 3D Digital TV, HDTV, Videos-on-Demand , Interactive multimedia across Africa

Dr. Lasisi Salami  
Head of Satellite Navigation  
Department of Engineering  
Nigerian Communications Satellite Ltd  
Abuja, Nigeria

Africa still remained the least wired continent in the world in terms of robust telecommunications infrastructure and systems to cater for its more than one billion people. Existing infrastructure in the African hinterlands are grossly inadequate, thus the need to develop national, sub-regional and regional carrier of carriers and digital links with cross-border inter-connectivity.

African Leaders and key stakeholders through institutional frameworks have recognized the role of ICT infrastructure and the multiplier effect it has on other development sectors. As a means of closing the infrastructure deficiency and after due process and a request for proposals from various communications satellite companies, the Federal Government of Nigeria took the bull by the horns by signing a Communication Satellite contract with the China Great Wall Industry Corporation in December 2004. The high powered, Quad band (Ku, Ka, C and L Band) geostationary satellite, with a service life span of 15 years, had 8 active transponders on the Ka-band, which were based on a feasibility field trial assessment of bandwidth demand projection for sub-Saharan Africa required to carry Africa's international voice and data traffics and the success of the ANIK F2 satellite with Ka band.

The National priority project and first Nigerian Communication Satellite (NIGCOMSAT-1) was eventually launched on the 13th of May 2007 becoming the first communication satellite to provide users with Ka-band resources over African soil. The satellite suffered an onboard subsystem failure and was de-orbited on 10th of November 2008 bringing all broadcast, telecommunication services and strategic navigational plans to an abrupt end. NIGCOMSAT-1R SYSTEM The high-powered, quad band (Ku, C, Ka and L Band) geostationary satellite with a life span of more than 15 years with an orbital home of 42.5 degrees east was designed to provide strong foot prints across the sub-sahara region of Africa, Part of Europe and

Asia to meet the telecommunication and broadcast needs of clients, service providers including Navigational requirements. The 5 tonnes spacecraft at lift-off was launched by an LM-3B launch vehicle built on a 3-axis stabilized DFH-4 satellite bus platform with heritage from DFH-3 series.

## NIGCOMSAT-1R Ka-Band System

The NIGCOMSAT-1R Ka-band system has an improved payload configuration and composition over its predecessor; NIGCOMSAT-1. The payload is comprised of a total of eight (8) 120MHz reconfigurable transponders with three (3) large-sized spot beams having congruent transmit and receive coverage over Europe, South Africa and Nigeria. The eight (8) Ka-Band active channels were designed with redundant high power amplifiers, receivers, smart RF switches etc to provide IP trunking, bi-directional communications and broadcasting services under its service zones. Unlike its predecessor that had 50Watts HPA for trunking and 70Watts for broadcasting channels, Each transponder of the NIGCOMSAT-1R Ka-band system is equipped with a Travelling Wave Tube Amplifier (TWT) having effective RF output power of 70Watts, dedicated linearized channel amplifier (LCAMP), Electronic Power conditioner (EPC) and commandable channel controls in two modes; Fixed Gain Mode (FGM) and Automatic Level Control (ALC).

## NIGCOMSAT Ltd's Services, Solutions and Applications on NIGCOMSAT-1R Ka Band

The circularly polarized transponders with a bandwidth of 120MHz and bandwidth gap of 30MHz between transponders offer high-speed and throughput services than its contemporaries (traditionally Ku and C-band



transponders). Such services, solutions and applications are as provided in figure 6 are at competitively priced transmission capacity, small antennas and reduced customer premise equipment (CPE) cost.

NIGCOMSAT Gateways and hubs were deployed at the coastal areas of the country to gain access to the huge communication potential of the various submarine landing cables with terrabytes of capacity. The strategic deployment and implementation of a teleport hub serves as an African convergence port, where the terrestrial fiber can connect and merge with the Communication Satellite Network. The Hub is a gateway for all satellite based networks into the Internet Superhighway with 7.6M antenna system co-located.

NigComSat Ltd was the first to launch one of the most modern teleport services in the SubSahara region, using the iDX 3.0 on DVB-S2 technology and the 2D-16state MODCOD technique on the iDirect hub system, as depicted in figure 8, through a 7.6 m Ku Band Antenna system as shown in figure 7 with a fully redundant 100W BUC solution supporting multi-carriers.

Aside from the iDirect Hub currently being used to deploy multiple classes of services on IP broadband networks to various remote locations using variants of Very Small Aperture Terminal (VSAT) systems. A dedicated NEWTEC Sat3Play Broadband Gateway system as illustrated in figure 9 is specifically dedicated for the Ka-band System in furtherance of delivery of a high speed broadband solution with a differentiated class of services.

The core of the Sat3Play system is a DVB-S2 system that enables the provisioning of both basic and complex services to consumers and business markets. The network system is designed for scalability of both traffic and network management capacity with support for a growing range of data, multimedia and voice applications. The Sat3play management system offers multi service provider platforms for wholesale parts of the system infrastructure with capacity for several large and medium-sized ISPs and VPN operators. The teleport facilities are of utmost importance to the economy of the nation; making available high performance IP broadband networks for education, government, military, healthcare system, enterprise organizations, Upstream Internet Service Providers, Government MDAs, Schools, ELearning initiative drives, smart communities, e-villages etc. The differentiated classes of services offered by the teleport is capable to improve the ICT, internet, Broadband penetration and Broadband speed indices of not just Nigeria but the entire African region and beyond. To ensure continuity of services including the need for satellites as backup to serve as risk mitigation if the working satellite fails, NIGCOMSAT Ltd with the support of the federal government, as it is a state owned company, is working assiduously to launch two more satellites known as NIGCOMSAT-2 and NIGCOMSAT-3. The entire system network of NIGCOMSAT-1R, 2 & 3 will offer added advantages in reliability, compatibility, security, operations, marketing and increased customer confidence as a client of NIGCOMSAT Ltd. The three communication satellites will strengthen the company's corporate vision as "...the leading communications satellite operator and service provider in Africa." including strong coverage over other continents such as Europe, South America etc. for a wider market capture and patronage

## Meet the Ka-Band: New Possibilities and Capabilities

Ka-band is a high radio frequency typically between 20-30GHz that allows high volume and faster data throughput

to be transmitted and received with relatively very small ground antennas with competitive prices. Ka-band is distinguished from C-band and Ku-band by its higher frequency. The Ka-band uplink frequencies are usually between 24.75 GHz and 31 GHz and downlink uses frequencies are between 17.3 GHz to 21.2 GHz depending ITU region, satellite usage, national regulators etc. Ka-band also offers another technology advantage of frequency re-use through space diversity by reusing the same frequency up to as much as six times allowing regionalized content space-based bandwidth resources to be shared between simultaneous users giving rise to today's High Throughput Satellites (HTS). Ka band has moved from experimental laboratory demonstrators to application in high speed networks with digital channelization using onboard routers for broadcasting, telecommunications, IP trunking services, Communications-on-the-Move (COTM) etc.

## Conclusion

Ka-band systems and technologies hold great promise for Africa in complementing the inadequate terrestrial networks and ensuring that its nations are not isolated from the global economy and worldwide communications network growth. The Ka band spectrum has helped the satellite industry in optimal utilization and availability of the Satellite frequency spectrum and management through digital channelization and frequency re-use of the ICT infrastructure, it is the corner stone for guaranteeing universal access. Continuous proliferation of wireless and radio technologies urgently requires periodic review of the communications act, policies and that of spectrum management in tandem with new technologies, innovations in spectrum management techniques, consumer demands for new services, regional and international developments.

Non-geostationary Ka-band satellites such as the O3B Ka-band satellite designed for medium earth orbit offers lower latency and throughput equivalent to an optic fiber cable system. NIGCOMSAT Ltd, as the first satellite operator to provide Ka-band resources over African soil, will continue to drive the national ICT revolution by the provision of cost effective and affordable solutions involving: broadcasting, seamless integration of telecommunication connectivity and backbone and IP trunking, inter alia, by exploiting its Ka-band resource, complemented by the other bands onboard NIGCOMSAT-1R and the future fleet of HTS satellites over the African continent and the globe at large. Well implemented Ka-band multimedia services and applications with international distribution networks and local service providers remains a key success factor in driving the new and enhanced satellite service business including new market opportunities such as Internet-in-the-sky, 3D Digital TV, HDTV, Videos-on-Demand, Interactive multimedia etc.

# Amos-17 boosts spacecoms' satellite fleet's capacity, and expansion to more regions



Dan Zajicek New  
CEO  
Spacecom  
7 Menachem Begin St.  
Ramat Gan 52521, Israel

According to sources, by 2025 Africa will have over 1.5 billion residents with the largest amount of young people in the world, all of whom will have an accelerating appetite for communication services and will be in need of proper connectivity infrastructure. projects by operators is greatly reduced. **Dan Zajicek New** says Spacecom's AMOS-17 is the only digital High Throughput Satellite specifically designed to offer mobile operators and telecom service providers a distinct economically and operationally viable answer to meet African consumer needs.

Spacecom established in 1994, launched its first geostationary satellite – AMOS-1 in 1996. A dynamic, growing, satellite operator- Spacecom operates the AMOS communications satellite fleet, covering diverse territories with an International global expansion growth strategy. Spacecom today is an established market leader in Europe, the Middle East with the 4°W orbital slot 'hot spot', has established a significant footprint in Africa and North America and is now expanding to Asia. Spacecom has an excellent reputation in the market with an experienced and stable management and strong financial backing. Our collective vision is to position Spacecom as an international satellite services provider — one that operates a constellation of advanced satellites at multiple orbital locations and maintains its personalized attention to its customers over a wider range of territories. For more than 20 years Spacecom has supported Africa's communication and economic growth with ISP's, MNO's, Government, UN; thousands of projects of all kinds. Today, AMOS-17, Spacecom's newest satellite brings new opportunities to the governments of Africa.

Spacecom is a specialized satellite operator providing Ultra-High-Throughput & Cost-Effective satellite solutions to African MNOs, ISPs, Governments, Mining, Hospitality, Broadcast, and Integrators.

For more than 20 years Spacecom has supported the rollout and development of cellular networks across Africa. From backhaul to backbone to backup, our domestic and international services have developed and shaped to meet the specific needs of our customers.

Spacecom's Communication Services Are Designed to provide Mining-Oil-Gas Companies In Africa more productive time any time. With low power consumption, AMOS-17 High throughput and digital amplifiers allowing you to use low Wats LNB and modems, and dramatically reduce the power consumption of the satellite network. Its also great for solar-powered remote locations.

The satellite is perhaps the most powerful HTS C-Band with High-Density ALC - Active signal amplification per link. Perfect Signal - Digital "Disruptions & Noise Suppression" onboard the satellite for best performance at all times shine or raining.

If your crew members are away from home, for a long pirate of time, companies can make this time valuable by providing high-speed internet to support voice and video conversation, Education, movies, and more via AMOS-17. In today's internet world, Big Data is the name of the game. For the first time, customers can share your big data flow in real-time with home servers and get perfect analyses faster than ever before.

In May, Spacecom successfully demonstrated of a 1.3 Gbps link using Comtech EF Data's CDM-760 Advanced High-Speed Trunking and Broadcast Modems operating over AMOS-17 C-band HTS payload. The exceptionally high throughput of 1.3 Gbps on a single link was established between two Telemedia facilities over AMOS-17's C-band spot beam using a single CDM-760 modem per facility. Telemedia is a leading provider of broadcast and teleport services in South Africa.

In addition, using the DoubleTalk® Carrier-in-Carrier® adaptive cancellation functionality of the CDM-760, the team established a symmetrical 270Mbps/270Mbps link between two Telemedia sites using a total of only 62.8MHz on AMOS-17, achieving spectral efficiencies of 8.6 bits/Hz in such a high capacity C-band link.

Ping tests showed that these links had a round-trip delay of less than 500ms, including the satellite link, modems and external routers, which is extremely low latency for a GEO satellite link.

The throughput and efficiencies of AMOS-17's spot beams are unique over Sub Saharan Africa. Comtech EF Data's modems and team proved this, while only using one modem per site. Engaging the African market with key enabling connectivity technologies for commercial and government sectors is a strategic goal for Spacecom.

Together with Comtech EF Data, we are able to address important market segments with cost-effective, easy to deploy and maintain solutions.”

Customers will really benefit from the high data rates that can be achieved even with small antennas. The combination of HTS throughput, C-band reliability and low latency makes the solution ideal for IP trunking, mobile backhaul, critical applications and remote enterprise offices.”

AMOS-17 is the only digital HTS (High Throughput Satellite) specifically designed to offer mobile operators and telecom service providers a distinct economically and operationally viable answer to meet African consumer needs. Because Africa's growing population includes many rural and outlying residents (low-density population areas), the economic justification for investing in ground telecom infrastructure projects by operators is greatly reduced. However, by utilizing AMOS-17's advanced digital technologies, service providers will be able to offer an expansive array of services quickly, highly efficiently and at low cost to these populations.

Spacecom has deep knowledge of Africa with years of experience working with African governments and commercial enterprises such as in internet, data, video and broadcast. Today, via the AMOS-7 and AMOS-4 satellites, the company provides a range of services. Together with AMOS-17, more clients will be able to enjoy a fuller range of packages from the three satellites. According to sources, by 2025 Africa will have over 1.5 billion residents with the largest amount of young people in the world, all of whom will have an accelerating appetite for communication services and will be in need of proper connectivity infrastructure.

### Modern & Flexible Business Models

Spacecom's different services as well as advanced pricing models are supporting current and future MNO's way of capacity management. An excellent example of it is the Volume based charge (GB), model. Now MNO can compare Apples to Apples. Instead of buying Mbps' converting them to Gb and lose money in the process. With Spacecom, you can purchase GB and pay only for those you consumed de-facto.

AMOS-17's launch represents important global cooperation and the application of innovative technologies for the creation of new services to the world's fastest growing continent. AMOS-17 is an important milestone for Israel's space industry and the fulfillment of Spacecom's vision towards filling space with advanced satellites to provide a wide range of answers to countries and enterprises throughout the globe.

AMOS-17 is build to meet the most demanding needs of the most demanding people in the most demanding industries. High availability, incredible uptime, and an industry-leading throughput guarantee.

Located directly above the heart of Africa at 17 East, AMOS-17 own the ultimate sky position over Africa. High Elevation antennas tend to be less sensitive to notice and interference, the broadcast travels the shortest route in the atmosphere and the line of sight is perfect.

The satellite offers faster and more efficient service in all conditions. With a single-hoop swap between all beams and bands. It provides dynamic split between uplinks and downlink, to achieve multi beams and bands downlink from a single uplink. Robust security and unmatched flexibility Launched late 2019 AMOS-17 is a new Boeing 702MP digital satellite. Being one of the most advanced and powerful satellites ever build it is characterized by high performance and almost perfect stability.

Spacecom has a sales backlog of US\$ 58 million for communications services to the African market by AMOS-17 and for other services and believes that following the satellite's launch, more clients will sign future large deals. AMOS-17 boosts Spacecom's capabilities to support communication users with advanced Turn Key Solutions

including, among others: designing communication networks, deploying ground station and broadcast facilities, long-distance facility management and providing a full array of support services.

AMOS-17's unique design and embedded technologies coupled with its prime orbital position over Africa enable the satellite to cover an entire country by a single beam to provide high capacity and highest service levels quickly, efficiently and at low cost. This includes high availability services for governments and telecom operators, broadcasting content to millions of viewers, broadband data services via smaller terminals and utilizing a combination of Ka, Ku and C-Band frequencies as needed by each client, and more.

The fastest and most cost-efficient way to fulfill your nation's Space/Satellite program, eliminating the risks and save valuable time. Launch your space program today, with the most advanced satellite in Africa. Our national beam is highly efficient. We already got you covered. Customers can initiate projects anywhere in their country and connect with Ultra-High-Throughput. MNOs can establish a National-Communication-Network as an umbrella to endless number of applications, users and usage nationwide, connecting remote communities to the local & digital economy.

### PanAccess' Nigerian broadcast bouquet now on AMOS-17 Ku-band

Spacecom, operator of the AMOS satellite fleet announced that it is providing Ku-band capacity from its AMOS-17 communication satellite to PanAccess, a leading German broadcast services company, for broadcasting to Nigeria

Specifically designed to meet Africa's fast-moving communication demands, AMOS-17's advanced digital payload will be Africa's most technologically advanced satellite. It will provide extensive C-Band HTS capabilities, Ka-Band and Ku-Band to a range of markets and will combine broad regional beams and high throughput spot beams to maximize throughput and spectral efficiency to connect Africa, the Middle East and Europe. PanAccess' growing broadcast bouquet, originating in Germany, consists of dozens of channels and is broadcast free-to-air from the satellite located at the 17°E orbital position over Africa. PanAccess specializes in providing high-end one-way or two-way CAS and DRM security solutions around the globe. It offers a seamless service portfolio for consumers using any device.

According to Roland Schlichting, PanAccess CEO, “We are thrilled with Spacecom's response speed that enabled us to be on-air quickly and efficiently. PanAccess views the growth of our broadcast base in Nigeria as an important market and we will continue to add more channels for these customers.”

Spacecom VP Sales, EyalAltshuler commented, "Working in tandem with PanAccess, we succeeded in bringing their bouquet onto the air in less than 48 hours after we began designing their solution. AMOS-17 is an exciting satellite with its Ku, Ka and HTS C-Band capabilities. The Nigerian market is now experiencing services and communications from the most powerful, technically advanced satellite serving the region. Since the beginning of commercial operations in late 2019, the satellite is already boosting our business around the continent.

# Yahsat recognized for providing Internet connectivity to unserved and underserved areas



Masood M. Sharif Mahmood  
Chief Executive Officer,  
Al Yahsat

The UAE-based global satellite operator, Al Yah Satellite Communications Company (Yahsat) is a leading fixed and mobile satellite services operator offering integrated satellite communications solutions to over 150 countries across Europe, the Middle East, Africa, South America, Asia and Australasia. Yahsat was established to support Abu Dhabi's ambition to become a broadcasting and telecommunications hub, in line with its Economic Vision 2030. **Khaled Al Qubaisi**, says Al Yahsat recent commitment reaffirm our position as a market leader, pioneer and disruptor.

Al Yah Satellite Communications Company PrJSC (Yahsat) is a private joint stock company fully owned by Mubadala, an investment arm of the Government of Abu Dhabi. Since being incorporated in 2007, we have designed the region's first multi-purpose satellite system, based on extensive interaction with customers and research into their communication needs. Our firsthand understanding of specific market requirements has enabled us to develop customized satellite solutions for the government as well as the commercial sector in the Middle East, Africa, Europe and Central to South West Asia.

Yahsat was established in 2007 to meet the growing demand in the region for government, commercial and consumer satellite communication services. As one of the world's leading fixed and mobile satellite services operators, Yahsat caters to more than two-thirds of the global population, enabling critical communication technologies including data connectivity, broadcasting, backhauling and mobility solutions through Yahsat Government Solutions, YahClick, YahLink, Yahlive and Thuraya. Backed by a fleet of five satellites, Yahsat provides a wide range of C, Ku, Ka, and L-band solutions for terrestrial, maritime and aero platforms to consumers, governments and enterprises within diverse industries including defense, aerospace, oil and gas, relief as well as finance.

Yahsat's first satellite Al Yah 1 was successfully launched in April 2011, and a second satellite Al Yah 2 was added to its fleet in April 2012. Yahsat launched its third satellite, Al Yah 3, in January 2018, extending its commercial Ka-band coverage to 35 additional markets, including South America for the first time. Through YahClick, its joint venture with Hughes Network Systems LLC, Yahsat provides high-speed fixed satellite broadband services to over 60% of Africa's

population and to over 95% of Brazil's population.

Two L-band satellites, Thuraya 2 and Thuraya 3, joined the Yahsat constellation after the company acquired a majority stake in Thuraya Telecommunications Company in 2018. Yahsat is a wholly-owned subsidiary of Mubadala Investment Company.

## UAE's fledgling satellite operator

Al Yah Satellite Communications Company "Yahsat" provides multipurpose satellite solutions (government and commercial) for broadband, broadcast, military, and communications use across the Middle East, Africa, Central and South West Asia. Based in Abu Dhabi, UAE and wholly owned by the Mubadala Development Company, the investment vehicle of the Government of Abu Dhabi, Yahsat is the first company in the Middle East and Africa to offer multi-purpose satellite services: YahClick – offers home solutions, business solutions and transportable solutions, YahService – offers managed solutions and government capacity, YahLink – offers IP trunking solutions, corporate networking capacity and backhauling capacity. Yahsat's first satellite Y1A was successfully launched in April 2011 and the company's second satellite Y1B was successfully launched in April 2012.

Three of its satellites, Yahsat 1A and Yahsat 1B, Al Yahsat, have established the operator as a formidable regional player in Africa. Al Yah 3 has strengthened Yahsat's position in Africa while extending the operator's reach to South America. Al yahsat's 60 high-throughput spot beams will cover 95 percent of Brazil's population and expand Yahsat's coverage of Africa — the company's largest market — to 60 percent of the

continent's population. Al Yah 3 will extend the company's commercial Ka-band coverage to 60% of Africa's population. This procurement of the Jupiter platform is in preparation for the new satellite and is in line with Yahsat's strategy to widen and deepen its reach and continuously enhance its product offerings.

Al Yah 3, with support from Hughes, will strengthen Yahsat's position as the world's eighth largest operator in terms of revenue as the satellite company's coverage will be extended to wider parts of Africa.

YahClick provides reliable satellite internet for home and business internet users in 28 countries across the Middle East, Africa and South West Asia. The YahClick satellite broadband service uses game changing satellite technology to provide satellite internet services to rural or underserved areas, and is suited for use across a variety of different consumer segments and markets. At YahClick we believe in fast and cost effective internet for everyone, no matter where you are.

"According to the International Monetary Fund, growth in Africa is expected to continue over the next five years, nine out of the top twenty fastest growing economies in the world are expected to be in Africa. This represents a huge opportunity for satellite operators such as Yahsat and Internet service providers who can help connect urban, rural and remote communities so they may join the 21st century global economy." In Africa, YahClick is already operational in Angola, Nigeria, South Africa, Uganda, Kenya, Tanzania, and South Sudan.

Launched in 2013, YahClick is fast becoming Africa's must-have product, pushing boundaries in creating connected communities across the continent. With high speed services of up to 15Mbps and cost effective service plans at monthly subscription prices to suit a variety of audiences, YahClick's current subscribers include a mix of energy, construction, agri-based verticals, SME, NGOs, and individual users who are looking for high speed, reliable Internet connections. "African countries currently face major challenges including insufficient or congested telecommunications infrastructure, unconnected communities, unskilled workers and an education and healthcare system that needs serious improvements and assistance.

YahClick also offers a backup connectivity solution "YahClick Insure" designed for any entity that cannot risk being without continuous Internet access for financial, security or legal reasons if their primary link is disrupted. For organizations that require connectivity on-the-go, YahClick offers a transportable solution which is a service that is mounted on a vehicle that instantly provides high speed Internet connectivity in changing locations for broadcasters, businesses, government entities, and even private users in remote areas. "By providing communities with greater access to high speed, reliable Internet connectivity governments have the chance to turbo-charge economic growth and development. Businesses, the public sector and all stakeholders involved need to help shape the way emerging countries move to the next level." concluded Masood. Yahsat works with a network of 30 service partners across 28 markets. Key partners in Africa include Vox Telecoms, CoolLink, Hyperia, Infinity, Netone, Sistec, Simbanet, RCS Communications, and TruIT.

## Yahsat wins best company award from

### Tawteen

In 2020, Al Yah Satellite Communications Company (Yahsat) won the prestigious Emiratisation Award from the UAE Ministry of Human Resources and Emiratisation (Tawteen) in three categories. Yahsat was conferred the coveted prize for Best Company of the Year in the Establishments category, while two of its talented employees collected awards for Best New Emirati Employee and Best Emirati in a Supervisor Role.

Field Operations Engineer, Abdullah Essa Ahmed Sharif, won the Best New Emirati Employee award, which recognizes talented Emiratis who have taken up employment shortly after graduation. Yahsat's newly appointed Deputy Chief Technical Officer (CTO), Adnan Al Muhairi, was selected as the Best Emirati in a Supervisor Role. This award honours brilliant Emirati managers and section heads who are active in the private sector. All winners received their awards from His Highness Sheikh Mohammed bin Rashid Al Maktoum, the UAE Vice President and Prime Minister, and the ruler of Dubai.

The annual honour is bestowed on exceptional Emiratis and Emirati companies across a number of categories. The Emiratisation Award acknowledges the achievements of private sector companies that champion Emiratisation in support of UAE Vision 2021. The categories include Establishments, Best Emiratisation Supporting Entity, Emiratisation Pioneer, Best New Emirati Employee and Best Emirati in a Supervisor Role.

Yahsat won the award for the Best Company of the Year that recognizes Emirati companies on multiple fronts, including their work in innovation and community development, employment and talent development, leadership and strategy as well as engagement and work environment.

The Best New Emirati Employee award winner, Abdullah Essa Ahmed Sharif graduated as a Mechanical Engineer from the American University of Sharjah, with a Minor in Engineering Management. In 2018, he obtained an MSc in Engineering Systems and Management from Khalifa University, with a specialization in space systems and technology. Abdullah was part of the team that conceptualized and built the UAE's first nano satellite with remote sensing capabilities – MYSAT-1 - at Yahsat Space Lab on Khalifa University premises. After the successful closure of the project, he wanted to have a broader understanding of the space industry, which led him to take up his current role at Yahsat as a Field Operations Engineer.

With a distinguished record in the space industry, Adnan Al Muhairi has worked at Yahsat for 10 years. He was involved in the UAE's first successful remote sensing spacecraft programme. Later, he worked on the UAE's first communication satellites, Al Yah 1 and Al Yah 2, before being appointed as the Program Director of the Al Yah 3 space communications system - a highly advanced space network that expanded Yahsat's services further into Africa and also into Brazil. As Deputy CTO of Yahsat, Adnan oversees the design and development of cutting-edge communication solutions for Yahsat's customers across the world.

# The demand for autonomous ships



**Keith Murray**  
Product Manager - Maritime  
Thuraya

The maritime sector is worth US\$350-400 billion and it boasts more than one million employees. That includes people working at sea, shipyard and dock workers, and equipment manufacturers. Initially, one might expect this sector to be among the first to adopt such ground-breaking technology like autonomous ships. Yet, the majority of trials and tests related to unmanned vehicles are on drones and driverless cars, while progress with autonomous ships is comparatively slow. In as much as automated systems and interaction with onboard sensors, GPS and satellite communication equipment are already available, **Keith Murray** argues that the industry needs to find its feet to buy into this concept of autonomous ships

Thuraya Telecommunications Company is an industry leading MSS operator and a global telecommunication provider offering innovative communications solutions to a variety of sectors including energy, broadcast media, maritime, military and humanitarian NGO. Thuraya's superior network enables clear communications and uninterrupted coverage across two thirds of the globe by satellite and across the whole planet through its unique GSM roaming capabilities. The company's diverse range of technologically superior and highly reliable mobile satellite handsets and broadband devices provide ease of use, value, quality and efficiency for professionals across a wide range of sectors in more than 160 countries throughout Europe, Africa, Asia and Australia. Thuraya remains committed to serving humanity through delivering the essential tools for optimal connectivity, never leaving anyone out of reach.

## The demand for autonomous ships

When it comes to the adoption of everything technology can offer the maritime sector, it can sometimes be a case of mind over matter. While there can be technical matters to overcome, it is often more about the attitudes that need to change most if maritime is to see the levels of benefit being enjoyed in other industries. Shipping has already been disrupted by shifts in trade patterns as well as the impact of the financial crisis, and it will continue to be affected both by internal and external forces in the future.

One such force - and it is a force for good - is communications technology, a major contributor in the battle towards crew efficiency, improved safety standards and a secure working environment. Maritime crews rely on communications tools every day, and for a sector that is the life and soul of the global economy - 90% of all goods are transported by sea - it is imperative that investment in this area is cost effective. Costs can be reduced significantly if

thinking is changed, with real alternatives available for those willing to invest in technology.

The maritime sector is worth US\$350-400 billion and it boasts more than one million employees. That includes people working at sea, shipyard and dock workers, and equipment manufacturers. Initially, one might expect this sector to be among the first to adopt such ground-breaking technology like autonomous ships. Yet, the majority of trials and tests related to unmanned vehicles are on drones and driverless cars, while progress with autonomous ships is comparatively slow. Automated systems and interaction with onboard sensors, GPS and satellite communication equipment are already available but why is the industry taking so long to buy into this concept of autonomous ships?

Unmanned Airborne Vehicles (UAVs) operate in a 3D environment in which strict regulations must be observed and weather conditions need to be taken into account. Similarly, driverless cars operate in an environment dominated by humans going about their daily lives. Ships, however, operate in a predominantly 2D environment that is sparsely populated in comparison and could benefit the most from this unmanned concept. However, investments and advancements in technology for maritime appear way down the list of priorities for shipping companies.

Military drones are currently the most developed of the unmanned technological vehicles to date. These are ideal for tackling monotonous, dangerous tasks such as reconnaissance or lethal missions where very little additional frontline support is given. This raises the question of why the transition to using autonomous ships isn't moving full steam ahead when maritime crews also face both monotonous and dangerous tasks. It is important to consider the positive social impact that autonomous ships could have on countries like the

Philippines, a huge provider of crews to the shipping industry. Maritime crew often spend months at sea and can be away from their families for long periods of time. The impact of work-related stress – monotonous routines, harsh and hazardous working environments, a negligible social life, can take its toll on even the most experienced of crew members resulting in both physical and psychological issues.

Unmanned vehicles not only affect those out at sea but also those who supply services and equipment to support them. There is a cause and a reaction to shipping. We know that the more containers that fit on a ship, for example, the cheaper it is to move them, which helps increase efficiency, creates a faster turnaround time and potentially saves the port, the shipping company as well as local manufacturers, money. Unmanned ships have to be monitored and need to communicate with a central hub via satellite. This calls into question the various frequencies and bandwidths being used by satellite operators and how this has a knock-on effect on autonomous ships.

Medium frequencies such as C-band provide higher bandwidths (speeds) and are reasonably resilient to rainfall and atmospheric conditions. There are limited new spectrums available to satisfy this type of infrastructure, however, and the potential of interference from other systems such as radars. Higher frequencies are affected by rainfall either on the ship side or at the satellite ground station. However, the advantage of a higher frequency band is that it allows faster rates to transmit and receive data.

However, frequency bands such as L-band, used by Thuraya, have the advantage of a robust link that can bypass adverse weather. L-band provides lower data rates compared to K-band but offers a more cost-effective solution for asset tracking and fleet management. Concerns surrounding the implementation of autopilots, anti-collision radars, built-in test and monitoring systems, as well as navigation, could be overcome if these factors are integrated into a reliable and coherent system that allows individual sub-systems to work together with limited human intervention.

Ship owners and managers would also be able to save space and weight by eliminating equipment required to support personnel. This could lead to the reallocation and increase of cargo, driving higher revenues. Internal and external security threats are also a top line concern. Such threats include the pilfering of cargo and the sale of it on the black market as well the threat of piracy in high risk areas such as the Horn of Africa, Somalia and in the South China Sea. In most cases such threats can be reduced by vessel tracking and video feeds via satellite, transmitted back to HQ. Such tracking and video feeds also provide evidence for prosecution cases and insurance claims. At the most basic level, these vessel tracking and video feeds can act as effective deterrents.

Fortunately, major incidents such as the terrorist attack against the Achille Lauro cruise ship in 1985 are few and far between, but the notion of terrorist organisations seizing financial assets and growing stronger roots in the piracy trade remains a real threat. Crews being kidnapped and used as human shields, or ransomed along with the cargo, could become a thing of the past if autonomous ships become part of our lives. The shipping industry needs to take a more radical mindset to grasp the benefits of technology opportunities such as autonomous ships. Traditionally, the maritime sector is very conservative when adopting new technology and while 'tried and tested'

methods serve as a valuable indicator, what the industry ultimately needs is a fundamental change in how ships are operated. As with Google cars, Uber, Spotify, and Facebook - today's shipping industry needs to look at the latest technological advancements in communication and navigation - and what they have to offer. Inevitably, this will be driven by economics and it is important to get the economics right. Those that do this will reap the true cost benefits available by investing into this game-changing technology.

### **Thuraya Aero mobile connectivity solution on Airbus H145 and H135 helicopters.**

For the first time, Airbus customers can install and customize their Thuraya Aero kit when ordering new aircraft. The system will be fitted on the production line, with no need for further tests and verification. The aircraft will be ready to use on delivery, with voice and data connectivity fully functioning. This means that it can be deployed immediately to deliver mission-critical capabilities. There is no need to have the aircraft grounded for months after delivery in order to retrofit communication systems.

Thuraya Aero is an in-flight connectivity and data-sharing platform that uses mobile satellite communications to provide internet access, text messaging, phone calls, VOIP, video and audio conferencing as well as aerial surveillance, especially for BLOS missions. Thuraya and SCOTTY showcased the solution's live streaming capabilities at Dubai Air Show in November 2019, wherein surveillance data and video were transmitted to Dubai from an airborne Airbus H145 helicopter in Germany. Real-time streaming was made possible by Thuraya's L-band satellite network, which enables transmission over vast geographical areas. Thuraya has also demonstrated the advanced features of its aero mobility system to key UAE government customers.

Thuraya Aero enables critical connectivity for operations such as SAR (search and rescue), ISR (intelligence, surveillance and reconnaissance), telemedicine, monitoring military operations, office-in-the-sky and border surveillance. With video transmission and encryption systems pre-integrated into its SDU (satellite data unit), the solution makes airborne communications more secure. The more compact integration also optimizes space utilization. In addition, the Aero has built-in video transmission capability that offers real-time video streaming through on-board HD camera systems, enhancing its appeal for ISR and SAR aircraft as well as other air systems.

# Eutelsat market dominance driven by the digital revolution



Rodolphe Belmer  
Chief Executive Officer  
Eutelsat

Eutelsat enables clients across Video, Data, Government, Fixed and Mobile Broadband markets to communicate effectively to their customers, irrespective of their location. Today, Konnect Africa is targeting rural areas in particular by offering an adapted and lightweight solution called Konnect wifi, which provides shared Internet access through a single point of reception. Konnect wifi will provide Internet access at points of traffic such as shops, villages, schools, farms, hospitals, etc. in rural areas says **Rodolphe Belmer**,

Eutelsat's satellites provide ubiquitous coverage of Europe, the Middle East, Africa, Asia-Pacific and the Americas, enabling video, data, broadband and government communications to be established irrespective of a user's location. Headquartered in Paris, with offices and teleports around the globe, Eutelsat represents a workforce of 1,000 men and women from 32 countries who are experts in their fields and work with clients to deliver the highest quality of service.

As a core player in the most resilient segments, Eutelsat fixed satellites assets represent one of the largest and efficient in the industry. Fixed Satellite Services (FSS) operators operate geostationary satellites (GEO) that are positioned in an orbit approximately 36,000 kilometres from the earth in the equatorial plane. These satellites are particularly well-suited to transmitting signals to an unlimited number of fixed terrestrial antennae, which are permanently directed towards the satellite. They are therefore one of the most efficient and cost-effective means of communication for transmitting from one fixed point to an unlimited number of fixed points, as in the case of television broadcasting, for example. GEO 9879/satellites are also suitable for linking together a group of sites spread out over vast geographical areas (e.g. private business networks or retail outlets), as well as extending mobile telephone networks and Internet access to areas where terrestrial networks provide little or no coverage and establishing or restoring communications networks in emergency situations. The growth of television in emerging markets, growing needs in terms of internet access, whether fixed or on the move, and the role of satellites in complementing terrestrial networks to enable access to digital services in all regions are three key growth drivers in the FSS industry.

Eutelsat offers Internet access solutions, notably IP Connectivity services. Operating in Ka-band and covering Europe and the Mediterranean basin, the KA-SAT satellite offers, thanks to its 82-spotbeam architecture allowing

frequency re-use, increased resources (90 Gbps throughput) compared to a traditional satellite at a significantly reduced cost per Gigabyte. This enables to offer Internet Access Services at a competitive cost in remote areas under-served by terrestrial Broadband networks.

The range of services for private individuals (Tooway) offers download speeds of 22 Mbps and upload speeds of 6 Mbps, as well as the benefit of highly significant download volumes. These offers are mostly marketed by retailers who supplement the Internet access offer with additional services, such as voice on IP or access to a television package via satellite. In the framework of the partnership with ViaSat, this indirect approach is completed by a retail joint-venture (51% owned by ViaSat and 49% by Eutelsat) which is in charge of the direct commercialization of the Broadband Service to end-users in selected areas. In 2017-18, the first offers of this retail Joint-Venture have been launched in Scandinavian countries and in Poland.

A wide range of services for professionals are also commercialized on KA-SAT. The main markets targeted include Internet access markets for businesses and local authorities, the interconnection of private virtual networks, the security and safety of terrestrial networks by means of back-up satellite links and the deployment of remote surveillance solutions (SCADA). For example, KA-SAT is used at off-shore sites on the North, Baltic and Mediterranean Seas and can provide broadband access where there is a lack of terrestrial infrastructure for construction companies, event organisers, hotels and public safety organisations. In addition, Eutelsat provides capacity in Ka-band for Broadband Internet access in Brazil on the EUTELSAT 65 West A satellite, with capacity fully sold to EchoStar and StarGroup. Eutelsat also provide Broadband Internet access services in Russia on the EUTELAT 36C satellite since fall 2016. Furthermore, capacity leased on the fleet of Yahsa will allow to ramp-up Broadband Internet access



services in Sub-Saharan Africa in 2018-19 ahead of the availability of its own satellite which is expected to be launched in 2019 to serve this region.

### Mobile Connectivity

Eutelsat has a portfolio of assets with capacity dedicated to Mobile Connectivity (in-flight or maritime) at 3° East, 10° East, 172° East and 117° West orbital positions as well as on the KA-SAT satellite. In the value chain, the Group is a raw capacity provider and its main customers are distributors /integrators such as Panasonic, GoGo, ViaSat, Taqnia or Speedcast which resell turnkey services to airlines or shipping companies.

Capacity on KA-SAT satellite covering Europe and the Mediterranean basin will enable airlines to offer passengers top-quality Internet access throughout European airspace. For example, Eutelsat is providing capacity on KA-SAT for the fleets of Finnair, SAS, Icelandair and El Hal. Furthermore, Eutelsat has signed a multi-year agreement with Taqnia for the lease of four steerable HTS Ka-band spotbeams on the EUTELSAT 3B satellite. This capacity will be used for in-flight Connectivity on 130 medium-/long-haul aircraft of Saudi Arabian Airlines, covering flight paths from the Middle-East to Europe.

At the end-November 2017, EUTELSAT 172B satellite entered into service including notably a Ku-band HTS payload specifically designed for in-flight Connectivity over the Pacific region. This capacity has been fully leased on one hand by Panasonic Avionics Corporation as a platform for in-flight Connectivity and entertainment for airlines serving the Asia-Pacific area and on the Other by China Unicom to enhance inflight connectivity services across an area stretching from the West coast of North America to Asia, and down to Australia.

### Satellite constellation for video

Eutelsat's HOT BIRD™ satellites at 13° East forms the largest and most desirable broadcasting systems in Europe and Middle East. Neighboring HOT BIRD™ is EUROBIRD™ 9A at 9° East and co-located satellites at 16° East. Both location satellites contain strong video neighborhoods distributing programming in both HDTV and SDTV formats. Using Eutelsat's dual-feed reception solution, DTH users can see two satellites with a single antenna (HOT BIRD™ and EUROBIRD™ 9A or HOT BIRD and co-located satellites at 16° East - soon will be replaced by a new satellite). EUROBIRD™ 9A continues to grow and now has over 250 channels in over two years and recently has added additional capacity to continue with its growth. Co-located satellites at 16° East have very strong video platform service platforms covering Eastern Europe and the Balkans. Co-located with Nilesat, AB4A at 7° West is a new satellite added to the slot to provide more capacity into this very valuable high demand neighborhood serving the growing Middle Eastern markets. Covering Africa's emerging video demand is W7 at 36° East and W3A at 7° East. W3A also supports has a strong video neighborhood covering Turkey.

### Turnkey teleport capability

Our teleports in Europe offers an extensive range of video services. We have two teleports operational today, Rambouillet Teleport outside Paris and Skypark Teleport in Turin, Italy with a brand new teleport opening up in Sardinia. All our teleports have a wide geographic coverage enabling services that cover Americas, Europe, Middle East, Africa and Asia.

Eutelsat America has the video solution for you whether it is a complete turnkey service, or you need to transport a

signal terrestrially to be video multiplexed and transmitted, or you simply want to uplink your content, Eutelsat has a wide choice of solutions. All of our facilities are fully equipped for High Definition

(HD) or Standard Definition (SD) broadcasting using MPEG 2 or MPEG 4 and are DVB-S compliant. We can offer a wide array of custom solutions such as playback, ad insertion and encryption services. Eutelsat is proud to offer a full video solution on an established programming platform that includes space segment, uplink, downlink or turnaround, encoding, video multiplexing and encryption. We can even provide access to a centralized administration feature and Internet based Subscriber Management Service (SMS).

### IoT connectivity service via satellite

On the eve of the IOT Solutions World Congress in Barcelona, Eutelsat Communications announces the launch of a pioneering satellite-based IoT connectivity service: Eutelsat IoT FIRST. Having recently unveiled its ELO constellation of nanosatellites in Low Earth Orbit, dedicated to the Internet of Things, Eutelsat has taken further steps towards its ambition to become a leading satellite IoT company through the launch of Eutelsat IoT FIRST: a fully integrated IoT connectivity service operating in Ku-band via Eutelsat's geostationary satellites. Targeted companies include selected satellite service providers, telecom operators and IoT service providers. At a price point proposed on a par with cellular-based IoT connectivity services, Eutelsat IoT FIRST integrates satellite terminals, space and ground segments, packaged within an API-based service delivery framework.

With this product, Eutelsat is further addressing the connectivity challenges of industries spanning across retail, banking and security, through to energy, mining and agriculture, which seek a cost-effective and reliable IoT solution to connect their fixed assets, irrespective of their location. Eutelsat IoT FIRST also acts as an IoT backhaul service, enabling telecom operators to connect IoT base stations and gateways to their core network.

### Eutelsat Konnect Africa

Eutelsat Konnect Africa is now helping to bridge the digital divide across Africa by offering its broadband Internet offers to individuals and professionals, particularly outside major cities, where no reliable broadband solution is available. The Konnect range includes eight Internet access offers, ranging from 5GB to 30GB of data for Konnect Home residential offers, costing from 9,000 to 35,000 CFAF and adapting to all needs. Konnect Pro offers which provide superior performance corresponding to the expectations of professionals, offer between 50 and 500GB of data and are marketed at lower costs. These offers will be made available on a prepaid basis in order to meet the needs of the Ivorian market. The speeds offered will be up to 20 Mbit/s downstream and up to 3 Mbit/s upstream. For the launch, Konnect Africa is also setting up a promotion on this new range.

# Reaching Every Opportunity with Satellite and Backhaul



As we enter a new digitalized era, Mobile Network Operators (MNOs) are under intense pressure to expand networks and earn new subscribers. In the developing world, connectivity paves the way to local commerce, education, and economic growth. In remote parts of the world that are unconnected, mobile networks are often the only means of connectivity available. **Semir Hassanaly** says operators should consider migrating their operations to one multiservice platform to allow them to serve numerous markets at the same time and grow their network with their business.

Semir Hassanaly  
Head of Cellular Backhaul and Trunking  
ST Engineering iDirect

As we enter a new digitalized era, Mobile Network Operators (MNOs) are under intense pressure to expand networks and earn new subscribers. In the developing world, connectivity paves the way to local commerce, education, and economic growth. In remote parts of the world that are unconnected, mobile networks are often the only means of connectivity available. This is why many MNOs are beginning to build and expand their networks into rural and remote areas to capture this opportunity.

While expanding into new areas has a number of benefits, it's not without its challenges for the operators. Less accessible locations are home to smaller populations, and this means less revenue potential. But by utilizing cellular backhaul through satellite, MNOs are now able to remain profitable while meeting worldwide demand for greater connectivity and 5G. Satellite has become a top choice for those wanting to provide cellular backhaul in rural or remote areas.

The race to connect new subscribers is driving a wave of mobile expansion around the world. NSR forecasts that satellite backhaul will generate \$30 billion in revenue over the next 10 years — not taking into account the impact of 5G satellite deployment, where evolving standards have huge potential to further improve the cost effectiveness of satellite backhaul.

As a result, MNOs are looking for solutions which offer improved efficiency, performance, flexibility, and scalability. In remote regions, operators cannot easily roll out individual backhaul networks. In many African countries, for example, rural Middle populations are very sparsely spread, and expenditure would be several times the amount compared to urban areas. But cellular backhaul over satellite can offer a compelling business case, allowing people to remain connected and keep pace with the fast-developing technology landscape. As the majority of people access the internet via a mobile phone or tablet, rather than desktop computers or laptops, this technology is also easily accessible, allowing people to get online quickly and easily.

## Satellite in Action

For many years now, MNOs have relied on satellite for backhaul in more remote and less developed regions of the globe. For example, Telefonica — one of the largest MNOs in the world — had an aim to sell wholesale satellite capacity to other operators and to expand coverage areas across Latin and Central America. Utilizing satellite backhaul, Telefonica helped mobile operators bypass high capital costs and accelerated their timelines to build out services in those markets.

To give another example, Intelsat and Andesat are collaborating to bring an end-to-end mobile broadband (3G) service to remote communities in Perú. With the help of ST Engineering iDirect and ZTE, they are extending 3G access to 154 rural Peruvian communities in 2020, and as many as 400 remote sites across the country over the next 18 months. Here, satellite-based backhaul solutions provide the answer to bridging the digital divide.

The aim for the Te Conectamos Perú project is to ensure people are connected, which is essential for the economic and educational development of the country. Research shows that connectivity can have life-changing impacts for unconnected remote communities. The World Bank estimates that for every 10 percent increase in high-speed Internet connections, a country's gross domestic product rises approximately by 1.4 percent.

## A New Era of Connectivity

In most cases, bridging the digital divide in the outmost rural corners of the world requires more than just technology. A continued partnership between satellite and MNOs is also key to create opportunities and change the landscape of the cellular connectivity market for the better. With satellite at their disposal, MNOs have more room to extend the reach of their services and address new use cases, such as Over-the-Top (OTT) content distribution and critical connectivity for disaster response efforts. Mobile banking and finance are also extremely popular applications and only set to grow further.

High Throughput Satellites (HTS) and ground equipment

with the ability to support hundreds of megabits per second of capacity for backhaul, along with attractive price points, are also crucial in enabling service providers, telcos, and MNOs to not only connect the unconnected, but also to bridge the bandwidth gap between urban and unserved and underserved areas.

As we enter the 5G era, satellite connectivity is particularly crucial for the next stage of the evolution for MNOs. In fact, NSR estimates that 5G-differentiated applications — such as 5G backhaul and hybrid networks — will generate close to one third of net satellite capacity revenue growth in backhaul over the next 10 years. Satellite and terrestrial will work in a complementary way to unlock many use cases. This is due, in part, to the fact that 5G backhaul capacity demand will consume four to five times the bandwidth of a 4G site, according to NSR. Satellite technology has already proved itself as being highly adaptable for mobile backhaul purposes.

Connecting billions of people worldwide, broadband is a core pillar of modern society and the next stage of evolution for mobile networks calls for a total integration of satellite connectivity with the 5G network model. Satellites are set to play an integral role when it comes to the widespread deployment of 5G thanks to this combination of lower latency and compliance with 5G standards.

It's clear that satellite will also become more prevalent in this new connectivity era, opening significant business opportunities for the entire industry. For operators to ensure they serve their customers in an efficient way, they should consider migrating their operations to one multiservice platform to allow them to serve numerous markets at the same time and grow their network with their business.

# Enabling digital television penetration across Africa



Steve Collar  
Chief executive officer  
SES

In 2019, SES served a total of 367 million TV households compared with 355 million households in 2018 across its industry-leading video neighbourhoods. European reach remained solid with 168 million TV homes, or over 60% of all TV households in Europe, relying on SES for their video content. North American reach of 69 million TV households remains a key distribution platform for over 60% of TV households in the U.S. SES' reach in international markets has continued to expand, now serving a total of 130 million TV households across Asia-Pacific, Africa, Latin America and the Middle East.

SES (NYSE Euronext Paris and Luxembourg Stock Exchange: SESG) is the world-leading satellite operator with a fleet of more than 50 geostationary satellites. The company provides satellite communications services to broadcasters, content and Internet service providers, mobile and fixed network operators and business and governmental organizations worldwide. SES stands for long-lasting business relationships, high-quality service and excellence in the satellite industry. The culturally diverse regional teams of SES are located around the globe and work closely with customers to meet their specific satellite bandwidth and service requirements. SES holds a participation in O3b Networks, a next generation satellite network combining the reach of satellite with the speed of fibre.

In 2011, Steve Collar became CEO of O3b Networks, the company founded four years earlier by Hall of Famer Greg Wyler. The impact of his leadership soon made itself felt. Within two years, the company launched the first four satellites of its pioneering MEO constellation and added another eight the following year, and later bringing the number of O3b satellites launched to 20 in 2019. By 2016, O3b Networks had built a firm backlog of \$350 million with more than \$100 million in current-year revenue, making it the fastest-growing satellite operator in history.

SES was one of the company's early investors and, in 2016, exercised its option to acquire O3b Networks. The deal created the first communications satellite operator with spacecraft in both GEO and MEO orbits. Steve was appointed CEO of SES Networks, the newly-formed data-centric business unit of SES, in May 2017. Less than a year later, he became CEO of SES. Under Steve's leadership, the company used its unique mix of GEO and MEO coverage to deliver high bandwidth to the mobility market, where maritime and aero are delivering strong growth. SES has also driven open networking initiatives as well as partnerships with cloud service providers into the

satellite industry, advancing its vision to make satellite networks a seamless extension of the global communications ecosystem, becoming the first satellite network solutions provider to adopt an Open Network Automation Platform. In 2017, SES announced plans for a next-generation MEO constellation called O3b mPOWER, which will generate 35,000 electronically-steerable beams, delivering the flexibility to configure bandwidth, power and routing dynamically.

In May 2020, SES S.A., announced posting solid financial results for the first three months ended 31 March 2020 with performance in line with the company's expectations and strong underlying revenue growth in SES Networks. The business has seen limited impact to date from the COVID-19 global pandemic but given the unprecedented impact on the global economy and on certain industry segments that the company serves, SES has proactively implemented a series of measures to mitigate the headwinds to be faced in 2020.

## Response to the COVID-19 Global Pandemic

From a business perspective, SES' response and actions during this unprecedented period focus on employee safety and business continuity. Since early March 2020, SES has maintained a worldwide 'work from home' policy for the majority of its 2,100+ full-time employees and additional part-time staff/contractors, before any government regulation. SES has well established and tested contingency plans in place to address a number of scenarios across all technical facilities around the world and, accordingly, does not anticipate any impact on the services provided to SES' customers. All operations centres across the SES network remain 100% in service and operational; At 31 March 2020, SES had cash and cash equivalents of EUR 437.2 million prior to payment of the 2019 dividend (total amount of EUR 184 million) which was

paid to shareholders on 23 April 2020. The group has no refinancing requirements until 2021 and a EUR 1.2 billion Revolving Credit Facility which is fully undrawn. SES has implemented additional measures to manage cost and discretionary spending, notably reducing capital expenditure by EUR 180 million for the period 2020-2024 as compared with the previous forecast.

In addition, the fixed and long-term nature of SES' commercial contracts provide strong cash flow visibility and security as reflected in the group's fully protected contract backlog of EUR 6.2 billion as at 31 March 2020. SES is closely monitoring development across all business segments, most notably Aeronautical approximately 7% of group revenue, Cruise, approximately 4% of group revenue and Sports & Events approximately 1% of group revenue. At the same time, SES is focused on driving opportunities to support additional demand for content connectivity solutions in Fixed Data and Government.

Given the importance of staying connected, SES is actively supporting customers and Non-Governmental Organisations (NGOs) on the frontlines of the pandemic with "in kind" connectivity services and broadcasting programmes organised by non-profit organisations to uplift community spirits. SES employees are utilising the SES Give Back programme to support their local communities including through donations to qualified non-profit organisations which are matched by SES, helping vulnerable communities or serving as volunteers on the frontline of the response to COVID-19.

### **Simplify and Amplify update**

In March 2020, SES launched Simplify & Amplify, a programme of strategic actions to be executed throughout 2020 which will best position the business for future growth and deliver maximum value to customers and stakeholders. The programme comprises four major initiatives:

**Create Pure-Play Verticals:** SES is investigating the potential separation of its Video and Networks businesses within SES and, in so doing, provide greater visibility to the market, increase operational focus and maximise strategic flexibility. Additionally, and following the adoption by the U.S. Federal Communications Commission (FCC) of its final Report and Order regarding the repurposing of part of the C-Band spectrum, SES has set-up a dedicated team to execute on the most complex and demanding spectrum repurposing ever contemplated;

**Focus on Core Strengths:** SES will focus its capabilities and offerings across each of its markets on profitable segments that play to the group's core strengths, doubling down where it makes sense to do so, while exiting, reducing exposure to, or establishing alliances and partnerships to serve, other market segments. This will result in a stronger, more focused SES with world-leading products and solutions in the areas where it excels;

**Simplify Operations:** SES expects to realign its resources to support the above initiatives, to simplify operations, maximise efficiency & competitiveness, and make SES easier to do business with. Activities will include the consolidation and reorganisation of some functions to reflect any changes in business scope and structure. In addition, the company plans a comprehensive review of its global footprint. Overall it is expected that SES will generate EBITDA optimisation ramping to EUR 40 - 50 million annually from 2021 from the focus on core strengths and business simplification; and

### **Enabel partners SES to connect foreign aid projects in Africa via satellite**

SES, a leader in global content connectivity solutions

partner with Belgian development agency Enabel, to deliver satellite-based communications for the development and foreign aid projects spearheaded by the Belgian and other European governments. Under the multi-year framework contract awarded following a public tender, SES will bring managed end-to-end connectivity infrastructure and services to over 130 sites to support Enabel and development projects in 20 countries across Africa.

The end-to-end connectivity solution delivered by SES will be supporting Enabel in its goal of providing partners with the right digital solutions and latest technologies. The connectivity will power Enabel's projects and activities, further reinforcing the agency's commitment to the 'Digital for Development' policy (D4D) of the Belgian Development Cooperation and of the European Commission, the Principles for Digital Development and the UN Sustainable Development Goals.

As part of the solution, SES will provide antennae, installation, satellite bandwidth and end-to-end services to allow Enabel and its partners to upgrade the skills of African professionals, elevate the healthcare system and improve the people's living conditions.

"At Enabel, we believe that digitalisation and the benefits it brings serve as a catalyst for development. Access to high-bandwidth connectivity is essential for our projects in remote locations as it allows us to deploy critically important tools. We are delighted to find in SES a reliable partner who shares these values and has the right expertise," said Jean Van Wetter, Managing Director of Enabel. "SES's ability to quickly deploy a high-performance communications infrastructure and service, and their track record of working with governments around the world, make them the best fitting partner to support the nations in achieving Sustainable Development Goals."

"Many countries in Africa are characterised by vast or landlocked territories, making it difficult to deploy extensive terrestrial communications infrastructure," said Nicole Robinson, Senior Vice President of Global Government at SES Networks, the data-centric business unit of SES. "We are incredibly proud and humbled to provide Enabel with connectivity so that training programmes and various critical applications can be deployed, and quality of life in remote locations can be improved."

### **NHK WORLD-JAPAN joins growing TV channels on Ethiosat via SES**

Ethiosat is hosted on SES's NSS-12 satellite at the orbital location of 57 degrees East. To view Ethiosat TV channels, Ethiopian households should contact their local satellite antenna installer to re-configure the position of their home's antenna. This will allow them to receive content from SES's NSS-12 satellite. However, the NHK WORLD-JAPAN has launched on the Ethiosat TV platform, bringing the total channel count of the bouquet to 43.

NHK WORLD-JAPAN, the international broadcast service of Japan's public broadcaster, NHK, provides the latest news, NHK NEWSLINE along with technology, lifestyle and entertainment programs such as great gear, Dining with the Chef, J-Arena, and Journeys in Japan. In addition, the channel offers an assortment of documentaries and specials including Asia Insight and NHK Documentary.

The free-to-view Ethiosat platform, which already delivers a wide variety of popular local content, was launched in October 2019. It is Ethiopia's first dedicated TV platform, delivering a high-quality viewing experience for viewers across the country. The introduction of NHK WORLD-JAPAN ensures viewers will have access to quality international programming as part of their Ethiosat experience. This growing offering of both local and relevant

international content has been made possible by agreements between the Association of Ethiopian Broadcasters (AEB), the Ethiopian Broadcasting Corporation (EBC) and SES.

### **O3b mPOWER**

Orange, one of the world's leading multi-service telecommunications operators and present in 18 countries in Africa, will be the first telco to adopt the ground-breaking O3b mPOWER, SES's next-generation Medium Earth Orbit (MEO) satellite communications system, to exponentially ramp up its consumer and business services, starting in the Central African Republic.

O3b mPOWER is the world's only fully-funded non-geostationary orbit (NGSO) broadband system in development today. Positioned at only 8,000 kilometres away from Earth, the system will power low-latency high-throughput solutions that can be seamlessly integrated into existing terrestrial networks. When operational in 2022, O3b mPOWER will provide multiple terabits of throughput globally to drive digital transformation and cloud adoption virtually anywhere on the planet.

The highly flexible O3b mPOWER constellation comprises ultra-high-capacity, low-latency, high-power MEO satellites, each with up to 5,000 fully-shapeable and steerable beams that can be shifted and scaled in real-time to meet customers' demands. The system is ideally suited for domestic cellular backhaul and simultaneous international IP trunking applications.

Orange has been a customer and early adopter of SES's current generation O3b MEO managed services since 2017. Orange is a strategic partner for SES with its large presence in Africa and the Middle East, and with satellite gateways in several countries on the continent. With O3b mPOWER, Orange will substantially increase its low-latency MEO-enabled capabilities to support the growth of its bandwidth demand, driven by the ever-growing customer base, the new digital uses and financial services. The revolutionary system will enable Orange to offer high broadband and seamless connectivity, while extending geographical reach.

In addition, Orange Central African Republic will leverage the world's only multi-orbit network, utilising SES's MEO and GEO (Geostationary Earth Orbit) satellites to connect and aggregate 2G/3G traffic from remote base stations around the country to the core network in the capital of Bangui. This gives the operator a single source for cellular backhaul and core IP transit, as well as a consistent and seamless experience between the MEO and GEO services.

### **SES pioneers cloud based network automation**

Last August, SES created an open, standards-based network automation and service orchestration platform, built on Open Network Automation Platform (ONAP) and powered by Amdocs' network functions virtualization technology. With today's announcement, SES is the first satellite network solutions provider to adopt ONAP, an open software platform designed for orchestrating the creation and delivery of new services in an automated operational environment. SES is implementing ONAP with Amdocs on Microsoft Azure, the industry's scalable and flexible cloud services platform supported by Microsoft's expansive global network. With ONAP operating on Azure, SES can extend network services and activate virtualised network functions quickly and at scale, accelerating time-to-market and improving service agility for customers anywhere on the globe. In addition, SES is partnering with Amdocs, a leader in developing and integrating ONAP solutions on Microsoft Azure. Together, Amdocs and Microsoft represent best-in-

class ecosystem partners to deploy open, cloud-based network automation and orchestration.

As the first satellite network solutions provider to adopt ONAP, SES is continuing its leadership in driving open networking initiatives into the satellite industry, advancing its vision to make satellite networks a seamless extension of the global communications ecosystem. SES is a founding member of Linux Foundation Networking (LFN), which hosts the ONAP project, an initiative with widespread adoption as the preferred platform for open network automation and orchestration. By standardising on the same orchestration platform as leading telcos and mobile network operators, SES will make it easier and faster for its customers to deliver services over its high-performance satellite-based network.

# Intelsat delivers about 6,500 TV and radio channels and reaches over 2 billion people worldwide.



Consumer viewing habits and changes in television technologies evolve continuously, while the need to monetize content is a constant. The investments required to create content demands a smart, global distribution strategy. With Intelsat, you can gain access to the largest global media network and premier cable and broadcast systems – simply and seamlessly – connecting to 2 billion viewers worldwide and 6,500 channels via satellite. , said **Stephen Spengler**

Stephen Spengler  
CEO Intelsat

Intelsat S.A. (NYSE: I) operates the world's first Globalized Network, delivering high-quality, cost-effective video and broadband services anywhere in the world. Intelsat's Globalized Network combines the world's largest satellite backbone with terrestrial infrastructure, managed services and an open, interoperable architecture to enable customers to drive revenue and reach through a new generation of network services. Thousands of organizations serving billions of people worldwide rely on Intelsat to provide ubiquitous broadband connectivity, multi-format video broadcasting, secure satellite communications and seamless mobility services. The end result is an entirely new world, one that allows us to envision the impossible, connect without boundaries and transform the ways in which we live.

According to Intelsat, Global broadband requirements are expected to continue to increase, driven by the globalization of business, the penetration of wireless communications and the need to be connected at all times. Broadband demand is also being impacted by bandwidth-hungry mobility applications and the growing convergence of data and video. Fixed and wireless telecommunications operators, private data network providers and mobility solutions leaders in the aeronautical, maritime and government sectors require carrier-grade infrastructure in order to expand their respective broadband offerings. Terrestrial backbones have limited availability or reliability in some of the fastest growing regions due to vast, undeveloped territories and other challenges, and also are unavailable on the oceans and in the air.

Industries all over the world depend on reliable communications to keep them connected everywhere they do business. Users in mining, rail, oil & gas, first responders and humanitarian aid are discovering innovative ways to optimize their operations in remote locations or anywhere another network is unavailable. Whether on the move, or in a temporarily fixed location, these operations are increasingly dependent on

complex applications that require high-performing, reliable and cost-effective network access. Complex application requirements across these industries face significant connectivity challenges that often leave users unconnected when they need it most. Terrestrial networks often don't reach the most remote environments and may be disrupted by natural or man-made events. Traditional Mobile Satellite Service (MSS) solutions come with a high price tag and don't have the bandwidth necessary to power these data-intensive applications that your customers rely on.

## Intelsat FlexMove

As an end-terminal managed service, FlexMove removes the complexity of dealing with bandwidth availability, configuration and management of network infrastructure. It delivers speed and throughput where and when users need it and is available in simple GB packages designed to meet your customers' needs. Connectivity choices include both a public Internet or private IP connection to support access to a private network.

Intelsat is the only commercial satellite operator with an independent third-party Service Organization Control 3 (SOC 3) cybersecurity accreditation. This accreditation ensures our global satellite and terrestrial network is protected against unauthorized access, use or modification, giving you the peace-of-mind you need.

Intelsat's Communications-on-the-Move (COTM) uses a vehicle-mounted satellite antenna that automatically acquires a connection and maintains communication while a vehicle is moving. Communications-on-the-Pause (COTP) uses a highly compact and portable satellite terminal with an automatic or assisted pointing function to connect to a satellite and is designed for temporary use in a fixed location.

Our easy-to-use service management portal enables



our solution partners to deploy, reconfigure and monitor network access rapidly and in real-time using an online interface or by integrating our APIs. Quickly bring a terminal online without prior in-depth training and establish connectivity in seconds.

A high-performing, multi-layered Ku-band satellite fleet, this next generation platform dynamically manages capacity across the award-winning Intelsat Epic HTS fleet and the world's largest wide-beam satellite constellation. Having layers of capacity provides the added resiliency and reliability needed to deliver real customer value.

### Intelsat EpicNG Platform

There are several high throughput satellites (HTS) either in operation today or nearing deployment. While they each have distinct features, a common design element among most of these systems (typically Ka-band) is a network topology that limits connectivity and has lower isolation of co-channel spots. As a result, most of these systems are designed with an architecture that is proprietary and closed. This topology is a severe limitation for many operators.

Intelsat EpicNG allows connectivity among multiple spot beams, including star and mesh, as well as loopback within the same user beam.

This guarantees backward compatibility with existing networks, and forward compatibility with full flexibility to evolve the network design and technology as and when customers want. The end result: the Intelsat EpicNG design increases cost-effectiveness of the bandwidth, minimizes capital expenditures by providing backward compatibility with existing networks and allows customers full control over the topology and management of their network and the services they provide to the end user.

The fourth of the Intelsat EpicNG next-generation high throughput satellites, Intelsat 35e delivers high performance services in C- and Ku-bands. Its unique payload of C-band wide- and spot-beams enables higher efficiency and improved throughput for demanding applications including wireless backhaul, enterprise and mobility services in regions where weather patterns necessitate use of highly reliable C-band spectrum. The Intelsat 35e Ku-band services include a customized high power wide beam for DTH service delivery in the Caribbean, as well as services for mobility and government applications in the Caribbean, trans-Europe to Africa and the African continent.

Intelsat designed its next-generation platform, Intelsat EpicNG, to meet the demands of the new global broadband infrastructure. Intelsat EpicNG is designed to provide higher throughput and efficiency in an open architecture platform, providing highly reliable next-generation capabilities that build upon operators' existing networks. The Intelsat EpicNG platform represents the progressive evolution of Intelsat's leading global satellite and terrestrial infrastructure. Intelsat EpicNG incorporates C, Ku and Ka spot beams in a high-performance platform that delivers significantly more capacity and more throughput per unit of spectrum, an important technical and economic benefit for service providers delivering solutions customized for specific regions or applications. Intelsat EpicNG will serve telecommunications and value-added service providers that need to satisfy these connectivity demands, as well as energy, maritime, aeronautical, media, corporate networking and government customers that require broadband applications for the distribution and collection of content to regions often out of reach of traditional terrestrial connections. More than 90 percent of the commercial satellite industry customer base is comprised of

professional, carrier- or enterprise-grade service providers offering service in the Cand Ku-bands. Intelsat EpicNG is designed to build upon the success of these commercial and governmental entities, allowing them to expand offerings and enter new regions and vertical markets without abandoning previous infrastructure investments.

### Spectrum & multi-spot overview

Spectrum is a valuable resource. Irrespective of the frequency band (C, Ku, Ka), there is a limited amount of spectrum available, so it needs to be utilized efficiently. One approach is to employ frequency reuse, which refers to a satellite using the same frequency multiple times simultaneously. The more frequency reuse supported, the greater the total bandwidth that spectrum can deliver. Frequency reuse is a concept that is used both terrestrially (e.g. cellular networks) and on satellites. Intelsat has implemented frequency reuse in its satellites for several decades. It has been employed by "traditional" (wide-beam) satellites but in a relatively limited way. Take, for example, the C-band hemi (red outline) and zone (yellow shade) beams on Intelsat 904.

Each of the four zone beams uses the same frequencies; however, the beams cover different regions of the Earth. Similarly, each of the two hemi beams uses the same frequency, with different coverage. Different types of polarization, or orientation, of transmissions are used to further differentiate signals to avoid interference.

Intelsat EpicNG takes advantage of satellite antenna technology that enables multiple smaller beams to be deployed. This is similar to how consumer-focused Ka-band platforms have been deployed over small regions, but in this case, the implementation is expanded to the frequency band and beam configuration that is most appropriate for each region, application and customer set.



# Galaxybackbone deploys government networks for ICT services



In Nigeria, Government networks are used for providing ICT services including financial services, e-governance solutions, national ID management systems, tax services, e-agriculture and polling information to federal ministry departments and agencies (MDAs). In addition, it also support rural development, tele-education and telemedicine programs. The system includes a VSAT network and MPLS backbone. The Galaxy backbone system was established by the Nigerian government in 2006 to support the above services in a fully commercial manner to public service entities and underserved communities in the country, according to **Prof. Muhammad Bello Abubakar**

Prof. Muhammad Bello Abubakar  
Managing Director/Chief Executive Officer  
Galaxybackbone  
Nigeria

Galaxy Backbone Ltd is a public institution charged with building and operating shared ICT Infrastructure and services for all Federal Government Ministries, Departments and Agencies. The establishment of Galaxy Backbone by the Federal Government of Nigeria was driven by the need for Government to pursue a cohesive and harmonized approach to information and communications technology acquisition, deployment and utilization in the public sector. The company has the mandate to build and operate a Nationwide Broadband network that provides IP-based Connectivity services to all Federal Government MDAs and institutions. Galaxy is focused on providing ICT infrastructure, applications and services to all Federal Government MDAs and institutions which includes but not limited to managing Government Data Centers and databases, Directory Services, National Information Repositories, IP-telephony and other solutions/services delivered on the shared platform.



Galaxy Backbone is a leading Information and Communications Technology service provider in Nigeria. We were set up by the Federal Government in recognition of the need to harmonise the approach to ICT in the public sector, to help derive more value from its investments in Information and Communications Technology by eliminating duplication, establishing economies of scale, enhancing interoperability of systems and improving government's capacity to deliver electronic services.

We have come a long way, leveraging our directive from the Federal Government to build a common services platform consisting of in-country and offshore VSAT hubs, a datacenter, Federal Capital metro fiber backbone and multiple redundant internet gateways.

From this platform, GBB is growing its coverage of public institutions nationwide and currently connects about 4,000 locations spread across various parts of Nigeria representing over 350 Ministries Departments and Agencies of the Federal Government.

We are a focused institution with one customer and one purpose. We provide and deliver on the technology that enables government institutions work faster, smarter and solve their immediate and future challenges. The Federal government's investments in the Galaxy Backbone (GBB) infrastructure is geared towards improving government services and creating a platform that can accommodate public institutions at both federal and state levels and other private institutions that might want to benefit from these services.

Nigeria's role in the economic development and advancement of Africa is second to none. We see ourselves as playing an integral part in nation building and putting Nigeria on that map of continuous growth and technological advancement. Our role in helping government strengthen its system of delivering information and providing services to its people through the use of custom built and modern Information And Communications Technology is captured as one of the key objectives of our existence as an organization. Galaxy Backbone is currently leading discussions around e-government and the digitalization of government processes across the country. We are partnering both at the local and global stage to ensure that our commitments towards ensuring that government processes are well connected, documented and digitalized meet international expectations.

As one of our key responsibilities in driving e-government in Nigeria, Galaxy Backbone has taken a strategic approach to providing shared infrastructure services by studying models similar organizations in other countries have adopted to provide shared services and Infrastructure. We are playing a strategic role in the recently proposed e-government Master plan for Nigeria, in collaboration with Korea International Cooperation Agency (KOICA).

### **A model technology institution**

When we were set up, it was government's vision to build an organization that would bridge the gap between how business was perceived to be done in the public sector and how it is perceived to be done in the private sector. The goal for the creation of Galaxy Backbone was to ensure government processes were improved upon and worked effectively most especially in an obvious technology driven world that was oblivious of whether one belonged to the public or private sector. Technology indeed, is for everyone.

So for Galaxy Backbone, one of our greatest pride is in our people. We have assembled an exceptionally diverse set of professionals with both Private and public sector experience; men and women from different parts of the country and beyond. We also have a rich diversity of people cut across the different cultures in Nigeria who are not just technology professionals but understand what it means to deliver value to government institutions and ensure its operations are run effectively based on international standards. Our work culture and values thrives on teamwork, commitment to excellence and results.

At Galaxy Backbone (GBB), we take on the worry of delivering and managing world class technology services and solutions from public institutions, giving them the ability to focus more on their core business of governance, wide institutional developments, defense and the domestic and international economics of the nation. In achieving this, we work closely with the different public institutions to ensure they are properly connected; processes are properly documented, digitized and hosted within our secure network.

### **Connectivity, hosting and security of government processes**

At the core of our business is ensuring that public institutions can effectively connect and communicate amongst one another through a single, robust and secure network. A lot of investment has gone into the provision of a network infrastructure that can entrench and enhance operations of the institutions we serve. We provide a dedicated carrier class broadband connectivity to clients from our Data centre using Wireless, Fiber, Satellite(VSAT) or a combination of these technologies, ensuring excellent service to the customers Local Area Networks(LAN), which we also manage for them.

### **24/7 State Of The Art & Secure Datacentre**

Within the Abuja Central Business District, which is Nigeria's Federal Capital Territory, is situated a world class and indeed as attested by some of our customers, a state of the art government invested Datacentre. This technology infrastructure has been built with the highest detail in quality and cutting edge technology and with help of our global partners and service providers, it's

been designed with the capability of hosting over 300 Terabytes(TB) of Data. Through our Datacentre, an unmatched range of services is delivered to our target clients.

Security of Government information and that of our other target clients is always at the centre of our minds. That is why we have within our Datacentre, top rated Security Access doors, Electronic Access Control System, Premise wide and internal surveillance Cameras fitted with motion detectors and night vision. As a 24/7 Datacentre, we have at all times, experienced and well motivated Datacentre & Network Professionals who are empowered with a State of the art Network Management System that monitors all the operations within the Datacentre. This Government Data Centre provides Hosting, Business Continuity, and Disaster Recovery Services to Government and other customers.

### **Communication & collaboration**

We have created a platform called the Government Wide Messaging And Collaboration (GWMC) service specifically meant for officials of government institutions. It is our role to ensure that people communicate effectively through the use of emails which is one of the most common means of communication with corporate and public institutions globally. The GWMC platform helps deliver electronic messages to and from Government users anywhere, anytime and on any designated device and provides a platform for official emails with security and guaranteed data privacy/sovereignty.

### **GBB Cloud infrastructure**

The Galaxy Backbone Cloud Infrastructure is a platform designed to deliver hybrid cloud services to public institutions. This service offers customers an opportunity to have us host and manage their applications under a secure network infrastructure. The security of government data in the Cloud is of great importance to us hence our concerted efforts at ensuring that all we manage for government from the network, servers, operating system and storage are well secured and available when required.

In our entire scope of technology delivery to government, we view people development as a crucial part of what we do as an organization. So we go deeper than just implementing the technology in government. We provide consulting services to our customers via Technical Advisory Services, Training And Capacity Building Services, Operation Support Services and Project Management Services. The goal is to help customers better align technology with what they do and understand how technology can lead to the achievement of corporate and statutory goals.

Galaxy Backbone was recognized as the Most Outstanding Government Agency of the year. It was noted that GBB is a great example of a public sector institution blazing the trail around corporate governance and digitalization of government processes.

# Meeting Africa's demand for more bandwidths



Africa's demand for bandwidth is doubling every year, outpacing the laying of terrestrial telecom fiber links and encouraging commercial satellite operators to launch more units in to orbit. As a provider of data network products and services in Africa, **Adi Sfadia** says Gilat Satcom compete with a large number of telecommunications service providers, many of them have significant competitive advantages, including long-standing customer relationships, close ties with regulatory and local authorities and control over connections to local telephone

Adi Sfadia  
CEO  
Gilat Satellite Network

Gilat is a global company operating in ninety countries to provide satellite based broadband communication since 1987. Gilat delivers the ground segment equipment, comprehensive solutions and end to end services for both mobility and fixed applications, with a special focus and achievements for inflight connectivity, consumer broadband and cellular market. In order to address the abundance of HTS capacity and the wealth of new applications Gilat has brought to market a scalable single platform, SkyEdge II, to serve multiple commercial and government applications. The platform is supported by Gilat's distributed x-architecture based on software defined networking and network functions virtualisation and includes a set of specialized VSAT, BUCs, on the move antennas and a centralized network management systems

As a satcom solutions provider, Gilat offers satellite and fiber-based connectivity solutions in Africa, Asia and the Middle East. With successful deployments in 50 countries, we consistently deliver high-quality, cost-effective and efficient communication solutions to telcos, ISPs, governments, enterprise customers and international organizations. Our services on land, at sea and in flight transcend the barriers of communication infrastructures reaching the most remote locations on the planet. Our superior service is maintained by a highly professional and dedicated staff, outstanding engineering skills and excellent organization. The company operates three international teleports in Europe and the Middle East, fourteen hubs/PoPs in Africa and two PoPs in Europe. In addition, we are shareholders in WIOCC, owners of the Eastern Africa Submarine Cable System (EASSY), and in the West Africa Cable System (WACS), with undersea fiber optic

cable systems connecting eastern and western Africa to the rest of the world. We provide space segments over numerous satellites including Intelsat, Telesat, Hellas Sat, ABS, SES-NewSkies and others. As a subsidiary of Eurocom Group Gilat Satcom has a strong financial stability. Perceptive financial analysis, combined with strategic partnerships ensures that the group's holdings have the strong backing necessary to encourage growth. Providing Global Communication Services since 1992.

In Africa, satellite-based communications networks developed by Gilat Satcom offers the continent several advantages over land based terrestrial communications, especially to large retail, small and medium enterprises, small consumer-oriented businesses, including retail and consumer distribution, convenience stores, restaurants and hospitality establishments, gas stations, hotels, brokerage, banking and financial services providers, communications companies, lotteries, automotive and governmental institutions. In general, networks for some of these customers range from approximately 100 to 10,000 sites, although some customers have satellite data networks considerably smaller and others, considerably larger than this range.

Gilat's internet-based networking applications include networks within corporations (known as corporate intranets), corporate training and other corporate applications enabling the transmission of audio and video by high-speed Internet connections (known as broadband), as well as consumer broadband Internet uses; Gilat has also been providing on-line data delivery and transaction-oriented applications including point-of-sale (for example, credit and debit card authorization), inventory control and real time stock exchange trading; and telephone service in areas that are underserved by

the existing telecommunications services or in remote locations without service, some of which are maintained by us are being supported by the ubiquitous reach of satellite, providing equal access to users in urban and remote areas under a single tier network;

In general, satellite offers fixed transmission costs, insensitive to distance or the number of receiving stations, and a persistent “always on” connection to the Internet without the need to dial up to an internet service provider as well as cost savings over competing technologies such as ground telephone lines and digital subscriber lines in remote areas and suburbs. The services provided via satellite are also independence from telecommunication companies and other network providers.

The fibers reaching all coastal states in Africa created a wave of disconnections from satellite services (this process has passed its apex). The first fiber landed in Africa in 2001. And from 2009 until today another 8 fibers landed - established through consortia of telecommunications companies, according to TeleGeography. There are two fibers on the east coast, and the rest are on the west coast of the continent. Based on report from “TeleGeography” the growth in demand for international communication in Africa is the highest in the world. “TeleGeography” estimates that in 2012-2019 growth in demand is expected to be about 50% per annum.

At Gilat, we are targeting areas where it is difficult to provide service through fiber, such as cellular companies (additional services), development of innovative satellite services and providing service on fiber. To remain competitive in the Africa’s network communications market, Gilat anticipate changes in technology and industry standards and develop and introduce new products, applications and services, as well as enhancements to our existing products, applications and services.

Cellular companies are the major communications provider in Africa. The cellular market is the growth engine of the telecommunications market in Africa. The challenge facing the market is reducing costs and improving the stability of the infrastructure. Here cell carriers are strengthened at the expense of the traditional ISPs, especially in the private sector and transactions with the cellular companies are long-term.

The demand for Internet and data services in Africa has been driven by affordable mobile broadband connections. Mobile broadband users could grow by nearly eight times to 806 million by the end of 2018, according to Informa estimates.

Last year, Gilat Satellite Networks Ltd. announced that Gilat’s In-Flight Connectivity Electronically Steered Antenna has become the first-ever to operate during flight on a commercial aircraft, thus well positioning Gilat to win the vast opportunities in the fast changing market of ESA. The industry milestone was achieved onboard Honeywell’s Boeing 757 test aircraft with Gilat’s ESA terminal operating over Ka-band capacity on Telesat’s Telstar 19 VANTAGE High Throughput Satellite (HTS).

Gilat’s high throughput antenna demonstrated remarkable scores with complete gate-to-gate operation. Gilat’s ESA has no moving parts, full electronic beam steering and a flat panel with an extremely low profile. Gilat’s innovative design combines the benefits of ESA with the advantages of Ka-band, as highlighted by the performance achieved in this testing. The ESA terminal can serve both GEO and NGSO constellations that operate in Ka-band and features Gilat’s industry leading aero modem.

“The accomplishment of the successful in-flight

demonstration of Gilat’s IFC ESA terminal onboard Honeywell’s commercial jetliner using Ka-band capacity on Telesat’s Telstar 19 VANTAGE HTS demonstrates Gilat’s innovation and progress for next-generation IFC ESA technology, and our ability to overcome massive technological challenges,” said Liran Wiener, Director of SatCom On-the-Move Programs at Gilat. “This exciting solution meets the communication needs of the aero market including both commercial and smaller jets that until now could not be served efficiently by existing solutions and opens up great opportunity for Gilat both over GEO satellites and Non-GEO constellations.”

## **Gilat Telecom's Successful World's First Trials of SD-WAN for Satellite and Fiber in Africa**

Gilat Telecom made two announcements, both positive, regarding the commercial availability of its Software-Defined Wide Area Network (SD-WAN) for both satellite and fiber networks after successful and extensive testing by a major pan-African operator in the DRC and ISPs in both Niger and Seychelles. Gilat Telecom is the first company in the world to have developed an SD-WAN solution for satellite traffic; SD-WAN technology for fiber is available from approximately 60 vendors worldwide.

Gilat Telecom has designed its SD-WAN to specifically address the needs of African MNOs, ISPs and enterprises and is using AI and machine-learning algorithms to improve the user experience through improved traffic management and maximized bandwidth. Most MNOs and ISPs in Africa use both satellite and fiber networks to maximize coverage creating asymmetric traffic routes with end-customers receiving traffic over satellite and sending over fiber. Gilat Telecom’s SD-WAN enables service providers and MNOs to centrally control the route that both satellite and fiber traffic takes to and from the customer. It enables different applications – voice, streaming, caching (Facebook, Netflix, Microsoft cloud services etc) to be identified with automatic prioritization, according to the customer’s needs and demands. For African MNOs and ISPs, the major benefit is the ability to achieve more from their satellite bandwidth. With Gilat Telecom’s intelligent routing, capacity can be expanded by up to 20 percent (the equivalent of 6 Mbit/s can be achieved from a 5 Mbit/s downlink).

For enterprises with multiple office sites served by individual routers and on-site management, Gilat Telecom’s SD-WAN sits in HQ and enables traffic across the enterprise’s network to be managed from one central SD-WAN controller over a secure and optimized connection. This enables the enterprise to save bandwidth, and money, and gives users faster connectivity.

Gilat Telecom’s engineers realized that SD-WAN technology could be applied to traffic on Liptinfor’s fiber networks and decided to develop satellite SD-WAN to provide a single SD-WAN that Liptinfor could use across both its satellite and fiber networks. Gilat Telecom’s SD-WAN has transformed their network. Both their retail and enterprise customers have commented on the improved speeds and higher up-time, and their network managers are thrilled to have greater control over capacity.

# Inmarsat heralds new era in satellite navigation



Martin Turner  
Director of media  
Inmarsat

Inmarsat was created by the International Maritime Organization to provide safety services at sea and this has been part of our corporate DNA. At Inmarsat, we bring connectivity for the everyday applications needed, in general, for remote office environments where terrestrial services do not, or cannot, operate and satellite communications is often relied upon. We are a pioneer of mobile satellite services, with a global leading position in the industry. **Martin Turner** says Inmarsat service is trusted throughout the world by mariners and by the rescue co-ordination centres that are integral to ensuring that a safety alert is actioned

Established over 40 years ago as a mobile satellite services operator to serve maritime users, extending over time to land and aeronautical services. We bring connectivity for the everyday applications needed, in general, for remote office environments where terrestrial services do not, or cannot, operate and satellite communications is often relied upon. We are a pioneer of mobile satellite services, with a global leading position in the industry. We are successful in delivering innovative services, with a reputation for reliability and quality. These attributes are at the core of our ongoing success. Inmarsat was created by the International Maritime Organization to provide safety services at sea and this is part of our corporate DNA. We remain the only provider of satellite services for the Global Maritime Distress and Safety System ('GMDSS'). We remain fully committed to ensuring that mariners can rely on our service in times of need. In 2009, we also introduced an additional safety service called '505'. Vessels with FleetBroadband can now dial this number to be connected to recognised maritime rescue co-ordination centres for assistance. This service is not intended to replace the GMDSS service we provide, which is accessed by some of our other services, but is an additional means of safety communications for ship operators and their crew. We are also progressing plans to provide a GMDSS-approved service on FleetBroadband in the future. This will ensure that these highly reliable global safety services continue into the next decade.

Safety at sea remains a primary commitment for Inmarsat Global. Inmarsat remains the only approved provider of satellite communications services for the Global Mobile Distress and Safety System ('GMDSS'). This service is trusted throughout the world by mariners and by the rescue co-ordination centres that are integral to ensuring that a safety alert is actioned. The GMDSS service gives maritime users complete confidence that if they send a distress call, it will be received by a rescue authority. In 2009, Inmarsat also launched an additional maritime safety service, called '505' which enables safety services to be provided on our FleetBroadband suite of services. This

does not replace the GMDSS service which is provided on other Inmarsat services. It does however provide mariners with additional peace of mind during an emergency situation. Inmarsat has made a charitable donation to the International Maritime Organization's ('IMO') Safety and Rescue ('SAR') fund to support assistance for vessels off the coast of Africa. The International Maritime Bureau has been using the Inmarsat C SafetyNET service for several years to provide vital updates on reported pirate activity to approximately 70% of the global fleet. The service enables ship masters to access reports of pirate movements, giving them information to know which regions to avoid with high pirate activity and allowing them to re-route if necessary.

The Group continues its commitment to the support of Télécoms Sans Frontières ('TSF'), the telecommunications relief aid organisation. It has supported the charity for more than seven years through direct funding and the provision of free satellite terminals. TSF is able to reach disaster areas quickly and to help other aid charities with their communications needs whilst also providing the opportunity for those affected to call relatives. During 2009, TSF sent response teams to deal with crises in many different countries including the Philippines, China, Indonesia and more recently to assist following the earthquakes in Haiti and Chile.

We offer two types of services: Classic Aero and SwiftBroadband. The Classic Aero services are currently used in more than 8,000 airlines, business jets and military aircraft for operations and safety-critical services, providing links between the flight deck and air traffic control. All of the world's top intercontinental airlines use our services. The Classic Aero services became available in 2009 over the Inmarsat-4 satellites, following a network upgrade. These services already operate over the

Inmarsat-3 satellite constellation. The network upgrade allows users of Classic Aero, such as air transport, business, VIP and government customers, to access SwiftBroadband through a single antenna and set of avionics. This enhancement to the Inmarsat network allows customers to enjoy the benefits of satellite-aided air traffic control alongside SwiftBroadband-based high-speed connectivity for passenger and crew applications. The ability to use a single installation for safety services, operational communications and passenger connectivity is one of the key benefits of our solution as well as giving the airline the option to add passenger connectivity to their existing capabilities at a comparatively low incremental cost.

The Company's Universal Service Obligations seek to support the use of Inmarsat services, normally payphones, in rural villages in remote regions of the world, where terrestrial voice services are poor or non-existent. In essence, we support mission critical applications to customers operating in extreme environments supporting their day-to-day operations. Our customers often rely on our communications services for their businesses regardless of economic cycles. We benefit from the diversity of sectors we serve within the maritime, land mobile and aeronautical markets. This diversity, coupled with the mission critical nature of our customers' uses for these services, creates a stable revenue stream, somewhat independent of economic conditions. Because our services are global and work the same virtually wherever they are required on the planet, in many situations we are uniquely placed to support customers and serve their needs.

## Government

We have continued to support government operations worldwide with military and civilian applications. Government usage occurs across all our market sectors – in maritime, on land and in the air – and revenues from these customers are included in these sectors rather than being broken out into government sector usage. We have seen continued take-up of our services for military operational requirements. BGAN is used for providing mobile voice and broadband data while 'on the move'. Our leasing services serve aeronautical or maritime users who access dedicated satellite channels across different geographies. We continue to see the government sector as an opportunity to expand our reach and the acquisition we made of Segovia, with its specialist knowledge and skills, can help this drive greater growth in more applications in this sector.

GX is fundamental to Inmarsat's strategy because it meets the needs of customers for more bandwidth but with the same ease-of-use and reliability they are accustomed to enjoying with other Inmarsat services. US government customers have been using the first satellite and we have already seen Sky News (UK) broadcast the first TV live, on-air transmission over GX from Athens, Greece, in January. The seamless nature of GX, along with its unparalleled level of portability when compared to equivalent bandwidth solutions, makes it a unique proposition in satellite broadcasting and so it is no surprise that there is so much interest in it.

By far the largest contributor to land mobile revenue is the government sector, whose usage can be hard to forecast and also volatile from quarter to quarter. Other key segments for our land mobile sector are oil and gas extraction and exploration, usage by media for on-the-spot news gathering, aid agencies and beyond these, industries that simply operate in remote areas. The usage profile of these customer groups is such that they rely on Inmarsat services to provide essential value-for-money communications for remote operations. Unless these operations are entirely withdrawn, this day-to-day usage will continue to translate into

somewhat consistent ongoing revenues. We have seen from past experience that providing broadband to these customers has produced a growing and diversified base of revenues, beyond event-driven and less predictable revenues.

The drive for better video quality has been constant in the broadcast industry but the pace of adoption has differed markedly. For example, many broadcasters still have not completed the change to HD and while there have been many developments in 4K Ultra HD distribution, there is little likelihood of this becoming a de facto standard for news contribution in the near future. In addition, the drive for higher quality is being supported by the development of new encoding standards such as H.265/HEVC, which approximately doubles the video quality that can be achieved at a given throughput. We are already working with solutions providers to take advantage of these technologies to enable users to get the very best video quality from Inmarsat's networks.

The telemetry market offers the key strategic benefit of driving more traffic onto our existing network, without requiring us to incur any material increases in capital expenditures, or operating costs. The low-speed and packet nature of data transmitted by these units also allows us to support these services without any material impact on the capacity required for other services. We entered the market more actively because the revenue opportunity, which historically has been minimal, has recently been growing as the applications possible through these units has been expanded.

Land mobile sector revenue comes from a wide range of customer groups. The sensitivity of these land customers to disruptive events, such as earthquakes, military activities and even the Olympics, cause higher variability in usage compared to the maritime and aeronautical sectors.

There is huge potential in the aviation and maritime sectors, with GX ideally positioned to deliver the extra throughput that these markets demand. But Inmarsat's great advantage is a seamless set of solutions that allows us to meet customers' needs wherever they occur. The development of the "Internet of Things" (IoT) depends on ubiquitous connectivity and this is one of the fundamental reasons for launching our Open Technology strategy. Real-time monitoring of agriculture, transportation and energy installations are just a few examples in this area. And Inmarsat is already looking to the future with work beginning on the development of the next generation of satellites: the I6 constellation.

# Consumers in the eyes of Egypt's NTRA



Pursuant to the Telecommunications Act (Law #10/2003), the NTRA is the authority responsible for setting rules related to service quality, and also to health and environmental safety measurements when installing, operating and using telecommunication networks, in cooperation with the relevant ministries and other bodies of the state. In addition, the government of Egypt believes that access to information and telecommunications services at affordable prices is a right to all citizens, and will allow the promotion of political, economic, and cultural cohesion leading to overall economic development, according to **Hisham al-Alaily**

Hisham al-Alaily  
CEO  
National Telecommunications Regulatory Authority (NTRA),  
Cairo, Egypt

Telecom Regulators worldwide are mainly established to serve as arbitrators among different stakeholders in the telecom sector. Thus consumers - as one of the major stakeholders within the sector- are always in the eyes of regulators who relentlessly strive to enhance awareness, protect rights and guarantee the provision of best telecom services. In essence, regulators must spare no effort to ensure that consumers are well informed about the wide range of telecom products and services available to them, and that adequate consumer safeguards are continuously upheld. They are to monitor, and report on, the performance of telecommunications service-providers. Ideally, they should guarantee that all citizens, regardless of their location or standard of living, enjoy equal access to all available telecom services with the same quality.

The National Telecom Regulatory Authority (NTRA) was established in 1998. The NTRA's legislative and regulatory framework has been defined pursuant to the Telecom Regulation Law No. 10 of 2003, that stipulated that the NTRA is a national authority competent to regulate and manage the ICT sector on the basis of fundamental principles, including, transparency, free competition, universal service, consumers' rights protection and non-monopolistic practices.

Chief among NTRA's goals are the provision of high-quality telecom services at the most affordable prices, in addition to the exertion of all efforts to enhance the services, keeping abreast of the state-of-the-art technologies and huge advancements in ICT field. Thereupon, and in implementation of NTRA's main goals, the Consumers Rights Protection Committee (CRPC) was formed in August 2004. It allows all telecom service users to communicate and interact directly with all telecom users by launching awareness campaigns and

taking various measures. The CRPC, chaired by NTRA's Executive President, comprises notable public figures and convenes regularly.

In order to activate and fulfill the rights of every user to be provided with high-quality services, get clear and all-inclusive information about them and obtain health and environmental parameters, the NTRA established the Call Center. NTRA's Call Center receives complaints, inquiries and technical complaints of service failure from all users in the A.R.E., through the hotline (#155) and the free number (08003330333). It acts as a second-tier or second level for examining and solving such complaints, around the clock, in case the subscriber does not have his problem solved by the service provider.

## Teenagers and Children's Usage of Internet

Since the outbreak of "Information Revolution", controversial debate was raised about the best means to obtain optimal benefits from it and minimize the so-called "adverse effects" thereof. In fact, the Internet and satellites broke out into our households all of a sudden, and their emergence had huge impacts on the family and children, and this is considered one of the most prominent issues that attracted the attention and research of all concerned and specialized parties.

To maximize the positive aspects and guide the Egyptian family about the regulatory controls that should be observed to ward off the negative aspects of teenagers and children's usage of the Internet. This guide provides tips to the Egyptian families that might help them achieve this goal, taking into account their implementation after discussing relevant topics with children and convincing them thereof.

Pursuant to the Telecommunications Act (Law #10/2003), the NTRA is the authority responsible for setting rules related to service quality, and also to health and environmental safety measurements when installing, operating and using telecommunication networks, in cooperation with the relevant ministries and other bodies of the state. The concerned ministers and heads of concerned bodies issue resolutions of health and environmental standards in the official newspaper. To assure compliance to Quality of Service (QoS) parameters set by the NTRA, the Service-Monitoring and Operations Sector conducts regular surveys, visits and measurements to ensure that all operators provide approved quality telecommunication services to consumers, and that they abide by predetermined Health and Safety Protocols.

The NTRA is well aware that base transceiver stations of mobile networks incite health and safety concerns among the public, and therefore they receive a great deal of attention from the authority's Service-Monitoring Section. As in the case of telecom equipment, only mobile network stations, which abide by certified environmental health and safety protocols are allowed to function. The NTRA was engaged in this activity ever since the first implementation of mobile networks in Egypt, and from then on continued studying health and environmental impacts of mobile stations in collaboration with the National Telecommunication Institute (NTI), Ministry of Health and Ministry of Environment.

NTRA conducts station inspections periodically. The reason behind periodic inspections is to make sure that stations remain in conformity with the defined protocols. In addition, protocols are to be reviewed by the NTRA, Health and Environment ministries for updates in accordance with technology changes in new devices and frequencies used. NTRA also monitors the data network performance in terms of approved technical criteria (latency, loss packet availability, etc.)

### **Tariffs**

One of the main targets of the Service-Monitoring Sector is to ensure that the licensee is abiding by terms and conditions of the services provided; this includes adhering to the set tariffs approved by the NTRA. The authority ensures that set tariffs are met by regular inspections to points of sale, and though a constant effort aimed at following up with reviewed tariff norms accepted by the international telecommunications markets. This is done in order to ensure market growth based on a competitive environment receptive of dynamic international trends in pricing consumer services. In this regard, the NTRA periodically prepares comparison reports on international telecommunication tariffs using international databases and statistics in order to assess the Egyptian market and compare it to the international market to ensure that tariffs in Egypt are compliant with international standards.

### **Universal service**

The government of Egypt believes that access to information and telecommunications services at affordable prices is a right to all citizens, and will allow the promotion of political, economic, and cultural cohesion leading to overall economic development. Hence, the Telecommunications Act (Law #10/2003) stipulated the establishment of a Universal Service Fund (USF) and accorded the responsibility of its management to the NTRA. The USF was officially initiated in March 2005 with an initial budget of 50 millions L.E., and according to Article 9 of the aforementioned Law its funds should be aimed "to fund the provision of universal services in un-served or underserved areas, for example through the deployment of payphone service in these areas," and also "to compensate telecommunications operators and service providers for price differences between the approved economical

price for a service and that which may be determined by the State in favour of the user".

The importance the NTRA gives to its Universal Service projects is derived from the long standing convictions it holds of the economic benefits of equitable access to telecom services among all strata of the population. The spread of telecommunications empowers small business owners to expand their activities and ultimately leads to a flourishing of SMEs and other enterprises in general by increasing the capacity of business owners to reach more customers.

In addition to such economic benefits, the social impact of Universal Access to telecommunications is profound. It helps eliminate the disparity between rural and urban areas, sometimes known as the domestic digital divide, which tends to be more obvious in lower income countries and consequently paves the field for a more balanced population distribution and encourages the development of areas outside congested metropolitan areas. Furthermore, connecting as many members of the population as possible to the national telecom grid strengthens political, economic, and cultural cohesion, and creates stronger kinship ties. This is not to mention some of the more tangible advantages that can be gained such as improved law enforcement and rapid communication during disaster situations.

### **Consumer Rights Protection Committee**

Egyptian legislators, conscious of the necessity to disallow market competitiveness to infringe on the rights and welfare of consumers, stipulated the formation of the Consumer Rights Protection Committee within The Telecom Act (Law # 10/2003) underlining their conviction that their must be a soul retained to the process of liberalization.

The committee primarily focuses on guaranteeing that market mechanisms contribute to providing the consumers with best quality services at affordable prices. It ensures the availability of a market free of all monopolistic policies or any harmful practices and marked with transparency and balance between the main interacting parties in the market, namely, the government, the service providers and consumers. The committee is also in charge of enhancing the awareness of the end user regarding his/her rights.

All five sub-committees of the CRPC\* collaborate to raise consumer awareness through sessions and lectures dealing with consumers' duties and rights, types of services and technologies used. They also make use of market studies and field researches to estimate consumers' response to the provided services, and to issue recommendations on how to strengthen means of consumer-rights protection, consolidate free competition, prevent monopolistic activities, and ensure rights of the disabled and other underprivileged segments of the populace. It also falls upon the Committee to open appropriate channels and develop strong relationships between itself and all relevant NGOs.



# The role of NCC in regulating satellite earth station in motion



Prof. Umar Garba Danbatta  
Executive Vice Chairman & CEO  
Nigerian Communications Commission (NCC)  
Abuja, Nigeria

The Nigerian Communications Commission, NCC has continued to facilitate the deployment of, and use of Earth Stations in Motion (ESIMs) for the provision of services in Nigerian telecom space. According to **Prof. Umar Garba Danbatta**, “there is a need for global broadband mobile-satellite communications, and that some of this need could be met by allowing earth stations in motion (ESIMs) to communicate with space stations of the geostationary-satellite orbit (GSO) fixed-satellite service (FSS).

Earth stations remains a vital element in satellite communication network. They receive information from, or transmit information to, the satellite network in the most cost-effective and reliable manner with the desired signal quality. A Satellite Earth Station is a type of radio equipment that facilitate communications with a space station or a satellite from the Earth's surface, supporting the provision of telecoms services such as telephony, data, backhaul, broadcast feeder links and two-way broadband internet. However, Earth Stations in Motion (ESIMs) provide high-speed satellite communications for ships, vehicles, trains, and aircraft. Since 2018, the Commission reorganized and streamlined the rules governing the licensing and operation of ESIMs communicating with C- and Ku-band geostationary orbit (GSO) Fixed Satellite Service (FSS) satellites and expanded the rules to include operations in the conventional Ka-band.

Generally, the satellite earth stations segment falls into Network services. The segment, in Nigeria, however, is dominated by foreign satellites with Nigerian Communications Satellite, also playing in that space. Worthy of note is that the Network service segment is liberalized and open to Nigerians and foreigners alike who intend to launch and operate satellites services. NigComSatis licensed by the Commission for the provision of Satellite services in Nigeria.

The Nigerian Communications Commission NCC, is a specialize agency of the government of Nigeria established to provide regulatory framework for the Nigerian telecommunications industry, and to create an effective, impartial and independent regulatory authority. The commission is also vested with the responsibility to introduce innovative services and practices in the telecommunications sector in accordance with international best practices and trends and to ensure

efficient management, monitoring and use of scarce national resources in the communications sub-sector. Since the beginning of the deregulation of the Nigerian telecom space, the Nigerian Communications Commission, NCC has supported the exploration and use of telecom satellites through coordination and frequency allocation.

Inside the Commission, these functions are supervised by the Spectrum Administration Department, formerly known as Engineering Directorate is one of the oldest departments in the Commission.

The Department has the primary mandate of managing all the commercial Radio Frequencies in Nigeria. This involves frequency engineering, planning, assigning, monitoring and coordination, and keeping the data base of all frequencies allocated to the Commission. The Department is responsible for evolving fair, equitable and transparent procedures and conditions for the allocation and assignment of spectrum and ensuring innovative and efficient use of the radio spectrum (a scarce resource).

The mission of the Department is to ensure efficient and effective management of all commercial radio frequencies in the country. This will be achieved through regular planning, assignment, monitoring and keeping up-to-date records of assigned spectrum to ensure a clean spectrum for the benefit of the industry which will also enhance good quality of service delivery, and thus contributes to the overall mission of the Commission as a whole which is to support a market driven telecommunications industry and promote universal access.

The Nigerian Communications Commissions act 2003 clearly states in its third chapter -Technical Regulations- that the commission shall manage the frequency

spectrum for the communications sector; all numbering and electronic addressing of network services and application services; and provide technical code and specifications in respect of communications equipment and facilities that may be used in Nigeria.

Recognising that there is a need for global broadband mobile-satellite communications and that part of this need could be met by allowing ESIMs to communicate with fixed-satellite services (FSS), the 2015 World Radiocommunication Conference (WRC-15) decided to clarify that ESIMs can communicate with geostationary (GSO) FSS space stations using the 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space) Ka-band radiofrequency spectrum. ESIMs' use is subject to certain technical and operational conditions, which are specified in Resolution 156 (WRC-15).

## Frequency management

In exercise of the powers conferred upon it by Sections 33 and 70 of the Nigerian Communications Act, 2003 ("the Act") and all other powers enabling it in that behalf, the Nigerian Communications Commission ("the Commission") states that no person shall operate a communications system or facility nor provide a communications service in Nigeria unless authorised to do so under a communications licence or exempted under regulations made by the Commission under this Act.

Similarly, Section 32. (1) of the Act stipulates that the Commission shall issue communications licences for the operation and provision of communications services or facilities by way of class or individual licences on such terms and conditions as the Commission may from time to time determine taking into consideration the objectives of this Act and the provisions of section 33(3) of this Act.

Indeed, satellite communicates using frequency in the electromagnetic spectrum that are limited by physics. As a result of this, frequency coordination and allocation among users is one of the most important processes for the successful operation of a satellite systems.

As a representative of the International Telecommunications Union, ITU, the Nigerian Communications Commission, NCC implements and apply the ITU Radio Regulation on a national level, and therefore maintains the ITU regulations which include administrative regulation for radio communications services including satellite communication services. The radio regulation includes the Master frequency registrar of all coordinated frequencies. The Master Frequency Registrar are relied upon during the early stage of space project when considering which frequency or frequencies a space project's space systems and earth station will use.

Radiofrequency spectrum is divided into bands that are either exclusively allocated or that share allocation for various applications. A share portion of the spectrum is available for one or more services, either on a regional or national basis.

The idea of radio regulation presupposes that secondary services:

- not cause interference to stations or primary services to which frequencies are already assigned or may be assigned at a later date
- cannot claim protection from harmful interference from station or a primary service to which frequencies are already assigned or may be assigned at a later date; and
- can, however, claim protection from harmful interference from stations of the same or other secondary services to which frequencies may be assigned at a later date.

## Gateway earth station frequency licence

Earth stations in motion (ESIM) address a complex communication challenge especially in the provision of a reliable and high-bandwidth Internet services to moving targets. They provide broadband communications, including Internet connectivity, on platforms in motion.

There are currently three types of Earth stations in motion ESIM: ESIM on aircraft (aeronautical ESIM), ESIM on ships (maritime ESIM) and ESIM on land vehicles (land ESIM). They connect people on ships, aircraft and land vehicles and ensuring their safety, security and comfort on the move. When ships are at sea or aircraft cross the oceans, they are out of reach of terrestrial networks. ESIM systems can provide continuous and consistent service with very wide global, geographic coverage as ships and aircraft operate at or over almost any location.

In order to address the increasing need for Earth Station in Motion, ESIM, delegates at the WRC event discussed the use of frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) and how they could be used by ESIM. According to the ITU report on this, the new resolution says that, "There is a need for global broadband mobile-satellite communications, and that some of this need could be met by allowing earth stations in motion (ESIMs) to communicate with space stations of the geostationary-satellite orbit (GSO) fixed-satellite service (FSS) operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space)."

So far, the Commission has continued to facilitate the deployment of, and use of Earth Stations in Motion (ESIMs) for the provision of services in Nigerian telecom space. First, the Commission allows ESIMs to communicate in additional frequency bands with geostationary-satellite orbit (GSO) satellites operating in bands allocated to the fixed-satellite service (FSS). Second, it also adopts rules for ESIMs to communicate with non-geostationary orbit (NGSO) satellites in specific frequency bands allocated to the FSS. These actions will promote innovative and flexible use of satellite technology, as well as provide regulatory equity between GSO and NGSO FSS systems.

Although FSS traditionally involves communications between satellites in orbit and earth stations in fixed locations, the growing demand for broadband communications to vessels, land vehicles, and aircraft has resulted in increased use of FSS for mobility applications.

Earth Station in Motion, ESIMs enable the provision of very high data rate broadband communications, navigation, situational awareness, and other services to mobile platforms that often cannot be served using other communications technologies. Accordingly, licensees use Earth Station in Motion, ESIM to deliver broadband to ships, vehicles, trains, and aircraft using the same frequency bands, hardware, satellites, transponder beams, and control stations used to serve earth stations at fixed locations.

Consequently, satellite operators overwhelmingly support allowing ESIMs to receive transmissions from GSO FSS satellites on an unprotected basis in these bands.

## Addressing rising demand

To address the increasing need for radio-frequency spectrum for ESIM, while protecting other services, delegates at WRC-19 decided on the regulatory and technical conditions under which the frequency bands

17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) can be used by the three types of ESIM communicating with geostationary (GSO) space stations in the fixed-satellite service (FSS).

The new Resolution starts by stating that “there is a need for global broadband mobile-satellite communications, and that some of this need could be met by allowing earth stations in motion (ESIMs) to communicate with space stations of the geostationary-satellite orbit (GSO) fixed-satellite service (FSS) operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space)”

However, the Resolution also cautions that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) “are also allocated to terrestrial and space services used by a variety of different systems, and these existing services and their future development need to be protected, without the imposition of undue constraints, from the operation of ESIMs.”

# In Kenya, satellite systems provide widespread voice, data and broadcast services



Mercy Wanjau  
Acting Director-General  
Communications Authority of Kenya

In Kenya, ICT continues to play key roles in shaping trends in the Global economy. Artificial intelligence (AI), Cloud Computing, Mobile Fifth Generation (5G), Cyber Security, Block Chain and the Internet of Things (IoT) are the primary technologies in various sectors of the economy. **Mercy Wanjau** says satellite systems also provide widespread voice, data and broadcast services as the Authority has successfully assigned frequencies for five (5) additional satellite earth stations and five (5) private very small aperture terminals (VSAT) stations. Private radio networks are used for communication within an entity and not open to the public.

The growth of the ICT sector in Kenya continued on an upward trend, contributing to the country's GDP. This growth was attributed to increased digitization and continuous uptake of ICT services. In line with our mandate and strategic objectives, the following are the highlights of the activities undertaken. During the year, more Kenyans continued to access ICT services with mobile telephony subscribers rising to 52,168,066 from 45,568,924 recorded in the previous year. The increase in mobile subscription facilitated the increase in mobile money transfer subscription from 29,678,063 in the FY 2017/18 to 32,634,883 in the FY 2018/19. In order to increase consumer choice and competition among service providers, wallet-to-wallet interoperability of person-to-person mobile money transfer was launched in Kenya. This enables customers of different mobile service providers to receive money directly into their mobile wallets.

To promote security of people and critical infrastructure, the Authority undertook various initiatives aimed at enhancing the national cyber readiness and resilience. This entailed, among others, the enhancement of the capabilities of the National KE- CIRT/CC, and promoting a national culture of cyber security through various public awareness and engagement activities.

In a bid to promote the use and adoption of the dot KE country code top-level domain, the Authority, in consultation with the industry, developed a Restricted and Reserved Name List for the domain namespace. This is aimed at curbing abusive domain name registrations. In addition, the Authority introduced a new numbering level - 0100- with a capacity of 100 billion numbers to cater for the envisioned Machine-to-Machine services. In its effort to empower consumers, the Authority availed consumer advisory information targeting users of mobile, Internet, postal and courier services. In addition, the Authority

availed information on e-waste and guidelines for the Child Online Protection (COP). The Authority also held a County ICT Consumer Forum dubbed 'Kikao Kikuu' in Kisumu County. This forum provided a platform to engage ICT service providers, consumers of ICT and the County Government on various ICT consumer issues.

## Establishment and Mandate of the Authority

The Kenya Communications Act No.2 of 1999 (KCA) established the Authority in 1999 with a mandate to license and regulate the ICT sector. The KCA has since been amended a number of times, most notably in 2009 to Kenya Information and Communications Act, 1998 (KICA). The KICA expands the Authority's role to license and regulate the broadcasting and e-commerce sectors as well as the establishment of the Universal Service Fund (USF). Further amendments became necessary in 2013 to confer the Authority greater operational autonomy in implementation of Articles 34 and 35 of the Constitution of Kenya, 2010 on freedom of media and access to information, respectively.

Additionally, the 2013 amendments to the KICA charged the Authority with the responsibility to promote and facilitate efficient management of the Internet resource as well as to develop a framework for facilitating the investigation and prosecution of cybercrime offences. It further reinforced the Authority's role in managing competition in the sector. The Authority is also entrusted with the responsibility of facilitating the development of postal and courier, telecommunications, radio communications, broadcasting and electronic transactions in Kenya through adoption of the best

practice regulation and most appropriate technologies.

## Outlook in the ICT Sector

In Kenya, ICT is expected to continue playing a key role in shaping trends in the Global economy. Artificial Intelligence (AI), Cloud Computing, Mobile Fifth Generation (5G), Cyber Security, Block Chain and the Internet of Things (IoT) are the primary technologies expected to play a significant role in shaping trends in various sectors of the economy. Global System Mobile Association (GSMA), The Mobile Economy 2019, proposes that AI will be key to future business and digital transformation. It will increasingly drive autonomous and intelligent networks as well as improve customer experience through greater learning of customer behaviour. Operators across the globe are therefore expected to focus on AI with various AI-based applications such as network operation/planning, chatbots, digital assistants, customer care and advertising as well as AI as a service.

Boundaries between mobile and the wider digital ecosystem are also expected to continue to blur, as data monetisation will continue to pose a challenge to operators. Many operators are therefore expected to move beyond their traditional ICT businesses to explore new opportunities in a fast-changing competitive landscape. One such opportunity is the content production and distribution. This area is undergoing significant transformation driven by shifting consumer behaviour, new players and changing content production and distribution models. To benefit from the unprecedented level of content consumption, more operators are expected to enter this content space. In addition, existing content providers are expected to strengthen their existing content offerings through vertical integration and partnerships with Over the Top (OTT) video service providers.

As captured by GSMA in its The Mobile Economy 2019 Report, there remains a need for most countries to modernise regulatory frameworks. The world has changed, and regulation needs to advance with the times. Authorities should therefore be looking at two key areas for review and reform: firstly, regulatory frameworks should be reviewed and updated to promote market dynamism, competition and consumer welfare, while discarding legacy rules that are no longer relevant in the context of the digital ecosystem. Secondly, governments should reduce the sector-specific tax burden to encourage investment in new technologies. By setting the right regulatory context, governments can create incentives for technological innovation and investment that will benefit the whole society.

## Management of ICT resources

The Authority manages ICT resources to ensure their efficient and optimal utilization in the provision of ICT services. These include: frequency spectrum, domain names and numbering resources. The management of these resources ensures sustainable development of ICTs.

KCA manages scarce radio frequency spectrum to ensure its efficient utilization in the deployment of ICT services in the country. In this regard, the Authority plans, allocates, assigns and issues frequency licenses for use in various services. These services are mobile cellular, terrestrial fixed and fixed wireless access, satellite, Frequency Modulation (FM) radio, digital terrestrial television (DTT), aeronautical radio, amateur radio and private radio networks.

In 2019, the year, the number of Second Generation (2G) and Third Generation (3G) transceivers increased marginally to 161,867 and 66,990 from 154,250 and 53,557, respectively. The Fourth Generation (4G) transceivers more than doubled to 17,744 from 7,469 the previous year. This is attributed to the issuance of spectrum in the 700 MHz and 800MHz bands

to two licensees, which enabled the roll out of services on 4G technologies.

Fixed wireless access systems are traditionally deployed in the licensed 1.7GHz, 3.3GHz and 3.5GHz frequency bands to provide last mile connectivity to consumers. During the year, there was decreased deployment of fixed wireless systems attributed to preference of offering the same services in the unlicensed and unprotected 5GHz Industrial, Scientific and Medical (ISM) frequency band and fibre. Table 2.2 shows a summary of the deployment of fixed wireless access transceivers.

In Kenya, fixed terrestrial links are used for traffic backhaul by telecommunications networks. During the year in review, the Authority assigned 147 fixed links bringing the total number to 7,620. The growth in the number of fixed links is attributed to the continued roll out of the 4G technologies by Mobile Network Operators (MNOs) requiring more backhauling. This included assignment of frequencies in the 80GHz band, which has attracted growing interest due to their capacity and directivity.

In addition, satellite systems provide widespread voice, data and broadcast services. During the year, the Authority assigned frequencies for five (5) additional satellite earth stations and five (5) private very small aperture terminals (VSAT) stations. Private radio networks are used for communication within an entity and not open to the public. Compared to the previous financial years, the downward trend in the licensing of private land mobile services reversed during the year in review with the licensing of 218 additional private land mobile stations comprising 217 Very High Frequency (VHF) and 1 High Frequency (HF). This reversal may signal the beginning of resurgence in the deployment of private radio networks. The licensing of base stations and mobile stations in the HF and VHF bands over the years.

The Authority is mandated to promote the use and adoption of the dot KE country code top-level domain (ccTLD). This is Kenya's unique and authentic identity on the Internet. The use of dot KE domains promotes cyber security by enhancing the level of data and intellectual property protection, while stimulating the growth of eservices. In consultation with the industry, the Authority developed a Restricted and Reserved Name List (RRNL) for the Dot KE country Top-Level Domain (ccTLD) namespace. This is aimed at curbing abusive domain name registrations, which may facilitate brand and identity theft among other forms of cybercrime. The Kenya Network Information Centre (KENIC) is the licensed registry for the Dot KE domain namespace. In the course of the year, the Authority conducted annual regulatory compliance audit of KENIC. The audit established that KENIC was in compliance with the regulatory requirements. By the end of the period, KENIC had registered a total of 87,807 domain names. This was an increase of 17 per cent compared to the previous period. Table 2.11 shows the steady increase in registered domains over the years.

So far, the Authority assigned nine (9) mobile National Destination Codes (NDCs) to facilitate mobile telephony services, as well as one Central Office Code (CoC) for fixed telephony services. Other resources assigned included four (4) Short Codes and one (1) Mobile Network Code for data services. The Authority also introduced a new numbering level (0100) with a capacity

of 100 billion numbers to cater for the envisioned Machine-to-Machine services. Machine-to-Machine communications refers to the direct communication between devices. Ten million numbers in this new numbering level were assigned. Table 2.8 shows numbering resources assigned during the last five years.

Based on KCA report, aeronautical radio networks provide ground-to-ground and air-to-ground communication services to aviation operators. During the year, the Authority issued 579 aircraft station licenses compared to 673 the previous year. Amateur radio is the use of radio frequency spectrum for purpose of non-commercial exchange of messages, wireless experimentation, private recreation and emergency communication. In collaboration with the Amateur Radio Society of Kenya (ARSK), the Authority issues amateur radio licenses to individuals who are duly certified by the ARSK or an equivalent body from another country. During the year, the Authority issued 30 amateur radio operator licenses compared to 19, the previous year.

A radio alarm network is a wireless system aimed at detecting unauthorized access into a premise. The network comprises an alarm decoder located at the control centre connected to wireless alarm terminals. During the year, there was a 70 per cent reduction in the overall number of VHF alarm units deployed in radio alarm networks compared to the previous year. This decrease was due to decommissioning of radio alarm networks, which may be attributed to adoption of alternative technologies. Figure 2.4 shows the deployment of alarm units over the years.

According to KCA, DTT broadcasting frequencies are used by land-based (terrestrial) television (TV) stations to broadcast content to televisions in digital format. During the year in review, there was a slight decline in the number of digital TV frequency assignments. The decline was mainly attributed to GoTV's decommissioning of transmitters. A radio station utilises frequency modulation (FM) broadcasting frequency to broadcast content on radio. During the year in review, there was an 11 per cent increase in the number of frequencies assigned for FM radio broadcasting. The Authority assigned FM broadcast frequencies to 104 FM stations compared to 93 the previous year. The number of frequencies assigned to commercial and community FM stations in the last five years.

# Promoting stakeholder engagement, brand awareness and consumer education



**Festus K. Mbandeka**  
Chief Executive Officer  
communications regulatory authority of Namibia CRAN

According to Research ICT Africa, Namibia is rated as the country with the lowest data prices in Africa. As a custodian of the industry, the Communications Regulatory Authority of Namibia has continued to strive for an effective brand awareness and consumer education to enhance and cultivate a positive image and reputation for the agency. The is mandated to purposefully regulate the Information and Communications Technology (ICT) sector for the purpose of realizing socio-economic benefits for all Namibians. CRAN is a member of the Communications Regulator of Southern Africa under the auspices of the ICT Regulators of the Southern African Development Community (SADC).

The communications regulatory authority of Namibia CRAN is an independent regulator established under section 4 of the Communications Act (Act No. 8 of 2009) to regulate, supervise and promote the provision of telecommunications services and networks, broadcasting, postal services sectors and the use and allocation of radio spectrum in Namibia. CRAN has effectively replaced the previous regulator, the Namibia Communications Commission, which was operational from 1992 until 2008.

Regulations for these sectors are developed by CRAN, licenses are issued to telecommunications and broadcasting services providers, license compliance with the rules and regulations in place is monitored, and the radio spectrum is effectively planned and controlled.

Most importantly, we are committed to safeguarding our consumers against unfair business practices and poor quality services provided by telecommunications, broadcasting and postal services licensees, and facilitate the process of resolving such complaints in a timely and effective manner.

CRAN is a member of the Communications Regulator of Southern Africa (CRASA) under the auspices of the ICT Regulators of the Southern African Development Community (SADC)

Since its inception, CRAN has awarded over 37 broadcasting services licenses to date, providing a wide array of services throughout Namibia. CRAN also established a firm regulatory framework for the digital Terrestrial Television (DTT) switchover process and formulated a comprehensive frequency-channeling plan, which other Southern African Development Community (SADC) regulators are using as a benchmark.

CRAN reached yet another milestone when it ensured that a 120% penetration rate in the country was reached. This was achieved thanks to an established regulatory framework that creates an environment which promotes fair competition. CRAN also facilitated the extension and digitisation of ICT infrastructure and the introduction of the 4th generational LTE technology in Namibia.

The legislative mandate of the Communications Regulatory Authority of Namibia is to regulate telecommunications services and networks, broadcasting, postal services and the use and allocation of radio spectrum. Over the years, the ultimate aim is the attainment of an environment where all consumers have equal and equitable access to quality services and products at just and reasonable prices. The critical elements of such an environment include the creation of a comprehensive regulatory framework and increased market development and growth, as characterised by enhanced choices for consumers and expansion of services into underserved and unserved areas.

Everything CRAN does is aimed at ensuring that all people in Namibia have access to basic communication services at affordable prices, and through our license obligations, operators ought to roll out services in underserved areas in the country.

The Namibian Communication Commission (NCC), the predecessor of CRAN, ceased to exist on 18 May 2011 and has since been replaced by CRAN as the new regulator. The assets and liabilities of the predecessor regulator, the The Namibian Communication Commission (NCC), were to be transferred to the new regulator, CRAN, after a final audit was concluded. To get started CRAN needed a cash injection to commence its activities and on that basis, an amount of N\$37 million was transferred from the The Namibian

Communication Commission (NCC) to CRAN during the year ended 31 March 2012.

### **CRAN's governance framework**

CRAN as a Public Enterprise is governed by various legislation inter alia, the Communications Act, (Act No. 8 of 2009), the Public Enterprises Governance Act, (Act No. 2 of 2006 as amended) (including Directives issued by the Ministry of Public Enterprises) and the Public Procurement Act, (Act No. 15 of 2015). CRAN is further governed by a number of internal Policies relating to Finance, Human Resources, Internal Audit, and Electronic communications.

The Board and Board Committees' mandate, functions and responsibilities are governed by the Board Charter and Board Committees' Terms of Reference, which is derived from the relevant legislation governing the organisation. Furthermore, CRAN has a Delegation of Authority Policy in place. This policy delegates certain functions and duties to Management and Management Committees in line with the applicable legislation, policies and governance frameworks.

As a custodian of the industry, CRAN continues to strive for an effective brand awareness and consumer education to enhance and cultivate a positive image and reputation for CRAN. During the period under review approximately 35 stakeholder engagement/initiatives were rolled out. This included the annual licensee/ stakeholder engagements such as public hearings. The hearings included a Spectrum Assignment hearing, Broadcasting Code hearing, Postal Hearing, Type Approval hearing, Spectrum Use Licence hearing, Universal Access and Service hearing and a Broadcasting Stakeholder meeting.

One of CRAN's key objectives and strategic focus areas is Stakeholder Engagement which entails consumer education and protection. During the year under review, CRAN conducted a Consumer Complaint Trend Analysis in order to track trends and patterns of complaints and adjudication. These findings help CRAN to make sound strategic considerations towards improving its consumer protection mandate.

### **Stakeholder engagement**

The Communications Regulatory Authority of Namibia (CRAN) is mandated to purposefully regulate the Information and Communications Technology (ICT) sector for the purpose of realizing socio-economic benefits for all Namibians. As CRAN celebrated another year of existence on 18 May 2018, stakeholder engagement remained a crucial function that required proactive implementation of various interventions in order to achieve meaningful dialogue with the shareholder and all stakeholders. A key focus area in terms of CRAN's Strategic Plan is consumer advocacy and stakeholder engagement. This focus area has defined the manner in which stakeholder engagement is to be managed, with the emphasis being on proactive, appropriate and robust dissemination of information, brand awareness and consumer education.

This has resulted in increased brand awareness and education of consumers regarding their rights. It is our obligation to ensure that ICT consumers are informed, empowered and engaged. In the process, the department has ensured that stakeholders and ICT consumers not only have the necessary access to information surrounding their aforementioned rights and obligations, but also CRAN's activities in the sector. This has resulted in a positive shift in CRAN's image and reputation.

### **Achievements, positive impacts and strategic focus**

At the same time, CRAN has launched its 3rd Strategic Plan (2018-2021), which aims to enable CRAN to develop and implement a regulatory framework to address the challenges currently faced by CRAN and the industry as a whole. It also ensures compliance, enforcement and sound governance of the sector. Equally important is the framework expansion to include the Plan premised on the legislative mandate and alignment to key national, regional and international development agendas and policies. During the year under review, CRAN rolled out various legal and regulatory frameworks, namely:

Regulations prescribing the Provision of Universal Services by Telecommunications Service Licensees. The purpose of these Regulations is to set out the obligations of telecommunications service licensees in setting and complying with their universal service obligations.

Regulations to ensure fair Competition in the Telecommunications Sector, Guidelines on the general interpretation and applicability of enforcement, hearing and penalty provisions in the Communications Act, (Act No. 8 of 2009), amendments to the Regulations in respect of Type Approval and Technical standards for telecommunications equipment. This provides for, inter alia, an efficient and cost-effective type approval process and exemption of some equipment from type approval.

Regulations for Postal Services, which will result in the provision of Namibia Post Ltd (NamPost) with a Public Operator Postal Licence and, eventually, the courier service providers as well. This provides for prescribed postal licence categories, regulates the issuance, amendments, transfers, renewals and the revocation of postal services and determines the fees thereof under the Communications Act.

Broadcasting Code for Broadcasting Licences Issued in Terms of Section 89 of the Communications Act, Universal Service Obligations Guidelines and the Spectrum Licencing Procedures Regulations, to mention a few.

Another critical framework/initiative developed was the Frequency Channelling Plan for Digital Sound Broadcasting. This Plan would allow for the freeing up of more spectrum, which will result in the expansion of broadcasting services in accordance with the targets set out in the Harambee Prosperity Plan and the ITU GEO6 to which Namibia is a signatory. The proposed plan makes provision for 100% geographical coverage of digital radio services for Namibia. Most importantly, CRAN, in collaboration with the MICT, initiated a major exercise to amend the Communications Act to keep up with the latest developments in the industry.



# Satellite industry's guide

Your explicit guide to international space agencies, companies, and organisations supporting and providing satellite communications products and services in Africa and around the world

## ARAB SATELLITE COMMUNICATIONS ORGANISATION

**Contact:** Yasir Hassan  
**Job Title:** Director of Transmission Operations  
**Address:** PO Box 1038, Diplomatic Quarter, Riyadh 11431, Saudi Arabia.  
**Tel:** +966 11482 0000  
**Fax:** +966 11 488 7999  
**Email:** [info@arabsat.com](mailto:info@arabsat.com)  
**Website:** [www.arabsat.com](http://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 30 years.

Now one of the world's top satellite operators, and by far the leading satellite services provider in the Arab world, Arabsat carries over 500 TV channels over 200 radio stations, two pay-TV networks and a wide selection of HD channels reaching tens of millions of homes in more than 100 countries across the Middle East, Africa, Europe, Central Asia—including an audience of over 170 million viewers within the 21 Arab countries alone.

Operating a growing fleet of owned satellites at the 20°East, 26°East, 30.5°East, 39°East and 44.5°East positions of the geostationary orbit, Arabsat is the only satellite operator in the MENA region offering the full spectrum of broadcast, telecommunications and broadband services. This capacity will continue to expand with the launch of Arabsat's new 6th-generation satellites, making the Arabsat satellite fleet the youngest in the region.

## EGYPTSAT

**Contact:** Dr. Mohammed Elghamry  
**Job Title:** President and CEO  
**Address:** 24 Ebour Buildings, Salah Salem Road, Cairo, Egypt 11371.  
**Tel:** +20 2 261 2787  
**Fax:** +20 2 405 3949  
**Email:** [sales@egyptsat.com](mailto:sales@egyptsat.com)  
**Website:** [www.egyptsat.com](http://www.egyptsat.com)

Egyptsat provides high-speed Internet connection, using the Express AM22 satellite, which offers a hot spot beam pointed just over the Middle East, from the Indian Ocean to

## ES'HAILSAT

**Contact:** Ali Ahmed Al-Kuwari  
**Job Title:** CEO  
**Address:** Area No: 31, Umm Lakhba, Al Markhiya Street, PO Box 10653, Doha, Qatar.  
**Tel:** +974 44 99 35 35  
**Fax:** +974 44 99 35 04  
**Email:** [info@eshailsat.qa](mailto:info@eshailsat.qa)  
**Website:** [www.eshailsat.qa](http://www.eshailsat.qa)

Es'hailSat, the Qatar Satellite Company, is the first satellite company of Qatar. It will provide independent, high quality, critical capacity that Qatar will need for 2022 and beyond. It will also supply important additional connectivity, services, and redundancy, with Es'hailSat's satellites a cornerstone of Qatar's advanced communications industry—including providing an independent access to satellite capacity for Qatar's TV broadcasters, an alternative route for essential data connections outside Qatar.

## NIGCOMSAT

**Contact:** Ms. Abimbola Alale  
**Job Title:** Managing Director  
**Address:** Obasanjo Space Center, Umaru Musa Yar'Adua Express Way, Pyakassa, Abuja, Nigeria.  
**Tel:** +234 9 2911 731  
**Email:** [aalale@nigcomsat.gov.ng](mailto:aalale@nigcomsat.gov.ng)  
**Website:** [www.nigcomsat.gov.ng/](http://www.nigcomsat.gov.ng/)

NIGCOMSAT Ltd owns and operates the Nigerian Communications Satellite systems. The NigComSat-1R system is built to provide domestic and international satellite services via a 2 way satellite communications service across West, Central, South East Africa, Europe and Asia. Our main focus is to operate and manage the Nigerian Communications Satellites to provide on commercial basis, comprehensive transmission services via digital or analogue systems and to operate same by either fixed or mobile satellite, direct broadcast satellite services, end to end solutions and to engage in transponder leasing and such business for profit.

**NILESAT**

**Contact:** Dr. Tharwat Mekky  
**Job Title:** Chairman and CEO  
**Address:** PO Box 72, 6th of October City, Egypt.  
**Tel:** +202 38400 145  
**Fax:** +202 38400 402  
**Email:** marketing@nilesat.com.eg  
**Website:** www.nilesat.com.eg

The Egyptian Satellite Company, Nilesat, is a joint-stock company operating under the Free Zone Law in 6th of October City, and the name of a series of Egyptian communications satellites. It was established in 1996 to operate Egyptian satellites, associated ground control stations and uplinking facilities. It has launched two satellites to the 7° West orbital neighbourhood (Nilesat 101 and Nilesat 102), and launched its second generation satellite, Nilesat 201 in August 2010.

Nilesat broadcasts around 700 TV channels, and over 100 digital radio channels uplinked either from Cairo, Dubai, Amman, Doha, Riyadh and Beirut and covering North Africa, the Middle East and the Gulf Region. Nearly 76 percent of the TV channels are free to air, the remaining channels are encrypted. Nilesat viewership in the MENA region has shown steady growth, from 11 million households in 2003 to more than 43 million households.

**RASCOMSTAR-QAF**

**Address:** Dubai Internet City, Building 8, Unit 106, P.O. Box 500435, Dubai, UAE.  
**Tel:** +971 4 425 7899  
**Email:** marketing@rascomstar.com  
**Website:** www.rascomstar.com

RascomStar-QAF provides a new communication infrastructure for Africa to facilitate community development through information sharing and technical empowerment. The RASCOM-QAF satellite system allows innovating solutions for equitable and affordable access. RascomStar-QAF is convinced that the use of affordable information technology will ease the development of local knowledge and content, develop inter-cultural communication and increase information among populations in case of natural disasters or conflicts. The company has developed marketing thinking on the services, applications and contents which are adequate to rural and suburban areas.

**SPACE-COMMUNICATION LTD (SPACECOM)**

**Contact:** David Pollack  
**Job Title:** President & CEO

**Address:** Spacecom, Greg Tower, 5th Floor, PO Box 24854, Nicosia 1304, Cyprus.  
**Tel:** +357 22 030814  
**Email:** AMOS-Info@amos-spacecom.com  
**Website:** [www.amos-spacecom.com](http://www.amos-spacecom.com)

Spacecom established in 1994, launched its first geostationary satellite – AMOS-1 in 1996. A dynamic, growing, satellite operator- Spacecom operates the AMOS communications satellite fleet, covering diverse territories with an International global expansion growth strategy. Spacecom today is an established market leader in Europe, the Middle East with the 4°W orbital slot 'hot spot', has established a significant footprint in Africa and North America and is now expanding to Asia. Spacecom has an excellent reputation in the market with an experienced and stable management and strong financial backing. Our collective vision is to position Spacecom as an international satellite services provider — one that operates a constellation of advanced satellites at multiple orbital locations and maintains its personalized attention to its customers over a wider range of territories.

**THURAYA TELECOMMUNICATIONS COMPANY**

**Contact:** Samer Halawai  
**Job Title:** Chief Executive Officer  
**Address:** Post Box 283333 Dubai, UAE.  
**Tel:** +971 4 4488888  
**Fax:** +971 4 4488999  
**Email:** sales@thuraya.com  
**Website:** www.thuraya.com

Thuraya Telecommunications Company is an industry leading MSS operator and a global telecommunication provider offering innovative communications solutions to a variety of sectors including energy, broadcast media, maritime, military and humanitarian NGO. Thuraya's superior network enables clear communications and uninterrupted coverage across two thirds of the globe by satellite and across the whole planet through its unique GSM roaming capabilities.

The company's diverse range of technologically superior and highly reliable mobile satellite handsets and broadband devices provide ease of use, value, quality and efficiency. Thuraya remains committed to serving humanity through delivering the essential tools for optimal connectivity, never leaving anyone out of reach.

**TURKSAT**

**Address:** 40 KM. Konya Yolu 06839 Golbasi Ankara, Turkey.  
**Tel:** +90 312 615 3000  
**Fax:** +90 312 499 5115  
**Email:** info@turksat.com.tr  
**Website:** [www.turksat.com](http://www.turksat.com)

**YAHSAT**

**Contact:** Masood M. Sharif Mahmood  
**Job Title:** Chief Executive Officer  
**Address:** Yahsat HQ, Al Falah City, Abu Dhabi, UAE.  
**Tel:** +971 2 510 0000  
**Fax:** +971 2 510 0001  
**Email:** info@yahsat.ae  
**Website:** [www.yahsat.ae](http://www.yahsat.ae)

Al Yah Satellite Communications Company PrJSC (Yahsat) is a private joint stock company fully owned by Mubadala, an investment arm of the Government of Abu Dhabi. Since being incorporated in 2007, we have designed the region's first multi-purpose satellite system, based on extensive interaction with customers and research into their communication needs. Our firsthand understanding of specific market requirements has enabled us to develop customized satellite solutions for the government as well as the commercial sector in the Middle East, Africa, Europe and Central to South West Asia.

**SEALAUNCH**

Peter G. Stier  
**Title:** Vice President, Sales & Marketing  
**Address:** Chemin d'Eysins 47, CH-1260 Nyon, Switzerland.  
**Tel:** +41 31 380 00 00  
**Fax:** +41 31 380 18 08  
**Email:** peter.g.stier@sea-launch.com  
**URL:** [www.sea-launch.com](http://www.sea-launch.com)

Sea Launch SA's corporate headquarters are located in the canton of Vaud at Chemin d'Eysins 47, CH-1260 in Nyon, Switzerland. It is located some 25 kilometres north east of Geneva's city center. Sea Launch is responsible for contracting and managing all aspects of our customers' requirements for launch services.

From the preliminary technical evaluations of planned spacecraft configurations through launch and post-flight reporting, our objective is to provide an industry-leading launch experience for all of our customers.

Sea Launch has a highly experienced group of executives and personnel to support these activities, with expertise in management, mission design and planning, strategic planning, finance, contracting, legal, sales, marketing, insurance, communications and customer relations.

Sea Launch contracts directly and exclusively with Energia Logistics Ltd. as its technical partner for the delivery and execution of Sea Launch Zenit-3SL launch services, and regulatory compliance oversight.

**Thuraya Telecommunications**

Ng Guan Soon  
**Title:** Regional Director, Asia  
**Address:** 991G Alexandra Road, #03-29A, Singapore 119975.  
**Tel:** +65 6622 0605

**Fax:** +65 6622 0611  
**Email:** Guan.Soon@thuraya.com  
**URL:** [www.thuraya.com](http://www.thuraya.com)

Thuraya Telecommunications Company is an industry leading MSS operator and a global telecommunication provider offering innovative communications solutions to a variety of sectors including energy, broadcast media, maritime, military and humanitarian NGO. Thuraya's superior network enables clear communications and uninterrupted coverage across two thirds of the globe by satellite and across the whole planet through its unique GSM roaming capabilities.

The company's diverse range of technologically superior and highly reliable mobile satellite handsets and broadband devices provide ease of use, value, quality and efficiency for professionals across a wide range of sectors in more than 160 countries throughout Europe, Africa, Asia and Australia. Thuraya remains committed to serving humanity through delivering the essential tools for optimal connectivity, never leaving anyone out of reach.

**ZODIAC DATA SYSTEMS**

Thierry Balanche  
**Title:** Sales & Marketing Manager  
**Address:** 5 Avenue des Andes, 91943 Les Ulis, France.  
**Tel:** +33 6 87 69 70 35  
**Fax:** +33 1 69 82 76 79  
**Email:** Thierry.balanche@zodiacaerospace.com  
**URL:** [www.zodiacaerospace.com/en/zodiac-data-system](http://www.zodiacaerospace.com/en/zodiac-data-system)

ZODIAC DATA SYSTEMS is a leading provider in the fields of telecommunications, telemetry and high data rate transmissions, antennas (hexapod) and baseband receivers (Cortex HDR) for Earth observation applications, deep space processors (Cortex DS), TT&C modems (Cortex CRT), integrated solutions for carrier & signal analysis, monitoring, interference detection and geolocation, as well as other products like SSPAs, frequency U/D converters.

**International Telecommunications Satellite Organization (ITSO)**

Jose Toscano  
**Title:** Director General & CEO  
**Address:** 4400 Jenifer St. NW Suite 332, Washington DC 20008, USA.  
**Tel:** +1 202 2435096  
**Fax:** +1 202 2435018  
**Email:** jtoscانو@itso.int  
**URL:** [www.itso.int](http://www.itso.int)

The International Telecommunications Satellite Organization (ITSO), formerly abbreviated and referred to as INTELSAT, is the continuation of the intergovernmental organization established by treaty in 1973. The Organization underwent an important restructuring in 2001 in order to secure the long-term viability of its communications system in a market that is characterized by increasing competition,

fast-paced innovations and rising capital costs, and in order to attract private investments. On 18 July 2001 the satellite fleet, customer contracts and other operational assets previously held by INTELSAT were transferred to a new private company Intelsat, initially registered in Bermuda but now registered in Luxembourg.

At that time, the International Telecommunications Satellite Organization changed its acronym from INTELSAT to ITSO. Since the restructuring in 2001, ITSO has been tasked with the mission to ensure that Intelsat, S.A. continues to provide public telecommunications services, including voice, data and video, on a global and non-discriminatory basis. Headquartered in Washington D.C., ITSO currently has 149 member countries.

#### **Satellite Interference Reduction Group**

Martin Coleman

**Title:** Executive Director

**Address:** 3rd Floor, 4 Athol Street, Douglas, IM1 1LD, Isle of Man, UK.

**Tel:** +44 7785 258 027

**Fax:** +44 7092 380 183

**Email:** martin.coleman@satirg.org

**URL:** [www.satirg.org](http://www.satirg.org)

The Satellite Interference Reduction Group (IRG) is a global organization dedicated to combating the costly problem of satellite Radio Frequency Interference (RFI) and is working hard to reduce this industry issue. It comprises two advisory committees, the End User Initiative (EUI) covering Broadcasters and Uplinkers Certification and Documentation, and Carrier ID. In addition, the group has two working groups, covering Intentional and VSAT Interference.

The Group's membership comprises satellite operators, users, uplinkers, service providers, equipment vendors and other organizations to combat RFI. IRG's extensive and qualified industry experience is leveraged to influence suppliers, improve the quality of satellite communications equipment and services, identifying and providing technical resources to all. IRG leads the drive for Carrier ID, solving difficult cases, improving geolocation and looking at the root causes of VSAT Interference. IRG supports APSCC, CASBAA, GVF, SIA, SMg, SMi, SSPi, ITU, WBUISOG and WTA maintaining a vital link between all.

#### **INDIAN SPACE RESEARCH ORGANISATION (ISRO)**

**Contact:** A S Kiran Kumar

**Job Title:** Chairman

**Address:** Antariksh Bhavan, New BEL Road, Bangalore - 560 231, India.

**Tel:** +91 80 23415275 or 22172296

**Fax:** +91 80 23412253

**Email:** dir.ppr@isro.gov.in

**Website:** [www.isro.gov.in](http://www.isro.gov.in)

Throughout the years, ISRO has upheld its mission of bringing space to the service of the common man, to the

service of the Nation. In the process, it has become one of the six largest space agencies in the world. ISRO maintains one of the largest fleet of communication satellites (INSAT) and remote sensing (IRS) satellites, that cater to the ever growing demand for fast and reliable communication and earth observation respectively. ISRO develops and delivers application specific satellite products and tools to the Nation: broadcasts, communications, weather forecasts, disaster management tools, Geographic Information Systems, cartography, navigation, telemedicine, dedicated distance education satellites being some of them.

#### **AVANTI COMMUNICATIONS**

**Contact:** David Williams

**Job Title:** Chief Executive Officer

**Address:** Cobham House, 20 Black Friars Lane, London EC4V 6EB, UK.

**Tel:** +44 207 749 1600

**Fax:** +44 207 749 1633

**Email:** Online Form

**Website:** [www.avantiplc.com](http://www.avantiplc.com)

Avanti have been providing satellite internet services to individuals and companies worldwide for over a decade. Through the HYLAS satellite fleet and more than 150 partners in 118 countries, the network provides ubiquitous internet service to 27 per cent of the world's population. Avanti delivers the level of quality and flexibility that the most demanding telecoms customers in the world seek.

Avanti is the first mover in high throughput satellite data communications in EMEA. It has rights to orbital slots and Ka-band spectrum that cover an end market of over 1.5bn people. The Group has invested \$1.2bn in a network that incorporates satellites, ground stations, datacenters and a fibre ring. Avanti has a unique Cloud based flexible customer interface that is protected by patented technology.

Avanti's first satellite, called HYLAS 1, launched in November 2010 and was the first superfast Ka-band satellite launched in Europe. Avanti's second satellite, called HYLAS 2, was launched in August 2012 and extends Avanti's coverage to Africa, the Caucasus and the Middle East. Avanti also owns a multiband satellite called ARTEMIS, with a fourth and a fifth satellite under construction called HYLAS 3 and HYLAS 4.

#### **EUMETSAT**

**Contact:** A. Ratier

**Job Title:** Director General

**Address:** Eumetsat Allee 1, D-64295 Darmstadt, Germany.

**Tel:** +49 6151 807 3660/3770

**Fax:** +49 6151 807 3790  
**Email:** ops@eumetsat.int  
**Website:** [www.eumetsat.int](http://www.eumetsat.int)

EUMETSAT is a global operational satellite agency at the heart of Europe. Our purpose is to gather accurate and reliable satellite data on weather, climate and the environment around the clock, and to deliver them to our Member and Cooperating States, to our international partners, and to users worldwide.

#### **EUTELSAT**

**Contact:** Vanessa O'Connor  
**Job Title:** Corporate Communications Director  
**Address:** 70 rue Balard, 75502 Paris Cedex 15, France.  
**Tel:** +33 1 53 98 47 47  
**Fax:** +33 1 53 98 37 00  
**Email:** infomaster@eutelsat.fr  
**Website:** [www.eutelsat.com](http://www.eutelsat.com)

Established in 1977, Eutelsat Communications (Euronext Paris: ETL, ISIN code: FR0010221234) is one of the world's leading and most experienced operators of communications satellites. The company provides capacity on 37 satellites to clients that include broadcasters and broadcasting associations, pay-TV operators, video, data and Internet service providers, enterprises and government agencies.

Eutelsat's satellites provide ubiquitous coverage of Europe, the Middle East, Africa, Asia-Pacific and the Americas, enabling video, data, broadband and government communications to be established irrespective of a user's location.

Headquartered in Paris, with offices and teleports around the globe, Eutelsat represents a workforce of 1,000 men and women from 32 countries who are experts in their fields and work with clients to deliver the highest quality of service.

#### **GAZPROM SPACE SYSTEMS**

**Contact:** Dmitry Sevastiyarov  
**Job Title:** Director General  
**Address:** 77B Building, Moscow Street, Shchelkova, Moscow, Russia.  
**Tel:** +7 495 504 2906  
**Fax:** +7 495 504 2911  
**Email:** info@gazprom-spacesystems.ru  
**Website:** [www.gazprom-spacesystems.ru](http://www.gazprom-spacesystems.ru)

The company created and operates the Yamal Satellite Communications System consisting of four satellites (Yamal-201, Yamal-202, Yamal-300K, Yamal-402) and advanced ground telecommunications infrastructure (three teleports, digital satellite TV center) and a wide network of ground stations in the Russian regions.

Gazprom Space Systems is an international operator providing Yamal satellite capacity not only in Russia but also in a considerable part of the Eastern hemisphere. On the international market Gazprom Space Systems is positioned as a Fixed Satellite Service Operator, while within Russia the company is also a service provider (satellite communication links, satellite broadcasting services, satellite Internet access, aerospace monitoring services) and a systems integrator (development of space and ground communication systems).

#### **HELLAS SAT**

**Contact:** Christodoulos Protopapas  
**Job Title:** President and CEO  
**Address:** Konstantinoupoleos 48, Koropi, GR-19400, Athens, Greece.  
**Tel:** +30 210 6159700  
**Email:** sales@hellas-sat.net  
**Website:** [www.hellas-sat.net](http://www.hellas-sat.net)

Hellas Sat, is a leading satellite operator offering services in Europe, Middle East and South Africa. It was established in August 2001 and owns & operates the Hellas Sat 2 high power and advanced satellite located at 39° E, which was successfully launched in May 2003.

Hellas Sat value combines high quality services at affordable prices and professional business practices with understanding of different customer needs. Hellas Sat individual solutions are based on a wide portfolio of services offered in all regions.

The company has been focusing on the development of the orbital position of 39° E into an attractive alternative proposition to the international market for video broadcasting, as well as VSAT applications.

Through the very successful operation of the three DTH platforms in Romania (Dolce), Bulgaria (Bulsatcom) and Serbia (Polaris Media), Hellas Sat and the position of 39° E have emerged as one of the most popular combination in the region, broadcasting more than 200 HD and SD TV channels. The number of the households served by the orbital position 39° E is estimated to be in excess of 2.5 million.

In April 2013, Arabsat acquired a majority stake in Hellas Sat and the company is now a member of Arabsat Group. Hellas Sat 2 will soon be joined by two new powerful satellites HS-3 and HS-4 part of Arabsat's 6th generation satellite program.

#### **INMARSAT**

**Contact:** Katie Potts  
**Job Title:** Corporate Communications Manager  
**Address:** 99 City Road, London EC1Y 1AX, UK.  
**Tel:** +44 20 7728 1000  
**Email:** information@inmarsat.com  
**Website:** [www.inmarsat.com](http://www.inmarsat.com)

Inmarsat plc is the leading provider of global mobile satellite communications services. Since 1979, Inmarsat has been providing reliable voice and high-

speed data communications to governments, enterprises and other organizations, with a range of services that can be used on land, at sea or in the air.

Inmarsat employs around 1,600 staff in more than 60 locations around the world, with a presence in the major ports and centres of commerce on every continent. Inmarsat is listed on the London Stock Exchange (LSE:ISAT.L).

### THE INTERSPUTNIK INTERNATIONAL ORGANIZATION OF SPACE COMMUNICATIONS

**Contact:** Vadim Belov

**Job Title:** Director General

**Address:** 2nd Smolensky pereulok 1/4, 121099, Moscow, Russia.

**Tel:** +7 495 641 44 20

**Fax:** +7 495 641 44 40

**Email:** dir@intersputnik.com

**Website:** www.intersputnik.com

Founded in 1971 the Intersputnik International Organization of Space Communications supports cooperation and coordination of the efforts of 26 Member Countries aimed at designing, procuring, operating and expanding an international satellite telecommunications system. Intersputnik can be joined by the government of any state that shares the principles of Intersputnik's activity. Intersputnik operates an international satellite telecommunications system and makes its geostationary orbit and frequency resource on 22 satellites available to telecommunications operators and corporate customers.

Intersputnik is the official distributor of satellite resource and services of Eutelsat S.A., markets and sells RSCC, ABS, Intelsat, SES, Chinasat and Gazprom Space Systems satellite capacity, and works together with other regional and domestic satellite telecommunications operators. Isatel Russia is the first company of Intersputnik Holding, Ltd. established on the initiative of the member countries of Intersputnik. Isatel offers full-scale services related to the installation and operation of satellite communications networks. Intersputnik's own geostationary orbit and spectrum resource is used under projects with partners to establish new satellite telecommunications systems.

### O3B NETWORKS

**Contact:** Steve Collar

**Job Title:** Chief Commercial Officer

**Address:** 3rd Floor Anley House, Anley Street, St Helier, JE2 3QE, Jersey.

**Tel:** +44 1534 828 590

**Fax:** +44 1534 862 301

**Email:** getconnected@o3bnetworks.com

**Website:** [www.o3bnetworks.com](http://www.o3bnetworks.com)

O3b Networks Limited is a global satellite service provider operating a next-generation satellite network for telecommunications operators, Internet service providers, enterprise and government customers in emerging markets.

The O3b system combines the global reach of satellite with the speed of a fibre optic network providing billions of consumers and businesses in nearly 180 countries with low cost, high speed, low latency Internet and mobile connectivity. O3b Networks' investors include SES, Google, Liberty Global, HSBC Principal Investments, Northbridge Venture Partners, Allen & Company, Development Bank of Southern Africa, Sofina, Satya Capital and Luxempart. O3b Networks is headquartered in St. Helier, Jersey, Channel Islands.

### RUSSIAN SATELLITE COMMUNICATIONS COMPANY (RSCC)

**Contact:** Andrey Kirillovich

**Job Title:** Director, Integration Services and Projects

**Address:** 8, bld. 6, 1st Goncharyn pereulok, Moscow, 115172, Russia.

**Tel:** +7 495 730 0450

**Fax:** +7 495 730 0383

**Email:** sales@rsc.ru

**Website:** [www.rsc.ru](http://www.rsc.ru)

The Russian Satellite Communication Company (RSCC) is the Russian state satellite operator with global coverage. RSCC was founded in 1967 and belongs to the ten largest satellite operators in the world in terms of satellites and orbital slots. Satellites are located in the orbital arc from 14 West to 145 East and cover the whole territory of Russia, the CIS, Europe, the Middle East, Africa, the Asia-Pacific region, North and South America, and Australia. RSCC provides a full range of communications and broadcasting services using its own terrestrial engineering facilities and satellite constellation. The company's satellites offer wide opportunities for TV & radio broadcasting, broadband Internet access, data transmission, videoconferencing, VSAT network deployment, as well as departmental and corporate communications networks worldwide. The company includes five teleports and the company's own high-speed optical-fibre digital network.

### SES

**Contact:** Ferdinand Kayser

**Job Title:** Chief Commercial Officer

**Address:** Château de Betzdorf, L-6815 Luxembourg.

**Tel:** +352 710 725 1

**Email:** info@ses.com

**Website:** [www.ses.com](http://www.ses.com)

SES (NYSE Euronext Paris and Luxembourg Stock Exchange: SESG) is the world-leading satellite operator with a fleet of more than 50 geostationary satellites. The company provides satellite communications services to broadcasters, content and Internet service providers, mobile and fixed network operators and business and governmental organizations worldwide. SES stands for long-lasting business relationships, high-quality service and excellence in the satellite industry. The culturally diverse regional teams of SES are located around the globe and work closely with customers to meet their specific satellite bandwidth and service requirements. SES holds a participation in O3b Networks, a next generation satellite network combining the reach of satellite with the speed of fibre.

### TELENOR SATELLITE BROADCASTING

**Contact:** Morten Tengs

**Job Title:** CEO and Vice President

**Address:** Snarøyveien 30, M3A, 1331 Fornebu, Norway.

**Tel:** +47 67 89 00 00

**Email:** [infosatellite@telenor.com](mailto:infosatellite@telenor.com)

**Website:** [www.telenorsat.com/](http://www.telenorsat.com/)

Telenor Satellite Broadcasting (TSBc) is a major European satellite provider of broadcast and data communication services for customers in the broadcast, maritime, and oil and gas markets. TSBc owns and operates the THOR satellite fleet, positioned at 1°West, which provides highpowered and high-quality satellite capacity throughout Europe, the Middle East and Africa. TSBc has also strengthened its position by moving our Thor III satellite to a new orbital location, 4°West, from where it offers inclined-orbit services throughout the Middle East. With the successful launch of THOR 7 on April 26, 2015, TSBc looks to increasing its presence and expanding its regional coverage to support the growth requirements of its broadcast and enterprise customers.

TSBc is headquartered at Telenor Group offices in Fornebu, just outside Oslo. The company is 100 percent owned by Telenor Broadcast Holding AS, a wholly owned holding company of Telenor Group, one of the world's major mobile operators.

### ECHOSTAR CORPORATION

**Contact:** Michael T. Dugan

**Job Title:** President & CEO

**Address:** 100 Inverness Terrace East, Englewood, CO 80112, USA.

**Tel:** +1 303 706 4000

**Email:** Online Form

**Website:** [www.echostar.com](http://www.echostar.com)

EchoStar Corporation (NASDAQ: SATS) is one of the premier global providers of satellite operations and video delivery solutions. EchoStar's wholly owned subsidiary, Hughes, is the world's leading provider of

satellite broadband services, delivering network technologies and managed services in more than 100 countries.

Headquartered in Englewood, Colo., with business units worldwide, EchoStar is a multiple Emmy award-winning company that has pioneered advancements in the TV and satellite industries for nearly 30 years, consistently delivering value for customers, partners and investors. Over the last three decades, EchoStar's innovations in video technology have impacted the way consumers view, receive and manage TV programming, garnering numerous awards in recognition of EchoStar's advancements to the media landscape. EchoStar's consumer solutions include HughesNet®, North America's #1 high-speed satellite Internet service; Sling Media's Slingbox® products; EchoStar's line of advanced digital video set-top-box products for the satellite and terrestrial viewer markets, including the Hopper® and Joey®; and further contributions to the worldwide TV experience through partnerships in Canada, Mexico and Europe.

### GLOBALSTAR

**Contact:** James Monroe III

**Job Title:** Executive Chairman of the Board of Directors and Chief Executive Officer

**Address:** 300 Holiday Square Blvd., Covington, Louisiana 70433, USA.

**Tel:** +1 985 335 1538

**Fax:** +1 408 933 4100

**Email:** [info@globalstar.com](mailto:info@globalstar.com)

**Website:** [www.globalstar.com](http://www.globalstar.com)

Globalstar is a leading provider of mobile satellite voice and data services, leveraging the world's newest satellite network. Customers around the world in industries like government, emergency management, marine, logging, oil & gas and outdoor recreation rely on Globalstar to conduct business smarter and faster, maintain peace of mind and access emergency personnel.

Globalstar data solutions are ideal for various asset and personal tracking, data monitoring and SCADA applications. The Company's products include mobile and fixed satellite telephones, the innovative Sat-Fi satellite hotspot, Simplex and Duplex satellite data modems, tracking devices and flexible service packages.

### INTELSAT

**Contact:** Dianne VanBeber

**Job Title:** Vice President, Investor Relations & Corporate Communications

**Address:** 7900 Tysons One Place, McLean, VA 22102-5972, USA.

**Tel:** +1 703 559 6800

**Fax:** +1 703 559 7898

**Email:** [info@intelsat.com](mailto:info@intelsat.com)

**Website:** [www.intelsat.com](http://www.intelsat.com)

Intelsat S.A. is the world's leading provider of satellite services, delivering high performance connectivity solutions for media, fixed and mobile broadband infrastructure, enterprise and government and military applications. Intelsat's satellite, teleport and fiber infrastructure is unmatched in the industry, setting the standard for transmissions of video and broadband services. From the globalization of content and the proliferation of HD, to the expansion of cellular networks and mobile broadband access, Intelsat creates value for its customers through creative space-based solutions. Envision...Connect...Transform...with Intelsat.

### IRIDIUM

**Contact:** Bryan Hartin  
**Job Title:** Executive Vice President, Sales & Marketing  
**Address:** 1750 Tysons Boulevard, Suite 1400, McLean, VA 22102, USA.  
**Tel:** +1 703 287 7400  
**Fax:** +1 703 287 7450  
**Email:** [sales@iridium.com](mailto:sales@iridium.com)  
**Website:** [www.iridium.com](http://www.iridium.com)

Iridium Communications Inc. is the only satellite communications company that offers truly global voice and data communications coverage. A technology innovator and market leader, Iridium is advancing the way global enterprises conduct daily mission-critical activities through reliable, near real-time, communications services. Iridium's 66 low-Earth orbiting (LEO) cross-linked satellites – the world's largest commercial constellation – operate as a fully meshed network that is supported by multiple in-orbit spares. Reaching over oceans, through airways and across the Polar Regions, Iridium solutions are ideally suited for industries such as maritime, aviation, government/military, emergency/ humanitarian services, mining, forestry, oil and gas, heavy equipment, transportation and utilities. Iridium provides service to subscribers from the US Department of Defense, as well as other civil and government agencies around the world. Iridium sells its products, solutions and services through a network of service providers and value-added dealers.

### TELESAT

**Contact:** Daniel Goldberg  
**Job Title:** President & CEO  
**Address:** 1601 Telesat Court, Ottawa, Ontario K1B 5P4 Canada.  
**Tel:** +1 613 748 0123  
**Fax:** +1 613 748 8712  
**Email:** [info@telesat.com](mailto:info@telesat.com)  
**Website:** [www.telesat.com](http://www.telesat.com)

Telesat is a leading global satellite operator, providing reliable and secure satellite-delivered communications solutions worldwide to broadcast, telecom, corporate and

government customers. Headquartered in Ottawa, Canada, with offices and facilities around the world, the company's state-of-the-art fleet consists of 14 satellites plus the Canadian payload on ViaSat-1 with another satellite under construction. Telesat also manages the operations of additional satellites for third parties. Privately held, Telesat's principal shareholders are Canada's Public Sector Pension Investment Board and Loral Space & Communications Inc. (NASDAQ: LORL).

### VIASAT

**Contact:** Andre L. Jones  
**Job Title:** Director, Business Development  
**Address:** 6155 El Camino Real, Carlsbad, CA 92009, USA.  
**Tel:** +1 678 924 2474  
**Email:** [Andre.Jones@viasat.com](mailto:Andre.Jones@viasat.com)  
**Website:** [www.viasat.com](http://www.viasat.com)

Viasat Inc offers turnkey services for operators and service providers to deliver affordable, high-speed broadband

services worldwide, we offer the ViaSat Flexible Broadband System. This system brings a new level of flexibility, high-capacity, and affordability to service providers, enabling them to start with a smaller investment, focus capacity to match the bandwidth demand in their markets, and scale their infrastructure as expansion is needed.

The Flexible Broadband System is designed to provide the industry's best satellite bandwidth economics in a more affordable package, tailored to regional operators. The system is based on the most advanced ViaSat High-Capacity Satellite System, the same flexible networking system developed for the ViaSat-2 satellite scheduled to launch next year. ViaSat and Boeing are also adapting a ViaSat-2 based payload to the Boeing 702SP (small platform) satellite bus to provide affordable and flexible satellite broadband anywhere in the world.

### XTAR

**Contact:** Philip Harlow  
**Job Title:** President and Chief Operating Officer  
**Address:** 2551 Dulles View Drive, Suite 300, Herndon, VA 20171-5219, USA.  
**Tel:** +1 571 281 3570  
**Fax:** +1 571 281 3576  
**Email:** [info@xtar.com](mailto:info@xtar.com)  
**Website:** [www.xtar.com](http://www.xtar.com)

XTAR is a trusted partner in providing support exclusively for the benefit of military and government users. Offering service in the X-band frequency range via two satellite payloads, XTAR is the ideal source for cost effective and vital resources for today's government, military, diplomatic, humanitarian, and



emergency disaster response operations. XTAR's capabilities are designed to support a range of requirements and our space segment is employed by nations around the world. Every day, NATO-members and countries in Africa, the Middle East, and Latin America rely on XTAR to deliver critical services such as border security, information gathering and relief to people in need. XTAR is the satellite service provider of choice to support bandwidth-hungry applications in the most demanding environments in the air, on the ground, and at sea.

XTAR capacity is a powerful stand-alone communications resource. It also is fully compatible with and operates in conjunction with government-owned satellite systems like the Wideband Global SATCOM (WGS) system, and other MILSAT systems such as Syracuse and Sicral. Our non-preemptible service is highly secure and interoperable with existing networks. XTAR's agile and powerful commercial X-band is the best choice when mission success comes first.

#### **CHINA GREAT WALL INDUSTRY CORPORATION**

**Contact:** Liu Bo

**Job Title:** Director

**Address:** No.88 Nan Cai Yuan Street, Xi Cheng District, Beijing 100054, PR China.

**Tel:** +86 10 8810 2087

**Fax:** +86 10 8810 2109

**Email:** liubo@cgwic.com;  
spacebusiness@cgwic.com

**Website:** www.cgwic.com

Established in 1980, China Great Wall Industry Corporation (CGWIC) is the sole commercial organization authorized by the Chinese government to provide satellites, commercial launch services and to carry out international space cooperation.

As the professional company promoting international cooperation for China's space industry, CGWIC is devoted to the internationalized development of China's space industry. CGWIC has developed into a system integrator for space products and services.

It can meet customers' multi-directional needs by providing comprehensive solutions for commercial launch services, satellite export, satellite ground tracking and control station construction, satellite applications, project financing, project insurance and technical training,

#### **GALAXY BACKBONE LIMITED**

**Contact:** 1<sup>st</sup> Floor, BOI Building, Herbert Macaulay Way, Central Business District, Abuja

**Tel:** +234 9 461 248 1-2

**Fax:** +234 9 524 00 10

**Email:** info@galaxybackboneplc.com.ng

**Website:** www.galaxybackboneplc.com.ng

**Products:** Satellite-based Broadband Solutions

Galaxy Backbone Ltd is a public institution charged with building and operating shared ICT Infrastructure and services for all Federal Government Ministries, Departments and Agencies.

The establishment of Galaxy Backbone by the Federal Government of Nigeria was driven by the need for Government to pursue a cohesive and harmonized approach to information and communications technology acquisition, deployment and utilization in the public sector.

The company has the mandate to build and operate a Nationwide Broadband network that provides IP-based Connectivity services to *all* Federal Government MDAs and institutions. Galaxy is focused on providing ICT infrastructure, applications and services to *all* Federal Government MDAs and institutions which includes but not limited to managing Government Data Centers and databases, Directory Services, National Information Repositories, IP-telephony and other solutions/services delivered on the shared platform.

#### **SURREY SATELLITE TECHNOLOGY LIMITED**

**Contact:** Patrick Wood

**Job Title:** Group CEO

**Address:** Tycho House, 20 Stephenson Road, Surrey Research Park, Guildford GU2 7YE, UK.

**Tel:** +44 1483 803803

**Fax:** +44 1483 803804

**Email:** info@sstl.co.uk

**Website:** www.sstl.co.uk

Surrey Satellite Technology Limited (SSTL) is the world's leading small satellite company, delivering operational space missions for a range of applications including Earth observation, science and communications. The company designs, manufactures and operates high performance satellites and ground systems for a fraction of the price normally associated with space missions, with over 500 staff working on turnkey satellite platforms, space-proven satellite subsystems and optical instruments.

Since 1981, SSTL has built and launched 43 satellites – as well as providing training and development programmes, consultancy services, and mission studies for ESA, NASA, international governments and commercial customers, with an innovative approach that is changing the economics of space.

**THALES ALENIA SPACE**

**Contact:** Sandy Gillio  
**Job Title:** Director, Sales and Marketing, APAC  
**Address:** 5 Allee des Gabians – BP 99 – 06156  
 Cannes LA Bocca CEDEX - France.  
**Tel:** +33 4 92 28 95 87  
**Fax:** +33 4 92 92 34 50  
**Email:** sandy.gillio@thalesaleniaspace.com  
**Website:** www.thalesaleniaspace.com

Thales Alenia Space, a joint venture between Thales (67 percent) and Finmeccanica (33 percent), is a key European player in space telecommunications, navigation, earth observation, exploration and orbital infrastructures. Thales Alenia Space and Telespazio form the two parent companies' "Space Alliance", which offers a complete range of services and solutions. Because of its unrivalled expertise in dual (civil/military) missions, constellations, flexible payloads, altimetry, meteorology and high-resolution optical and radar instruments, Thales Alenia Space is the natural partner to countries that want to expand their space program. The company posted consolidated revenues in excess of 2 billion euros in 2013, and has 7,500 employees in six countries.

**ARIANESPACE - Headquarters**

**Contact:** Isabelle Veillon  
**Job Title:** Vice President Corporate Communications  
**Address:** Boulevard de l'Europe, BP 177, 91006 Evry-Courcouronnes, Cedex, France.  
**Tel:** +33 1 60 87 60 00  
**Fax:** +33 1 60 87 63 04  
**Email:** info@arianespaceonline.com  
**Website:** www.arianespace.com

Arianespace was founded in 1980 as the world's first commercial satellite launch company. Its shareholders include Airbus Safran Launchers, the French space agency CNES, and all European space companies, representing 10 European countries. As of January 1, 2015, the company had 329 employees, at corporate headquarters in Evry, at the Guiana Space Center (CSG) - launch site for Ariane 5, Soyuz and Vega - and at local offices in Washington DC, Singapore and Tokyo.

In 2014, six launches of Ariane 5, four launches of Soyuz at CSG and one launch of Vega generated a turnover of 1,399 million euros. Moreover, 14 satellite launch orders have been awarded to Arianespace. Since its creation, Arianespace has signed contracts with 93 customers worldwide carrying out 221 Ariane launches, 37 Soyuz launches (11 at CSG and 26 at Baikonur via its subsidiary, Starsem and the four first

launches of Vega. More than half of the commercial satellites in service today were launched by Arianespace.

**GILAT**

**Address:** 21 Yegia Kapayim St., Kiriath Arie, Petah-Tikva 4913020, Israel.  
**Tel:** +972 3 925 2000  
**Fax:** +972 3 925 2222  
**Email:** info@gilat.com  
**Website:** www.gilat.com

**Products:** Satellite-based Broadband Solutions

Gilat Satcom is a communication solutions provider that offers satellite and fiber-based connectivity solutions in Africa, Asia and the Middle East. With successful deployments in 50 countries, we consistently deliver high-quality, cost-effective and efficient communication solutions to telcos, ISPs, governments, enterprise customers and international organizations.

Our services on land, at sea and in flight transcend the barriers of communication infrastructures reaching the most remote locations on the planet. Our superior service is maintained by a highly professional and dedicated staff, outstanding engineering skills and excellent organization.

The company operates three international teleports in Europe and the Middle East, fourteen hubs/PoPs in Africa and two PoPs in Europe. In addition, we are shareholders in WIOCC, owners of the Eastern Africa Submarine Cable System (EASSY), and in the West Africa Cable System (WACS), with undersea fiber optic cable systems connecting eastern and western Africa to the rest of the world. We provide space segments over numerous satellites including Intelsat, Telesat, Hellas Sat, ABS, SES - New Skies and others.

As a subsidiary of Eurocom Group Gilat Satcom has a strong financial stability. Perceptive financial analysis, combined with strategic partnerships ensures that the group's holdings have the strong backing necessary to encourage growth. Providing Global Communication Services since 1992.

**Gilat Satcom at a glance**

- Headquarters in Israel, branch offices in Nigeria (Lagos) and Russia (Moscow)
- 3 international satellite teleports, 14 hubs/PoPs in Africa, 2 PoPs in Europe, 2 fibers
- Management of 2.4Gb of satellite capacity and 8 STM1s over fiber (EASSy & WACS)
- Use of 15 satellites
- Operations in 50 countries
- More than 1500 sites globally
- 24x7 bilingual Technical Assistance Center

**SEA LAUNCH AG**

**Contact:** Peter G. Stier  
**Job Title:** Vice President, Sales & Marketing  
**Address:** Chemin d'Eysins 47, CH-1260 Nyon, Switzerland.  
**Tel:** +41 31 380 00 00  
**Email:** peter.g.stier@sea-launch.com  
**Website:** www.sea-launch.com

Sea Launch SA's corporate headquarters are located in the canton of Vaud at Chemin d'Eysins 47, CH-1260 in Nyon, Switzerland. It is located some 25 kilometres north east of Geneva's city center. Sea Launch is responsible for contracting and managing all aspects of our customers' requirements for launch services.

From the preliminary technical evaluations of planned spacecraft configurations through launch and post-flight reporting, the objective is to provide an industry-leading launch experience for all of its customers.

Sea Launch has a highly experienced group of executives and personnel to support these activities, with expertise in management, mission design and planning, strategic planning, finance, contracting, legal, sales, marketing, insurance, communications and customer relations. Sea Launch contracts directly and exclusively with Energia Logistics Ltd. as its technical partner for the delivery and execution of Sea Launch Zenit-3SL launch services, and regulatory compliance oversight.

#### INTERNATIONAL LAUNCH SERVICES

**Contact:** Karen Rose Monaghan  
**Job Title:** Director, Communications and Customer Relations  
**Address:** 1875 Explorer Street, Suite 700, Reston, VA 20190, USA.  
**Tel:** +1 571 633 7549  
**Fax:** +1 571 633 7550  
**Email:** k.monaghan@ilslaunch.com  
**Website:** www.ilslaunch.com

For over 20 years, ILS has been providing launch services for global satellite operators and offers a complete array of support, from contract signing through mission management and onorbit delivery.

ILS has exclusive rights to market the Proton and Angara vehicles to commercial satellite operators worldwide and is a US company headquartered in Reston, VA., near Washington, D.C. For more information, visit [www.ilslaunch.com](http://www.ilslaunch.com).

Khrunichev, which holds the majority interest in ILS, is one of the cornerstones of the Russian space industry. Khrunichev manufactures the Proton the Angara launch systems. Proton launches from facilities at the Baikonur Cosmodrome in Kazakhstan, and has a heritage of over 400 missions since 1965. For more information, visit [www.khrunichev.com](http://www.khrunichev.com).

#### SPACE X

**Contact:** Hannah Post  
**Job Title:** Marketing & Communications Manager

**Address:** 1 Rocket Road, Hawthorne, CA 90250, USA.  
**Tel:** +1 310 219 7840  
**Email:** hannah.post@spacex.com  
**Website:** [www.spacex.com](http://www.spacex.com)

SpaceX designs, manufactures, and launches the world's most advanced rockets and spacecraft. The company was founded in 2002 by Elon Musk to revolutionize space transportation, with the ultimate goal of enabling people to live on other planets. Today, SpaceX is advancing the boundaries of space technology through its Falcon launch vehicles and Dragon spacecraft. SpaceX is the only private company ever to return a spacecraft from low-Earth orbit, which it first accomplished in December 2010. The company made history again in May 2012 when its Dragon spacecraft attached to the International Space Station (ISS), exchanged cargo payloads, and returned safely to Earth—a technically challenging feat previously accomplished only by governments.

As the world's fastest-growing provider of launch services, SpaceX has more than 50 launches on its manifest, representing more than US\$7 billion in contracts. These include commercial satellite launches as well as missions for NASA and the United States Air Force.

#### ATRIUM SPACE INSURANCE CONSORTIUM

**Contact:** David Wade  
**Job Title:** Space Underwriter  
**Address:** Lloyd's Building, 1 Lime Street, London EC3M 7DQ , UK.  
**Tel:** +44 207 327 4877  
**Email:** david.wade@atrium-uw.com  
**Website:** [www.atrium-uw.com/underwriting/space](http://www.atrium-uw.com/underwriting/space)

ASIC was formed in 2007. By matching the skills of an experienced underwriting team with those of a dedicated engineering team with years of industry knowledge and experience, ASIC is able to provide a market-leading service to its clients and brokers. With few satellites or launch vehicles being identical, it is vital that each risk be fully evaluated prior to being underwritten. Ambiguities that remain in the coverage design lead to complications and delays in settling a claim in the unfortunate situation of a loss arising. Collaborating with an insurer with the experience and ability to fully comprehend your requirements and the entrepreneurialism to craft a bespoke coverage design helps minimise the risk that ambiguities can produce.

#### BRIT INSURANCE

**Contact:** Mark Cloutier  
**Job Title:** Group CEO  
**Address:** 55 Bishopsgate, London EC2N 3AS, UK.  
**Tel:** + 44 20 7984 8500  
**Email:** [enquiries@britinsurance.com](mailto:enquiries@britinsurance.com)  
**Website:** [www.britinsurance.com](http://www.britinsurance.com)

Our team comprises some of the most experienced Space insurance specialists in the world. The nature of the

**Via della Bufalotta**

378 00139 Roma  
T (+39) 06 870901

[www.acsys.it](http://www.acsys.it)  
[space.business@acsys.it](mailto:space.business@acsys.it)

ACS is a software & system Integrator founded in 1979. To their Customers, this Italian SME can offer integrated systems, software, services and consultancy in:

- Earth Observation Satellites Payload Data Ground Segments
- Environment monitoring Applications
- Advanced & Immersive data visualization

As a «Payload Data Ground Segment» specialist, ACS develops ground stations and subsystems/components for satellite data acquisition, dissemination, processing. The 36-year long record testifies to profound knowledge of and capabilities in handling different satellite data, metadata, sensors, products, facilities interactions, associated services delivery.

Our cutting end technology solutions are serving customers in thirty countries.

Today, 70 IT specialists work on two company sites in Italy: Operational Headquarters in Rome and Research & Development center in Matera. ACS-D, our German subsidiary, provides high-end consultancy services at Eumetsat premises.

ACS is part of a large ICT group Exprivia (2200 employees, provider of SW technology and IT services in banking, medical, industrial, telecommunication and PA sectors).

**Aero Sekur**

Via delle Valli, 46 04011 Aprilia (LT)  
T (+39) 06 920161

[www.aerosekur.com](http://www.aerosekur.com)  
[space-systems@sekur.it](mailto:space-systems@sekur.it)

The company's mission is to design, develop, qualify and manufacture products and supply services dedicated to ensuring the survival of defense and security forces, as well as supporting helicopter, aircraft and land vehicle operations, based on the best and consolidated mechanical technology, software, textiles and innovative materials.

The Space & Technology Division of Aero Sekur is tasked with developing new technologies and designing new products of the future; all through a skillful fusion of advanced technological capability based on company expertise, collaboration with the main national and European Research Institutes, and a good amount of creativity that has always characterized the company's innovation capabilities.

European leader in the design, development and validation of atmospheric re-entry, descent and landing systems, Aero Sekur has the most advanced technologies for the production of flexible thermal protection systems and vented airbag systems which are the only one in the world to allow soft precision landing.

Thanks to this exclusivity, Aero Sekur is a continuously evolving company, able - with innovative products,

**AEROSPAZIO**

Via Provinciale Nord,  
42a 53040

Rapolano Terme (SI)  
T (+39) 0577 705009 [www.aerospazio.com](http://www.aerospazio.com)  
[erospazio@aerospazio.com](mailto:erospazio@aerospazio.com)

AEROSPAZIO Tecnologie is a leading SME providing testing and engineering services for Aerospace. The company is particularly active in the fields of Thermal Vacuum and Electric Space Propulsion, where provide its services to most of the European space industry.

For its mission, the company operate a test laboratory equipped with several vacuum test facilities some of which are unique in their features.

The expertise of the company include the development of electric propulsion technologies, diagnostics (plasma probes, thrust balance), vacuum systems and cryogenic equipment, data acquisition & control systems, networking & communications in harsh environments, software tools.

The company has worked in several ESA flight programmes, including the BepiColombo mission to Mercury, the Exomars mission to Mars and the Small-GEO programme.

**AGT**

Via Paolo Emilio,  
34 00192 Roma  
T (+39) 06 45437023  
[www.agtgroup.it](http://www.agtgroup.it)  
[info@agtgroup.it](mailto:info@agtgroup.it)

AGT is a scientific, engineering, marketing and sales integrated organization.

Agt enhances its customers products with innovative technologies identified by its sales team, reviewed by its R&D development team, engineered by its engineering team, and repositioned in their respective markets by its marketing team: this way injecting innovation and adding value into its customers products.

In addition, Agt develops horizontal capabilities of technology transfer and consultancies, develops its own prototype products, and operates services based on Artificial Intelligence proprietary patents applications.

AGT is active in the Aerospace, Transportation, Oil and Gas, and Energy production and distribution fields.

AGT has been partner of the ESA (European Space Agency) to transfer to the European Industries the activities available on the ISS (International Space Station), in the areas of Life Sciences and Advanced Materials; and to the ASI (Agenzia Spaziale Italiana) and NASA to perform two experiments with the Italian Astronaut Luca Parmitano during his mission on the ISS.

AGT is also partner in an International Consortium for the development and manufacture of innovative rail structural systems; designs and manufactures special systems and

### **Aerospace Laboratory for Innovative Components**

Via E. Gianturco, 31 80146  
Napoli  
T (+39) 081.6020139  
[www.aliscarl.it](http://www.aliscarl.it)  
[info@aliscarl.it](mailto:info@aliscarl.it)

ALI Aerospace Laboratory for Innovative Components is a consortium among aerospace and ICT companies, which work in the fields of design, engineering, prototyping and manufacturing of innovative components for aerospace, ground segment for controlling remote platforms, science and technology.

Companies associated with a workforce of approximately 1,500 employees and a turnover total of € 200M€, emit virtually the entire industry in the areas of activity considered.

The team also relies on the corporation of existing centres of excellence on the Campanian territory such as: CIRA, for technological aspects, University of Naples (DIAS - Aerospace Engineering Department - and Earth Science Department) and the CNR (National Research Centre) for scientific aspects. ALI participate in the following projects:

#### **IRENE (Italian Re-Entry Nacelle)**

The Italian and European Space Agencies (ASI and ESA) are supporting a research programme, called IRENE, carried out in Campania region (South of Italy) by a cluster of industries, research organizations and universities, to develop a low-cost re-entry capsule, able to return payloads from the ISS to Earth and/or to perform short-duration, scientific missions in Low Earth Orbit (LEO) and/or to perform Earth Observation missions.

#### **FIT (Technological Innovation Funds)**

Experimental development programme: "Technological Developments for the realization of a prototype of a deployable structure for use as a lifting body reentry capsule from space" (waiting for approval).

### **ALMA Sistemi sas**

Via Tenuta del Cavaliere,1  
CAR Centro Direzionale Building B,  
1st floor 00012 Guidonia (RM)  
T (+39) 0774 016871  
[www.alma-sistemi.com](http://www.alma-sistemi.com)  
[adi@alma-sistemi.com](mailto:adi@alma-sistemi.com)

ALMA Sistemi sas di Di Iorio Alessio & C ( [www.alma-sistemi.com](http://www.alma-sistemi.com) ) is an Italian SME established in 2005 in Guidonia (Rome, Italy) providing high level engineering and management consultancy in the space and defence markets. From 2005 ALMA operates in high-value, high technology areas focusing on helping clients to exploit new technologies and management styles. Its proven expertise has been gained from performing a broad range of projects in the: Aerospace, Engineering and Research sectors.

ALMA provides services in Project and Proposal Management, Business Development, Mechanical Engineering and Analysis as well as System and Software Engineering.

### **ALPHA Consult**

Via Umbria,10 20090 Segrate (MI)  
T (+39) 02 39810139  
[www.alphacons.eu](http://www.alphacons.eu)  
[es@alphacons.eu](mailto:es@alphacons.eu)  
[info@alphacons.eu](mailto:info@alphacons.eu)

#### **Emiliano Spaltro**

ALPHA Consult is a European management and technology consultancy supporting businesses, regulators and European institutions.

We are recognised as one of the leading independent experts in Satellite Navigation (GNSS), Earth Observation (EO), Intelligent Transport System (ITS) and Unmanned Aerial Vehicles (UAVs), and are increasingly active across other supporting and related markets (chiefly Aerospace, Transportation, Agribusiness, Emergency response and management, and Climate Change).

ALPHA Consult was established as a private limited company in 2009 by an experienced strategy consultant and today is an independent and wholly owned company by its working director and staff. ALPHA Consult's headquarters is Milan (Italy), with a branch office in London (UK). ALPHA Consult works with all manner of stakeholders providing high quality consultancy about all aspects of satellite navigation, earth observation, ITS, and UAVs concepts and technologies. Our core services are strategy, business case and technology advices.

### **Argotec**

Via Cervino, 52 10155  
Torino  
T (+39) 011 765 05 67  
[www.argotec.it](http://www.argotec.it)  
[info@argotec.it](mailto:info@argotec.it)

Argotec is an Italian aerospace engineering company founded in 2008 in Turin. It works in the aerospace sector and its activities are in various areas: payloads and technology, small satellites, as well as training and simulations for astronauts and ground staff. Argotec engineering activities have focused on the research and development of several technological solutions for the International Space Station. A branch of the research is dedicated to the field of passive heat transfer. Additionally, the company works to design and build mini-satellites with small size and low mass (<50 kg).

Training and simulation operations are conducted by instructors certified by NASA and ESA. Many of these activities take place at the European Astronaut Centre (EAC), based in Cologne in Germany. Moreover, the Turin headquarters has a functional Mission Control Centre, directly connected to NASA, from which Argotec engineers can provide real-time support for the operations on the International Space Station (ISS).

In recent years, Argotec has designed and constructed the "Space Food Lab", a new research facility for the study of healthy and nutritious food for astronauts. In particular, a team of chefs, food technologists, dietitians, nutritionists, and engineers developed the bonus food for ESA astronauts who have flown to the ISS. Argotec

**AVIOSPACE**

Via Giovanni Botero,  
18 10122 Torino  
T (+39) 011 0867 100  
[www.aviospace.com](http://www.aviospace.com)  
contact@aviospace.com

AVIOSPACE is a space company located in Torino. The company was formed in 2004 and its network of partnership includes various SMEs in the field of Engineering and Manufacturing, several Universities, and Professionals.

Between January 2010 and March 2016 Aviospace has been an Airbus Defence and Space company, remaining however an Italian registered company with management and personnel entirely Italian.

Company core competences:

- System Engineering, Space Transportation, Future Launchers, and Space Exploration systems
- Thermal Control, Mechanical structures, Composite materials, and nano-structured material
- Avionics and On-board Software
- Propulsion, Multi-layer thermal insulation equipment (MLI), and Multi-physical simulation
- Human Life in Space and ISS operations

AVIOSPACE can benefit of a network of collaborations with small and medium companies with robust experience in high-quality manufacturing and niche technologies.

The scenario of collaborations is permanently in evolution: agreements across Italy and Europe are already established or are in final preparation in the sector of the automatic space systems for transportation and exploration with the Italian Institute of Technology (IIT), as well as with universities and other academic organizations (e.g. INSTM, Politecnico of Torino, La Sapienza) and manufacturers.

**Compolab project**

Via dell'Artigianato, 53 Livorno  
T (+39) 0586 422497  
[www.compolab.it](http://www.compolab.it)  
info@compolab.it

Compolab project was founded in 2010 aiming to provide solutions and technologies to support our clients through the conception, the design, the prototyping and the industrialization of the product and to assist them in process design and optimization.

The company business is focused on design and technical drafting, on modelling, on structural and fluid dynamic simulations, on design and realization of test machines and tests. We have developed remarkable skills in project design and in the direct distribution of highly qualified activities on projects promoted by regional, national and European bids. Our internal resources are highly specialized and qualified to guarantee an efficient and valuable quality service at competitive costs.

Our crew has progressively increased the number of its collaborators and has guaranteed a constant turnover growth.

Among our clients, besides some PMI, we count the main international players within the automotive,

**Datasel**

Via privata OTO, 45 19136 La Spezia  
T (+39) 0187 599077 [www.datasel.it/chisiamo.html](http://www.datasel.it/chisiamo.html)

**Managing Director**  
**Sandro Pazzini**

T (+39) 346 0098399 s.pazzini@datasel.it

Datasel s.r.l. is a small engineering company operating both in hardware and software capabilities to perform design, development, qualification and construction/implementation of reduced quantities of electronic equipments. Datasel especially operate in the following fields:

- Navigation device, detonation control system and special interface equipments for missiles;
- System Integration and software development of special equipments for Microsatellite;
- BMS (Battery Management Systems) for applications in electromedical robotics (e.g. exoskeleton), automotive and military applications;
- Illumination, Domotic control and Security Systems (e.g. PA/GA for Mega-yachts and Cruise Ships).

**D-Orbit**

Via Giuseppe Mazzini, 2 20123  
Milano Viale Risorgimento,  
57 22073  
Fino Mornasco (CO)  
**Renato Panesi – CCO**  
T (+39) 320 0244978  
renato.panesi@deorbitaldevices.com  
[www.deorbitaldevices.com](http://www.deorbitaldevices.com) info@deorbitaldevices.com

D-Orbit is a satellite systems company providing commissioning and decommissioning solutions for spacecraft, launch vehicles, and next-generation satellite constellations. D-Orbit adds value by streamlining the initial and final phases of satellite missions with systems and services that enable customers to simplify spacecraft design, increase reliability, improve the use of mission resources, reduce operational costs associated with commissioning and decommissioning, and increase the revenue-generating phase of a space mission.

D-Orbit's technology will be space-qualified in orbit in Q4-2016 with D-Sat, a satellite developed in-house with built-in self-decommissioning capability.

D3 is an independent, smart motor optimized for decommissioning maneuvers. Installed on satellites before launch, D3 removes them from operational orbit at end-of-life or in case of major failure in a quick, safe and direct manner. D3 is fully compliant with international space debris regulations, enabling operators of constellations to cleanly remove satellites at end-of-life,

## Dragonfly

Piazza Guglielmo Marconi, 15 00144 Roma  
 T (+39) 06 9293.9404 [www.dragonfly.it](http://www.dragonfly.it)  
[Claudio.giarda@dragonfly.it](mailto:Claudio.giarda@dragonfly.it)

Dragonfly is an innovative start-up (under Law 221/2012), operating in specific services for additive manufacturing, in particular for Defense and Aerospace fields.

Dragonfly offer an all-around support for additive manufacturing adoption, in terms of services and products: ranging from tailored business cases to system integration services and from products "additive" engineering design to third parties prototyping & production.

We help you to develop your product with specialized additive redesign services. We will find unconventional design solutions in lightening, assembly and fluid dynamics optimization, solving technical problems that until now were faced with only partial solutions, not entirely effective.

We quickly realize your prototype and produce and finish final parts using the most advanced technologies of laser metal powder fusion (EOS M290) with which it is possible to obtain fully dense objects with excellent metallurgical characteristics.

Dragonfly is based in Capua inside the Italian Center for Aerospace Research (CIRA), with branches in Rome and Milan.

On December 22nd, 2015,

Dragonfly established (along with other leading partners in the aerospace, engineering and research) the network of companies called NIAM (Italian Network for Additive Manufacturing).

## EIE GROUP

Via Torino, 151/A 30172 Mestre (VE)

T (+39) 041 5317906 [www.eie.it](http://www.eie.it)

**Mr. Gianpietro Marchiori, CEO**  
[gmarchiori@eie.it](mailto:gmarchiori@eie.it) [mtordi@eie.it](mailto:mtordi@eie.it)

EIE GROUP has been on the market since 1989, specializing in Engineering & Design, Management & Contracts and Production & Services. It operates globally to provide engineering and turn-key solutions in areas such as Astronomy, Astrophysics, Big science, Civil Infrastructures, Large Scientific Technological Facilities as well as Space Technologies and Renewable Plants. EIE GROUP is an internationally recognized player in Astronomy, very active in Dome and Telescope engineering.

In the scope of the services provided for supporting the scientific research, EIE GROUP established EIE Space Technologies for the development of the activities in the Aerospace sector.

EIE Space Technologies is based in Mestre-Venice, headquartered at the main offices of the Group. It is devoted to the development of Optical, Thermal and Mechanical Ground Support Equipments for the Aerospace market and the design and integration of optical payloads. With more than ten years of experience with aerospace industry (Leonardo-Finmeccanica, Thales Alenia Space, ASI, ESA, MT-Mechatronics) we can provide products and solutions for the most demanding conditions.

## Elettronica Italiana

c/o Tecnopolo Abruzzo,  
 ss17 Ovest Nucleo Industriale di Pile 67100 L'Aquila  
 T (+39) 0862 1965740

[www.elital.com](http://www.elital.com), [info@elital.com](mailto:info@elital.com)

**Mr. Guido Arista**

T (+39) 08621965740 ext.50 [guido.arista@elital.com](mailto:guido.arista@elital.com)

Elital (the name is Elettronica Italiana) was founded in 1986 and has rapidly expanded its capabilities in the design and manufacturing of complex and multidisciplinary systems, subsystems and complete products.

The fields where our technology is applied are mainly Space and Defense (Homeland Security included) and also Industrial application. Product and technologies are listed into [www.elital.com](http://www.elital.com). Some of our products:

- MGSE – OGSE
- EGSE
- Space Qualified PCB (Printed Circuit Boards)
- Space Qualified Brazings
- Transportable Satcom systems
- Mobile Satcom Systems

## Esri Italia

Via Casilina, 98 00182 ROMA

Strada 1, Palazzo F2 Milanofiori 20090 Assago (MILANO)

T (+39) 06 40696.1 [www.esriitalia.it](http://www.esriitalia.it) [info@esriitalia.it](mailto:info@esriitalia.it)

Esri Italia is the Italian leading company in geospatial solutions for Government and Enterprise. Esri Italia is Esri Official Distributor for the Italian market where the company operates also in networks with important Partners. The target customers are mainly in Government, Defence, Public Safety & Security, Space, Telecom & Utilities, Enterprise Companies, Universities, Research Institutions and No-Profit Associations.

Esri Italy has a strong presence in the Italian market with Enterprise solutions supporting operation and decision making of any private or public organization.

The company offers high level of expertise in various application fields with solutions based on Esri technology and the integration of ArcGIS Platform with other enterprise systems. The offering integrates Geolocation and Mapping Platforms, Spatial Analysis, GIS, Geospatial Data, Training Programs and Professional Services.

ArcGIS is a geolocation platform to make better, smarter decision and a more efficient organization.

It works about every problem and situation has a location aspect.

People in an organization can use ArcGIS in different ways i.e.:

- Executives use the platform to keep on top of key performance indicators and analyze trends and spatial connections that influence every aspect of organization's operations.
- GIS analysts with ArcGIS can build maps using up-to-date data, perform deep analysis, and share

## Flyby

Via Carlo Puini, 97 int. 26/27 57128 Livorno  
T (+39) 0586 505016 [www.flyby.it](http://www.flyby.it) [info@flyby.it](mailto:info@flyby.it)

Flyby is an independent Italian company, specialized in the development of Decision Support Systems (DSSs) exploiting edge technologies in the field of Remote Sensing, Signal Processing and Big Data Analytics.

The company has been founded in 2001 with the aim to develop innovative solutions exploiting data analytics. Today we are operating worldwide providing our systems and services in different scenarios and market fields.

The company is managed by the founder, Dr. Emilio Simeone (M.S. in Physics, Ph.D. in Applied Optics), and the staff is composed by experts with M.S./Ph.D. level education and skills in Computer Science, Physics, Telecommunication, Electronics, Signal Processing Engineering and Artificial Intelligence.

Flyby operates in five different business sectors (Defence, Space, Health, Maritime&Fishing, Energy) with five related Strategic Business Units (SBUs) and Controlled Corporations: FlySight, siHealth, Flyby Space, BestFish and i-EM. i-EM (Flyby 70%, Enel 30%) and BestFish (Flyby 60%, PxL 40%) are currently two joint venture founded respectively in 2012 and 2016. siHealth Ltd is a UK company founded in 2015 (100% Flyby owned).

Transversally to the five SBUs, the Research & Development Department ensures a continuous growing of the edge competences in several technological fields.

Since its foundation, the Company has been continuously involved in a wide range of R&D projects funded by the European Space Agency (ESA), the Italian Space Agency (ASI), the European Commission (EC) and by other regional agencies. These participations allowed us to bring in the market state of art technologies for our customers.

All the processes in the Company are managed according to UNI EN ISO9001:2008 quality standards. For the more demanding Military and Space projects we apply the rules and the quality requirements set down respectively by the MIL-STD-498 and by the ECSS standards.

## The Group of Astrodynamics

Via Lariana, 5 00199 Roma  
T (+39) 06 97 88 14 40  
[www.gaussteam.com](http://www.gaussteam.com) [info@gaussteam.com](mailto:info@gaussteam.com)

The Group of Astrodynamics for the Use of Space Systems (G.A.U.S.S. Srl) is an Italian limited liability company based in Rome, founded in 2012 as a spin-off of the Scuola di Ingegneria Aerospaziale of Sapienza University of Rome, carrying on the school's more than twenty years tradition in the field of microsatellites. Active in the space technology field, its aims are the research, the development and the implementation of aerospace projects, plus the educational aspect and the execution of related cultural initiatives.

G.A.U.S.S. Srl has gained its experience from 8

## Geophysical Applications Processing

Via Amendola, 173 c/o Physics Department 70126 Bari  
T (+39) 080 5442180 [www.gapsrl.eu](http://www.gapsrl.eu) [info@gapsrl.eu](mailto:info@gapsrl.eu)  
[raffaele.nutricato@gapsrl.eu](mailto:raffaele.nutricato@gapsrl.eu) [mimma.ciola@gapsrl.eu](mailto:mimma.ciola@gapsrl.eu)

Geophysical Applications Processing s.r.l. is a spin-off company of Politecnico di Bari, established on February 2006, whose mission is to develop products, processes and services with technological and scientific value in the fields of satellite remote sensing, stereo vision and biomedical research, and related software/hardware technologies. All the activity is performed on the basis of competencies and pay-offs of research projects, particularly in the Remote Sensing Group of the Department of Physics of Bari, in collaboration with the Institute for high studies on Intelligent Automation Systems (ISSIA) of the National Council of Research (CNR), based in Bari, Italy.

During the last twenty years, the following scientific competences have been acquired:

- Synthetic Aperture Radar (SAR) data processing;
- Developing of a multi-temporal SAR interferometric processing chain (SPINUA © - Stable Points Identification in Non Urbanized Areas) for ground instability monitoring (subsidence, landslides, earthquakes);
- Analysis of optical data acquired by satellite platforms aimed at the inference of biophysical parameters such as water quality and chlorophyll;
- Meteorological and climate data processing; high resolution forecast services using numerical meteorological models;
- Development of signal and image processing algorithms using both interpreted and compiled programming languages (MATLAB, SCILAB, IDL, C, C++) as well as Assembly;
- Development of algorithms on parallel architectures and computational grids.

## Geocar

Viale del Basento, 120 85100 Potenza  
T (+39) 0971 56671 [www.geocart.net](http://www.geocart.net)  
[geocart@geocart.net](mailto:geocart@geocart.net)

Geocart is an engineering company that operates in the fields of Earth Observation, Environmental Monitoring, Engineering and Information and Communication Technology by providing technical expertise and highly innovative services. The core activity is the design, production and maintenance of geographical databases.

The company provides services related to the processing of satellite images and of geographic data acquired by means of terrestrial and aerial remote sensing with the use of traditional techniques and innovative instruments (GPS, laser scanner, photogrammetric cameras and sensors operating in different spectral bands).

Moreover, Geocart designs and develops multi-sensor integrated platforms and carries out GIS and cartographic editing and offers a consolidated experience on differential SAR interferometry techniques. Regarding SAR analysis, the company has



**GMSPAZIO**

Via Stefano Longanesi, 14 00146 Roma  
 T (+39) 06 4555 2502  
[www.gmspazio.com](http://www.gmspazio.com) [info@gmspazio.com](mailto:info@gmspazio.com)  
 T (+39) 335 5702 339

**Dott. Filippo Gemma MBA**

GMSPAZIO is a small hi-tech ICT enterprise based in Rome, made mainly of brilliant young engineers operating in the fields of Aerospace, Defense and Homeland Security to help customers managing:

- Complex Modeling & Simulation Scenarios,
- Space Surveillance & Tracking and Space Situational Awareness Systems,
- Missile Defense Network Analysis Systems,
- Satellite Remote Sensing Products and Services,
- UAVs Surveillance & Monitoring Activities,
- Offering Products, Services, Training, and Know-how transfer, to develop Integrated and Customized Information Systems, and customers' tailored ICT applications and related services.

GMSPAZIO operates in EU Countries and overseas markets delivering integrated solutions to the main actors of the aforementioned market segments, serving International and National Space Agencies, Ministries of Defense, Prime Contractors, Subcontractors, and Research Entities with state-of-the-art products and solutions used to produce high quality results saving time, money and resources.

**Tyvak International SRL**

Corso Castelfidardo, 30/A 10129 Torino  
[T \(+39\) 011 1911 6070](tel:+3901119116070)  
[www.tyvak.eu](http://www.tyvak.eu)  
[sales@tyvak.eu](mailto:sales@tyvak.eu)

Tyvak International SRL is one of the three operating groups and the first international branch of Terran Orbital Corporation. Terran Orbital teams are leading innovators and providers of nanosatellites and microsatellite space vehicle products that target advanced state-of-the-art capabilities for government and commercial customers to support operationally and scientifically relevant missions.

Tyvak International represents the most advanced and vertical integrated offer in the market of small space vehicle products and services. The proprietary technology and know-how, based upon the continuous progress in the miniaturization of semiconductors, enable to develop, design and commercialize small satellites platforms faster and cheaper with respect to traditional satellites systems. This also provides considerable opportunities to exploit the space more effectively and profitably.

Founded in 2015, during its first year Tyvak has successfully started the process of technology transfer from the USA headquarters, being able to start its own R&D activities. So far, Tyvak International has executed considerable space engineering projects, from mission concepts and feasibility studies to nanosat development and integration, launch integration services and procurement of launch opportunities, for commercial and institutional customers at international level. The company has established partnerships with important stakeholders

**GEO-K**

Via Carlo Bartolomeo Piazza, 30 00161 Roma  
 T (+39) 06 44292634  
[www.imtsrl.it](http://www.imtsrl.it)  
[imtsrl@imtsrl.it](mailto:imtsrl@imtsrl.it)

GEO-K was founded in April 2006 as the first spin-off company of the University of Rome "Tor Vergata". The mission of GEO-K is to conduct R&D activities and to provide consulting, services and products in the field of image processing and of microwave, optical and hyperspectral remote sensing. It is the commercial vehicle through which the scientific know-how developed by the University's Earth Observation Laboratory is made available to public and private initiatives in the form of user-oriented applications. Right after its birth, GEO-K was incubated within the European Space Agency (ESA) ESRIN center, where new technology, based on artificial neural networks for the processing of satellite data, was further developed.

The key-personnel of GEO-K is highly qualified and with significant experience in international activities. In fact, over the last few years GEO-K has been involved in contracts with national (Italian Space Agency) and international institutions (ESA, EUMETSAT) for the exploitation of EO data. Moreover, GEO-K is the only SME partner in the "URBANFLUXES" project, funded under the Horizon 2020 program, and aiming at estimating anthropogenic heat flux in urban areas from satellite data. The company has also acquired experience in providing educational sessions in EO, mainly addressing companies or technical groups.

**IngeniArs**

Via Ponte a Piglieri, 8  
 56121 Pisa  
 T (+39) 050 6396129  
[www.ingeniars.com](http://www.ingeniars.com)  
[info@ingeniars.com](mailto:info@ingeniars.com)

IngeniArs S.r.l. is an Italian spin-off company of the University of Pisa, born in 2014 (registered as "Innovative Start-Up" according to the Italian law 221/2012) from the large experience of his co-founders in the area of Electronics and Computer Science Engineering advanced research. Its ambitious goal is to provide an answer to the ever increasing demand of innovation in strategic areas such as aerospace, telemedicine and automotive. The main focus is the design, development and commercialization of Electronics Systems, Informatics Systems and innovative services. This is accomplished by offering highly advanced hardware/software solutions, and by managing the complete lifecycle of electronics, microelectronics and embedded systems.

IngeniArs has a consolidated network of partners, suppliers and customers, and can offer a wide range of high quality products and services being able to cope with cutting edge technologies and at the same time answer

## Iptsat

Via Sallustiana, 23 00187Roma  
T (+39) 06 42041717  
www.ipsat.com  
info@ipsat.com

The Iptsat has long been engaged in the development of solutions for the management and monitoring of land and environment through interaction with the users community GIS (Geographic Information System) and Remote Sensing, providing high level of professionalism in all aspects relative to the use of these technologies and proposing solutions with high added value.

The business sector in which Iptsat in 1982 initially concentrated its energies was that of GIS Geographic Information Systems, operating in developing applications for the management of geographic resources.

Since 1996 Iptsat draws new life and economic planning from a corporate reorganization operated to meet the growing demand for remote sensing data and the need to create new GIS solutions to meet ever-changing technology.

In the following years Iptsat signs an A.A.D. Acquisition, Archiving & Distribution agreement with ImageSat International, which enables the acquisition of exclusive high-resolution panchromatic data from EROS satellites in the constellation.

In the following years Iptsat signs an A.A.D. Acquisition, Archiving & Distribution agreement with ImageSat International, which enables the acquisition of exclusive high-resolution panchromatic data from EROS satellites in the constellation.

In 1999 Iptsat joined the Business Network of esri Italy, dealing with the sale, assistance and development of customized software ArcGIS. With the growth of its know-how, Iptsat pays special attention to training activities, offering training courses best suited to professions and businesses, with strong skills in computerized management of land and environment. Since April 2008 Iptsat AICA is the official test center for GIS ECDL (European Computer Driving License for Geographic Information System).

## ItalConsul

Via Frangipane, 24 00184 Roma  
T (+39) 06 6791818 F (+39) 06 69787432  
www.italconsul.net italconsul@italconsul.it  
m.paggi@italconsul.it

ItalConsul is an engineering services enterprise. Its Core Business is the Logistics Engineering, ie RAMS Analysis (CENELEC - Norm EN 50126) that make up the Integrated Logistics Support to Design of Systems and Equipments.

Decades of experience gained in RAMS Analysis led ItalConsul to develop its ability to Design in the fields of Mechanical, Electrical, Electronics Engineering (Machinery and Equipment), Software and Assessments. Moreover, ItalConsul extended over time its skills to simulations by software, such as Finite Element Analysis, Multi-domain and circuit simulations, too. The work-areas of ItalConsul concern Aerospace, Naval, Railway, Power Plants and manufacturing.

Then ItalConsul is engaged in Research & Development activities. Among its results it includes three patents, seventy scientific publications (also in prestigious journals) and the realization of "RelySoft", a software-tool, based on

## ITS

Via Monte Santo, 2  
00195 Roma  
T (+39) 06 45504949  
www.intese.com  
info@intese.com

ITS was established on 1st September 1999 and is formed by managers and entrepreneurs deriving their complementary experiences from a prolonged activity in the main aerospace Italian industries and from the mastery of the financial instruments necessary for the "start-up" of firms focusing in the high technological sectors.

Main motivation for the establishment of the Company was the awareness that a strong industrial capability in any Territorial District, regional, national or continental, can't be flourish without the availability of innovative technologies and advanced products, those are main ITS's objective. In this sense a particular attention is devoted to the relationship with Research and Final Users, carrying out industrial links which changes technologies into hi-tech products really usable.

Mission of ITS is to operate in the High Band of the Information Technology field for the markets of:

- Space
- Defense
- Energy

## Kayser Italia

Via di Popogna, 501 57128 Livorno  
T (+39) 0586 562 100  
www.kayser.it  
kayser@kayser.it

Kayser Italia is a Small Medium Enterprise (SME), a private independent aerospace system engineering company, owned by Dr. Valfredo Zolesi's family. It has been incorporated in 1986, and since 1995 it is 100% Italian property. The company is located in the countryside of Livorno, in the region of Tuscany, 20 Km south of the international airport of Pisa and 90 Km from Florence. In a modern building, the company has 5,000 sq. meters of property, organized into offices, meeting rooms, conference room, laboratories, clean room, manufacturing, inspection and integration area, and an User Support Operation center (USOC) for the support to the execution of experiments with astronauts on board the ISS.

Since the beginning up to 2015, Kayser Italia has participated to 64 space missions with 101 payloads, all of them completed with full scientific, technical, economic and programmatic success. The staff consists of 50 high-specialized engineers, with expertise in electronics, aeronautics, mechanics, thermodynamics, physics, computer science, optics and molecular biology. Their design and manufacturing capabilities, joined with a deep

**KELL**

Via Donat Cattin, 83 52100 Arezzo  
 T (+39) 06 36004916  
 F (+39) 06 3216937 [www.kell.it](http://www.kell.it) [info@kell.it](mailto:info@kell.it)

KELL is an ICT Italian company operating for over twenty years in the Space and ICT sectors developing SW and ICT smart solutions in the following fields of application: e-health, telemedicine, e-government, Earth Observation, remote sensing, mobile applications. Our Vision "make everyday life easier with computing by making the technology easy, usable and available to everyone through continuous innovation." This objective is pursued through a process of continuous innovation that promotes the exploitation of research and its dissemination in the industry and market.

The team is formed by young researchers and technicians, with strong and focused skills on ICT solutions, informatics, software engineers, electronic engineers, physicists, engineers, electronic, oceanographers, economist who form a young, dynamic and multidisciplinary group engaged in R&D activities performed for international and national Public Bodies and private organizations.

The main technologies and skills are: a) Information Technology: web platform and mobile solutions for e-Health applications; b) Earth Observation: Kell designs and develops software systems for telemetry processing and production and processing of remote sensing images, optical and SAR, archiving and distribution of data and quality control fusion and geo-location for smart agriculture, water and land management; c) Navigation

**LAER**

Via Caracciano 57/63 82011 Airola (BN)  
 T (+39) 0823 951634  
[www.laergroup.com](http://www.laergroup.com)  
[info@laergroup.com](mailto:info@laergroup.com)

LAER is a private company, AQ-ITA-SINCERT and NADCAP qualified, operating since 1989 in aerospace field. The core business is represented by large assemblies and manufacturing of metal and reinforced composites parts.

LAER is also involved in several ambitious R&D projects, assuring a continuous improvement of its products quality and technical competences.

**Imasrl**

Via Vercelli 6 10044 Pianezza (TO)  
 T (+39) 011 9672053

[www.lmasrl.com](http://www.lmasrl.com)  
[lma@lmasrl.it](mailto:lma@lmasrl.it)

With more than 45 years of commitment into the Aerospace Market, LMA is today a leading global supplier of integrated solutions for the most important players in the Space sectors.

A whole set of in-house capabilities gives LMA the ability to provide customers with any combination of services required - from the detailed-design, build-to-print manufacturing, to the assembly - and anything in between

**MapSAT**

C.da Piano Cappelle, 129 (area MUSA) 82100 Benevento  
 T (+39) 0824 52422 [www.mapsat.it](http://www.mapsat.it)  
[direzione@mapsat.it](mailto:direzione@mapsat.it)

MapSAT is an Italian newCo, based in Milan (Italy) and established in March 2015. The principal place of operations is located in Benevento (Campania Region - Italy) in order to meet a specific sector of the market, related to the growing demand for products and services of remote sensing for continuous monitoring of the Earth's soil and sea. These activities are aimed at protecting environment and climate, citizens security, urban planning, development of energetic and electrical infrastructure, prevention of human and natural risks and, more generally, updating and control of the elements of main interest to constantly increase the knowledge of territorial changes.

MapSAT targets both public and private clients, with the aim of creating technology platforms dynamic and flexible, able to satisfy both of these stakeholders, working on customizing the hardware and software solutions based on the same technology.

Since 2004, the MARSec Ground Station has been acquiring data from Aqua and Terra NASA satellites equipped with MODIS sensor. This experience has given the opportunity of configure and adapt the systems to acquire EROS-A starting from August 2005, RadarSat-1 from 2006 and EROS-B since 2009.

The X-band Antenna System is SeaSpace TeraScan 4.4m, three axes X-Band Polar Satellite Tracking Antenna. The Antenna is connected to the Equipment Racks located in Equipment Room.

The distance is about 146 meters therefore the tracking/carrier frequency is down-converted to 720 MHz. The antenna is configured to acquire EROS-B, EROS-A, Terra and Aqua missions.

**MEC**

Via San Nicolò di Villola, 1 40127 Bologna  
 T (+39) 051 6333403 [www.mec-mmec.com](http://www.mec-mmec.com)  
[contact.mec@mec-mmec.com](mailto:contact.mec@mec-mmec.com)

**Giorgio Mariani**

[giorgio.mariani@mec-mmec.com](mailto:giorgio.mariani@mec-mmec.com)

MEC was founded in 2004, as spin-off of Bologna's and Ferrara's Universities, in order to offer to the Italian and European enterprises, the know-how coming from the university R&D department in the field of microwave electronic components, with a main focus on MMIC and TR Modules. The Company's expertise and core business, are based on the executive design, lay-out generation, on wafer probe test, on jig electrical & thermal characterization of MMIC.s and discrete active components.

The leading technologies based on GaAs and GaN semiconductors are used in our projects. A manpower of fifteen PhD Engineers, with solid background and expertise in MMIC design, make the strength of our Company. Further, the most advanced software tools, based on ADS, Microwave Office Sonnet EM and

## Media Lario

Località Pascolo 23842 Bosisio Parini (LC)  
T (+39) 031 867111  
www.media-lario.com  
info@media-lario.com

Media Lario S.r.l. is a dynamic and innovative technology-driven company with more than two decades of experience supplying advanced optical components and optical systems.

The company works with leading industrial and agency partners including ASI, ESA, NASA, INAF, INAOE, Max-Planck Institutes, Thales Alenia Space Italia, Leonardo Finmeccanica, OHB, ASML, and others.

Media Lario's products are aboard space missions such as Beppo-SAX, SWIFT, XMM, eROSITA, ROSETTA, INTEGRAL, CHEOPS, and installed in terrestrial observatories such as IRAM, ALMA, LMT, MAGIC.

The company is located in Italy, within the industrial hub of Milan, an area rich with opto-mechanical expertise and experience with space programs.

## Nadir

c/o Campus Scientifico Università Cà Foscari  
Venezia  
Via Torino, 155b 30172 Mestre (VE)  
T (+39) 041 2346711  
T (+39) 348 3639396  
www.nadir-tech.it  
[scatto@nadir-tech.it](mailto:scatto@nadir-tech.it)

Nadir S.r.l. is a small enterprise which heads some experienced researchers that decided to focus their activities in the development of a novel atmospheric plasma technology and innovative nanocomposites polymers materials with active and smart functionalities.

## NEXTANT

Via Andrea Noale, 345/A 00155 Roma  
T (+39) 06 91139002 [www.nais-solutions.it](http://www.nais-solutions.it)

### Marco PASCALE

[marco.pascale@nais-solutions.it](mailto:marco.pascale@nais-solutions.it) T (+39) 335 7781148  
NEXTANT Applications & Innovative Solutions – NAIS was founded in 2005 with headquarters in Rome, with the mission to design innovative applications in the Aerospace market, based on the ICT infrastructure and satellite technologies of Navigation, Earth Observation and Telecommunication. For this purpose, NAIS continuously invests in research activities financed by equity and participating in R&D projects, co-financed by the National and International programs; in partnership with other Companies, Universities and Research Centers.

The overtime expertise in satellite assets and ICT technologies allowed NAIS to develop Innovative applications in the field of: Smart-mobility (solution for both citizens and tourists transportation support and information); Emergency (mission management and

## Open Sky's

C.so Santi Felice e Fortunato, 105 36100 Vicenza  
T (+39) 02 47931234 [www.opensky.it](http://www.opensky.it)  
[info@open-sky.it](mailto:info@open-sky.it)

Connecting anybody anywhere has been our motto and goal from the very beginning. This is why in 2001 Open Sky started a partnership with Eutelsat, one of the leading satellite Internet providers worldwide, and committed to the challenge of connecting 100% of the Italian territory. Because the digital divide, lack or poor Internet terrestrial connections, was largely spread throughout Italy, an exciting technological and business opportunity lay ahead of us. Soon Open Sky increased its expertise and market share to become the Italian leading telecom operator by number of Tooway subscribers and today our network includes 2500 authorized Smart Installers and 140 dealers.

The trusting relationship and cooperation with our client companies changed our role from service provider to consultant and partner in the technological endeavours of businesses and professionals. As a result, we were able to design breakthrough B2B satellite services to meet the diverse needs of our clientele, such as the remote control of surveillance systems for monitoring, and telemetry to backup data to the live streaming.

Our other passion is the distribution of digital content to theatres via satellite. Open Sky's Cinema Division is now the Italian leader in the industry as it broadcasts more than 300 films per year, which equals about 85% of the shows broadcast via satellite. In 2015 we launched Cinema On Demand, a digital delivery through broadband connection. This service makes it possible for theatres to select and download DCP and trailers from our online catalogue.

## Planetek Italia

Via Massaua, 121 70132 Bari  
T (+39) 080 9644200  
[www.planetek.it](http://www.planetek.it)  
[info@planetek.it](mailto:info@planetek.it)

Planetek Italia is an Italian SME, established in 1994, which employs 45 men and women, passionate and skilled in Geoinformatics, Space solutions, and Earth science.

We provide solutions through all phases of data life cycle from acquisition, storage, management up to analysis and sharing. Application areas: satellites missions & cosmic exploration; environmental & land monitoring, open-government & smart cities.

Main activity areas are: On board payload data processing and compression, radar and optical data processing for the ground segment, systems for the satellite attitude determination, software for EGSE, mission planning and real-time system; Satellite, aerial and drone data processing for cartography and geo-

insured risk requires a considerable breadth of experience and technical knowledge and we work closely with one of the world's largest satellite operators, Telesat, who provide valuable technical expertise.

With the growth of applications such as HD television, broadband internet access through satellite and satellite imagery, this niche market is primed for growth. Meticulous attention is given to providing a bespoke wording for each risk. These can vary greatly depending on the type of satellite and its intended use.

#### **INTERNATIONAL SPACE BROKERS, INC.**

**Contact:** Jeffrey Poliseno

**Job Title:** Chief Executive Officer

**Address:** 1300 Wilson Boulevard, Suite 990, Rosslyn, VA 22209, USA.

**Tel:** +1 703 276 4900

**Fax:** +1 703 276 4901

**Email:** Online Form

**Website:** [www.aon.com/industry-expertise/space.jsp](http://www.aon.com/industry-expertise/space.jsp)

International Space Brokers (ISB), part of Aon Risk Solutions, is the world's only insurance broker dedicated exclusively to the space industry. We harness our insurance and space industry expertise to make complex situations simple, developing innovative responses that bring value to our clients.

The ISB team brings together experts in space engineering, contract negotiation, finance, risk management and insurance. In less than two decades we have become one of the most respected names in space insurance, with a client list that includes eight of the world's top 20 satellite companies. We currently place over 35% of the world's space insurance premium.

#### **CCTV INTERNATIONAL**

**Address:** Blk D, Wanghailou, No. 10 West 3rd Ring Road (Central), Haidian District, Beijing, 100142, China PR.

**Tel:** +86 10 8804 6666

**Fax:** +86 10 6851 1134

**Email:** Online Form

**Website:** [www.cctv.com](http://www.cctv.com)

China Central Television (CCTV) is the national TV station of the People's Republic of China and it is one of China's most important news broadcast companies. Today, CCTV has become one of China's most influential media outlets. CCTV NEWS is the English language news channel of China Central Television (CCTV), the nation's largest national broadcasting network.

#### **MULTICHOICE AFRICA**

**Address:** Abayode Savage Close, Victoria Island, Lagos

**Tel:** +234 80345 46088, 8023702646

**Fax:** +23410 6851 1134

**Email:** Online Form

**Website:** [www.dstv.com](http://www.dstv.com)

From small beginnings, *MultiChoice Africa* has grown into a pay-TV giant. It all began in South Africa in 1986 when M-Net was founded as one of the first two subscription television services outside of the United States, and *MultiChoice Africa* was incorporated to provide subscriber management services for pay television bouquets. Today, MultiChoice operates in 50 countries across sub-Saharan Africa including the Indian Ocean islands. Currently DSTv is available in all 50 countries via satellite and GOtv is available in 8 countries with an aggressive roll out plan for further country expansion to new countries.

"When first established, M-Net used terrestrial frequencies to broadcast an encrypted signal with sports and movie programming". Subscribers bought a decoder and paid monthly subscriptions. "M-Net obtained a license from the South African government for its terrestrial channel, as a pay TV service with two hours per day free-to-air broadcasting which turned out to be an important marketing tool, since non subscribers could see the exclusive programming contained in M-Net during this open time".

By 1993, M-Net had leased a satellite transponder, which gave C-band (satellite transmission frequency) footprint over sub-Saharan Africa. This was leased from INTELSAT, the global communications satellite network. "At that time, the world's governments, through their Posts and Telecommunications Authorities, controlled INTELSAT". Accordingly, M-Net set up MultiChoice to be a satellite platform for delivery of television services throughout Africa. Recently, Multichoice Africa activated one additional transponder on the Eutelsat 36A satellite in March, with a second one in May, this takes to 22 the total number of transponders leased by Multichoice at Eutelsat's 36 degree video neighborhood.

#### **ZEE TV**

**Address:** 135 Continental Building, Dr. Annie Besant Road, Worli, Mumbai, 400018, India.

**Tel:** +9122 2493 9694

**Fax:** +9122 2493 1925

**Email:** [response@zee.esselgroup.com](mailto:response@zee.esselgroup.com)

**Website:** [www.zeetv.com](http://www.zeetv.com)

Zee TV, the flagship channel of Zee Entertainment Enterprises LTD was launched in October 1992. With a

reach of more than 169 countries and access to more than 670 million viewers globally, Zee TV has created strong brand equity and is the largest media franchise serving the South Asian Diaspora. Realizing its strength in programming and the need for Indian entertainment in the overseas market, it launched Zee TV in the UK / Europe (1995), the USA (1998), Africa (1998) and is available across five continents. Nearly two decades since its launch, Zee TV has driven the growth of the satellite and cable industry in India. The popularity of Zee arises from its understanding of Indian culture and beliefs which are depicted in its programming.

#### **GVF**

**Contact:** David Hartshorn  
**Job Title:** Secretary General  
**Address:** Fountain Court, 2 Victoria Square, Victoria Street, St Albans, Hertfordshire, AL1 3TF, UK.  
**Tel:** +44 1727 884 513  
**Email:** david.hartshorn@gvf.org  
**Website:** www.gvf.org

GVF serves as the unified voice of the international satellite industry. The association, which is non-profit and non-partisan, was founded in 1998 by 27 companies from throughout the world and has grown to a membership of 165 commercial organisations from more than 60 countries. Whether your organisation is a satellite service or system provider, a regulator or ministry, or an end user, we would be honoured to facilitate your participation in this dynamic industry.

#### **INTERNATIONAL TELECOMMUNICATION UNION**

**Contact:** Houlin Zhao  
**Job Title:** Secretary General  
**Address:** Place des Nations, 1211 Geneva 20, Switzerland.  
**Tel:** +41 22 730 5111  
**Fax:** +41 22 733 7256  
**Email:** itumail@itu.int  
**Website:** [www.itu.int](http://www.itu.int)

ITU is the United Nations specialized agency for information and communication technologies – ICTs. We allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide. ITU is committed to connecting all the world's people – wherever they live and whatever their means.

#### **BHARTI AIRTEL**

**Address:** Qutab Ambience (at Qutab Minar), Mehrauli Road, New Delhi - 110 030, India.

**Tel:** +91 222 762 9000  
**Fax:** +91 222 762 9010  
**Email:** Contact Form  
**Website:** www.airtel.com

#### **Products:** Global Telecommunications Provider

Headquartered in New Delhi, India, the Company ranks among the top 3 mobile service providers globally in terms of subscribers. In India, the Company's product offerings include 2G, 3G and 4G wireless services, mobile commerce, fixed line services, high speed DSL broadband, IPTV, DTH, enterprise services including national & international long-distance services to carriers. In the rest of the geographies, it offers 2G, 3G and 4G wireless services and mobile commerce. Bharti Airtel had over 342 Mn customers across its operations at the end of March 2016.

Airtel is bridging the gaps in the worldwide fibre network coverage through our satellite services that fully complement our fibre infrastructure for emerging markets. Airtel Business continues to provide a one-stop network solution to customers, leveraging its efficient network capability. The satellite service provider industry is slowly progressing from conventional geo-stationary satellites to medium and low orbit satellites. The advantage is 'high throughput' and 'low latency' to the global network. Airtel Business is among the very first adaptors and promoters of this technology. It has partnered with medium earth orbit (MEO) satellite providers to delight its customers with the affordable and efficient network solution on this platform.

#### **CODAN LIMITED**

**Address:** 81 Graves Street, Newton SA 5074, Australia.  
**Tel:** +61 8 8305 0311  
**Fax:** +61 8 8305 0411  
**Email:** info@codan.com.au  
**Website:** www.codan.com.au

#### **Products:** Antennas | Repeaters | Amplifiers

Codan Limited is a group of electronics-based businesses that capitalise on their fundamental design and manufacturing skills to provide best-in-class electronics solutions to global markets. Codan Limited is a global company with additional business, engineering, and technical support facilities in Canada, United States of America, United Kingdom, Ireland and United Arab Emirates. Codan Limited is a publically traded company on the Australian Securities Exchange (ASX – CDA) with approximately 375 employees worldwide. Codan Limited invests significant resources and utilises its experience and expertise to develop new solutions and state-of-the-art turnkey systems to meet specific user requirements.

#### **DATASAT COMMUNICATIONS LTD**

**Address:** Tavistock Estate, Twyford, Berkshire, RG10 9NJ, UK.  
**Tel:** +44 118 934 9199

**Fax:** +44 118 934 9198  
**Email:** sales@datasat.com  
**Website:** www.datasat.com  
**Products:** Remote Communications Solutions | TETRA

Datasat has been in business for over 30 years providing principally innovative Satellite Communications Solutions to Enterprise and Government Customers Globally. It is a long standing Intelsat Partner. It is also an Intel distribution and development partner. The company was founded in the 1980's initially to provide an innovative solution for real-time global distribution of Stock Market Prices for the London Stock Exchange. Datasat has delivered solutions in over 160 countries often in challenging conditions. Datasat Communications Ltd. provides satellite services. The Company designs, build, manage, and maintain global networks. Datasat Communications creates satellite network infrastructures for the latest voice, data, satellite broadband, satellite internet, and converged internet protocol applications.

#### **BAYCOM**

**Address:** No.30-2, Jalan PJU 8/5B, Bandar Damansara Perdana, 47820 Petaling Jaya, Selangor, Malaysia.  
**Tel:** +60 3 7728 0063  
**Fax:** +60 3 7728 0353  
**Email:** sales@baycom.com.my  
**Website:** www.baycom.com.my  
**Products:** Managed Satellite Network Provider

BAYCOM is your single point of contact for industry-leading voice, video and data solutions. Our goal is to help organizations of all types operate safely and with maximum efficiency. Above all, we provide the communication needed in order to be your lifeline in the moments that matter. BAYCOM is a premier reseller and service provider of wireless voice and data communications and video surveillance solutions for businesses, schools, state and local government, and public safety organizations across the United States.

Our mission is to keep communities and workforces secure and connected by providing value-rich technology that drives efficiency and safety. Our highly trained service team focuses on aligning solutions with customer goals while working within the reality of budget constraints.

#### **VODACOM NIGERIA**

3A Aja Nwachukwu close,  
 Ikoyi,  
 LAGOS  
**Tel:** +234  
**Fax:** +234  
**Email:** sales@vodacom-nigeria.com  
**Website:** www.vodacomng.com  
**Products:** Satcom Services | Networks

#### **COMPUTER WAREHOUSE GROUP PLC**

Block 54A, Plot 10, Off Rufus Giwa Street  
 Off Adebayo Doherty Road  
 Off Admiralty Way  
 Lekki Phase 1, Lagos  
**Tel:** +234 7030079110  
**Email:** sales@cwg-plc.com  
**Website:** www.cwg-plc.com  
**Products:** Modems | Satcom Services | Networks/Data/Voice

With over two decades of immense contribution to the Information and Communication Technology sector, CWG Plc has continuously remained a benchmark for excellence in Africa. The company commenced operations in Nigeria, on September 26th 1992 as Computer Warehouse Limited principally to cater for the hardware projects. In 1994, DCC Networks was established as the communication arm to provide VSAT, Metropolitan, Wide Area and Local area networks to corporate organizations. To concentrate on demands in the area of software solutions, system and training, the Expert Edge software was acquired in 1997. With over two decades of immense contribution to the information communication and technology sector, CWG Plc has continuously remained a benchmark for excellence in Africa.

#### **IPNX**

4, Balarabe Musa Crescent,  
 Victoria Island,  
 Lagos.  
**Tel:** +234 815964016  
**Email:** sales@ipnx-nigeria.com  
**Website:** www.ipnx-nigeria.com

**Products:** Modems | Satcom Services | Networks

ipNX is one of Nigeria's fastest growing Information and Communications Technology companies, serving a multitude of needs across enterprises, small businesses and residents with innovative, world-class services. Our ability to identify, satisfy and exceed today's market needs is a testament to over a decade of experience, our commitment, drive and passion realized through highly skilled and well seasoned professionals. As a pioneer and a leading Fibre-To-The-Home (FTTH) operator in Nigeria, we currently provide a number of solutions to various industries and market segments using industry-leading technology (such as our very own Fibre-To-The-Home (FTTH) cable technology) as our core access network infrastructure and fixed wireless radio services (via licensed frequency). We also proffer complementary IT solutions, with a view of covering key commercial and suburban regions.

#### **TELNET GROUP**

Plot 242 Kofo Abayomi Street,  
 Victoria Island, Lagos.  
**Tel:** + 234 1 4611 747, +234 740 6890, +234 8022245991  
**Fax:** +234 740 6890  
**Email:** sadeleye@iteco.com  
**Website:** www.telnetng.com

**Products:** Modems | Satcom Services | Networks

All Companies are turning into digital businesses. A digital business serves its customers using mobile phones, the internet and a variety of other technologies that do not require the physical presence of the customer and of the business. 10 years ago, going online with a website was a nice to have, now you need to be reachable and able to do business on the phone, with whatsapp on FB, etc.

Companies struggle to use all of these digital channels at scale without errors. Companies struggle in seeing how all of these can drive business outcomes. Successfully going digital requires a deep understanding of the underlying technology and the complex interactions between infrastructure, software and the Nigerian environment.

**Telnet helps companies become digital.**

**NEWTEC**

**Address:** Newtec Cy N.V., Laarstraat 5, B-9100, Sint-Niklaas, Belgium.

**Tel:** +32 3 780 65 00

**Fax:** +32 3 780 65 49

**Email:** sales@newtec.eu

**Website:** www.newtec.eu

**Products:** Modems | Modulators | Satcom Services | Networks

For over 30 years Newtec has developed satellite communication equipment and technologies for broadcast, government and defense, IP trunking and consumer and enterprise VSAT. Our dedicated team meets industry standards with efficient, scalable and economical solutions. Through our expertise and in cooperation with our customers we make the world a safer, more informed and connected place. Newtec's portfolio of satcom products and technologies meet the highest operational requirements for professional reliability and service availability. They can be applied in a wide range of markets such as Broadcast, IP Trunking & Backhauling, Consumer & Enterprise VSAT, Government & Defense and their respective applications.

**PARADIGM**

**Address:** Paradigm House, 14 Wilsom Road, Alton, Hampshire GU34 2PP, UK.

**Tel:** +44 1420 88199

**Fax:** +44 1420 88842

**Email:** sales@paracomm.co.uk

**Website:** www.paracomm.co.uk

**Products:** Terminals | Earth Stations

Paradigm has been making satcom simple since 1996. We work closely with our customers so that we completely understand the challenges and complexities they can face when using satcom in the field. This knowledge is then used to improve, advance and sometimes completely redesign the technology, utilising our high levels of engineering excellence to produce state-of-the-art solutions which really make a difference. As a privately-owned, global enterprise, we are able to respond quickly to our customers' specific needs and feedback, providing clear sighted solutions that are reliable, optimal and innovative.

**SUPERNET**

**Address:** 10th Floor, Tower B, World Trade Centre, 10 Khayaban-e-Roomi Block 5, Clifton Karachi-75600, Pakistan.

**Tel:** +92 21 3587 1864-7

**Fax:** +92 21 3587 1869

**Email:** sales@super.net.pk

**Website:** www.super.net.pk

**Products:** Data Networking Solutions

Supernet is the wholly owned subsidiary of Telecard Limited, a public company listed on the Pakistan Stock Exchange. Telecard is a full-service telecommunications provider with licenses for both Local Loop (LL) and Long Distance & International (LDI) Services. While Telecard's roots are in the public payphone market, today Telecard provides a suite of services to Corporate Customers in Pakistan, as well as International Wholesale services. More information on Telecard can be found at [www.telecard.com.pk](http://www.telecard.com.pk) We have demonstrated the reliability, innovation, and consistency to serve the evolving needs of the Pakistani market for more than 20 years.

We are part of a group of businesses which have consistently demonstrated the ability to adapt to a changing environment and bring new technologies and services to the Pakistani market. Supernet offers a full portfolio of local-to-global communications solutions to enable key business processes of its customers. With its unmatched technical expertise, extensive range of services and solutions, and broadest presence of support staff, Supernet is ready to connect your business anywhere!

**FOXCUM**

**Address:** 16 Hataasia St., Har Tuv A, Beit Shemesh, Israel 99052.

**Tel:** +972 2 589 9888

**Email:** sales@foxcom.com

**Website:** www.foxcom.com

**Products:** Satcom Solutions

Foxcom manufactures advanced RF over fiber solutions for the commercial, government, and military markets. The company's extensive portfolio of RF optical solutions covers a wide range of applications, from in-building wireless coverage to satellite ground station connectivity. Foxcom's capabilities cover DC to 15 GHz with superior performance, making Foxcom the supplier of choice for leading satellite operators, broadcasters, integrators, and broadband service providers. Building on its strong technological foundation of optical broadband solutions, the company is an industry leader in product quality, reliability, and customer satisfaction. The company's RF/optical product lines are designed to meet the needs of four market segments: satellite communications, multifamily housing TV distribution, in-building wireless coverage solutions, and military satellite solutions.

**HORIZON SATELLITE SERVICES**



**Address:** PO Box 502343, Office Number 406, Zee Tower, Dubai Media City, UAE.

**Tel:** +971 4 391 5122

**Fax:** +971 4 391 2906

**Email:** Online Form

**Website:** www.horizon-satellite.com

**Products:** Managed Broadband Solutions | IP Trunking | GSM Backhauling

Horizon Satellite Services Fz-LLC was founded in 2004. The company's line of business includes the dissemination of visual and textual television programs on a subscription or fee basis. HorizonSat - connecting people across horizons HorizonSat, with its strong presence in the satellite communications industry in the Middle East, Asia and Africa, provides satellite services to large corporations, telecom operators, broadcasters and ISPs. Leveraging the latest innovations in satellite technology, HorizonSat delivers quality end-to-end customized solutions to its clients. Operation out of its headquarters and state-of-the-art network operations center in UAE, with teleport facilities in Germany, HorizonSat ensures uninterrupted transmissions through unparalleled redundancy and a superior level of technical support on a 24/7 basis.

## INTERNET SOLUTIONS

**Address:** The Campus, Le Mans Building, 57 Sloane Street, Bryanston Gauteng, South Africa.

**Tel:** +27 011 575 1000

**Email:** info@is.co.za

**Website:** www.is.co.za

**Products:** Managed Provider of Internet services. Network Services

The company is an Internet services provider (ISP), providing connectivity and related services across the African continent. IS is a Pan-African telecoms service provider to public and private sector organisations that have, or want to establish a presence on the African continent. We have been providing innovative end-to-end telco solutions and related services for more than 20 years. Today, IS is at the forefront of Internet Protocol-based technologies and we build solutions and services tailored to the increasingly complex demands of organisations across the enterprise, public sector, global carrier and growing small-to-medium business sectors. As a wholly owned subsidiary of the Dimension Data Group and part of NTT, IS leverages its infrastructure and global footprint to support organisations with the rapid deployment of emerging technologies.

Headquartered in South Africa, we have operating offices in Mozambique, Kenya, Nigeria, Ghana and the UK. We also have international PoPs (Point of Presence) in New York, London, Germany, Hong Kong and Singapore as well as 63 PoPs across the African continent. The company has over 15,500 sqm of data centre space across the African continent and is the largest provider of alternate last mile services in South Africa. Internet Solutions also has the largest network of WiFi hotspots.

## ISAT AFRICA

**Address:** 105, Building 10, PO Box 500459, Dubai Internet City, Dubai, UAE.

**Email:** Online Form

**Website:** www.isatafrica.com

**Products:** Satellite Broadband | Teleport Collocation | Broadcasting

iSAT Africa is a UAE based company and a subsidiary of Wananchi Group Holdings, a fast growing fixed satellite solution service provider in Africa. iSAT's Satellite Solutions, backed by powerful Satellites, Teleport infrastructure and latest chosen technology solutions are unique in the industry, whether it's for transmission of video, data or voice services. Our customers include the leading media and network companies, multinationals, ISPs, Telcos and governmental agencies. We work closely with our partners and service providers to create the best solutions for Data, Voice and Video type requirements for our customers using our satellite and terrestrial infrastructure. Our mission is to transform the way Africa gets and stays connected with rest of the World through our carrier grade connectivity for voice, data and video applications increasing business opportunities in all kinds of diverse and challenging environments. iSAT Africa, through its Satellite Teleport Services, is offering solutions that deliver efficient, reliable and affordable data, Internet, voice and video connectivity to enterprises, governments, carriers, media and broadcast, whilst providing value to its customers through comprehensive end-to-end solutions, turn-key projects, managed network services and network outsourcing. Through these services ISAT Africa is setting standards for transmission in rural and urban regions of East Africa.

## ITC GLOBAL

**Address:** Level 7, PPF Plaza - Front Tower, Kanyatta Road, Mwanza, Tanzania.

**Tel:** +255 2 8250 6004

**Fax:** +255 2 8250 6005

**Email:** sales@itcglobal.com

**Website:** www.itcglobal.com

**Products:** Satellite Communications

ITC Global was founded in 2001 to bring carrier-grade telecommunications and networking technologies to developing markets and remote and harsh locations. Our vision and mission are simple. Build the world's best satellite communications provider by offering the best technical solutions, backed by the best customer service in the industry. We specialize in satellite-based communications for industrial operations in extreme environments, including deep-water energy exploration, remote mining and transoceanic shipping. Today ITC Global is the number one provider of satellite communications networks to the mining industry and among the top three providers to the oil and gas industry. Part of the Panasonic family, ITC Global offers global-scale presence and local on-site support. We engineer every ITC Global solution to fit the specific requirements of each customer. We build our solutions with best-in-class components, proven engineering and the availability of unparalleled network capacity.

## IWAY AFRICA

**Address:** Suite 223/224 Grand Baie Business Park Air and Geranium Street, Grand Baie, Mauritius.

**Tel:** +230 26 393 22

**Fax:** +230 26 310 67

**Email:** Mauritius@iwayafrica.net  
**Website:** www.iwayafrica.com  
**Products:** VSAT | VoIP | Wireless Broadband | MPLS

iWayAfrica is a leading African ISP, offering solutions over satellite, fibre optic and wireless networks. iWayAfrica's expertise lies in designing, installing and operating networks to suit customers' requirements. The Group currently services over 67,000 corporate subscribers and over 20,000 consumer subscribers across Sub-Saharan Africa. Through our own primary operations, distributor and affiliate network across the continent, our direct presence spans across 44 African countries. iWayAfrica was formed as the result of the amalgamation of MWEB Africa, Africa Online and AFSAT in 2008 when MWEB Africa was purchased by Telkom SA.

#### **KOLAGEN TELECOM**

**Address:** 27 BP 805, Abidjan 27.

**Tel:** +225 22 41 12 68

**Fax:** +225 22 41 12 48

**Email:** info@kolagen-telecom.com

**Website:** www.kolagen-telecom.com

**Products:** Telecomms KOLAGEN TELECOM West Africa SA is an Ivorian limited private company with 100 million CFA francs Share Capital. Its HQ in Abidjan, 1598 Rue des Jardins, Les 2 Plateaux Cocody, in Cote d'Ivoire (Ivory Coast), the Hub of West Africa, an ideal location to provide service within West and Central Africa Region. KOLAGEN TELECOM West Africa started with Audit, and Support services in telecommunication network engineering, but also Mobile network infrastructure supply, installation and commissioning. Since November 2008, the Company was granted from the ARTCI, the Telecom sector Regulatory Body of Côte d'Ivoire the following licenses: KOLAGEN TELECOM West Africa is part of the GVF community (member) providing Internet and Satellite Communication services to NGO, Government services and Corporate Companies in Cote d'Ivoire. Kolagen Telecom West Africa is SatADSL solution main Distributor for Ivory Coast and BePartner for Newtec in the Region. With its internal skilled resources (all GVF certified), KOLAGEN TELECOM West Africa also acts as a service integrator in the West and Central Africa region, enabling Satellite service provider to get deeper down in the value chain to meet customer "end to end" and full Managed Services requirement. KOLAGEN TELECOM West Africa with its vast and deep knowledge of the Africa Region Market provides Consultancy service in supporting Telcos with actual and accurate market intelligence to help them make informative decision about their business move in

the region. Networks

#### **ARQIVA**

**Address:** Crawley Court, Winchester SO21 2QA UK.

**Tel:** +44 1962 823 434

**Email:** enquiries@arqiva.com

**Website:** www.arqiva.com

**Products:** TV | Radio | Network Solutions | Mobile | IoT,

Arqiva is a leading UK communications infrastructure company, behind the scenes delivering millions of vital connections. Every day our infrastructure and associated services enable millions of people, businesses and machines to connect wherever they are through TV, radio and machine-to-machine data services.

We are the only supplier of national terrestrial television and radio broadcasting services in the UK and our advanced networks support the critical passage of data and content from connected TVs, and smart meters for water, gas and electricity. Our customers include major UK and international broadcasters such as the BBC, ITV, Sky Plc., Turner Broadcasting, the independent radio groups and major utility companies and networks.

We carried the BBC's first television broadcast in 1936, were behind the first satellite TV tests in the 1970s, launched the UK's national DAB radio and digital terrestrial television networks in the 2000s and are a key part of the national roll out of smart gas and electricity meters in the North and Scotland. Our expertise in managed networks has also seen us develop a growing presence in the water industry, helping utilities companies meet their leakage reduction targets.

#### **Company: AIRBUS DEFENCE AND SPACE**

**Address:** 31 rue des Cosmonautes, 31402 Toulouse Cedex 4, France.

**Tel:** +33 5 62 19 62 19

**Email:** telecomsat@airbus.com

**Website:** www.space-airbusds.com

**Products:** Satellite Systems | Telecoms | Services  
**C2SAT**

**Address:** Isafjordsgatan 32B, SE-16440 Kista-Stockholm, Sweden.

**Tel:** +46 8 705 9500

**Email:** info@c2sat.se

**Website:** www.c2sat.com

**Products:** Stabilised Maritime VSAT Antenn

With a 50-year track record of innovation, technological firsts and industry milestones, Airbus has lived up to its official motto, "We Make It Fly," from the company's creation. Today, Airbus is a leader in designing, manufacturing and delivering aerospace products, services and solutions to a customer base that spans the globe – with operations for commercial aircraft, helicopters, defence and space.

#### **LIQUID TELECOMMUNICATIONS LTD**

**Address:** 5th Floor, Ebene Mews, 57 Cybercity, Ebene, Mauritius.

**Tel:** +230 466 7620  
**Email:** info@liquidtelecom.com  
**Website:** www.liquidtelecom.com  
**Products:** Data, Voice and IP Provider

Liquid Telecom is a leading communications solutions provider across 13 countries primarily in Eastern, Central and Southern Africa that serves mobile operators, carriers, enterprise, media and content companies and retail customers with high-speed, reliable connectivity, hosting and co-location and digital services. It has built Africa's largest independent fibre network, spanning over 70,000km, and operates state-of-the-art data centres in Johannesburg, Cape Town and Nairobi, with a combined potential 19,000 square metres of rack space and 78MW of power. This is in addition to offering leading cloud-based services, such as Microsoft Office 365 and Microsoft Azure, across our fibre footprint. Through this combined offering, Liquid Telecom is enhancing customers' experience on their digital journey. A subsidiary of Econet Global, Liquid Telecom began life as the satellite and voice operator Econet Satellite Services, which was founded in 1997. Rebranding to Liquid Telecom in 2004, we went on to launch our high-speed, cross-border fibre network linking Southern Africa to the rest of the world in 2009. And now we've grown to provide services to more than 50 global wholesale carriers operating in Eastern, Central and Southern Africa, Europe, North America and Asia Pacific, as well as the national and international enterprise market. Operators and users alike are seeing the benefits of our reliable, cost-effective communications infrastructure. We set out to challenge the status quo. Today, we're changing the African telecoms industry, the lives of millions and even the continent itself.

#### **LOGICAL WIRELESS PTY LTD**

**Address:** Fountain Grove – Suite 7, No 5, Second Road, CNR William Nicol Drive, Hyde Park 2196, Johannesburg, South Africa.  
**Tel:** +27 11 530 9300  
**Fax:** +27 11 327 2700  
**Email:** info@logical.co.za  
**Website:** www.logical.co.za  
**Products:** VSAT | Internet | Voice | Data

Logical Wireless specialises in providing satellite and Wireless communications solutions, as well as complimentary products and other connectivity solutions. Logical Wireless offers high quality BettaSat solutions to the consumer on the African continent. Our satellite solutions brings connectivity to the remotest of areas, providing Internet, Data, and Voice on Ku & C-band platforms, via state of the art Teleports in Johannesburg and the United States.

#### **MECONNECT**

**Address:** Jebel Ali Free Zone, Area RA08-CA04  
**Tel:** +971 4 8837071  
**Email:** sales@meconnect.net  
**Website:** www.meconnect.net

**Products:** Modems | VSATs | Wireless | Cables | Test & Measurement

MEconnect FZCO is a united company that firmly believes in working for quality and customer satisfaction, propelling it among the ranks as the leading distributor in products of excellence for Telecom and IT Solutions. Based in Jebel Ali Free Zone and having its warehouses, MEconnect deals with customers and projects mainly located the Middle East, the Levant countries and Africa. Being well-established and deeply involved with Hi-Tech and Communication equipment, MEconnect decided to provide to its clients an online based network, for their convenience and expediency. MEconnect expects the website ([www.MEconnect.net](http://www.MEconnect.net)) to be a reference for every client, providing them with all the necessary information and updates regarding our products and activities.

MEconnect currently promotes and holds products from Comtech EFData, a company that has always been the milestones in the VSAT technology and in bandwidth optimization. In the Middle East, MEconnect is also a proud business partner with International Data Casting, the leading company in the DVB-IP and broadcasting equipment, and the main distributor for TERRASAT COMMUNICATIONS, the high end BUC manufacturer.

Additionally, MEconnect acquired considerable expertise in the wireless applications by working alongside internationally renowned manufacturers. MEconnect provides various solutions in the wireless domain, distributing and cooperating with Bridgewater Communication, the world leader in the mm Wave products and EXALT Communication, the leading innovator in next generation wireless backhaul solutions. MEconnect recently expanded its activities in order to include more value added solutions such as PATAPSCO's TDM over IP and BATS's esteemed broadband tracking system, a unique technology that allows the tracking of a broadband connectivity (e.g. connecting moving ships and rigs in the Oil and gas industry or moving vehicles to their command center in the Military Applications).

#### **MOBAX GROUP**

**Address:** 5 Regency Drive, Route 21 Corporate Park, Irene, Pretoria, South Africa.  
**Tel:** +27 12 345 4007  
**Email:** info@mobaxgroup.com  
**Website:** www.mobaxgroup.com  
**Products:** Telecomms Managed Services

Mobax Group is recognised for delivering professional and high quality engineering, project and technical services to Telecommunication Network Operators and Corporate clients in Africa, promoting geographical and technological diversification.

#### **OFFSHORE TECHNOLOGIES**

**Address:** 63, Rue 16 249-Face Lycée des Nations, Ouagadougou, Burkina Faso.  
**Tel:** +226 25 38 84 08  
**Fax:** +226 25 38 84 09  
**Email:** info@offshoretechnologies.net

## Airbus Group Australia Pacific

49 Port Road Thebarton SA 5031  
 Unit 6B Level 1 2 Brindabella Circuit Brindabella  
 Business Park Canberra ACT 2609  
[www.airbusgroupap.com.au](http://www.airbusgroupap.com.au)  
[www.airbusdefenceandspace.com](http://www.airbusdefenceandspace.com)  
[www.intelligence-airbusds.com](http://www.intelligence-airbusds.com)

**Contacts:** Valentin Merino-Villeneuve  
[valentin.merino@airbus.com](mailto:valentin.merino@airbus.com) +61 421 730 422  
 James Prior (Airbus DS Geo Australia)  
[james.prior@airbus-geo.com.au](mailto:james.prior@airbus-geo.com.au) +61 2 6143 5606

### ORGANISATION OVERVIEW

Airbus Group Australia Pacific is part of Airbus Group, a global pioneer in aerospace and defence related services whose companies include Airbus, Airbus Helicopters and Airbus Defence and Space. Wholly owned by Airbus Helicopters, Airbus Group Australia Pacific represents Airbus Group in Australia, New Zealand and the South Pacific.

In the space sector, Airbus DS Geo Australia Pty Ltd is a wholly owned subsidiary of Airbus DS Geo S.A. The Geo business line provides earth observation satellite imagery and associated products and services through direct sales and a network of resellers. The satellite imagery provided through Geo is obtained from a constellation of four optical and two radar earth observation satellites that are either owned by or operated on behalf of Airbus DS Geo.

Airbus Defence and Space provides decision makers with sustainable solutions to increase security, optimise mission planning and operations, boost performance, improve management of natural resources and, last but not least, protect our environment. Provision of earth observation satellite imagery and associated services and solutions from the Airbus operated constellation of four optical and two radar satellites. Provision of x-band secure satellite communication services.

### UNIQUE SELLING POINTS

From a single provider, Airbus Defence and Space cover the broadest range of optical and radar satellite imagery products. They have an extensive global network of resellers who can adapt their satellite imagery for the local context. They excel in regular large area (whole state/whole country) satellite imagery coverages and regular monitoring services. Airbus Defence and Space owns and operates Skynet 5, the UK's military satellite communications system. With spot beam up to global coverage capabilities, Skynet 5 offers a commercial route to protected, secure and resilient communications to Government users worldwide.

## AU Launch Services

[www.aulaunchservices.com](http://www.aulaunchservices.com)  
**Contact:** Brett Burford [brett@aulaunches.com](mailto:brett@aulaunches.com) +61 488 662 466

### ORGANISATION OVERVIEW

AU Launch Services is an Adelaide-based consulting group that works with cubesat manufacturers, owners and operators, preparing the required launch documentation and organising third party service providers in order to facilitate the launch, access to spectrum, and success of Australian cubesat missions. AU Launch Services is the single point of contact for clients. This saves time, avoids miscommunication, and streamlines the administrative processes. It bridges the gaps between cubesat designers, manufacturers and operators, governmental regulatory agencies, launch providers, and space insurers. Solutions are tailored for each client to ensure their needs are met.

### EXPERTISE AND CAPABILITIES

Risk analysis.  
 Overseas launch certificate documentation.  
 Consulting and administrative tasks.  
 Insurance facilitation.  
 Launch procurement.  
 AU Launch Services streamlines the process of launching Australian space objects through the use of its direct experience and relationships with local and international organisations. This saves time and money for the client.

## Auspace

27-31 London Road Mile End South SA 5031  
[www.auspace.com.au](http://www.auspace.com.au)  
**Contact:** Paul Weiss [paul.weiss@novasystems.com](mailto:paul.weiss@novasystems.com)  
 +61 408 273 654

### ORGANISATION OVERVIEW

Auspace is a systems integrator with a machine to machine (M2M) communications specialisation, focused on delivering turnkey, bespoke solutions by enabling systems for the integrated management of lone workers, vehicle management systems, industrial infrastructure and assets. Auspace joined the Nova Group of companies in 2007 and in 2012 was re-purposed to focus on an in-service M2M specialisation.

### EXPERTISE AND CAPABILITIES

Many enterprises deploy a range of portable and mobile assets in addition to their vehicles and lone workers, some of which require tracking and monitoring in order that their business performance is optimised. An integrated Internet of Things (IoT) approach to managing portable and mobile assets with the vehicles and workers who deploy them, can provide very low cost improvements in asset control and coordination. Data is managed by the Auspace Global Alerting Platform portal for real time exception management and visualisation, providing a harmonised environment for the management of people, vehicles and assets. Alerts,

alarms, track and trace and reporting can be consistently generated, visualised and integrated into the enterprise where required. Capabilities include: asset and attribute monitoring, asset control data collection, decision support and enterprise integration.

### **BAE Systems Australia**

Taranaki Road Edinburgh Parks Edinburgh SA 5111  
www.baesystems.com

**Contact:** Andrew Sysouphat  
andrew.sysouphat@baesystems.com +61 8 8480 8729

.sysouphat@baesystems.com +61 8 8480

### **8729 ORGANISATION OVERVIEW**

BAE Systems Australia is Australia's largest and most versatile defence and security company working with government and industry to enhance the country's defence capability through the delivery of innovative solutions. BAE Systems delivers the world's most advanced technology-led defence, aerospace and information security solutions.

### **EXPERTISE AND CAPABILITIES**

BAE Systems Australia has an Australian leading capability to deliver complex integrated technology solutions – based at its headquarters in South Australia. Applied to the space sector, its advanced manufacturing and systems engineering capability allows the development and delivery of broad solutions from full system applications down to discrete component development and production. BAE Systems has local teams specialising in the development and servicing of advanced radio frequency, electronics and optical products and systems. Through its work with the Department of Defence it also has significant experience in the support of satellite ground stations, and as a global company has delivered key components for over 250 satellites. BAE Systems' advanced manufacturing capabilities in South Australia allows it to produce mechanical and electronic components on site, using some of Australia's most advanced machining, printed circuit board assembly and environmental testing capabilities. Its Edinburgh Parks site is also the hub of its Australian additive manufacturing capability.

### **UNIQUE SELLING POINTS**

As the Australian capability leader in defence and aerospace products and systems, BAE Systems offers an end-to-end product lifecycle solution from system concept and development through operational data management and analysis. Its sustainment capabilities support a broad range of system integration, software and hardware upgrades and modernisations. BAE Systems is a global leader in defence and aerospace, and has reach-back to the global organisation with over 40,000 people working in electronic systems development and support.

### **Cobham**

National Drive Adelaide Airport SA 5950  
www.cobham.com.au

**Contact:** Anthony Patterson  
Anthony.patterson@cobham.com +61 412 671 610

Cobham is an aviation and aerospace service provider to the commercial, government and defence sectors under long term performance based contracts. Its space related activity is currently airborne satcom and the time critical transmission of collected sensor data and imagery for surveillance operations.

### **Fleet Space**

1 Redwood Street Rostrevor SA 5073  
www.fleet.space.com

**Contact:** Flavia Tata Nardini flavia@fleet.space +61 424 487 893

Fleet is a truly agile space technology start-up building connectivity as a service platform. Scalability and iterative development are built into its business model and infrastructure. Its core expertise is nano-satellite manufacture and deployment, satellite propulsion systems, IoT connectivity and software as a service platform development.

Fleet is an agile space company making it faster, simpler and cheaper to connect the world's Internet of Things (IoT) devices, connecting the IoT around the world using a massive fleet of small low-cost satellites. It provides direct, global access to a secure low-cost low-bandwidth connectivity platform ideal for machine to machine data exchange and deploying IoT sensor networks at scale. With simple device setup and management through a web interface and powerful cognitive analytics built in, the IoT is about to take a giant leap forward.

### **Geoplex**

10 Kingfisher Drive Hewett SA 5118  
www.geoplex.com.au

**Contact:** Rick Bailey rbailey@geoplex.com.au +61 419 218 458

Geoplex specialises in the delivery of Enterprise geographic information system solutions and professional services. This includes the sale of geospatial data collected using satellites, via partners such as Planet Labs (Earth Observation imagery) and Spire (Satellite - Automatic Identification Systems maritime tracking). Geoplex also partners with US software company, AGI, to offer the physics modeling software Systems Tool Kit (STK) in Australia. STK allows engineers and scientists to perform complex analysis of ground, sea, air, and space assets, and share results in one integrated solution.

With respect to earth observation, Geoplex works closely with the customers who consume and add value to the data collected by satellites. For example, decision makers in agriculture, understanding their problem domain and identifying the type of data to meet their requirements.

### ORGANISATION OVERVIEW

Greenhouse Gas Monitor Australia Pty Ltd (GGMA) was formed to develop and commercialise state-of-the-art capabilities to measure, monitor and understand the behaviour of greenhouse gases (GHGs) in the atmosphere. GGMA's main activities are to: develop and commercialise novel instrumentation and methods to measure CO<sub>2</sub> and CH<sub>4</sub> in the atmosphere, supported by field measurements develop atmospheric models to attribute measurements of GHGs to sources and sinks and predict the transport of GHGs in the atmosphere provide GHG data products to industry, legislators, traders, and to the agricultural community through interpretation of Earth-based and space-based sensors.

### EXPERTISE AND CAPABILITIES

GGMA principals have a long history of remote sensing of trace gases in the atmosphere and in the development of related terrestrial and space-based instruments. GGMA has a pedigree of pioneering the field of space-based sensing of trace gases in the atmosphere, and providing key expertise in the development of a carbon dioxide (CO<sub>2</sub>) sensor successfully deployed on NASA's Orbital Carbon Observatory (OCO).

GGMA provides expert analysis and interpretation of data from both OCO and Japan's Greenhouse Gases Observing Satellite. GGMA is also supporting Lockheed Martin to develop novel instrumentation to measure CO<sub>2</sub> from a geostationary platform.

### UNIQUE SELLING POINTS

GGMA has developed novel technology to measure and map atmospheric methane and is well advanced in extending this technology to measure nitrous oxide. GGMA has developed: an autonomous, unmanned aerial vehicle-based instrument to measure methane spectra of sampled gas software to: extract sub-1ppm trace gas concentrations from measured spectra produce 3D gas concentration fields understand surface fluxes and transport of trace gases infer location and strength of trace gas sources through a fusion of terrestrial and space-based measurements.

### Inovor Technologies

39 Gawler Terrace Walkerville SA 5081  
www.inovor.com.au

**Contact:** Matthew Tetlow matt.t@inovor.com +61 412 644 853

### EXPERTISE AND CAPABILITIES

Inovor has a small team with expertise in guidance navigation and control, embedded systems and software design and development, with a balanced split between graduate level, mid-career and subject matter experts. Areas of expertise and experience in space systems:

systems engineering and mission design; spacecraft integration and test; attitude determination and control

- precision pointing; spacecraft navigation and positioning; space object detection and tracking; flight/ground segment software development; spacecraft structures.

Inovor has two prototype space subsystems and associated Intellectual Property.

### ORGANISATION OVERVIEW

Inovor Technologies has two business streams: defence contract research and development, and nanosatellite technologies. It designs and integrates small satellites, providing a full development service from customer needs to requirements, through design, build, integrate and test. Its specific capabilities are mission design, satellite guidance, navigation and control, systems engineering, structures and power management, with commercial off the shelf hardware being used where necessary. Partnered with a defence prime and the University of Adelaide, it is developing a nanosatellite-based space situational awareness system to monitor defence and commercial space assets from both accidental and malicious threats.

### UNIQUE SELLING POINTS

Inovor is a small agile company with a capable team of specialists as well as considerable experience commercialising technology and building international collaborative teams. It has both a deep research and development culture, with the majority of the team coming from a research background, and expertise in systems engineering, which enables it to engineer quality assured products that meet user/customer needs. Inovor is geographically close to the booming Asia-Pacific region and has a less restrictive export control regime, allowing free access to this growing market.

### Lockheed Martin

5 Third Ave Mawson Lakes SA 5095  
53 Wentworth Avenue Kingston ACT 2604  
www.lockheedmartin.com.au

**Contact:** Michelle Scully  
michelle.m.scully@lmco.com +61 2 6269 0101

### ORGANISATION OVERVIEW

Headquartered in Bethesda, Maryland, Lockheed Martin is a global security and aerospace company that employs approximately 125,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

Lockheed Martin Australia (LMA) has grown to over 1000 staff currently engaged throughout Australia - from Queensland to Western Australia, South Australia and many points in between. Lockheed Martin Space Systems Company is actively involved in Australia by: being a contributing partner in the Space Environment Research Centre

developing a ground based space situational awareness sensor in Western Australia.

**EXPERTISE AND CAPABILITIES**

Lockheed Martin Space Systems Company (SSC) has more than 50 years' experience in space system design, development, operations and sustainment. Its portfolio extends across: commercial space - remote sensing, commercial SATCOM, and wind energy management; military space - protected communications, narrowband communications, navigation, weather, early warning, space protection civil space - human exploration, planetary exploration, weather and environment advanced technologies - optics, Radio Frequency and photonics; advanced manufacturing and nano systems; and space science and instruments launch capability – medium and heavy through United Launch Alliance, our joint venture with Boeing.

**UNIQUE SELLING POINTS**

Lockheed Martin is an innovative company that uses research and development to solve some of the world's most complex problems. By combining skilled staff with an experienced management team, and through a customer oriented contracting approach that offers real value-for-money solutions, Lockheed Martin aims to continue to grow and establish itself as a major presence in Australia and the Asia-Pacific region. As part of this growth Lockheed Martin seeks to partner with niche Australian high technology companies and provide those companies with reach-back to access deep technical expertise, market and supply chain opportunities.

**Nova Systems SATCOM**

27-31 London Road Mile End South SA 5031

[www.novasystems.com.au](http://www.novasystems.com.au)

**Contact:** Peter Nikoloff

[peter.nikoloff@novadefence.com.au](mailto:peter.nikoloff@novadefence.com.au) +61 8 8252 7100

**EXPERTISE AND CAPABILITIES**

Nova Systems SATCOM comprises a satellite communications team with high quality, experienced people that cover multiple disciplines encompassing project specification, requirements definition, engineering, integration, installation, test and evaluation, operations and International Launch Service. Our experts deliver successful commercial and Defence projects and provide expert advice and guide clients through all aspects of SATCOM project establishment, delivery and support including: project management, satellite payload design and in-orbit testing, Earth station design and testing, commercial/military certification testing, SATCOM systems modelling and simulation (Satellite Tool Kit, Qualnet), link budget planning, network management systems, through life support planning, SATCOM training, asset and personnel tracking and space launch.

**ORGANISATION OVERVIEW**

Nova Systems is a professional service provider, specialising in the provision of engineering and management services, providing industry and government with world-class independent expertise in delivering complex projects and solving technologically challenging problems. Nova Systems' heritage is in

supporting complex military systems, including a significant foot print in military SATCOM and now growing into the commercial sector.

**UNIQUE SELLING POINTS**

Australian owned.

Member of the Defence Security Program.

Largest employer of SATCOM/COMS specialists in Australia

**Small World Communications**

6 First Avenue Payneham South SA 5070

[www.sworld.com.au](http://www.sworld.com.au)

**Contact:** Steven Pietrobon [steven@sworld.com.au](mailto:steven@sworld.com.au)

+61 8 8332 0319

**ORGANISATION OVERVIEW**

Small World Communications specialises in the design of error control encoders and decoders used in digital communications. Error control codes are used to correct errors caused by noise, interference and signal distortion. Its products consist of software cores that are used in field programmable logic arrays (FPGA) and application specific integrated circuits (ASIC). Many of its products are designed for and used in satellite and deep space communication systems. These include encoders and decoders that are compatible with the Consultative Committee for Space Data Systems (CCSDS), GEO-Mobile Radio (GMR), Inmarsat and Intelsat standards as well as custom coding solutions.

**EXPERTISE AND CAPABILITIES**

Design of error control encoders and decoders and research in error control codes. Expertise in convolutional, trellis, turbo and low density parity check (LDPC) codes.

**UNIQUE SELLING POINTS**

Small World Communications has a large range of Viterbi, trellis, turbo and LDPC decoders and associated encoders. The company is able to provide cores for both FPGAs and ASICs as well as custom coding solutions. It is also able to design encoders and decoders with high performance and encoding and decoding speeds over one billion bits per second.

**SpeedCast**

49 Port Road Thebarton SA 5031

[www.speedcast.com](http://www.speedcast.com)

**Contact:** Mike Kenneally

[mike.kenneally@speedcast.com](mailto:mike.kenneally@speedcast.com)

+61 412 833 613 +61 8 8443 9844

**UNIQUE SELLING POINTS**

SpeedCast is a truly global service provider with a growing network of over 30 Earth stations worldwide. In Australia, SpeedCast owns and operates its own network infrastructure consisting of three Earth stations; equipment hosting and co-location in other landmark teleports; country-wide point of presence; and an uncontended and redundant backbone

**Website:** [www.offshoretechnologies.net](http://www.offshoretechnologies.net)

**Products:** Satcom Systems | WAN | VoIP

With 115,000 visitors a month, **offshore-technology.com** is one of the leading websites covering the needs of the global offshore oil and gas industry. Featuring a mixture of articles including the latest news, views, industry project updates and trends, **offshore-technology.com** provides senior engineers, managers and other leading technology decision makers with all that is required to stay on top of this fast-paced industry. With journalists positioned around the world, **offshore-technology.com** represents the industry as a whole, with unbiased and timely reporting. When you combine this with one of the most comprehensive and detailed listings of offshore equipment suppliers, products and services, free white paper downloads and company press releases, you can see why **offshore-technology.com** is the key point of reference for the upstream offshore oil and gas industry. **Offshore-technology.com** runs in conjunction with its sister publication World Expro, which specialises in offshore recruitment and career solutions.

### SKYSTREAM

**Address:** Dubai Internet City, Building 14, Suite 201, Dubai, UAE.

**Tel:** +971 4 391 3377

**Fax:** +971 4 390 8720

**Email:** [info@sky-stream.com](mailto:info@sky-stream.com)

**Website:** [www.sky-stream.com](http://www.sky-stream.com)

**Products:** Satcom Systems | IP | Voice | Video

SkyStream Streaming Media Players allow you to experience an immediate cost savings by eliminating your cable bill and using **FREE STREAMING APPS** that are ready to be downloaded via the Google Play Store. Watch a ton of **FREE TV Shows, Movies and Sports** on apps like Pluto TV or Crackle. Stream your local channels in HD for **FREE** with the Mohu HD Antenna and watch all your favorite sports using apps in the Google Play Store or via your HD Antenna. At SkyStream Technologies, we provide our customers with the ultimate home theater experience. The SkyStream Streaming Media Players are the newest wave of streaming devices allowing users to watch their favorite TV shows, movies & sporting events using one of the thousands of streaming applications available through the app store or one's that come pre-installed on the box! With streaming applications like Netflix, Hulu, Amazon Video, SlingTV, Youtube and more - the SkyStream Streaming Media Players are "plug & play" ready! (\*subscriptions may be needed to access some content)

We have been providing alternate cable solutions for over 7 years and will continue to help our customers save money on their cable bills every month. We are based out of Orlando, Florida and sell internationally as well. Our streaming players can work anywhere in the world so if you travel a lot, this may be the solution for you.

SkyStream Technologies is a company that strives to save our customers money and provide the highest quality streaming service! Since day one, SkyStream has been the #1 innovator for android powered streaming players - we were the first to release a quad core streaming player -

The SkyStream X4. Before we go there, let us tell you our story...SkyStream Technologies is the largest supplier of streaming media players powered by android today, basing their business off of 3 core competencies - **Service, Product, and People**. We feel that if we can provide our customers with **unforgettable service** to go along with a **cutting-edge product** made and serviced by **extraordinary people**, everyone wins! This is exactly the philosophy that guides SkyStream today.

### TARASUL TELECOM

**Address:** P.O.Box: 21340, Safat, Tarasul Telecom is a Kuwait established company with a capital of USD 8 million. Its core business is centered on Information Technology and it's applications in Telecommunications, Physical Security and IT Infrastructure and Enterprise Applications. It is headed by a well-known figures in the IT Industry both in Kuwait and the region (i.e. Mr. Sulaiman Al Musallam –Chairman) (Mr. Borhan Naamani-Managing Director). The shareholders are very selective and represent a combination of high net worth individuals as well as corporate investors who add value to the business. The Board consists of Al Kharafi, Al Mutawaa & Al Musallam Family members.



Code 13136, Kuwait.  
**Tel:** +965 22420001  
**Fax:** +965 22407806  
**Email:** info@tarasul telecom.com  
**Website:** www.tarasul telecom.com  
**Products:** High-Speed Internet Services

#### **THURAYA TELECOMMUNICATIONS COMPANY**

**Address:** P.O. Box 283333, Dubai - UAE.  
**Tel:** +971 4 4488888  
**Fax:** +971 4 4488999  
**Email:** sales@thuraya.com  
**Website:** www.thuraya.com  
**Products:** MSS Operator | Telecomms Solutions

Thuraya, is the mobile satellite services subsidiary of [Yahsat](#), a leading global satellite operator based in the United Arab Emirates (UAE), fully owned by [Mubadala Investment Company](#), the investment vehicle of the Government of Abu Dhabi. Established in 1997, Thuraya is the UAE's first home grown satellite operator. We offer innovative communications solutions to a variety of sectors including energy, government, broadcast media, maritime, military, aerospace and humanitarian NGO. Our superior network enables clear communications and uninterrupted coverage across two-thirds of the globe by MSS, quasi-global VSAT coverage and around the world through our unique GSM roaming capabilities. Thuraya's diverse range of technologically advanced and dependable mobile satellite handsets and broadband devices provide ease of use, value, quality and efficiency. Through relevant partnerships, we stay ahead by delivering solutions and supporting applications that meet the rapidly transforming nature of market demands. Thuraya remains committed to keeping everyone within reach in any circumstance by making accessible the essential tools required for vital connectivity. Headquartered in Abu Dhabi, UAE, Yahsat is the first company in the Middle East and Africa (MENA) to offer Ka-band services including [YahClick](#), [Yahsat Government Solutions](#), [YahLink](#) and [Yahlive](#) via its Al Yah 1 and Al Yah 2 satellites. With the launch of Al Yah 3, Yahsat's commercial Ka-band coverage has extended to an additional 20 markets, reaching 60% of Africa's population and over 95% of Brazil's population. By acquiring Thuraya, Yahsat has become the 6<sup>th</sup> largest satellite operator in the world in terms of revenue. Thuraya's two satellites, serving over 160 countries, has expanded the group's satellite fleet to five. The combination of geostationary satellites operating in the C, Ka, Ku and L-bands jointly cover Europe, Africa, the Middle East, South America, and Asia, providing a broad range of Fixed and Mobile Satellite Services spanning voice and data communications to both commercial and government sectors.

#### **SIS LIVE**

**Address:** Whitehall Avenue, Kingston, Milton Keynes MK10 OAX, UK.  
**Tel:** +44 1908 865 252  
**Email:** Contact Form  
**Website:** www.sis.tv  
**Products:** Satellite Networks | Broadcasting Solutions

SIS (Sports Information Services) is the leading supplier of 24/7 betting services to retail and online operators globally.

We provide betting operators with desirable and profitable content with an end-to-end solution of live pictures, data on-screen graphics with betting triggers and a wide range of markets and pricing to drive betting revenues. We can provide operators with a range of solutions including horse and greyhound racing, virtual & numbers content as well as a number of additional sports.

#### **DATASAT COMMUNICATIONS LTD**

**Address:** Tavistock Estate, Twyford, Berkshire, RG10 9NJ, UK.

**Tel:** +44 118 934 9199

**Fax:** +44 118 934 9198

**Email:** sales@datasat.com

**Internet:** www.datasat.com

**Products:** Remote Communications Solutions | TETRA

Datasat Communications Ltd. provides satellite services. The Company designs, build, manage, and maintain global networks. Datasat Communications creates satellite network infrastructures for the latest voice, data, satellite broadband, satellite internet, and converged internet protocol applications. Datasat has been in business for over 30 years providing principally innovative Satellite Communications Solutions to Enterprise and Government Customers Globally. It is a long standing Intelsat Partner. It is also an Intel distribution and development partner. The company was founded in the 1980's initially to provide an innovative solution for real-time global distribution of Stock Market Prices for the London Stock Exchange. Datasat has delivered solutions in over 160 countries often in challenging conditions.

#### **ECHELON SATNET**

**Address:** Echelon Satnet Ltd, 29 Harley Street, London W1G 9QR, UK.

**Tel:** +971 6 5570900

**Fax:** +971 6 5570930

**Email:** info@echelonsatnet.co.uk

**Website:** www.echelonsatnet.co.uk

**Products:** Network Systems Integrator

#### **TALIA GROUP**

**Address:** 19 Nassau Street, London W1W 7AF, UK.

**Tel:** +44 20 3318 1500

**Fax:** +44 207 631 3343

**Email:** Online Form

**Website:** www.talia.net

**Products:** Internet | Voice | Video

Talia is a market-leading teleport, satellite and terrestrial network operator; providing secure global IP communications that allow enterprises to thrive. Our hybrid network supports international businesses with connectivity wherever and whenever they need it. With field engineers on the ground in many countries, our team goes further by providing hardware, software and connectivity solutions to support the day-to-day

operations that many leading international businesses need.

#### **ULTRA ELECTRONICS, GIGASAT**

**Address:** Tring Business Centre,

Ultra CIS' GigaSat business is a leading global specialist in the design, development, supply and support of advanced mobile and flyaway satellite and microwave equipment for secure government, military and commercial broadcast communications. Gigasat's solutions are specially designed to operate in the harshest environments, ensuring that users have continuous access to reliable communications regardless of the operating environment. Highly experienced in creating bespoke, integrating systems, GigaSat is able to count several of the world's militaries, the BBC and Formula 1 amongst its worldwide consumers. Whatever size of the antenna - 0.23m (parabolic equivalent) to 3.7m - and wherever in the world it may be required, GigaSat's specialised team of engineers and technicians offer installation, integration and adaptation to local conditions, combined with a through-life, in-service support provision that safeguards operational capability even in remote environments.

Design, production and testing are kept exclusively in-house at GigaSat's UK factory, dramatically reducing product lead times from an industry standard of months to a matter of weeks. Stringent in-house production standards have enabled GigaSat to receive the highest certifications of MIL-STD-810 and WGS. Icknield Way, Tring, HP23 4JX, UK.

**Tel:** +44 1442 892000

**Email:** enquiries@ultra-gigasat.com

**Website:** www.ultra-gigasat.com

**Products:** Mobile Flyaway Antenna Systems

#### **EMC SATCOM TECHNOLOGIES**

**Address:** Vollsvveien 21 N-1366, Lysaker, Norway.

**Tel:** +47 (67) 535 337

**Fax:** +47 (67) 535 335

**Email:** sales@emcsatcom.com

**Website:** www.emcsatcom.com

**Products:** IP-based Satellite Network Systems

EMC Satcom Technologies, a division of Emerging Markets Communications provides complete IP-based satellite network systems compliant with DVB-S2 and DVB-RCS2 standards. The company holds 18 patented technologies including the bandwidth saving Noise Reduction System (NRS), the PowerBooster and MEO Booster, HDConnect, and SpeedNet, a zero-latency browser for use over satellite. These products are in use globally with more than 150 thousand terminal deploy worldwide serving end-users with fixed and mobile communication requirements.

#### **ETL SYSTEMS**

**Address:** Coldwell Radio Station, Madley,

ETL Systems has been designing and manufacturing RF equipment since 1984, and from 2003 onwards benefited from the new management of Ian Hilditch and Dr Esen Bayar. In 2013 it received its third Queens Award for Enterprise, marking impressive growth in International

Trade, and is now one of the world's leading RF manufacturers to the Satellite industry. Located at its purpose built secure facility next to the BT Madley Satellite Earth Station, ETL boasts RF testing facilities, software design, automated circuit board assembly, concept design areas, pick and place machinery as well as machining workshops. This means that design, production and maintenance can be carried out in-house under the umbrella of the newly awarded ISO 9001 Quality Management System. ETL's heritage is in designing satellite signal routing solutions for Broadcasters, who demand hi-levels of RF performance, as well as redundancy and resilience. This expertise has been expanded to cover Government, Defence, Marine, Private VSAT networks as well as global Satellite Operators. ETL continues to invest heavily in Research & Development, to ensure that its RF components and rack mounted equipment meet the changing needs of the Satellite industry.

Hereford, HR2 9NE, UK.  
**Tel:** +44 1981 259 020  
**Fax:** +44 1981 259 021  
**Email:** info@etlsystems.com  
**Website:** www.etlsystems.com  
**Products:** RF Equipment

### ADVANTECH WIRELESS

**Address:** 657 Orly Avenue, Montreal, QC,

Advantech Wireless is a leading wireless broadband communications solution provider for commercial, critical, infrastructure and Government and Military clients. Our smarter solutions give clients the freedom reach farther, to achieve reliable connectivity anywhere in the world, and accomplish critical missions of global significance. We design turnkey terrestrial and satellite communications solutions that maximize performance and minimize operational costs, all with uncompromising quality. With our customized approach, award-winning R&D and innovative engineering, we empower you to achieve excellence in communication, while you experience reduced CAPEX and OPEX overall. Advantech Wireless Technologies delivers intelligent broadband communications solutions that achieve excellence and maximize performance with uncompromising quality. Ultimately, we help people stay connected and informed by designing and manufacturing advanced terrestrial and satellite communication technologies.

### ANACOM

**Address:** 1996 Lundy Avenue, San Jose, CA 95131, USA.  
**Tel:** +1 408 519 2062  
**Fax:** +1 408 519 2063  
**Email:** sales@anacominc.com  
**Website:** www.anacominc.com  
**Products:** Block-up Converters | Transceivers | SSPAs, IP Networking

AnaCom, Inc. is the worldwide leader in the design and manufacturing of high performance C & Ku band Block Up-Converters, transceivers, and SSPAs. AnaCom's

reputation for reliability and ease of use is well-known in the satellite industry, and is the brand of choice for leading satellite professionals. Quality by design, engineering capabilities, and a strong manufacturing base all allow AnaCom to maintain lower product costs. Our transceiver, BUC, and SSPA offerings cover all commercial satellite frequencies over a wide range of power levels. AnaCom's headquarters resides in a technology park in San Jose, California in the heart of Silicon Valley.

### C-COM SATELLITE SYSTEMS

**Address:** 2574 Sheffield Road, Ottawa, Ontario, Canada K1B 3V7.  
**Tel:** +1 613 745 4110  
**Fax:** +1 613 745 7144  
**Email:** info@c-comsat.com  
**Website:** www.c-comsat.com  
**Products:** Antenna Systems | Emergency Communications

Established in 1997, C-COM Satellite Systems Inc. is a world leader in the design, development and manufacture of commercial grade, fully motorized, auto-pointing mobile antennas (iNetVu®) for the delivery of broadband Internet to remote locations. The company has been a pioneer in the one-button, auto-deploy VSAT market – with over 7,000 units in the field, in over 100 countries. The iNetVu® brand is synonymous with reliability, affordability and superior technology. C-COM has developed Comm-on-the-Pause (COTP) antennas that operate in all major satellite bands (Ka, Ku, C, and X-band), in sizes (from 75cm to 2.4M) and in various formats (Driveaway, Flyaway and Fixed Motorized).

### COBHAM SATCOM LAND SYSTEMS

**Address:** 2100 North Alafaya Trail, Suite 300, Orlando, Florida 32826, USA.

**Tel:** +1 407 650 9054  
**Fax:** +1 407 650 9086  
**Email:** sales@tracstar.net  
**Website:** www.cobham.com  
**Products:** Antennas | Networks | Vertical Market Satcom Solutions

Cobham SATCOM has a variety of land based satellite communications systems serving a diverse range of users and providing connectivity to businesses and industries operating in remote areas. Our satellite and radio communication terminals perform in the most challenging and remote environments on land, at sea and in the air. We design and manufacture these high performance products under the EXPLORER, SAILOR and Sea Tel brands providing customers with outstanding performance, value and support through our global sales and service network

### COMTECH EF DATA

**Address:** 2114 West 7th Street, Tempe, AZ 85281, USA.  
**Tel:** +1 480 333 2200

**Fax:** +1 480 333 2540

**Email:** sales@comtechefdata.com

**Website:** www.comtechefdata.com

**Products:** Satellite Bandwidth Efficiency and Link Optimization | VSATs | Modems

Comtech EF Data Corp. is a leading supplier of satellite bandwidth and link optimization. Our high-performance satellite communications infrastructure solutions feature groundbreaking efficiency, robust intelligence and unparalleled horsepower. Commercial and government users around the world utilize our solution suite to reduce OPEX/CAPEX and to increase throughput for the most demanding fixed and mobile networks.

## EXPEDITION COMMUNICATIONS

**Address:** 521 E. 1st Street - Long Beach, CA 90802, USA.

**Tel:** +1 877 410 8101

**Email:** ushq@expeditioncommunications.com

**Website:** www.expeditioncommunications.com

**Products:** Satellite and VSAT Installations

Expedition Communications goes where their clients' telecommunications needs take them. To date, the company has installed systems on every continent except Antarctica and in more than half of the countries across the globe. Founded in 2008 by a retired Army telecommunications engineer, the company is a Veteran-Owned Small Business that is dedicated to solving communications problems and providing service to locations far removed from hard networking infrastructure. This makes their telecom systems perfectly suited for both urban and remote areas.

Offering VSAT satellite internet systems, digital media, and wireless networking, as well as 24-7 support to locations around the world, Expedition Communications is dedicated to giving business, military, and government locations affordable, reliable, and secure telecommunications options.

We continually strive to meet our clients' communications needs while exceeding their expectations of service. Management and on-site engineers excel at providing "turn-key" solutions to virtually any problem.

## HUGHES NETWORK SYSTEMS

**Address:** 11717 Exploration Lane Germantown, Maryland 20876, USA.

**Tel:** +1 301 428 5500

**Fax:** +1 301 428 1868

**Email:** globalsales@hughes.com

**Website:** www.hughes.com

**Products:** Broadband Satellite Networking Solutions

Hughes is the 800 pound gorilla of the VSAT market and even the largest of the company's competitors generally try and work around it rather than go head-to-head. The fact of the matter is that VSAT is Hughes and, in many ways, Hughes is VSAT. The company lives and breathes the technology at all levels from chipsets to installation not least because it lays claim to have started the industry with its early work in the early to late 1980s.

Beyond technology and product innovation, over the past several years Hughes has successfully morphed into being the leading broadband satellite service provider in North America, Europe, India and Brazil as well as supplying a growing list of operators and service provider customers in the rest of the world with its broadband technologies and products. Its dominance of the enterprise VSAT industry is remarkable in the fact that the company has been able to sustain its lead for over twenty years and that it has rolled with the punches and constantly responded with new developments which has kept it at the forefront of an intensely competitive market. Customers purchase HNS VSAT systems because it is the market leader, understands competitive pricing and has cutting edge products, but also because there is a confidence that the company will always overcome any problems and the system will work reliably.

## ST Engineering iDirect

**Address:** 13861 Sunrise Valley Drive, Ste 300, Herndon, VA 20171 USA.

**Tel:** +1 703 648 8000

**Fax:** +1 703 648 8014

**Email:** marketing@idirect.net

**Website:** www.idirect.net

**Products:** IP-based Satellite Communications

ST Engineering iDirect is a global leader in satellite communications providing technologies and solution that enables customers to expand business opportunities. Every ST Engineering iDirect innovation is designed to enable our customers to optimize their networks, differentiate their services and expand their business. ST Engineering developed the industry's first major global HTS ground infrastructure for enterprise and mobility services. The company achieves No.1 ranking in the maritime market, chosen by 8 out of 10 providers. Introduces new highly efficient, powerful remote services based on DVB-S2X. Open a new way to new mobility applications via ground breaking flat panel antenna terminal in partnership with Kymeta. ST Engineering iDirect also achieves No 1 market share position with over 2,100 iDirect hubs deployed, 62.35 hub market share,, ranked No1 by COMSYS. iDirect Government becomes a wholly-owned subsidiary of VT iDirect serving the US DoD market with specific highly secured, mobile and portable solutions. It launched iDirect universal hub, the first of its kind to point to five different satellites, and combines multiple topologies uin a single hubs. ST Engineering iDirect pioneers a seamless mobile experience for vessels and planes moving across multiple satellites and beams with the development of the first automatic beam switching technology.

## ITC GLOBAL

**Address:** 2000 B Edwards Street, Houston, TX 77007, USA.

**Tel:** +1 855 639 4482

**Email:** sales@itcglobal.net

**Website:** www.itcglobal.com/

**Products:** Networking Solutions

ITC Global was founded in 2001 to bring carrier-grade

telecommunications and networking technologies to developing markets and remote and harsh locations. Our vision and mission are simple. Build the world's best satellite communications provider by offering the best technical solutions, backed by the best customer service in the industry. We specialize in satellite-based communications for industrial operations in extreme environments, including deep-water energy exploration, remote mining and transoceanic shipping. Today ITC Global is the number one provider of satellite communications networks to the mining industry and among the top three providers to the oil and gas industry. Part of the Panasonic family, ITC Global offers global-scale presence and local on-site support. We engineer every ITC Global solution to fit the specific requirements of each customer. We build our solutions with best-in-class components, proven engineering and the availability of unparalleled network capacity.

#### **MARITIME COMMUNICATIONS NETWORK**

**Address:** 3044 N. Commerce Parkway, Miramar, FL 33025, USA.

**Tel:** +1 954 538 4000

**Fax:** +1 954 431 4077

**Email:** sales@mtnsat.com

**Website:** www.mtnsat.com

**Products:** VSAT Solutions | Oil&Gas | Maritime

Maritime Communication Services, Inc. was founded in 1997. The company's line of business includes providing business consulting services on a contract or fee basis. Maritime Telecommunications Network Inc. (MTN) provides wireless communication solutions. The Company offers solutions including voice, data, internet, and compressed video services through satellite and terrestrial broadband. MTN serves customers worldwide

#### **NORSAT INTERNATIONAL**

**Address:** 110-4020 Viking Way, Richmond, British Columbia V6V 2L4, Canada.

**Tel:** +1 604 821 2800

**Fax:** +1 604 821 2801

**Email:** satellite@norsat.com

**Website:** www.norsat.com

**Products:** Microwave Components | Terminals | Receivers and Transmitters

Norsat International Inc., founded in 1977, is a leading provider of innovative communication solutions that enable the transmission of data, audio and video for remote and challenging applications. Norsat's products and services include customizable satellite components, portable satellite terminals, maritime solutions and satellite networks.

Through its Sinclair Division, Norsat is a leading provider of antenna and RF conditioning products, systems and coverage solutions for public safety, defense and private wireless networks. Norsat's unique platform technology allows for quick customization, tailored to meet the needs of customers.

The company's products and services are used extensively by telecommunications services providers, emergency services and homeland security agencies, military organizations, health care providers, news organizations and Fortune 1000 companies. Customers include NATO,

the United States Department of Defense, Marine Corps, Army, Navy and Air Force; FOX News, CBS News; Boeing, Reuters, TESSCO, General Dynamics and others.

Norsat International Inc. is consistently ranked among the top technology companies in Canada and the top 100 companies in British Columbia.

The company is headquartered in Richmond, British Columbia and also has a facility in Aurora, Ontario. Norsat was acquired by Hytera Communications Co., Ltd in July 2017. Norsat remains an independently operated Canadian subsidiary of Hytera

#### **OPTIMAL SATCOM INC**

**Address:** 11180 Sunrise Valley Drive, Suite 200, Reston, VA 20191-5491, USA.

+1 703 657 8800

**Fax:** +1 603 547 0145

**Email:** jscott@optimalsatcom.com

**Website:** www.optimalsatcom.com

**Products:** Enterprise Capacity Management Systems

Optimal Satcom, Inc. was formed in 2002 as the result of a spin-off from Lockheed Martin Corporation. Optimal Satcom is the proven leader in the provision of enterprise SATCOM capacity management systems, software tools, and support services for both commercial and military satellite operators. Optimal Satcom's product suite represents the state of the art in satellite communications capacity planning and management. The products are seamlessly integrated with each other and can be brought together in different configurations to form modular and alterable solutions capable of meeting the needs of even the most demanding users such as satellite operators, VSAT service providers, media companies, civilian, military, and non-governmental programs. In addition, Optimal Satcom provides support services such as expert technical consulting, data analysis and database customization, advanced troubleshooting support, custom software development, and satellite communications training courses.

#### **PANASONIC AVIONICS CORPORATION**

**Address:** 26200 Enterprise Way, Lake Forest, CA 92630, USA.

**Tel:** +1 949 672 2000

**Fax:** +1 949 462 7100

**Email:** info@panasonic.aero

**Website:** www.panasonic.aero

**Products:** In-Flight Connectivity

Panasonic Avionics Corporation is located in CA, United States and is part of the Engineering Services Industry. Panasonic Avionics Corporation has 2,725 employees across all of its locations. There are 2,235 companies in the Panasonic Avionics Corporation corporate family. Dun & Bradstreet provides data on over 120 million companies like Panasonic Avionics Corporation around the world, including contacts, financials, and competitor information.

#### **POLARSAT**

**Address:** 549 Meloche Avenue, Dorval, Quebec H9P 2W2, Canada.

**Tel:** +1 514 635 0040

**Fax:** +1 514 635 0044

**Email:** Contact Form  
**Website:** [www.polarsat.com](http://www.polarsat.com)  
**Products:** VSAT Systems

PolarSat was started in 2003 with the investment by our largest customers. This emphasis on the customer is part of our culture and is what PolarSat strives for today. We have focused on the private network portion of the satellite networking market to give customers control over their network. Our Vision is to be recognized by our customers as a "true partner" who enables them to succeed in providing satellite-based broadband communication services to their users. It is PolarSat's policy to deliver products and services to our Customers which enable their business success. Towards this end, we act as a partner and we are committed to continually improve our products and services so as to ensure our Customers benefit from the vast experience and competence of our people. Our people work together in core teams whose members are multi-cultural and multi-tasking.

#### **RIGNET**

**Address:** 1880 S. Dairy Ashford, Suite 300, Houston, TX 77077, USA.  
**Tel:** +1 281 674 0100  
**Fax:** +1 281 674 0101  
**Email:** [sales@rig.net](mailto:sales@rig.net)  
**Website:** [www.rig.net](http://www.rig.net)  
**Products:** Managed Network Services

RigNet delivers optimized industry solutions, advanced global software, and secure communications infrastructure that allow industrial companies to obtain the business value of digital transformation. From remote locations to diverse multi-stage operations, RigNet is the partner of choice for connecting, securing, and capturing actionable intelligence from your distributed assets. As one of the world's leading digital service providers, RigNet makes it easy for your business to gain real-time insights from remote operations. With world-class industry-leading machine learning analytics, ultra-secure solutions spanning IP connectivity, bandwidth-optimized OTT and more, RigNet supports full evolution of digital enablement

#### **TERRASAT COMMUNICATIONS**

**Address:** 235 Vineyard Court, Morgan Hill, Tel: +1 408 782 5911 CA 95037, USA  
**Fax:** +1 408 782 5912  
**Email:** [sales@terrasatinc.com](mailto:sales@terrasatinc.com)  
**Website:** [www.terrasatinc.com](http://www.terrasatinc.com)  
**Products:** Block Upconverters | RF Transceivers

Terrasat Communications, Inc. manufactures microwave and satellite RF equipment. The Company offers intelligent block upconverter for satellite communications, internet protocol monitoring and control interface, ancillary equipment, outdoor and indoor power supplies, interface units, controllers, and redundancy systems. Terrasat Communications operates in the State of California.

#### **International Space Agencies**

##### **CSIRO Office of Space Science and Applications**

**Contact:** Mr Alex Held  
**Address:** CSIRO Office of Space Science and Applications  
 G.P.O. Box 3023, Canberra, ACT 2601  
**Fax:** 02 6246 5988  
**Tel.:** 02 6246 5899  
**Email:** [alex.held@csiro.au](mailto:alex.held@csiro.au)  
**Web site:** [www.cossa.csiro.au](http://www.cossa.csiro.au)

We're Australia's national science research agency. At CSIRO, we solve the greatest challenges using innovative science and technology. At the Commonwealth Scientific and Industrial Research Organisation (CSIRO), we shape the future. We do this by using science to solve real issues to unlock a better future for our community, our economy, our planet. Since 1916, we've been advancing Australia with inventions and innovations that have a positive impact on people's lives around the world.

##### **Azerbaijan National Aerospace Agency (ANASA)**

**Contact:** Mr Alchin Shirin-zada  
**Job:** Director General  
**Address:** National Aerospace Agency  
 Ministry of Defence Industry  
 159 Azadlig Ave.  
 Baku, AZ 1106, Azerbaijan  
**Fax:** +994-12-562 1738  
**Tel.:** +994-12-562 9387  
**Email:** [a.shirin-zadeh@box.az](mailto:a.shirin-zadeh@box.az)

National Aerospace Agency (NASA) started operation within the structure of the Academy of Sciences of Azerbaijan from 1974 as a Scientific Centre "Caspian" and in 1981 on its base was set up a Scientific-Industrial Association of Space Research. By the Order of the President of Azerbaijan Republic from February 21, 1992 No 580 on its base was established the Azerbaijan National Aerospace Agency (ANASA, later NASA). From September 2006 by the Order of the President of Azerbaijan Republic NASA is operating under subordination of the Ministry of Defence Industry of the Azerbaijan Republic.

##### **Space Research and Remote Sensing Organization (SPARRSO)**

**Contact:** Mr Md. Nazmul Huda Khan  
**Job:** Chairman  
**Address:** Space Research and Remote Sensing Organization (SPARRSO)  
 Mohakash Biggyan Bhaban. Agargaon, Sher-e-Bangla Nagar  
 Dhaka 1207, Bangladesh  
**Fax:** +88-2-811-3080  
**Tel.:** +88-2-814-1402 / 913-1741  
**Email:** [admin@sparrso.gov.bd](mailto:admin@sparrso.gov.bd)

SPARRSO was established in 1980 as an autonomous organisation of the Government of the People's Republic of Bangladesh. It keeps close collaboration with national, regional and international organizations, institutions and agencies. SPARRSO acts as the centre of excellence and national focal point for the peaceful applications of space science, Remote sensing and Geographical Information Systems (GIS) in Bangladesh. Space technology

applications in Bangladesh started in 1968 through the establishment of APT Ground Station in the then Atomic Energy Center. In 1972 National Aeronautics and Space Administration (NASA) of United States launched Earth Resources Technology Satellite (ERTS). Likewise in newly independent Bangladesh Bangabandhu Government initiated a project named Bangladesh ERTS Programme for surveying natural resources, environment and disaster monitoring and management purposes. Due to the success of the activities issued under this programme, in 1975 Bangladesh Landsat Programme (BLP) was included in the five year plan. Afterwards in 1980, Space and Atmospheric Research Centre (SARC) of Bangladesh Atomic Energy Commission and BLP was merged to establish Bangladesh Space Research and Remote Sensing Organization (SPARRSO). For the effective use of space and remote sensing technology and research and development on this field, the parliament of Peoples' Republic of Bangladesh re-organized Bangladesh Space Research and Remote Sensing Organization (SPARRSO) by the enactment of Act.29 1991. Mr. Mizanur Rahman has been working as the Chairman of Bangladesh Space Research and Remote Sensing Organization (SPARRSO) since February 2020. He is an Additional Secretary to the Government of the People's Republic of Bangladesh.

### National Remote Sensing Centre of China (NRSCC)

**Contact:** Mr Zhang Guocheng  
**Job:** Director-General  
**Address:** National Remote Sensing Centre of China  
 Ministry of Science and Technology  
 15B Fuxing Road  
 Beijing 100862, China  
 Fax: +86-10-6851-3212  
 Tel.: +86-10-6853-9135  
 Email: zhanggc@nrsc.gov.cn,  
[lijiahong@nrsc.gov.cn](mailto:lijiahong@nrsc.gov.cn)

NRSCC have been extended from remote sensing and geographic information system to the domain of earth observation and navigation technology, including remote sensing, geographic information system, satellite navigation and positioning, and deep space exploration. Its overall function is to organize and implement national scientific and technological plans in the field of earth observation and navigation technology. It aims at developing innovation capacity of China and fostering the strategic new industry in remote sensing, geographic information system and navigation and positioning. It is characterized by the international cooperation and the national strengths by mode of "condensed kernel, wide network". NRSCC also provides the technical support to major strategic decisions for the national economic construction, social sustainable development by exerting the advantages of remote sensing science and technology.

### The Hong Kong Observatory

**Contact:** Mr C. Y. Lam, Director  
 Hong Kong Observatory  
**Address:** 134A Nathan Road, Kowloon

Hong Kong, China  
 Fax: +852-2311-9448  
 Tel.: +852-2926-8221  
 Email: [dhko@hko.gov.hk](mailto:dhko@hko.gov.hk)

The Hong Kong Observatory is a government department responsible for monitoring and forecasting weather, as well as issuing warnings on weather-related hazards. The Observatory also monitors and assesses radiation levels in Hong Kong, and provides other meteorological and geophysical services to meet the needs of the public, special users, the shipping and aviation communities. The Observatory's vision is to be a model of excellence in protecting lives and building together a better society through science. Service development is based on the core values represented by the seven letters that make up the word "SCIENCE".

### INDIAN SPACE RESEARCH ORGANISATION (ISRO)

**Contact:** A S Kiran Kumar  
**Job Title:** Chairman  
**Address:** Antariksh Bhavan, New BEL Road, Bangalore -560 231, India.  
**Tel:** +91 80 23415275 or 22172296  
**Fax:** +91 80 23412253  
**Email:** [dir.ppr@isro.gov.in](mailto:dir.ppr@isro.gov.in)  
**Website:** [www.isro.gov.in](http://www.isro.gov.in)

India decided to go to space when Indian National Committee for space research (INCOPAR) was set up by the Government of India in 1962. With the visionary Dr. Vikram Sarabhi at its helms, INCPOAR set up the Thumba Equatorial Rocket Launching Station (TERL) in Thiruvananthapuram for upper atmospheric research. Indian Space Research Organisation, formed in 1969, superseded the erstwhile INCOPAR, Vikram Sarabhi, having identified the role and importance of space technology in a nation's development, provided ISRO the necessary direction as an agent of development, ISRO then embarked on its mission to provide the Nation space based services and to develop the technologies to achieve the same independently. Throughout the years, ISRO has upheld its mission of bringing space to the services of the common man, to the services of the nation, in the process, it has become one of the six largest space agencies in the world. ISRO maintains one of the largest fleet of communication satellites INSAT and remote sensing IRS satellites that cater to the ever growing demand for fast and reliable communications and earth observation respectively. ISRO develops and delivers applications specific satellite products and tools to the Nation, broadcasts, weather forecasts, disaster management tools, geographical information systems, cartography, navigation, telemedicine, dedicated distance education, satellites being one of them.

### AERONAUTICS ANALYSIS AND INFORMATION CENTRE, NATIONAL INSTITUTE OF AERONAUTICS AND SPACE, (LAPAN)

**Contact:** Mr Adi Sadewo Salatun  
**Job:** Chairman  
**Address:** National Institute of Aeronautics and Space (LAPAN)  
 P.O. Box 1020/JAT

Jakarta 13220, Indonesia  
 Fax: +62-21-489-4815  
 Tel.: +62-21-489-5040  
 Email: [sadewo@lapan.go.id](mailto:sadewo@lapan.go.id)  
 LAPAN's mission is to strengthen and implement guidance, control and utilization of rocket technology, satellite and aviation, strengthen and implement guidance, control and utilization of technology and remote sensing data, strengthen and implement guidance, control and utilization of space and atmospheric..

## NATIONAL SPACE AGENCY, MALAYSIA

Contact: Ms Mazlan Othman  
**Job:** Director General  
**Address:** Ministry of Science, Technology and Innovation  
 Paras 5, Block 2, Menara PjH, Presint 2  
 62100 Putrajaya, Malaysia  
 Fax: +6(03) 8888 3478, +6012-2335898  
 Tel.: +6(03) 8888 8668  
 Email: [mazlan@angkasa.gov.my](mailto:mazlan@angkasa.gov.my)

ANGKASA is the agency mandated by the government to develop the space sector for the nation. Through the National Space Policy, the country is envisioning to have the capability and capacity to capitalize space as a strategic sector for national well-being towards achieving Vision 2020 and beyond. With that, the agency is geared to develop the country's potential in the space sector to support the economic growth and social development, and strengthening the national security

## IRANIAN SPACE AGENCY (ISA)

**Contact:** Yousef Ghadaksaz Khosroshahi  
**Job Title:** Director of Satellite Planning and Development Department  
**Address:** No.34, Saayeh Street., Nelson Mandela Blvd., Tehran, Islamic Republic of Iran.  
**Tel:** +98 21 2202 9995  
**Fax:** +98 21 2202 7272  
**Email:** [ghadaksaz@isa.ir](mailto:ghadaksaz@isa.ir), [int@isa.ir](mailto:int@isa.ir)  
**Website:** [www.isa.ir](http://www.isa.ir)

The Iranian Space Agency is responsible for all peaceful activities undertaken by all relevant authorities in the area of space science and technology. This agency is focal point and representatives of the government of Islamic Republic of Iran in all international space-related organizations and forums. The main duties of the agency include designing and manufacturing research and operational satellites, and developing and expanding space applications across the country

## ISRAEL SPACE AGENCY

**Contact:** Yitzchak Ben Yisrael

**Job Title:** Chairman  
**Address:** Derech Menachem Begin 52, Tel Aviv, Israel.  
**Tel:** +972 3 7649600  
**Email:** Online Form  
**Website:** [www.space.gov.il](http://www.space.gov.il)

The Israel Space Agency, founded following a government decision in 1983, is a national agency operating under the auspices of the Ministry of Science and Technology. The Agency is responsible for initiating, leading and coordinating all activities of the civilian space program. The Agency especially supports scientific research and development with real, economic potential such as the development of unique and innovative technologies. In addition, the Agency operates on the premise that all space related activities contribute to the Israeli economy, to the country's international standing and also benefit its citizens in terms of agriculture, communications, monitoring of environmental pollution and research.

## JAPAN AEROSPACE EXPLORATION AGENCY

**Contact:** Naoki Okumura  
**Job Title:** President  
**Address:** Public Affairs Department, Japan Aerospace Exploration Agency (JAXA) Ochanomizu sola city, 4-6 Kandasurugadai, Chiyoda-ku, Tokyo, 101-8008, Japan.  
**Tel:** +81 3 5289 3600  
**Fax:** +81 3 3258 5051  
**Email:** [proffice@jaxa.jp](mailto:proffice@jaxa.jp)  
**Website:** [www.jaxa.jp](http://www.jaxa.jp)

The Japan Aerospace Exploration Agency (JAXA) was born through the merger of three institutions, namely the Institute of Space and Astronautical Science (ISAS), the National Aerospace Laboratory of Japan (NAL) and the National Space Development Agency of Japan (NASDA). It was designated as a core performance agency to support the Japanese government's overall aerospace development and utilization. JAXA, therefore, can conduct integrated operations from basic research and development, to utilization. In 2013, to commemorate the 10th anniversary of its founding, JAXA created the corporate slogan, "Explore to Realize," which reflects its management philosophy of utilizing space and the sky to achieve a safe and affluent society

## KOREA AEROSPACE RESEARCH INSTITUTE (KARI)

**Contact:** Eun-Jung Lee  
**Job Title:** Head, External Relations Team  
**Address:** 169-84 Gwahangno, Yuseong-Gu, Daejeon 305-806, Korea.  
**Tel:** +82 42 860 2148  
**Fax:** +82 42 860 2015  
**Email:** [monicalee@kari.re.kr](mailto:monicalee@kari.re.kr)  
**Website:** [www.kari.re.kr](http://www.kari.re.kr)  
 Korea Aerospace Research Institute (KARI) is a specialized institution founded for national development through the research and development of aerospace scientific



technologies. Despite its relatively short history, it has developed the world's leading aerospace scientific technologies, contributing to the development of the national economy and the improvement of the citizens' quality of life through its commitment to research and development.

### **NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**Contact:** Charles F. Bolden, Jr  
**Job Title:** NASA Administrator  
**Address:** NASA Headquarters, 300 E. Street SW, Suite 5R30, Washington, DC 20546, USA.

**Tel:** +1 202 358 0001  
**Fax:** +1 202 358 4338  
**Email:** Online Form  
**Website:** [www.nasa.gov](http://www.nasa.gov)

NASA stands for National Aeronautics and Space Administration. NASA is a U.S. government agency that is responsible for science and technology related to air and space. The Space Age started in 1957 with the launch of the Soviet satellite Sputnik. NASA opened for business on Oct. 1, 1958. The agency was created to oversee U.S. space exploration and aeronautics research. The administrator is in charge of NASA. The NASA administrator is nominated by the president and confirmed by a vote in the Senate. NASA helps teachers prepare students who will be the engineers, scientists, astronauts and other NASA workers of the future. They will be the adventurers who will continue exploration of the solar system and universe. NASA has a tradition of investing in programs and activities that inspire students, educators, families and communities in the excitement and discovery of exploration. NASA offers training to help teachers learn new ways to teach science, technology, engineering and mathematics. The agency also involves students in NASA missions to help them get excited about learning.

### **NATIONAL SPACE RESEARCH & DEVELOPMENT AGENCY, NIGERIA** NASRDA

**Contact:** Professor Seidu Onailo Mohammed  
**Job Title:** Director General  
**Address:** Obasanjo Space Centre, Umaru Ya'ardua Way, Pyakkassa Junction, Abuja, Northern Nigeria  
**Tel:** +234 8033139987  
**Email:** [dg@nasrda.gov.ng](mailto:dg@nasrda.gov.ng)  
**Website:** [www.nasrda.gov.ng](http://www.nasrda.gov.ng)

The National Space Research and Development Agency (NASRDA) is a research institutions that is under the supervision of the Federal Ministry of Science and Technology of Nigeria. The Agency was established on May 5, 1999 with the broad objective to pursue the development and application of space science and technology for the socio-economic benefits of the nation. NASRDA is host to one of UN-SPIDER's Regional Support Offices (RSO) in Africa. The RSO in Nigeria was established in 2008 with the mandate to promote and

support the use of space technology within and outside of Nigeria for the management of the full disaster cycle including prevention and mitigation.

### **NATIONAL SPACE AGENCY OF UKRAINE**

**Contact:** Oleg Uruskyi  
**Job Title:** Head  
**Address:** 01010, Kyiv, Moskovska Str, 8,, Ukraine.  
**Tel:** +380 44 281 6200  
**Fax:** +380 44 281 6209  
**Email:** [yd@nkau.gov.ua](mailto:yd@nkau.gov.ua)  
**Website:** [www.nkau.gov.ua](http://www.nkau.gov.ua)

State Space Agency of Ukraine as a central body of executive power established in 1992 implements state policy concepts in the exploration and peaceful use of outer space. SSAU belongs to the 5 world leaders in providing launching services. For 20 years of activities 125 launches of Ukrainian LVs have been conducted and over 230 spacecraft delivered into orbit for the benefit of 20 countries worldwide

### **NORWEGIAN SPACE CENTRE**

**Contact:** Bo N. Andersen  
**Job Title:** Director General  
**Address:** PO Box 113 Skoyen, 0212 Oslo, Norway.  
**Tel:** +47 22 51 18 00  
**Fax:** +47 22 51 18 01  
**Email:** [spacecentre@spacecentre.no](mailto:spacecentre@spacecentre.no)  
**Website:** [www.spacecentre.no](http://www.spacecentre.no)

The Norwegian Space Agency (NOSA) is a government agency under the Ministry of Trade, Industry and Fisheries. The Agency was established in 1987, when Norway became a member of the European Space Agency (ESA).NOSA is responsible for organizing Norwegian space activities, particularly with respect to ESA and the EU, and for coordinating national space activities.

### **PAKISTAN SPACE & UPPER ATMOSPHERE RESEARCH COMMISSION**

**Contact:** Mr Ahmed Bilal  
**Job Title:** Chairman  
**Address:** SUPARCO Headquarters, SUPARCO Road, P. O. Box No. 8402, Karachi-75270, Pakistan.  
**Tel:** +92 21 34690765  
**Fax:** +92 21 34644928  
**Email:** [am.pr@suparco.gov.pk](mailto:am.pr@suparco.gov.pk)  
**Website:** [www.suparco.gov.pk](http://www.suparco.gov.pk)

Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), the national space agency, was established in 1961 as a Committee and was granted the status of a Commission in 1981. SUPARCO is mandated to conduct R&D in space science, space technology, and their peaceful applications in the country. It works towards

developing indigenous capabilities in space technology and promoting space applications for socio-economic uplift of the country

#### ROMANIAN SPACE AGENCY

**Contact:** Marius-Ioan Piso  
**Job Title:** President  
**Address:** str. Mendeleev 21-25, sector 1, 010362 Bucharest, Romania.  
**Tel:** +40 21 3168720  
**Fax:** +40 21 3128804  
**Email:** rosa-hq@rosa.ro  
**Website:** www.rosa.ro

Romanian Space Agency (ROSA) was established in 1991 and reorganized by a Government Decision in 1995 as an independent public institution under the auspices of the Ministry of Research and Technology (actually, the Ministry of Education, Research, Youth and Sport). ROSA is the national co-ordinating body of the space activities. The missions of ROSA are to promote and coordinate development and national efforts in the field, and, as a Government representative, to promote international cooperation. In particular, ROSA is authorized to establish research and development centres oriented on specific objectives of the Romanian Space Programme. ROSA is developing its own research and development projects. On behalf of the Government, ROSA is the national representative in the cooperative agreements with international organizations, such as European Space Agency (ESA) and Committee on Space Research (COSPAR), as well as bilateral governmental agreements. Together with the Ministry of Foreign Affairs, ROSA is representing Romania in the sessions of the United Nations Committee on the Peaceful Use of Outer Space (COPUOS) and its Subcommittees.

#### RUSSIAN FEDERAL SPACE AGENCY - ROSCOSMOS

**Contact:** Komarov Igor  
**Job Title:** Head  
**Address:** Schepkina st. 42, Moscow, Russia, 107996.  
**Tel:** +7 495 631 85 21  
**Fax:** +7 495 631 90 24  
**Email:** Online Form  
**Website:** [www.en.federalspace.ru](http://www.en.federalspace.ru)

The Federal Space Agency (Roscosmos) is an authorised federal executive body responsible for implementing government policy and legal regulation, providing government services and managing state property in the field of space exploration, international space cooperation and joint projects and programmes in space, space research, missile and space technology for military purposes, strategic missile systems, coordination of the maintenance, further development and use of the Global Navigation Satellite System (GLONASS) in the interests of civilian consumers, including commercial consumers, and international cooperation in this sphere, as well as the general coordination and management of the activities being carried out at the Baikonur space centre.

#### SWEDISH NATIONAL SPACE BOARD

**Contact:** Olle Norberg  
**Job Title:** Director General  
**Address:** Box 4006, SE-171 04 Solna, Sweden, Sweden.  
**Tel:** +46 8 6276480  
**Fax:** +46 8 6275014  
**Email:** [rymdstyrelsen@snsb.se](mailto:rymdstyrelsen@snsb.se)  
**Website:** [www.snsb.se](http://www.snsb.se)

The Swedish National Space Board, SNSB, is a central governmental agency under the Ministry of Education and Research. SNSB is responsible for national and international activities relating to space and remote sensing, primarily research and development. SNSB's three main tasks are the distribution of government grants for space research, technology development and remote sensing activities, the initiation of research and development in space and remote sensing areas and acting as Swedish contact point for international co-operation.

#### TAIWAN NATIONAL SPACE ORGANIZATION

**Contact:** Dr. Guey-Shin Chang  
**Job Title:** Director General  
**Address:** 8F, 9, Prosperity 1st Road, Science-Based Industrial Park, HsinChu, Taiwan ROC.  
**Tel:** +886 3 578 4208  
**Email:** [contact@nspo.org.tw](mailto:contact@nspo.org.tw)  
**Website:** [www.nspo.org.tw](http://www.nspo.org.tw)  
 National Space Organization (NSPO) is the only space agency in Taiwan

The agency has the characteristics of both the national space science and technology policy implementation and the space science and technology development, with the implementation of satellite programs as the main axis, to strengthen the promotion of academic research, establish Taiwan's self-reliant space science and technology, conduct cutting-edge space scientific research and promote satellite applications as the mission goals.

#### Name: UAE SPACE AGENCY

**Contact:** Mohammed Al Ahbabi  
**Job Title:** Director General  
**Address:** P.O. Box: 7133 Abu Dhabi, UAE.  
**Tel:** +971 2 202 2222  
**Fax:** +971 2 202 2000  
**Email:** [info@space.gov.ae](mailto:info@space.gov.ae)  
**Website:** [www.space.gov.ae](http://www.space.gov.ae)

The Emirates Space Agency is a general federal authority, established by Federal Decree Law No. 1 of 2014 regarding the establishment of the Emirates Space Agency, and the space sector includes all activities, projects and programs related to outer space above the Earth's atmosphere. The decree stipulated that the Emirates Space Agency is affiliated with the Council of Ministers, has an independent legal personality, enjoys financial and administrative independence, and has the legal capacity necessary to carry out all actions and actions that ensure the

achievement of its objective. The Emirates Space Agency is also responsible for monitoring space business and uses in the country to ensure the safe and proper use of space, holding conferences and seminars related to the space sector and participating in it, and providing technical and advisory support in the field of the space sector to the concerned authorities in the country, as well as any other tasks and functions assigned to the agency from Before the cabinet.

**Name: UK SPACE AGENCY**

Contact: Dr. David Parker

Job Title: Chief Executive

Address: Polaris House North Star Avenue,  
Swindon, Wiltshire SN2 1SZ, UK.

Tel: +44 1793 418069

Email:

correspondence@ukspaceagency.bis.gsi.gov.uk

Website: [www.bis.gov.uk/ukspaceagency](http://www.bis.gov.uk/ukspaceagency)

We are responsible for all strategic decisions on the UK civil space programme and provide a clear, single voice for UK space ambitions. At the heart of UK efforts to explore and benefit from space, we are responsible for ensuring that the UK retains and grows a strategic capability in space-based systems, technologies, science and applications. We lead the UK's civil space programme in order to win sustainable economic growth, secure new scientific knowledge and provide benefit to all citizens

**Company: MEASAT GLOBAL BERHAD**

Contact: Yau Chyong Lim

Job Title: Chief Commercial Officer

Address: Jalan Teknokrat 1/2, Cyberjaya 63000,  
Selangor, Malaysia.

Tel: +603 8213 2188

Fax: +603 8213 2233

Email: sales@measat.com |

corporate.communications@measat.com

Internet: [www.measat.com](http://www.measat.com)

MEASAT is a premium supplier of satellite communication services to leading international broadcasters, Direct-To-Home (DTH) platforms and telecom operators. With capacity across six communication satellites, the company provides satellite services to over 150 countries representing 80 percent of the world's population across Asia, Middle East, Africa, Europe and Australia.

The MEASAT fleet includes the state-of-the-art MEASAT-3, MEASAT-3a and MEASAT-3b satellites co-located at 91.5°E, supporting Asia's premium DTH and video distribution neighbourhood; MEASAT-2 at 148.0°E; and, MEASAT-5 at 119.5°E. In Africa, the AFRICASAT-

1a satellite at 46.0°E provides satellite capacity across the African continent with connectivity to Europe, the Middle East and South East Asia. The MEASAT fleet will be further strengthened with the addition of MEASAT-3c at 91.5°E in 2016 and MEASAT-2a at 148.0°E in 2017. Leveraging facilities at the MEASAT Teleport and Broadcast Centre, and working with a select group of world-class partners,

MEASAT also provides a complete range of broadcast and telecommunications solutions. Services include ultra high definition, high definition and standard definition video playout, video turnaround, co-location, uplinking, broadband and IP termination services.

**GEO-INFORMATICS AND SPACE TECHNOLOGY DEVELOPMENT AGENCY, THAILAND**

Contact: Mr Thongchai Charupatt

Job: Director

Address: Geo-Informatics and Space Technology  
Development Agency

196 Phahonyothin Road, Chatuchak

Bangkok 10900, Thailand

Fax: +66-2-561-3035

Tel.: +66-2-940-6420-9

Email: [thongc@gistda.or.th](mailto:thongc@gistda.or.th)

**SPA CONDOR ELECTRONICS ALGERIA**

Condor SPA Electronics is the figurehead of Benhamadi Group. Founded in 2002, It soon grows into a leader in its field. It specializes in manufacture&maintenance of electronic products, computer, multimedia, home appliances, photovoltaic panels etc. Thanks to its aggressive price policy, reliability & after sales service, it has become one of the most successful brands in Algeria&won the heart of the Algerians. The enormous success that it achieved in Algerian&abroad market, denotes the high quality&efficiency of its devices which are now the pride of Algeria. Important figures: Global workers:5110 Number of showrooms across Algeria:130 Condor Product penetration in Algerian homes:90%.

Website: <http://www.condor.dz/>

Email: [info@condor.dz](mailto:info@condor.dz)

**Novatti AUSTRALIA**

Business Support Systems (BSS), Mobile Financial Services, Mobile Payments and Remittances, Systems Integration. Novatti, an Australian-based company, is an award-winning global software technology and systems integration provider, committed to delivering innovative payment solutions since 1996. With an emphasis on the development and delivery of high volume, mission critical systems, these reliable and efficient solutions include Consumer Digital Wallet, Electronic Top-Up, Mobile Money, Bill Payments, Remittance Services, Voucher Management Systems (PINs & PINless) and Electronic Value Distribution Systems. Novatti enables telecommunication, banking and alternative network service providers to seamlessly expand their product portfolio and diversify their target markets. Novatti's solutions are highly customizable and can be adjusted to fit your business needs.

Email: [info@novatti.com](mailto:info@novatti.com)

Website: <http://www.novatti.com/>

### **Real Impact Analytics BELGIUM**

Data Analysis, Data Products and Services, Mobile Advertising and Marketing, Network Management, Network Planning and Design Real Impact Analytics (RIA) taps into rich telecom data flows to capture their value. The data is turned into action with big data apps embedded in our clients' day-to-day work.

Email: [info@realimpactanalytics.com](mailto:info@realimpactanalytics.com)  
 Website: [info@realimpactanalytics.com](http://info@realimpactanalytics.com)

### **Option Wireless Technology BELGIUM**

Consulting and Engineering Services, M2M / Telemetry Systems, Modems, Systems Integration, Utilities (Smart Grid)

Option Wireless Technology's CloudGate is the carrier-approved IoT solution platform that delivers device connectivity, security, edge computing processing power for global IoT applications across the variety of protocols in different IoT verticals. It includes the globally carrier-approved intelligent Cloudgate gateway plus CloudGate Universe, Option's cloud-based configuration and deployment platform, as well as the CloudGate SDK for rapid

application development and the CloudGate HDK for prototyping custom expansion cards. LuvitRed completes it and overcomes complexities of the vast variety of protocols used in different IoT verticals and delivers true IoT Edge Computing capabilities. Only Option delivers a complete M2M ecosystem.

Email: [sales@option.com](mailto:sales@option.com)  
 Website: <http://www.option.com/>

### **VASCO Data Security BELGIUM**

Encryption and Security Equipment, Fraud Management and Solutions VASCO is a world leader in providing two-factor authentication and digital signature solutions to financial institutions. More than half of the top 100 global banks rely on VASCO solutions to enhance security, protect mobile applications and meet regulatory requirements. VASCO also secures access to data and applications in the cloud, and provides tools for application developers to easily integrate security functions into their web-based and mobile applications. VASCO enables more than 10,000 customers in 100 countries to secure access, manage identities, verify transactions, and protect assets across financial, enterprise, e-commerce, government and healthcare markets.

Email: [info@vasco.com](mailto:info@vasco.com)  
 Website: [www.vasco.com](http://www.vasco.com)

### **Norwegian Computing Center NORWAY**

Application Development – General, Consulting and Engineering Services, Mobile Health Services and Solutions, Mobile Payments and Remittances. Norsk Regnesentral (Norwegian Computing Center, NR) is a private, independent, non-profit foundation established in 1952. NR carries out contract research and development projects in the areas of information and communication technology and applied statistical modeling.

Email: [bjarte@nr.no](mailto:bjarte@nr.no)  
 Website: <http://www.nr.no/>

### **Moota Telecom AS NORWAY**

Content Management, Data Analysis, Device Management, Middleware, Mobile Enterprise Solutions and Services. Moota Telecom and hSenid Mobile in strategic partnership will showcase how Telcos can transform their future in digital services and gain more control over subscribers. Offering a device configuration solution, Moota Telecom ensures Telcos get control over subscriber mobile devices. Whereas, hSenid Mobile enables Telcos to open up their network assets via APIs for collaborative innovation, whilst continuing to control those assets. While opening up avenues for Service Providers to use both handset and network capabilities to turn out new services, the joint offering will empower Telcos with complete end to end control of service innovation delivered to subscriber handsets.

Email: [otto@moota.com](mailto:otto@moota.com)  
 Website: <http://moota.com/>

### **Elliptic Laboratories AS NORWAY**

Devices, Mobile Enterprise Solutions and Services, Semiconductors. Elliptic Labs' ultrasonic technology provides 3D touchless gesturing for consumer and IoT devices, creating more intuitive ways for users to navigate content and control devices, while making them more beautiful. The technology can be integrated in all-in-ones, tablets, smartphones, wearables, and IoT devices. Ultrasound offers the best combination of high resolution, 180-degree interaction space and low power consumption compared to cameras or other sensing technologies. Elliptic Labs uses ultra-low-power processors for ultrasound processing from companies such as Cirrus Logic, Qualcomm, and MediaTek. Elliptic Labs is a private company with offices in San Francisco, California; Shanghai, China; and Oslo, Norway.

Email: [britt@ellipticlabs.com](mailto:britt@ellipticlabs.com)  
 Website: <http://www.ellipticlabs.com/>

### **Innovation Norway NORWAY**

Government and Regulatory, Network Management. Innovation Norway is the Norwegian government's most important instrument for the innovation and development of Norwegian enterprises and industry. Innovation Norway provides competence, advisory services, promotional services, financing and network services. We are represented in more than 30 countries worldwide and in all Norwegian counties. Head office is in Oslo

Email: [desiree.vikse@innovationnorway.no](mailto:desiree.vikse@innovationnorway.no)  
Website: <http://www.innovationnorway.no/>

### **Verscom Technologies & Services (Pvt) Ltd PAKISTAN**

Application Development "General, Augmented Reality, Business Support Systems (BSS), Managed Network Services, VoIP Systems. VERSCOM TECHNOLOGIES AND SERVICES Pvt. Ltd. Established in 2012, Verscom Technologies and Services are focusing on different segments of the software and solutions arena. The core competency of our company relies in providing turn-key solutions by developing software's which are mission critical for organizations in the telecom sector. Which are tailored according to the need of customer, the company emphasizes upon user friendly, robust, solutions, service and excellent customer support to differentiate itself from competitors. The company develops custom software solutions based on a range of platforms and technologies, including Android, iOS, .Net, Java, PHP, SQL, and other mobile embedded systems.

Email: [hamid.bilal@verscomtech.com](mailto:hamid.bilal@verscomtech.com)  
Website: <http://www.verscomsolutions.com/>

### **Pakistan Software Export Board (PSEB) PAKISTAN**

Government and Regulatory. Pakistan Software Export Board (PSEB) is a body under Ministry of IT which connects foreign IT customers and investors with IT industry of Pakistan. Pakistan is in Upwork's top 5 countries for freelancing and is home to over 2,000 software houses & call centers with expertise in software development, mobile applications, and BPO services.

### **NAES Group PANAMA, REPUBLIC OF**

Batteries, Consumer Electronics (CEM), Device. NAES is focusing on improves people's quality of life by integrating technologies and developing innovations. We studying human behaviors from

today's needs to the unmet needs; bring identified technologies from R&D Labs to the real markets; taking selected products from the concept stage to consumer's life. Accessories, Power Systems, Wi-Fi Services & Management

Email: [info@naesgroup.com](mailto:info@naesgroup.com)  
Website: <http://www.naesgroup.com/>

### **Pomeranian Science and Technology Park Gdynia POLAND**

Consulting, Location Technologies and Services, LTE Network Infrastructure, Mobile Advertising and Marketing, Outsourcing The Pomeranian Science and Technology Park in Gdynia (PPNT Gdynia) successfully supports the development of innovative projects in a knowledge-based environment of partnership cooperation. Combining science and business on an international scale, the PPNT Gdynia presents hi-tech, cutting-edge projects: TeleMobile – RF & Microwave Products & Services; JIT Solutions – helps in creating remote teams; Amplituda – makes interfaces; Smart Media – smart solutions for your business; QB-mobile – many cities, many stories, one app.

Email: [m.rybak@ppnt.gdynia.pl](mailto:m.rybak@ppnt.gdynia.pl)  
Website: <http://www.ppnt.pl/>

### **Ooredoo QATAR**

Network Operator. About Ooredoo Ooredoo is a leading international communications company delivering mobile, fixed, broadband internet and corporate managed services tailored to the needs of consumers and businesses across markets in the Middle East, North Africa and Southeast Asia. As a community-focused company, Ooredoo is guided by its vision of enriching people's lives and its belief that it can stimulate human growth by leveraging communications to help people achieve their full potential. Ooredoo has a presence in markets such as Qatar, Kuwait, Oman, Algeria, Tunisia, Iraq, Palestine, the Maldives, Myanmar and Indonesia.

Email: [media@ooredoo.com](mailto:media@ooredoo.com)  
Website: <http://www.ooredoo.com/>

### **PROTEI RUSSIAN FEDERATION**

Core Network Equipment, Messaging, Roaming Solutions, Voice Products and Services, VoIP Systems. PROTEI is an international telecommunication systems vendor operating in Russia, Eastern Europe, Central Asia, Latin America, the Middle East & North Africa. Under PROTEI brand we present reliable, cost-effective, carrier-class

solutions. Using the latest convergent technologies implemented in our products the most innovative services can be delivered with maximum efficiency. PROTEI product line covers all needs of mobile operators: core network (like HLR/HSS and GMSC), roaming, charging, IN&VAS, messaging and MVNO solutions. Our products are highly customizable and can be altered according to any requirements. PROTEI serves more than 300 customers in 30 countries, to cater 120 million subscribers worldwide.

**Micran, Research and Production company  
RUSSIAN FEDERATION**

Backhaul Solutions, IP Networking Equipment, LTE Network Infrastructure, Semiconductors, Test and Measurement Equipment. Micran – delivering your network to high technologies with cost saving

Email: ak@micran.ru  
Website: <http://www.micran.com/>

**STC  
SAUDI ARABIA**

ISP, LTE Network Infrastructure, Mobile Enterprise Solutions and Services, Network Operator, Voice Products and Services. STC is the largest teleco in ME and Africa catering to 100 million globally with a fiber network spanning 137,000 kilometers across Asia, Europe and ME. STC covers more than 99% of Saudi Arabia's populated areas; its 4G more than 85%. STC owns 100% of Viva Bahrain, 26% of Viva Kuwait alongside a management contract, 35% of Oger Telecom Limited UAE which controls Turk Telecom, Avea in Turkey and Cell-C in South Africa, and 25% of Binariang GSM Holding Malaysia which controls Maxis in Malaysia and Aircel in India. STC invests in IT, Content, Distribution, Contact Centers, and Real Estate.

Email: info@stc.com.sa  
Website: <http://www.stc.com.sa/>

**Wireless Broadband Alliance  
SINGAPORE**

Telecoms Authorities / Associations, Wi-Fi Services & Management The mission of the Wireless Broadband Alliance (WBA) is to champion the development of the converged wireless broadband ecosystem through seamless, secure and interoperable unlicensed wireless broadband services. WBA continues to drive and support the adoption of Next Gen Wi-Fi and other unlicensed wireless services across the entire public Wi-Fi ecosystem, including IoT, Big Data, Converged Services, Smart Cities, 5G, etc.

Today, membership includes major fixed and mobile operators such as AT&T, Boingo Wireless,

China Telecom, Comcast, KT Corporation, Liberty Global, NTT DOCOMO, Orange and leading technology companies such as Cisco, Microsoft, Huawei Technologies, Google, Intel  
Email: ton@wballiance.com  
Website: <http://www.wballiance.com/>

**REVE Systems India Pvt Ltd  
SINGAPORE**

Roaming Solutions, Voice Products and Services, VoIP Systems. REVE Systems is a 12 year old company focusing on the IP based communication industry. We are a leading provider of software solutions and hold a leadership position in Mobile VoIP, Softswitch & Billing Solutions. At present our company serves 2600+ VoIP & Telecommunication service providers across 78 countries. The Company is also Red Herring Top 100 Global winner.

Email: raihan@revesoft.com  
Website: <http://www.revesoft.com/>

**Iskratel  
SLOVENIA**

Core Network Equipment, IP Networking Equipment, Managed Network Services, Systems Integration, Voice Products and Services. Iskratel builds the foundations of tomorrow's success today by creating value, helping people, ensuring safety and increasing efficiency in numerous areas. We leverage our ICT expertise in delivering integrated solutions across telco, transport, public safety and energy industries. We represent the best alternative to major providers – enabling the most favourable way to network modernisation with integrated and proven solutions, using our own and our partners' products. We aim to become a competent and credible global integrator of infocommunications solutions.

Email: info@iskratel.si  
Website: <http://www.iskratel.com/>

**MIMOTech and CSG Science & Technology (Hefei)  
SOUTH AFRICA**

Backhaul Solutions, BTS Fronthaul Solutions. MIMOTech specialises in high efficiency wireless telecommunications transport equipment for backhaul, front-haul and fiber extension markets using microwave and millimeterwave technologies. In 2015, MIMOTech released the Janus AirDuplex(TM) product which doubles spectral efficiency and throughput capacity of backhaul transport networks for capacities up to 10Gbps.

Email: sales@mimotechnology.com  
Website: <http://www.mimotechnology.com/>

**DATATRONICS, S.A.  
SPAIN**

Core Network Equipment, LTE Network Infrastructure, Messaging, Systems Integration, VoIP Systems. DATATRONICS is a leading System Integrator focused on Telecom Operators and CSPs. The company offers high value-added and innovative solutions in areas of Signaling (STP, DSR), Network Evolution (VoLTE, IMS, VAS), VoIP Systems (MGW, SBCs), Roaming, Troubleshooting and QoS Monitoring, Time&Frequency, Network Intelligence and Policy Solutions (PCRF). Active on the new technologies, Datatronics is helping its customers with the evolution to Software Telco with NFV solutions. Present in the market since 1996, the company partners with leading technological companies, employs a team of engineers with proven and international expertise in Telco environments and deploys projects in EMEA and LATAM.

Email: [info@datatronics.es](mailto:info@datatronics.es)  
Website: <http://www.datatronics.es/>

**P-OSS SOLUTIONS  
SPAIN**

Monitoring Systems and Equipment, Network Management, Network Planning and Design, Operational Support Systems (OSS). P-OSS is a privately owned company established by experienced Performance Management engineering experts. We have developed iPe-Bot, the cutting-edge world-class future-proof Performance Management system. We look for long-term partnerships, growing confidence and improved trust in the relationship over time. P-OSS has grown steadily since its inception, enhancing technical capabilities and delivering first-in-class solutions: the partner you can trust.

Email: [contact@p-oss.com](mailto:contact@p-oss.com)  
Website: <http://www.p-oss.com/>

**Vodafone España S.A.U  
SPAIN**

Network Operator. Vodafone Spain is part of Vodafone Group, one of the world's largest mobile communications companies by revenue, providing voice, messaging, data and fixed communication services. Vodafone offers mobile services in 26 countries and fixed broadband services in 17, with 57 partner networks worldwide. As of 30th September 2015, Vodafone has over 449 mobile customers and over 12 million fixed broadband customers. 14,186,000 mobile and 2,879,000 fixed broadband Vodafone Spain customers benefit from the expertise and global leadership of this company, which helps individuals, businesses and communities to be better connected.

Email: [mwc@corp.vodafone.es](mailto:mwc@corp.vodafone.es)  
Website: <http://www.vodafone.es/>

**Ibys Technologies  
SPAIN**

Monitoring Systems and Equipment, Test and Measurement Equipment. Ibys Technologies, a Spanish company specializing in manufacturing and delivering advanced QoS/QoE Systems and Solutions. Since its foundation in 1989, it has been developing Testing and Monitoring Equipment to assess the end2end quality of service on several technologies like GSM/GPRS/EDGE/UMTS/HSPA and LTE. As well as xDSL, FTTH, PSTN and WIMAX. Ibys keeps on walking on the road of excellence by developing new monitoring features and tools related to VoLTE, VoWiFi, HDVoice-2G/3G, VoD, IPTV, RCS and OTT in general. Thus allowing us to be at the forefront of the technological evolution, and offer the best-in-class tools in the market.

Email: [admin@ibys.com](mailto:admin@ibys.com)  
Website: <http://www.ibys.com/>

**VALID  
SPAIN**

M2M / Telemetry Systems, Mobile Financial Services, Mobile Payments and Remittances, NFC Services and Solutions, SIM Cards and Smart Cards. Since its first day of work in 1957, Valid was already completely dominating the technologies for high-security paper printing. Valid continued to be a player on the market, and grew mainly thanks to its ability to keep up with the transformations in the world. Valid has a global presence and a complete portfolio of solutions in Payment Solutions and Mobile Solutions, Identity Solutions, Digital Marketing and Digital Certification. VALID is one of the world's main providers of secure solutions, and we never waver from our focus: the client. Today, our brand is synonymous with trustworthiness and quality. More info: [www.valid.com](http://www.valid.com)

Email: [sales@valid.com.es](mailto:sales@valid.com.es)  
Website: <http://www.valid.com/>

**ALBEDO Telecom  
SPAIN**

LTE Network Infrastructure, Monitoring Systems and Equipment, Test and Measurement Equipment, Utilities (Smart Grid), VoIP Systems. ALBEDO's core expertise ranges from PTP, SyncE, Synchronization, PPS, Wander, Ethernet, 10G, E1/T1 Transmission, WAN emulation, VoIP, SIP trunking, Voice Quality, VoWLAN, C37.94, TR-069 Packet Capture, Lawful interception, Datacom, Test and Measurement. Our typical customers are Manufacturers, R&D labs, Universities, Military, Power Utilities, Railways, Mobile and Telecom Operators that are running critical

applications that need tools to install, testing, emulate or maintain telecom infrastructures.

Email: [pca@albedotelecom.com](mailto:pca@albedotelecom.com)  
Website: <http://www.albedotelecom.com/>

### **STARLAB SPAIN**

Antennas, Aerials, Masts and Towers, Consulting and Engineering Services, Data Analysis, Data Products and Services, Environment / Recycling Services. Starlab's mission is to transform science into technologies with a profound and positive impact on society. Our main areas of work lie in the Space and Neuroscience sectors, two key areas for the 21st century with a common element: the increasing availability of streams of information. We provide technical solutions, products and services for governments, industry and downstream markets. We are market-aware and market-driven: in Space (Star2Earth: SmartIrrigation) and Neuroscience (Neurokai and Neuroelectrics) have great impact in and through several key markets, including environment, energy and health.

Email: [info@starlab.es](mailto:info@starlab.es)  
Website: <http://www.starlab.es/>

### **CTTC SPAIN**

Backhaul Solutions, Intellectual Property, Location Technologies and Services, Network Management, Network Operating Software. CTTC is a Research Institute oriented towards innovative and high quality R&D project execution with IPR generation. A portfolio of Products & Solutions (P&S) in the fields of: Communication networks, technologies, systems, position, navigation, and remote sensing, in different technology readiness levels (TRL), is available through the company CTTC-HK Ltd. DLR GfR is a company that provides reliable, safe and secure aerospace services, DLR GfR operates and manages the constellation of Galileo satellites, provides project management, ground infrastructure build-up, and high-level security applications. DLR GfR holds an Air Navigation Service Provider Certificate for communication and navigation services at airports.

Email: [albert.sitja@cttc.es](mailto:albert.sitja@cttc.es)  
Website: <http://www.cttc.es/>

### **NEXIONA SPAIN**

M2M / Telemetry Systems, Monitoring Systems and Equipment, Systems Integration. We are a passionate team born in Barcelona dedicated in create IoT (Internet of Things) Technology, offering a Software Composer to developers and customized solutions to manufacturers.

Email: [info@nexiona.com](mailto:info@nexiona.com)  
Website: <http://www.nexiona.com/>

### **TELNET Redes Inteligentes, S. A. SPAIN**

Antennas, Aerials, Masts and Towers, BTS Fronthaul Solutions, LTE Network Infrastructure, M2M / Telemetry Systems, Small Cells. Headquartered in Spain, Telnet Redes Inteligentes is a leading global supplier that designs and manufactures high performance antennas for next-generation networks (NGN). Quality is our most important feature. RAN complexity demands top performance antennas to ensure data traffic growth and QoS. 4G, 5G, MIMO, LTE-A, Small-Metro Cells, extra-low PIM antennas, sharing infrastructure, low visual impact, concealed solutions, custom antennas. We design innovative products, excellent manufacturing and seamless customer service. With offices in Europe, LATAM, Russia, factories in Spain, TELNET's antennas are deployed by the top MNOs and vendors worldwide. TELNET will help your RAN to reach the next level.

Email: [comercialantenas@telnet-ri.es](mailto:comercialantenas@telnet-ri.es)  
Website: <http://www.telnet-ri.es/>

### **GRUPO CYS SPAIN**

Antennas, Aerials, Masts and Towers, In-Building Systems, Location Technologies and Services, M2M / Telemetry Systems, Small Cells. GRUPO CYS is an international company founded in 1985 and established in Spain, Peru and Mexico.

Email: [mwc2016@grupocys.com](mailto:mwc2016@grupocys.com)  
Website: <http://www.grupocys.com/>

### **Sensing & Control Systems S.L. SPAIN**

Application Development " General, Business Support Systems (BSS), Cloud Services, Data Analysis, Middleware. We offer IoT solutions to organizations in different sectors including telecom, energy providers, healthcare, buildings construction and management, hardware and appliance manufacturers, retailers, insurance companies and Smart Cities. Our platform is a complete IoT end-to-end solution that easily integrates with existing communication network, monitoring tool or control systems. It connects to any device including sensors, actuators, appliances, meters, wearables, smartphones, smart home and building devices (thermostats, lights, energy plugs, air conditioning, heaters, etc.), cameras, locks, etc.

Email: [pedro.espinel@sensingcontrol.com](mailto:pedro.espinel@sensingcontrol.com)  
Website: <http://www.sensingcontrol.com/>



**ACUNTIA  
SPAIN**

Core Network Equipment, IP Networking Equipment, Managed Network Services, Systems Integration, VoIP Systems. A future where our Customers and their needs find that we are the perfect travel companion: collaborating, involved, close, smart, self-demanding and strong. Information Technologies walk towards the future as they never have before, having to balance the profound transformation of competitiveness within organisations and cost optimisation. An expedition where our Customers face new challenges for which ACUNTIA can provide new tailor-made solutions in critical environments.

Email: [marketing@acuntia.es](mailto:marketing@acuntia.es)  
Website: <http://www.acuntia.es/>

**Landatel Comunicaciones, S.L.  
SPAIN**

IP Networking Equipment, ISP, Mobile TV, Network Planning and Design, Wi-Fi Services & Management. Founded in 2001 as a pioneering distributor of Wi-Fi equipment for Wireless Internet Service Providers (WISP). Today Landatel is a Global Telecommunications company with presence in Europe and LATAM who compete in the EU horizon 2020 with new connectivity products and services. Its Engineering team, in close collaboration with the University, develops R&D projects that sells under its own brand AirGiga. As a result, and with the CDTI's help, borns SIUSAS; a technology platform for urban buses that provides ubiquitous Internet access, energy efficiency, geo-positioning ,video surveillance and digital contents, in an example of IoT for Smart Cities.

Email: [info@landatel.com](mailto:info@landatel.com)  
Website: <http://www.landatel.com/>

**Sivers IMA  
SWEDEN**

Backhaul Solutions, LTE Network Infrastructure, Semiconductors, Small Cells, Test and Measurement Equipment. Sivers IMA is a leading developer and manufacturer of advanced millimeter wave products. The company was founded in 1951 and is publicly traded. Our headquarters and manufacturing is located in Stockholm, Sweden, with an additional sales office and R&D department in Gothenburg. We also work with several manufacturing partners for high volume production. Hundreds of companies have purchased our products for research, test- and measurement or built into their end-customer products for large volume deployment.

Email: [sales@siversima.com](mailto:sales@siversima.com)  
Website: <http://siversima.com/>

**POLYSTAR  
SWEDEN**

Monitoring Systems and Equipment, Network Management, Operational Support Systems (OSS), Roaming Solutions, Test and Measurement Equipment Polystar enables Communications Service Providers to achieve excellence in CEM, Big Data Analytics, Service Assurance, Network Monitoring, Service Enablement and High Performance Testing. We help CSPs to simplify their CEM strategies and drive operational efficiency through real-time network analytics. Polystar's real-time Network and Customer Insights uncover a goldmine of data, which yields indispensable analytics to CSPs. Polystar is recognised as one of the fastest-growing companies in Sweden. Since Polystar's foundation in Stockholm in 1983, we have experienced continuous and sustainable growth, and evolved to a global presence, serving our customers in over 50 countries.

Email: [marketing@polystar.com](mailto:marketing@polystar.com)  
Website: <http://www.polystar.com/>

**Deltanode Solutions AB  
SWEDEEN**

In-Building Systems, LTE Network Infrastructure, Operational Support Systems (OSS), Test and Measurement Equipment. Deltanode™, a Bird Technologies® Company, is a total solution provider of high performance, quality RF Distributed Antenna Systems (DAS) equipment and services. Designed to meet the requirements of US and global wireless voice and data providers, DeltaNode products have been proven to provide the communications industry with reliable DAS headend and remote solutions for both indoor and outdoor applications. DeltaNode has designed and installed DAS solutions from VHF to 2600 MHz with a flexible core that allows seamless upgrading to new frequencies and modulations as carriers service requirements expand.

Email: [henrik.huss@deltanode.com](mailto:henrik.huss@deltanode.com)  
Website: <http://deltanode.com/>

**Netonomics AB  
SWEDEN**

Backhaul Solutions, BTS Fronthaul Solutions, Cloud RAN, Consulting and Engineering Services, LTE Network Infrastructure. Netonomics designs optimal network architectures for CRAN. Optimal pooling of Access Nodes into BBH ensures highest radio capacity at required latency and lowest cost, important in 4G and 5G with high traffic volumes and crucial latency.

Email: [andre@netonomics.se](mailto:andre@netonomics.se)  
Website: <http://netonomics.se/>

**COMLAB  
SWITZERLAND**

In-Building Systems. COMLAB offers efficient modular

and expandable repeater systems to provide mobile communication within entire range of operation for TETRA, GSM-R, UMTS, GSM900, GSM1800, and LTE with excellent quality for railways, onboard and buildings. Due to modern carriage design, it compensates high signal penetration loss. The repeater system suits the requirements for all multi-operator applications.

Email: neslihan.karaman@comlab.ch  
Website: <http://www.comlab.ch/>

### **G-Lab GmbH / Geneva Lab SWITZERLAND**

Cloud Services, Consumer Electronics (CEM), Devices, Encryption and Security Equipment, In-Building Systems. G-Lab is a Swiss company that has built a reputation for its innovative and high quality audio products sold around the world under the "GENEVA" brand. G-Lab is now launching a new home security system, that includes a complete wireless and battery powered security system with cameras and a mobile app. The system is easy to use and for self-installation and communicates through fixed line, broadband and GSM.

### **New Voice International AG SWITZERLAND**

Consulting, Mobile Enterprise Solutions and Services, Systems Integration, VoIP Systems. Since 1991, New Voice is a software developer and systems integrator company in the areas of Security. Our "Unified Event Communication" platform "MobiCall" is worldwide known and is used to unify the communication systems and devices, mobilize people and automate processes. We have numerous solutions like emergency calls, staff and lone worker protection, localization and tracking, evacuation, fire alarms, intrusion detection, technical and IT alarms, crisis and disaster management and other security-related functions.

Email: [mobicall@newvoice.ch](mailto:mobicall@newvoice.ch)  
Website: <http://www.mobilisierung.com/>

### **Alpha Networks Inc. TAIWAN**

Data Products and Services, Femtocells, IP Networking Equipment, Mobile Enterprise Solutions and Services, Small Cells. Alpha Networks is a global leader in the networking ODM/OEM industry. We possess highly capable design, manufacturing, and service resources to offer a complete portfolio of off-the-shelf and custom solutions that deploy a variety of cutting edge technologies. With more than 1000 R&D and verification professionals, Alpha is capable of developing a wide variety of products with complex architectures, covering Mega Data Center Switches, Large-sized Blade Switches, Wireless 802.11ac Enterprise Access Points (Wave2 4x4 AC2500), LTE Routers (CAT3/4/6), UMTS/LTE and Wi-Fi Dual-mode Small Cells, FTTH with GPON, xDSL with Vectoring and G.fast, Digital Multimedia Devices, and Intelligent Sensors.  
[www.alphanetworks.com](http://www.alphanetworks.com)

Email: [sales@alphanetworks.com](mailto:sales@alphanetworks.com)

### **MitraStar Technology TAIWAN**

Backhaul Solutions, Femtocells, LTE Network Infrastructure, Small Cells. MitraStar – Smarter • Connected MitraStar is a world-class Design, Manufacturing and Service (DMS) company. We work closely with our customers, suppliers, and partners to innovative design and manufacturing. We provide reliable networking products and services that meet evolving digital demands.

Email: [salesgroup@mitrastar.com.tw](mailto:salesgroup@mitrastar.com.tw)  
Website: <http://www.mitrastar.com/>

### **Wistron NeWeb Corp. TAIWAN**

IP Networking Equipment, M2M / Telemetry Systems, Mobile Enterprise Solutions and Services, Small Cells, Wi-Fi Services & Management. Wistron NeWeb Corporation (WNC) is an industry leader in the design and manufacturing of advanced communication products. With strong R&D and high-volume production capabilities, WNC consistently introduces innovative technologies covering a range of products including: DBS outdoor units, satellite/digital radio, networking devices (IEEE 802.11a/b/g/n/ac), 4G mobile devices, small cells, set-top boxes, digital home devices, automotive electronics, IoT products, RFID and NFC solutions, and various types of mobile-device/cellular-phone/LDS antennas.

WNC's mission is to provide its worldwide customers and partners with superior products through premium ODM/JDM design, manufacturing, logistics, and after-sales services.

Email: [molly.lin@wnc.com.tw](mailto:molly.lin@wnc.com.tw)  
Website: <http://www.wnc.com.tw/>

### **TECHSEMA**

Via Castello Tesino 46 00124 Roma  
T (+39) 338 7547405

T (+39) 335 8318900

[www.techsema.it](http://www.techsema.it) [fgardini@techsema.it](mailto:fgardini@techsema.it)

[mfagnoli@techsema.it](mailto:mfagnoli@techsema.it)

TECHSEMA srl began to operate at end 2002 analyzing the Italian Space market with particular attention to the SME' role and expectations . It is an Italian SME owned by private managers previously acting at high level in the major Italian Space and Military Industries.

The main TECHSEMA mission is to analyze and exploit the development of available satellite technologies for social and commercial applications also supporting other SME not having a similar background of marketing experience. Joining its shareholders technical & marketing experience with external professionals TECHSEMA is a in position to offer:

- Competence and assistance in the field of satellite TLC applications for social and commercial services with institutional entities and private customers.

**Sercomm Corporation**  
**TAIWAN**

IP Networking Equipment, Small Cells. Sercomm Corporation is a worldwide leading manufacturer of broadband and wireless networking equipments. Founded in 1992, Sercomm has been focusing on developing embedded solutions to make networking simple, reliable and affordable. With 24 years industrial experience, Sercomm has more than 6,000 employees globally.

Email: carol\_lee@sercomm.com  
Website: <http://www.sercomm.com/>

**Advantech**  
**TAIWAN**

Advantech NCG provides the industry's broadest range of communications infrastructure platforms, scaling from one to hundreds of Intel® cores, consolidating workloads onto a single platform architecture and code base. Our technology leadership stems from our x86 design expertise combined with high performance switching, hardware acceleration and innovative FlowNIC offload techniques. Advantech's NFV Elasticity framework extends NFV to access points, small cells and base-stations by supporting consistent, scalable carrier-grade platforms that can run VNFs anywhere in the network. Operators, integrators and software-vendors can rapidly validate their preferred NFVI and evaluate VNFs on a broad range of networking platforms using Advantech's Remote-Evaluation-Service.

Email: ncg@advantech.com  
Website: <http://www.advantech.com/nc>

**IEI Integration Corp.**  
**TAIWAN**

Data Products and Services, NFC Services and Solutions, Retail. IEI Integration Corp., a leading industrial computing service provider, integrates computing platforms and customization services. IEI supplies hundreds of industrial computer boards, systems and peripherals for various customer applications, in addition to supporting OEM/ODM services. IEI has an innovative R&D team, effective management system, quality assurance and over 400 products passing through more than 100 distributors in order to provide customers with the fastest time-to-market services all over the world.

Email: pinkyhsiao@ieiworld.com  
Website: <http://www.ieiworld.com/>

**FIRSTAK**  
**TUNISIA**

Application Development " Gaming, Application Development " General, Augmented Reality, Business Support Systems (BSS), Mobile Enterprise Solutions and Services. Firstak is an enterprise of IT

development situated in tunisia. It is mainly specialized with the conception and the development of web/mobile applications as well as gaming on smartphone, tablet, Pc and Smart Tv. Thanks to its own research unit which allows it to follow the news,  
Email: karim.khabthani@gmail.com  
Website: <http://firstak.com/>

**Esprit**  
**TUNISIA**

Application Development " Gaming, Application Development " General, Augmented Reality, Cloud Services, Mobile Health Services and Solutions.

**RoamSmart**  
**TUNISIA**

Cloud Services, Consulting, Fraud Management and Solutions, Roaming Solutions. RoamSmart is one of the world pioneers in providing Roaming and Big Data Solutions for Mobile Operators, helping them proactively optimize workflows and monetize the existing roaming data. We aim to optimize the way to manage the daily roaming operational and financial business. Our mission is to support Mobile Operators worldwide in times of low growth and profits with intelligent value added services needed to optimize margins within their existing business and increase revenues. T

Email: m.triki@roam-smart.com  
Website: <http://www.roam-smart.com/>

ESPRIT, Private Higher Institute of Engineering and Technology, is a major actor in engineering education in Tunisia. Its success is due to new educative approaches (active learning) and its interest in several areas, such as R&D and Innovation, through Esprit-tech Research units. Esprit-mobile, one of Esprit-tech Research units is composed of instructors and students who are primarily committed to working on the latest trends of mobile development and technologies. It has already produced plenty of applications on mobile stores.

Email: contact@esprit.ens.tn  
Website: <http://www.esprit.ens.tn/>

**Elgazala Technopark**  
**TUNISIA**

Application Development " Gaming, Application Development " General, Augmented Reality, Consulting, M2M / Telemetry Systems. Elgazala is the pioneer technopark, in Tunisia and in the Maghreb Region, focusing on Information and Communication Technologies (ICTs). It was created in 1997 as a cornerstone of the Tunisian national strategy to develop this sector. The ecosystem of Elgazala Technopark is highly diversified and incorporates a variety of components, which makes it a prolific environment where innovation and entrepreneurship can flourish.

Email: contact@elgazala.tn  
Website: <http://www.elgazala.tn/>

## **LANDOLSI TELECOM TECHNOLOGY – L2T TUNISIA**

Cloud Services, Content Management, Content Provider, Messaging, Mobile Advertising and Marketing. As a Global Mobile Services Cloud in Africa, L2T provides Messaging, Payment Solutions and a wide portfolio of innovative high VAS to some of the world's best known brands, MNO, Aggregators... Our Services & Solutions: L2T Messaging : SMS Notifications, SMS API, SMS Marketing, SMS 2 WAYS, White Label SMS Reseller L2T Solutions : L2T Cloud Messaging, Yasmine Market White Label Appstore, Didon Interactive CMS, SMS2TV L2T VAS: Mega Promotions, Entertainment Content, Apps & Games content providing and management, SMS JOB notifications L2T Payment : Trickpay Micropayment Solution L2T Gateway : Direct connection to Tunisian, Congolese and Senegalese MNO.

Email: [marketing@l-2t.com](mailto:marketing@l-2t.com)  
Website: <http://www.l-2t.com/>

## **National Digital Certification Agency TUNISIA**

Government and Regulatory. The National Digital Certification Agency was established by law 2000-83 of 9 august 2000 on electronic exchanges and e-commerce, it operates as the root certification authority in Tunisia and issues licenses for certification services provider.

Email: [ance@certification.tn](mailto:ance@certification.tn)  
Website: <http://www.certification.tn/>

## **Argela TURKEY**

Cloud RAN, Government and Regulatory, LTE Network Infrastructure, Monitoring Systems and Equipment, Small Cells. At Argela, we push the boundaries of research and innovation to formulate and implement the communication technologies of the future. While we develop products for the current market, we continuously search for the next big thing. We are a driving force for 5G initiatives and 5G enabling technologies and are generating IPR for these technologies. Our product and solutions are enabling the telecommunications industry and other sectors such as Government and Military. Argela's solutions portfolio includes Software Defined Networks, Programmable RAN, Network Performance Monitoring and Subscriber Analytics, Small Cell Solutions (3G & LTE), Cloud-based Video Surveillance and Signaling Applications.

Email: [nilgun.aktas@argela.com.tr](mailto:nilgun.aktas@argela.com.tr)  
Website: <http://www.argela.com/>

## **Innovile Communications TURKEY**

Monitoring Systems and Equipment, Network Management, Network Operating Software, Operational Support Systems (OSS). Innovile Communications is a network management solutions company working to improve customer experience and network quality for mobile network operators. We're a group comprised of experts with 20+ years of experience in Telecommunications industry, as well as RF engineers and software engineers. Our primary solutions are Self-Organizing Networks, Performance Management, and Configuration Management.

Email: [evren.atasayar@innovile.com](mailto:evren.atasayar@innovile.com)  
Website: <http://www.innovile.com/>

## **TELENITY TURKEY**

Core Network Equipment, Location Technologies and Services, LTE Network Infrastructure, Managed Network Services, Messaging. Telenity is a leading provider of cutting edge solutions for Mobile Network Operators. With Telenity VAS Consolidation Platform, operators significantly improve the operational efficiency on their existing value added services and enable the migration to all-IP core networks. Telenity's API Management Solution creates new revenue sources for operators through third party developers that utilize their network capabilities. Telenity enables rapid creation, execution and management of a large number of composite services with its Service Enablement Suite. Telenity Location Based Services include family tracking solutions for subscribers, asset and employee tracking solutions for businesses, and location enablement for third party applications.

Email: [ilhan.bagoren@telenity.com](mailto:ilhan.bagoren@telenity.com)  
Website: <http://www.telenity.com/>

## **Laboremus Uganda UGANDA**

Application Development – General, Cloud Services, Government and Regulatory, Mobile Payments and Remittances. Laboremus Uganda is a software development and consultancy firm. Laboremus provides solutions mainly for the European market in the finance sector as well as the East African region. The solutions we develop include business process automation for banking and government sector, mobile applications, and large corporate websites. We have competence in both .NET and open source technology. Our solutions are built to be deployed on premise and in the cloud. Some of the solutions we have provided for clients include internet banking, trading systems for project finance companies, workflow, digital archive, monitoring and evaluation systems among others.

Email: [timothy@laboremus.no](mailto:timothy@laboremus.no)  
 Website: <http://www.laboremus.no/>

### **ClinicMaster INTERNATIONAL UGANDA**

Application Development “ General, Business Support Systems (BSS), Mobile Health Services and Solutions, Mobile Payments and Remittances. ClinicMaster INTERNATIONAL is a systems integration and software development company responsible for the development and support of ClinicMaster. ClinicMaster is an integrated health information management and medical billing software that automates patient’s transactions in the hospital or clinic on a visit basis and daily procedures. The system allows patients make online appointment bookings, receive notifications on ready results or other via their mobile devices, view their bills and/or make payments using mobile money etc.

Email: [wilson.kutegeka@clinicmaster.net](mailto:wilson.kutegeka@clinicmaster.net)  
 Website: <http://www.clinicmaster.net/>

### **Etisalat UNITED ARAB EMIRATES**

Network Operator. Etisalat Group is one of the world’s leading telecom groups in emerging markets. Etisalat Group’s market cap is over 132 billion AED, equivalent to more than 36 billion USD, Etisalat ranks amongst the most profitable telecom groups in the world. Its high credit ratings at AA-/A+/Aa3 reflect the company’s strong balance sheet and proven long-term performance. Headquartered in Abu Dhabi, Etisalat was established four decades ago in the UAE as the country’s first telecommunications service provider. An international blue-chip organisation, Etisalat provides innovative solutions and services to 170 million subscribers in 18 countries across the Middle East, Asia and Africa.

Email: [akbark@etisalat.ae](mailto:akbark@etisalat.ae)  
 Website: <http://www.etisalat.com/>

### **It4i, Technology for Propulsion and Innovatio**

Via della Croce Rossa, 112 35131 Padova  
 T (+39) 049 927 1547 [www.t4innovation.com](http://www.t4innovation.com)  
[info@t4innovation.com](mailto:info@t4innovation.com)  
[a.bettella@t4innovation.com](mailto:a.bettella@t4innovation.com)

It4i, Technology for Propulsion and Innovation, is a spin-off of the University of Padova and classified in the Italian enterprises’ register as an innovative start-up (i.e. a firm that develops, produces and sells innovative high added value products and services). It was founded in 2014 by an entrepreneur, a team of professional managers, researchers and engineers with international experience and several years of expertise in developing innovative systems. T4i’s professionals come mainly from aerospace systems sector where research and development demands an effective integration of engineering, physics and computer science know-how to develop complex systems.

### **MYCOM OSI UNITED KINGDOM**

MYCOM OSI is a leading independent provider of best-in-class Service Assurance, Automation/Orchestration & Analytics solutions to the world’s largest Communications Service Providers (CSPs) that empower them to: create intelligence out of billions of disparate data across vendors, technologies and domains; align network, service and customer teams; empower users with flexibility and autonomy from vendors; deliver efficiency through automation capabilities. MYCOM OSI is headquartered in London UK, has 250+ staff worldwide and has been 100% focused on telecom networks for 25+ years.

Email: [info@mycom-osi.com](mailto:info@mycom-osi.com)  
 Website: <http://www.mycom-osi.com/>

### **Assurant Solutions UNITED KINGDOM**

Content Management, Messaging, Mobile Enterprise Solutions and Services, Mobile Entertainment, Voice Products and Services. Internet-based communications has demonstrated the value of membership-based models. As a service exclusively available through Mobile Operators, ONEm creates a similar global experience for mobile users over ordinary Voice and SMS networks. ONEm has global services that cater to individuals, groups, Enterprises, Governments, NGOs and Industries. The ONEm global Platform manages user memberships and delivers messaging, voice, PABX, M2M and Third Party Application Content to end users over a Global Private Network. Mobile Operators enjoy additional revenues from their existing assets while providing a new and exciting range of mobile services for their subscribers.

Email: [info@onem.com](mailto:info@onem.com)  
 Website: <http://www.onem.com/>

### **Equal Experts UNITED KINGDOM**

Application Development “ General, Bluetooth Accessories, Consulting and Engineering Services, Location Technologies and Services, Mobile Enterprise Solutions and Services. Equal Experts is an international, award-winning software delivery company. We work with organisations such as Klarna, Tesco, the UK Government and Telefónica to create simple solutions to complex business challenges. At MWC we’re showcasing our new Innovation Platform, which allows developers to put prototype apps on real users’ handsets in hours, rather than days or weeks – vastly reducing the time and cost of validating ideas. We’re also unveiling world-first technology with a next-generation Bluetooth beacon for retail. This lets customers simply tap their iOS or Android phones to trigger events and complete actions, extending the possibilities for in-store interaction.

Email: [hellouk@equalexperts.com](mailto:hellouk@equalexperts.com)  
 Website: <http://www.equalexperts.com/>

### **GSMA Managed Services UNITED KINGDOM**

Device Management, Messaging, Mobile Privacy / Spam Prevention, Mobile Security Systems, Network Management. GSMA Device Database, the authoritative global IMEI TAC database, containing device make, model and further capability information.

Email: [managementservices@gsma.com](mailto:managementservices@gsma.com)  
 Website: <http://www.gsma.com/managementservices/>

### **Smartpipe Solutions Limited UNITED KINGDOM**

Data Analysis, Data Products and Services, Mobile Advertising and Marketing. Smartpipe offers global network operators a data-broker platform for monetising customer data safely and securely. Smartpipe's patent protected solution creates a global ecosystem that enables network operators, data providers, advertising agencies and brands to mutually benefit from high quality, privacy -compliant data assets, driving ROI for the entire advertising value chain. Made possible by a single technical integration into multiple ecosystems such as advertising, e-commerce and financial services, Smartpipe's approach offers contextual, consented and anonymised customer data to data partners in real-time.

Email: [contactus@smartpipesolutions.com](mailto:contactus@smartpipesolutions.com)  
 Website: <http://www.smartpipesolutions.com/>

### **D-Link UNITED KINGDOM**

Cloud Services, IP Networking Equipment, LTE Network Infrastructure, M2M / Telemetry Systems, Managed Network Services. D-Link is one of the world's leading networking and telecom product providers with award-winning innovative designs, unique cloud technology, Enterprise Networking, Smart Home products, Unified Wireless, Video Surveillance and Hybrid WAN technologies. At the forefront of LTE development for 'Internet of Things', D-Link is developing for a wide range of applications such as mobile entertainment, industrial automation, Smart Cities, etc. for access, monitoring and control purposes. D-Link has been developing 4G LTE technology for some time, using its vast technical and Cloud knowledge to lead the way in outdoor APs, small-cell LTE coverage extension, in-vehicle LTE hotspots and direct-machine connection.  
 Email: [eu-mwc@dlink.com](mailto:eu-mwc@dlink.com)  
 Website: <http://www.dlink.com/>

### **Viavi Solutions UNITED KINGDOM**

Backhaul Solutions, Operational Support Systems (OSS), Small Cells, Test and Measurement Equipment. Viavi offers a fully integrated and interoperable portfolio of cloud-enabled instruments and systems, software automation, and services for network testing, performance optimization, and service assurance. Designed to support the most complex IT and communications networks of today and tomorrow, our solutions help you get the best possible performance from your network investments.

Email: [sales.uk@viavisolutions.com](mailto:sales.uk@viavisolutions.com)  
 Website: <http://www.viavisolutions.com/>

### **EMERSON NETWORK POWER UNITED KINGDOM**

Core Network Equipment, Mobile Enterprise Solutions and Services, Monitoring Systems and Equipment, Power Systems. A trusted industry leader in smart infrastructure technologies, Emerson Network Power is the world's leading provider of critical infrastructure technologies and life cycle services for information and communications technology systems. With an extensive portfolio of intelligent, rapidly deployable hardware and software solutions for power, thermal and infrastructure management, Emerson Network Power enables efficient, highly-available networks across the globe, regardless of network demands.

Email: [marketing.networkpower.emea@emerson.com](mailto:marketing.networkpower.emea@emerson.com)  
 Website: <http://www.emersonnetworkpower.eu/>

### **SpacEarth Technology**

Via di Vigna Murata, 605 00143 Roma  
 T (+39) 06 5186 0396 [www.spaceearth.netinfo@spaceearth.net](http://www.spaceearth.netinfo@spaceearth.net)

SpacEarth Technology started its activities in 2014 as spin-off of INGV (Istituto di Geofisica e Vulcanologia) to realise innovative products and services through technological transfer from the INGV research results.

The company is composed by a team of engineers, physicists and geologists with a long involvement in research fields such as: Upper Atmosphere Physics, Space Weather, Satellite Navigation and Positioning, Remote Sensing, Data management and Elaboration, Radio propagation, Marine Monitoring and Environmental Geophysics. As spin-off of INGV we inherit a long standing experience in the use of GNSS receivers and algorithms development for the monitoring, forecasting and analysis of ionospheric disturbances and their effect on positioning. SpacEarth Technology is the owner of the Italian patent "Method for forecasting ionosphere total electron content and/or scintillation parameters" (2015) which is now being extended to International patent. The invention relates to a method of TEC (Total Electron Content) and scintillation empirical short-term forecasting (seconds to minutes), able to provide the basic quantities describing the ionospheric and signal propagation conditions, even under severe scintillation environment.

**Oracle Corporation**  
**UNITED KINGDOM**

Cloud Services, LTE Network Infrastructure, Network Management, Operational Support Systems (OSS), Voice Products and Services. Oracle Communications helps Network Operators, Enterprises and Digital Lifestyle Providers accelerate their journey to the NOW Economy – a virtualized, orchestrated, software-led and cloud-enabled future where business, industry and the customer experience are infused with connectivity, analytic insight and increased agility and competitive advantage. For more information, visit <http://www.oracle.com/communications>  
Email: [virginie.rampon@oracle.com](mailto:virginie.rampon@oracle.com)  
Website: <http://www.oracle.com/>

**OpenCloud**  
**UNITED KINGDOM**

Core Network Equipment, LTE Network Infrastructure, Mobile Enterprise Solutions and Services, Network Operating Software, Voice Products and Services. Used by 60+ operators globally, OpenCloud's open, virtualizable products transform the real-time communications service layer to enable competitive and economically-sustainable evolution of IN, IMS and VoLTE services. OpenCloud's customers include multi-national groups, large operators, smaller operators, MVNOs, mobile, wireline and converged operators. Rhino, OpenCloud's family of next-generation service layer products, is deployed within SS7 and All-IP networks to accelerate transitional and convergent network transformation and enable competitive differentiation.  
Email: [info@opencloud.com](mailto:info@opencloud.com)  
Website: <http://www.opencloud.com/>

**ADAX**  
**UNITED KINGDOM**

Core Network Equipment, LTE Network Infrastructure, Test and Measurement Equipment. Discover the most advanced levels of EPC reliability, security and signaling performance with flexible and scalable Adax solutions for traditional Legacy TDM networks to LTE and beyond.

Email [sales@adax.co.uk](mailto:sales@adax.co.uk)  
Website: <http://www.adax.com/>

**GSMA**  
**UNITED KINGDOM**

Network Operator. The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

Email: [membership@gsma.com](mailto:membership@gsma.com)  
Website: <http://www.gsma.com/>

**Cambridge Broadband Networks Ltd (CBNL)**  
**UNITED KINGDOM**

Backhaul Solutions, IP Networking Equipment, LTE Network Infrastructure, Network Planning and Design, Small Cells. Pioneering next generation microwave transmission equipment since 2000, Cambridge Broadband Networks Ltd (CBNL) is the market-leader in carrier-class, licensed point-to-multipoint.

Email: [cwright@cbnl.com](mailto:cwright@cbnl.com)  
Website: <http://www.cbnl.com/>

**Cobham Wireless**  
**UNITED KINGDOM**

In-Building Systems, IP Networking Equipment, Test and Measurement Equipment. Delivering state-of-the-art wireless and connectivity solutions that give our customers a competitive edge.  
Email: [wireless@cobham.com](mailto:wireless@cobham.com)  
Website: <http://www.cobham.com/wireless>

**Panorama Antennas Ltd**  
**UNITED KINGDOM**

Antennas, Aerials, Masts and Towers, Device Accessories, In-Building Systems, M2M / Telemetry Systems. A market leader in the design and manufacture of high performance antennas, Panorama has developed a huge range of 4G LTE antennas for consumer wireless, M2M, in-building and vehicle applications. With its headquarters in London, UK and with sales offices throughout Europe, USA and Australia, Panorama supplies numerous cellular operators, equipment manufacturers and system integrators with its antennas as well as having an extensive distribution network worldwide.

Email: [sales@panorama-antennas.com](mailto:sales@panorama-antennas.com)  
Website: <http://www.panorama-antennas.com/>

**KLEOS**  
**UNITED KINGDOM**

Antennas, Aerials, Masts and Towers, Cloud RAN, Core Network Equipment, LTE Network Infrastructure. KLEOS, a leading innovator of advanced wireless systems, is introducing the world's most powerful LTE/4G+ base station, PEGASUS. With Spatial Diversity and Massive MIMO technologies at its core, PEGASUS is the solution for solving Spectrum Scarcity problems, maximizing Coverage, fortifying Wireless Security and providing unrivaled Deployment Flexibility. This leads to a significant increase in Operators' Profitability and allows the delivery of Unprecedented Capacity. KLEOS Wireless Superiority coupled with its smart Virtual EPC and unique Distributed Storage System, position KLEOS solution as the ultimate path for both, Commercial and Public Safety operators, in their evolution towards the new era of 5G.

Email: [sales@kleos.net](mailto:sales@kleos.net)

Website: <http://www.kleos.net/>

**Computaris International Ltd**  
**UNITED KINGDOM**

Business Support Systems (BSS), Network Management, Operational Support Systems (OSS), Outsourcing, Systems Integration. Computaris International, the telecom arm of the R Systems Group, is a UK-based company specialized in system integration, software development and technical consultancy services for telecommunication providers and independent software vendors worldwide. We have been turning bytes into business since 1992. Since then we have opened new offices in Poland, Romania, Moldova, Malaysia, India and the US and have successfully delivered 1000+ projects to 80+ operators worldwide. We are proud of our long term partnerships with top industry enterprises and work closely with business partners that demand and recognize service excellence from line of code to customer experience.

Email: [contact@computaris.com](mailto:contact@computaris.com)  
Website: <http://www.computaris.com/>

**Ranplan Wireless Network Design Ltd.**  
**UNITED KINGDOM**

Cloud Services, Network Planning and Design  
Ranplan is a company with a unique heritage and skillset that has developed iBuildNet the world's only all-in-one tool able to simultaneously handle outdoor/indoor coverage and loading issues. iBuildNet also copes with the challenges of dynamic radio engineering demanded by Small Cells, DAS and HetNets, where traditional static models no longer function

Email: [kevin.robinson@ranplan.co.uk](mailto:kevin.robinson@ranplan.co.uk)  
Website: <http://www.ranplan.co.uk/>

**Stream Technologies Ltd**  
**UNITED KINGDOM**

Data Products and Services, ISP, M2M / Telemetry Systems, Managed Network Services, Utilities (Smart Grid). Stream Technologies is the company behind IoT-X, a Connectivity Enablement, Management & Billing platform (CMP). Designed for all operators of Cellular, Satellite & Low Power Wide Area networks, IoT-X is offered as a Platform as a Service (PaaS) and is fast being adopted by established network operators and new entrants into the M2M/IOT sector. IoT-X offers low cost, low risk, high functionality of connectivity management, resulting in fast to market, with support from one of the most experienced technical and operational teams in IoT. Stream Technologies Simplifies the Complex and gets devices connected.

Email: [kevin@stream-technologies.com](mailto:kevin@stream-technologies.com)

Website: <http://www.stream-technologies.com/>

**ip.access Ltd**  
**UNITED KINGDOM**

Data Products and Services, Femtocells, Small Cells. Ip.access is the world's premier independent specialist small cell product and systems company. Operating since 2000, it ships its GSM, W-CDMA and LTE small cells, gateways and management solutions to over a hundred customers globally. Serving both the Mobile Network Operator and Special Applications markets, its products and technology power the ATT Microcell residential 3G small cell, the market-dominant eXPhone in-flight cellular service solution, the award-winning PEAK disaster relief communications package, among countless other enterprise, residential, rural and remote applications. Superbly backed by Zouk Capital, ip.access has the technical capability and commercial weight for all your small cell infrastructure needs.

Email: [marketing@ipaccess.com](mailto:marketing@ipaccess.com)  
Website: <http://ipaccess.com/>

**Broadband 4 Africa Ltd**  
**UNITED KINGDOM**

Backhaul Solutions, Data Products and Services, ISP, Network Operator. BB4Africa is a newly created subsidiary of Eutelsat, one of the world's leading satellite operators, dedicated to the provision of broadband services over Sub-Saharan Africa. BB4Africa will operate satellites of the most advanced technology in order to deliver quality and affordable internet connectivity.

Email: [fboulette@eutelsat.com](mailto:fboulette@eutelsat.com)  
Website: <http://www.bb4africa.com/>

**OPENGEAR**  
**UNITED KINGDOM**

Core Network Equipment, Device Management, LTE Network Infrastructure, Monitoring Systems and Equipment, Network Management. ONLY Opengear delivers full Network Resilience to deliver always on resilient connectivity.

Email: [emea@opengear.com](mailto:emea@opengear.com)  
Website: <http://www.opengear.com/>

**Tyrone Fabrication**  
**UNITED KINGDOM**

Power Systems, Systems Integration Tyrone Fabrication produce a wide range of advanced steel equipment enclosures for the transportation, telecommunications & power supply industries. All of our enclosures are manufactured using only superior materials and components from approved suppliers. We're able to work on everything from single, bespoke designs to multinational network systems Located on a purpose-built, eight-acre facility in Northern Ireland, we combine leading-edge CAD/CAM technology and a highly skilled workforce with over 30 years' manufacturing experience



and sector expertise. Our strategy is one of constant development, of both product and skills – guaranteeing consistent quality in our engineering and project management expertise.

Email: [info@tfl.eu.com](mailto:info@tfl.eu.com)

Website: <http://www.tyronefabrication.co.uk/>

### **Genesys Telecommunications UNITED KINGDOM**

Middleware, Mobile Enterprise Solutions and Services, Voice Products and Services Genesys is the market leader in multi-channel customer experience (CX) and contact centre solutions in the cloud and on-premises. We help brands of all sizes make great CX great business. Our Customer Engagement Centre empowers businesses to create frictionless customer journeys across all channels and touch points, centred on the mobile device. Genesys is trusted by over 4,500 customers in 80 countries to orchestrate more than 100 million digital and voice interactions each day. They include 19 of 24 world's largest telecommunications & service providers (including the top ten). Visit us at [www.genesys.com](http://www.genesys.com)

Email: [lara.booth@genesys.com](mailto:lara.booth@genesys.com)

Website: <http://www.genesys.com/>

### **Sky UNITED KINGDOM**

Application Development Film, Application Development General, Mobile Entertainment, Mobile TV. Sky is Europe's leading entertainment company and serves 21 million customers across five countries: Italy, Germany, Austria, UK and Ireland. We believe in better and that means offering a better choice of high-quality entertainment for the whole family and using technology to put them in control, whenever and wherever they want.

Email: [sophie.earnshaw@sky.uk](mailto:sophie.earnshaw@sky.uk)

Website: <http://www.sky.com/>

### **PricewaterhouseCoopers LLP. UNITED STATES**

Consulting. Technology connects us to new people, experiences, products and services every day, in all aspects of our lives. But how is your company using technology to achieve outcomes that matter for your stakeholders?

### **Kumu Networks UNITED STATES**

Backhaul Solutions, Intellectual Property, LTE Network Infrastructure, Semiconductors, Small Cells. Kumu Networks ([www.kumunetworks.com](http://www.kumunetworks.com)) was formed by Stanford University professors and PhD graduates, and funded by top-tier VCs. The team has succeeded to challenge some of the basic

assumptions in wireless technology by building a full-duplex wireless system that can transmit and receive on the same frequency at the same time, doubling spectral efficiency! The solution is based on software-controlled self-interference-cancellation technology that eliminates the need for FDD or TDD duplexing. In addition to its potential for 5G standards, the technology can be used to improve spectrum reuse and remove limitations of hardware-based filters in existing systems.

Email: [info@kumunetworks.com](mailto:info@kumunetworks.com)

Website: <http://www.kumunetworks.com/>

### **INTEGRATED DEVICE TECHNOLOGY UNITED STATES**

BTS Fronthaul Solutions, Consumer Electronics (CEM), Core Network Equipment, Power Systems, Semiconductors. Integrated Device Technology, Inc., develops system-level solutions that optimize its customers' applications. IDT uses its market leadership in timing, serial switching and interfaces, and adds analog and system expertise to provide complete application-optimized, mixed-signal solutions for the communications, computing and consumer segments. Headquartered in San Jose, Calif., IDT has design, manufacturing, sales facilities and distribution partners throughout the world. IDT stock is traded on the NASDAQ Global Select Stock Market® under the symbol "IDTI." Additional information about IDT is accessible at [www.IDT.com](http://www.IDT.com). Follow IDT on Facebook, LinkedIn, Twitter, and YouTube.

Email: [anita.faggianelli@idt.com](mailto:anita.faggianelli@idt.com)

Website: <http://www.idt.com/>

### **AAC Technologies featuring WiSpry UNITED STATES**

Antennas, Aerials, Masts and Towers, Consulting and Engineering Services, Modems, Semiconductors, Systems Integration. AAC Technologies Featuring WiSpry – Hall 2/2B40MR – AAC Technologies is a world leading micro-component total solutions supplier for acoustics, haptics, optics, RF and mechanical integration. The recent acquisition of WiSpry has added integrated RF-MEMS antenna technology to AAC Technologies product range to optimally support next generation multi-band and multi-standard devices and the newest RF architectures. At MWC, AAC and WiSpry will feature multiple product demonstrations exciting new products showcasing the latest in micro-component technology for mobile devices. For more information, visit [www.aactechnologies.com](http://www.aactechnologies.com) and [www.wispri.com](http://www.wispri.com)

Email: [sales@wispri.com](mailto:sales@wispri.com)

Website: <http://www.wispri.com/>

### **Aviat Networks UNITED STATES**

Backhaul Solutions, IP Networking Equipment, LTE Network Infrastructure, Managed Network Services, Network Management. Aviat Networks, Inc. (NASDAQ: AVNW) is a leading global provider of microwave networking solutions transforming communications networks to handle the exploding growth of IP-centric, multi-Gigabit data services. With more than one million systems sold in over 140 countries, Aviat Networks provides microwave networking solutions to mobile operators, including some of the world's largest and most advanced 4G/LTE networks. Public safety, utility, government and defense organizations trust Aviat Networks' solutions for their mission-critical applications where reliability is paramount. A comprehensive suite of support services enables customers to seamlessly migrate to next-generation Carrier Ethernet/IP networks. For more information, visit [www.aviatnetworks.com](http://www.aviatnetworks.com)

Email: [marketing@aviatnet.com](mailto:marketing@aviatnet.com)  
Website: <http://www.aviatnetworks.com/>

### **Microsemi Corporation** **UNITED STATES**

Backhaul Solutions, BTS Fronthaul Solutions, LTE Network Infrastructure, Semiconductors, Small Cells. Microsemi Corporation, headquartered in Aliso Viejo, offers innovative products and solutions for timing and synchronization, Power over Ethernet (PoE), Carrier Ethernet and Hardware Security. At the MWC 2016, Microsemi will be exhibiting its newly expanded Integrated GNSS Master (IGM) family of 1588 Grandmasters. With small form factor and enhanced reception of integrated GPS receiver, IGM significantly reduces cost and efforts of indoor deployment for small cells. Bringing defense level security to communications, Microsemi will display ways to enhance Hardware Security of networking equipments. In addition, portfolio of PoE midspan to power small cells, microwave and WiFi AP will be displayed.

Email: [sales.support@microsemi.com](mailto:sales.support@microsemi.com)  
Website: <http://microsemi.com/>

### **Cohere Technologies** **UNITED STATES**

Backhaul Solutions, LTE Network Infrastructure. Cohere Technologies has developed groundbreaking technology with broad applications for wireless communication. Called OTFS (for Orthogonal Time Frequency & Space), Cohere's new modulation scheme delivers 100% coverage, 10x spectral efficiency and a 50% cost savings over existing solutions by perfectly capturing the wireless channel. The combination of OTFS with traditional modulation schemes extends the benefits of this 2D modulation to existing platforms as required for the future of 5G mobility. Meet with one of Forbes Magazine's hottest

top 50 startups – Santa Clara, California-based Cohere Technologies – by contacting: [mwc2016@cohere-technologies.com](mailto:mwc2016@cohere-technologies.com).

Email: [mwc2016@cohere-technologies.com](mailto:mwc2016@cohere-technologies.com)  
Website: <http://www.cohere-technologies.com/>

### **Citrix** **UNITED STATES**

Application Development – General, Cloud Services, IP Networking Equipment, Network Operating Software. Citrix is a leading cloud company focused on the transition to a software-defined workplace: uniting virtualization, enterprise mobility management and networking to enable businesses and people to work more intelligently together. With the secure delivery of mobile apps and data as a catalyst, Citrix's solutions enable service-providers to deliver value through mobility, virtualize and automate the network infrastructure and optimize subscriber and enterprise applications delivered through telco clouds. Citrix XenMobile enables IT to manage a broad set of mobile devices while enhancing users' BYO device experiences without compromising security. Over 150 million mobile subscribers are powered by Citrix NetScaler.

Email: [george.mcgregor@citrix.com](mailto:george.mcgregor@citrix.com)  
Website: <http://www.citrix.com/networking>

### **Aricent** **UNITED STATES**

Backhaul Solutions, Cloud RAN, Consulting and Engineering Services, Semiconductors, Small Cells. Aricent is the world's #1 pure-play product engineering services firm. The company has 20-plus years' experience co-creating ambitious products with the leading networking, telecom, software, semiconductor, Internet and industrial companies. The firm's 11,000-plus engineers focus exclusively on software-powered innovation for the connected world.

Email: [info@aricent.com](mailto:info@aricent.com)  
Website: <http://www.aricent.com/>

### **Brocade** **UNITED STATES**

Core Network Equipment, IP Networking Equipment, LTE Network Infrastructure, M2M / Telemetry Systems, Mobile Enterprise Solutions and Services. Brocade® (NASDAQ: BRCD) networking solutions empower the world's leading organizations to transition smoothly to a world where applications and information reside anywhere. By delivering agility and innovation for cloud-based environments, Brocade helps organizations modernize their networks and accelerate their journey to the New IP.

Email: [events4@brocade.com](mailto:events4@brocade.com)

Website: <http://www.brocade.com/>

**Azimuth Systems  
UNITED STATES**

Test and Measurement Equipment. Azimuth Systems, Inc., is a leader in performance test solutions for the RF and wireless world, including cellular, Wi-Fi, and emerging applications like IoT. Azimuth's solutions enable precise, repeatable measurements and analysis of wireless device performance, conformance, interoperability, and coexistence within established areas as cellular and new areas as M2M, C2C, and UAVs. Leveraging its renowned RF expertise and portfolio, Azimuth provides automated test solutions focused on the use cases and key performance metrics necessary for understanding real-world performance. The company is based in Acton, Massachusetts, USA, with sales offices around the world.

Email: [info@azimuthsystems.com](mailto:info@azimuthsystems.com)  
Website: <http://www.azimuthsystems.com/>

**Broadcom Limited  
UNITED STATES**

Femtocells, Semiconductors, Small Cells, Wi-Fi Services & Management Broadcom Limited (NASDAQ: AVGO) is a leading designer, developer and global supplier of a broad range of analog and digital semiconductor connectivity solutions. Broadcom Limited's extensive product portfolio serves four primary end markets: wired infrastructure, wireless communications, enterprise storage and industrial & other. Applications for our products in these end markets include: data center networking, home connectivity, broadband access, telecommunications equipment, smartphones and base stations, data center servers and storage, factory automation, power generation and alternative energy systems, and displays. For more information, go to [www.broadcom.com](http://www.broadcom.com).

Email: [sdinh@broadcom.com](mailto:sdinh@broadcom.com)  
Website: <http://www.broadcom.com/>

**AAC Technologies featuring WiSpry  
UNITED STATES**

Antennas, Aerials, Masts and Towers, Consulting and Engineering Services, Modems, Semiconductors, Systems Integration AAC Technologies Featuring WiSpry – Hall 2/2B40MR – AAC Technologies is a world leading micro-component total solutions supplier for acoustics, haptics, optics, RF and mechanical integration. The recent acquisition of WiSpry has added integrated RF-MEMS antenna technology to AAC Technologies product range to optimally support next generation multi-band and multi-standard devices and the newest RF architectures. At MWC,

AAC and WiSpry will feature multiple product demonstrations exciting new products showcasing the latest in micro-component technology for mobile devices. For more information, visit [www.aactechnologies.com](http://www.aactechnologies.com) and [www.wispry.com](http://www.wispry.com)

Email: [sales@wispry.com](mailto:sales@wispry.com)  
Website: <http://www.wispry.com/>

**Aviat Networks  
UNITED STATES**

Backhaul Solutions, IP Networking Equipment, LTE Network Infrastructure, Managed Network Services, Network Management Aviat Networks, Inc. (NASDAQ: AVNW) is a leading global provider of microwave networking solutions transforming communications networks to handle the exploding growth of IP-centric, multi-Gigabit data services. With more than one million systems sold in over 140 countries, Aviat Networks provides microwave networking solutions to mobile operators, including some of the world's largest and most advanced 4G/LTE networks. Public safety, utility, government and defense organizations trust Aviat Networks' solutions for their mission-critical applications where reliability is paramount. A comprehensive suite of support services enables customers to seamlessly migrate to next-generation Carrier Ethernet/IP networks. For more information, visit [www.aviatnetworks.com](http://www.aviatnetworks.com)

Email: [marketing@aviatnet.com](mailto:marketing@aviatnet.com)  
Website: <http://www.aviatnetworks.com/>

**Microsemi Corporation  
UNITED STATES**

Backhaul Solutions, BTS Fronthaul Solutions, LTE Network Infrastructure, Semiconductors, Small Cells Microsemi Corporation, headquartered in Aliso Viejo, offers innovative products and solutions for timing and synchronization, Power over Ethernet (PoE), Carrier Ethernet and Hardware Security At the MWC 2016, Microsemi will be exhibiting its newly expanded Integrated GNSS Master (IGM) family of 1588 Grandmasters. With small form factor and enhanced reception of integrated GPS receiver, IGM significantly reduces cost and efforts of indoor deployment for small cells. Bringing defense level security to communications, Microsemi will display ways to enhance Hardware Security of networking equipments., In addition, portfolio of PoE midspan to power small cells, microwave and WiFi AP will be displayed.

Email: [sales.support@microsemi.com](mailto:sales.support@microsemi.com)  
Website: <http://microsemi.com/>

**ESS Technology  
UNITED STATES**

Semiconductors For more than three decades ESS Technology has been on the cutting edge of audio technology. A privately held fabless semiconductor company, ESS Technology designs and markets high-performance analog and HiFi audio devices for mobile, consumer, automotive, and professional audiophile systems. The company was founded in 1984 and today

## **Aricent** **UNITED STATES**

Backhaul Solutions, Cloud RAN, Consulting and Engineering Services, Semiconductors, Small Cells Aricent is the world's #1 pure-play product engineering services firm. The company has 20-plus years' experience co-creating ambitious products with the leading networking, telecom, software, semiconductor, Internet and industrial companies. The firm's 11,000-plus engineers focus exclusively on software-powered innovation for the connected world.

Email: [info@aricent.com](mailto:info@aricent.com)  
Website: <http://www.aricent.com/>

## **Lattice/SiBEAM** **UNITED STATES**

Backhaul Solutions, Consumer Electronics (CEM), Mobile Entertainment, Semiconductors, Small Cells SiBEAM, a Lattice technology, is a pioneer in developing intelligent millimeter wave technologies for wireless communications. The company was the first to build 60GHz chipsets using standard CMOS technology. SiBEAM, a Lattice technology is a global leader in driving next-generation architecture and semiconductor implementation of wireless connectivity solutions in the consumer electronics, mobile, enterprise and infrastructure markets.

<http://www.sibeam.com>.  
Email: [amy.hill@latticesemi.com](mailto:amy.hill@latticesemi.com)  
Website: <http://www.sibeam.com/>

## **CNET** **UNITED STATES**

Content Provider CNET is the world's #1 tech media brand with tens of millions of visitors each month. Through bold storytelling, expert reviews, photography and engaging video, CNET educates, inspires and tells the real story of the way technology impacts our daily lives. CNET covers every aspect of consumer technology, from personal and automotive tech to home and smart appliances. CNET properties also include Roadshow by CNET, a brand new automotive destination,

Email: [newstips@cbsinteractive.com](mailto:newstips@cbsinteractive.com)  
Website: <http://www.cnet.com/>

## **Officina Stellare**

Via della Tecnica, 87/89 36030 Sarcedo (VI)  
Tel. Inter. (+39) 0445 1922219  
Tel. USA (001) 323 9271020 F (+39) 0445 1922009  
[www.officinastellare.com](http://www.officinastellare.com)

Officina Stellare srl is an Italy based company specialized in the design and manufacturing of optomechanical instrumentation for professional applications.

The wide range of products is including optical payloads for earth imaging satellites, Astronomical Research Observatories, Space Situational Awareness and Debris tracking solutions, Aerospace and Defence application, Astroimaging and CCD imaging cameras.

Headquarters are in Sarcedo (Italy) whit R&D, mechanical

manufacturing, integration and final quality control and metrology. The Optical Design and Manufacturing Unit is based in Occhiobello (Italy) whit the design/manufacturing of optics up to 1 meter. Custom development and manufacturing of hi resolution, wide spectral bandwidth optical systems satellite payloads for earth imaging applications. Custom development and manufacturing of Lasercom/ Optical Antennas optical systems.

## **Brocade** **UNITED STATES**

Core Network Equipment, IP Networking Equipment, LTE Network Infrastructure, M2M / Telemetry Systems, Mobile Enterprise Solutions and Services Brocade® (NASDAQ: BRCD) networking solutions empower the world's leading organizations to transition smoothly to a world where applications and information reside anywhere. By delivering agility and innovation for cloud-based environments, Brocade helps organizations modernize their networks and accelerate their journey to the New IP.

Email: [events4@brocade.com](mailto:events4@brocade.com)  
Website: <http://www.brocade.com/>

## **NetCracker Technology** **UNITED STATES**

Business Support Systems (BSS), Consulting, Network Management, Operational Support Systems (OSS), Outsourcing NetCracker Technology is the proven partner for cable operators and CSPs in enabling product innovation and deploying next-generation IT and networks. The end-to-end NetCracker 10 solutions and services portfolio brings together comprehensive business and operations management offerings, big data analytics, orchestration and virtualization onto a single cloud-enabled platform.

Email: [scherer@netcracker.com](mailto:scherer@netcracker.com)  
Website: <http://www.netcracker.com/>

## **GENBAND** **UNITED STATES**

LTE Network Infrastructure, Mobile Enterprise Solutions and Services, NFC Services and Solutions, Telecoms Authorities / Associations, VoIP Systems GENBAND, a 2015 CNBC Disruptor 50, is a global leader in real time communications software solutions for service providers, enterprises, independent software vendors, systems integrators and developers in over 80 countries. The company's Network Modernization, Unified Communications, Mobility and Embedded Communications solutions enable its customers to quickly capitalize on growing market segments and introduce differentiating products, applications and services.

Email: [catherine.berthier@genband.com](mailto:catherine.berthier@genband.com)  
Website: <http://www.genband.com/>

## **Juniper Networks UNITED STATES**

Backhaul Solutions, Cloud RAN, Cloud Services, Core Network Equipment, IP Networking Equipment Juniper Networks (NYSE:JNPR) delivers innovation across routing, switching and security. Juniper Networks' innovations in software, silicon and systems transform the experience and economics of networking. Additional information can be found at Juniper Networks ([www.juniper.net](http://www.juniper.net)) or connect with Juniper on Twitter and Facebook. At Juniper Networks, we believe the network is the single greatest vehicle for knowledge, understanding, and human advancement that the world has ever known.

Email: [events@juniper.net](mailto:events@juniper.net)  
Website: <http://www.juniper.net/>

## **TeleCommunication Systems, Inc. UNITED STATES**

In-Building Systems, Systems Integration, Wi-Fi Services & Management TeleCommunication Systems, Inc. (TCS) [www.telecomsys.com](http://www.telecomsys.com)

Email: [dbaker@telecomsys.com](mailto:dbaker@telecomsys.com)  
Website: <http://www.telecomsys.com/>

## **Procera Networks, Inc. UNITED STATES**

Network Management Procera Networks Inc. structures mobile and fixed broadband network data, transforming it into actionable intelligence to empower operators to make informed business decisions and improve the quality of Subscriber Experience.

Email: [info@proceranetworks.com](mailto:info@proceranetworks.com)  
Website: <http://www.proceranetworks.com/>

## **NuCurrent Inc. UNITED STATES**

Antennas, Aerials, Masts and Towers, Batteries, Consumer Electronics (CEM), NFC Services and Solutions, Power Systems NuCurrent is a leading developer of high-efficiency antennas and modules for wireless power applications. Compliant across Wireless Power Consortium (Qi) and AirFuel Alliance (formally PMA and A4WP standards), NuCurrent works closely with OEMs and integrators to custom-design, rapid-prototype and integrate high Quality (Q) Factor antennas and modules for many applications. NuCurrent's patented structures, proprietary tools and design techniques mitigate typical high frequency effects, offering higher efficiency, smaller sizes, thinner (0.18 mm), higher durability and lower cost wireless power development.

Email: [info@nucurrent.com](mailto:info@nucurrent.com)  
Website: <http://www.nucurrent.com/>

## **Lemko Corporation UNITED STATES**

In-Building Systems, ISP, LTE Network Infrastructure, M2M / Telemetry Systems Lemko makes innovated 2G, 3G and 4G cellular solutions for carriers, first-responders and industry IoT users. At MWC, Lemko is featuring the LTE EZ Access Point, a Private LTE scalable network deployable out of the box. EZ LTE is Drop-n-Go solution that is as simple to install and provision as Wi-Fi. EZ delivers LTE benefits with Wi-Fi economics. EZ LTE connects to your existing IP network securely behind an enterprises' firewall. EZ LTE is available on most LTE bands.

Email: [info@lemko.com](mailto:info@lemko.com)  
Website: <http://www.lemkocorp.com/>

## **Escape Communications UNITED STATES**

Backhaul Solutions, BTS Fronthaul Solutions, Modems Escape Communications is a modem supplier for Wireless Backhaul. We offer modems with 1Gbps, 2.5 Gbps, and 10 Gbps. Our E band modems are fully integrated with the RF chipsets from our partners offering customers low cost, fast time to market solution with outstanding performance.

Email: [mpope@escapecom.com](mailto:mpope@escapecom.com)  
Website: <http://www.escapecom.com/>

## **Vasona Networks UNITED STATES**

Backhaul Solutions, Cloud RAN, Core Network Equipment, Data Analysis, Network Management Founded in 2010, Vasona Networks, Inc.® works with global mobile network operators to deliver better user experiences. The company's pioneering SmartAIR™ edge application controller and the SmartVISION™ analysis suite elevate capabilities to overcome network congestion, and to understand network activities for better management and planning.

## **MEC**

Via San Nicolò di Villola, 1 40127 Bologna  
T (+39) 051 6333403 [www.mec-mmhc.com](http://www.mec-mmhc.com)  
[contact.mec@mec-mmhc.com](mailto:contact.mec@mec-mmhc.com)

MEC was founded in 2004, as spin-off of Bologna's and Ferrara's Universities, in order to offer to the Italian and European enterprises, the know-how coming from the university R&D department in the field of microwave electronic components, with a main focus on MMIC and TR Modules. The Company's expertise and core business, are based on the executive design, lay-out generation, on wafer probe test, on jig electrical & thermal characterization of MMIC.s and discrete active components.

The most known European satellite programmes, to name some : Iridium, Galileo, CosmoSkymed, SIASGE, Sentinel...etc, board MMIC.s and microwave ybrids in their most critical line-ups, developed by MEC.

Email: [skenvin@vasonanetworks.com](mailto:skenvin@vasonanetworks.com)  
 Website: <http://vasonanetworks.com/>

**Polaris Networks Inc**  
**UNITED STATES**

Core Network Equipment, In-Building Systems, LTE Network Infrastructure, Mobile Enterprise Solutions and Services, Test and Measurement Equipment Silicon-valley headquartered Polaris Networks, is a leading provider of LTE software for 1) Test & Measurement, 2) EPC for deployment in commercial, private and tactical networks.

Email: [alakananda\\_mukherjee@polarisnetworks.net](mailto:alakananda_mukherjee@polarisnetworks.net)  
 Website: <http://www.polarisnetworks.net/>

**Front Porch (Network Engagement)**  
**UNITED STATES**

ISP, Location Technologies and Services, Messaging, Mobile Advertising and Marketing, Wi-Fi Services & Management Reach 100% of your customers with your important message. Front Porch offers broadband service providers (3G/LTE, Cable, Telco, Wi-Fi) a network-based solution that solves key notification needs and improves ISP-to-Subscriber multi-screen communications.

Email: [info@frontporch.com](mailto:info@frontporch.com)  
 Website: <http://www.frontporch.com/>

**PeerApp**  
**UNITED STATES**

Backhaul Solutions, Cloud RAN, IP Networking Equipment, Mobile Entertainment, Network Management PeerApp's Mobile-Edge as well as Core-based solutions are used by more than 150 Mobile Network Operators (MNOs) around the world to address Video & OTT Content strain on networks. PeerApp's Open CDN & Cache solution implements Mobile Edge Computing (MEC) principles to accelerate Video Delivery & host Content at Mobile Network Edges. By bringing and managing content at the very edge of Mobile Networks, PeerApp's MEC solution maximizes end-user QoE, increases Radio Access Network (RAN) utilization, achieves savings of 20-25% on Backhaul Traffic & Costs, and supports Edge-based Mobile Content Monetization.

Email: [info@peerapp.com](mailto:info@peerapp.com)  
 Website: <http://www.peerapp.com/>

**KELL**

Via Donat Cattin, 83 52100 Arezzo  
 T (+39) 06 36004916  
 F (+39) 06 3216937 [www.kell.it](http://www.kell.it) [info@kell.it](mailto:info@kell.it)

KELL is an ICT Italian company operating for over twenty years in the Space and ICT sectors developing SW and ICT smart solutions in the following fields of application: e-health, telemedicine, e-government, Earth Observation, remote sensing, mobile applications. Vision "make everyday life easier with computing by making the technology easy, usable and available to everyone through continuous innovation."

**3Z Telecom**  
**UNITED STATES**

Antennas, Aerials, Masts and Towers, Monitoring Systems and Equipment, Network Management, Network Operator, Test and Measurement Equipment 3Z Telecom offers In-Building DAS, RF Engineering, RF EME Compliance, Interference Hunting, Tower Services & Drive Testing. Along with these services, 3Z also offers the World Leader Antenna Alignment Tool: The 3Z RF Aligner for both Panel Antennas and point to Point Microwave Systems and the Antenna WASP, the World's First Wireless Antenna Monitoring Sensor, which monitors the antenna alignment and reports any undesired changes occurred. 3Z Telecom's RF Aligner and 3Z Antenna WASP will maximize and sustain your antenna's performance from initial installation throughout its usable life.

Email: [fhernandez@3ztelecom.com](mailto:fhernandez@3ztelecom.com)  
 Website: <http://www.3ztelecom.com/>

**JQL Electronics Inc**  
**UNITED STATES**

Backhaul Solutions, Devices, In-Building Systems, LTE Network Infrastructure, Small Cells JQL Electronics Inc, is a technology company, designing and manufacturing microwave passive components and subsystems, for the wireless network infrastructure market. Our technology includes ferrite isolator/ circulators, cavity filters, directional couplers, power dividers, combiners, ceramic filters, waveguide components and solid state power amplifiers. With cutting edge design capabilities and world class manufacturing, JQL's innovative design, rapid prototyping, precise manufacturing and short lead-time delivers high quality product to the customer backed up with excellent customer service.

Email: [info@jqlelectronics.com](mailto:info@jqlelectronics.com)  
 Website: <http://www.jqlelectronics.com/>

**InterDigital**  
**UNITED STATES**

Backhaul Solutions, M2M / Telemetry Systems, Network Management, Small Cells, Wi-Fi Services & Management InterDigital designs and develops advanced mobile technologies that enable and enhance communications.

Email: [patrick.vandewille@interdigital.com](mailto:patrick.vandewille@interdigital.com)  
 Website: <http://www.interdigital.com/>

**InfoVista**  
**UNITED STATES**

Backhaul Solutions, Managed Network Services, Monitoring Systems and Equipment, Network Management, Network Planning and Design InfoVista is the leading provider of cost-effective network performance orchestration solutions at the service of a better connected and collaborative world. Our award-winning solutions empower mobile operators

and communications service providers to ensure a high-quality subscriber experience across the entire life-cycle, all technologies and all domains of both the mobile and fixed networks. Using InfoVista's solutions, eighty percent of the world's largest communications service providers and mobile operators deliver high-performing and differentiated services, maximize network ROI, plan and optimize networks to match application and service demands, and streamline network operations while keeping total cost of ownership as low as possible.

Email: [drodrigues@infovista.com](mailto:drodrigues@infovista.com)  
Website: <http://www.infovista.com/>

**Franklin Wireless**  
**UNITED STATES**

M2M / Telemetry Systems, Mobile Enterprise Solutions and Services, Modems Franklin Wireless is a global leader in innovative hardware and software products that support machine-to-machine (M2M) applications and the Internet of Things (IoT) as well as intelligent wireless solutions including mobile hotspots, routers and modems.

Email: [alysia@franklinwireless.com](mailto:alysia@franklinwireless.com)  
Website: <http://www.franklinwireless.com/>

**Skyworks Solutions**  
**UNITED STATES**

LTE Network Infrastructure, Semiconductors, Small Cells  
Skyworks Solutions, Inc. is empowering the wireless networking revolution. Our highly innovative analog semiconductors are connecting people, places, and things, spanning a number of new and previously unimagined applications within the automotive, broadband, cellular infrastructure, connected home, industrial, medical, military, smartphone, tablet and wearable markets.

Email: [sales@skyworksinc.com](mailto:sales@skyworksinc.com)  
Website: <http://www.skyworksinc.com/>

**QLogic Corporation**  
**UNITED STATES**

Core Network Equipment, Data Products and Services, IP Networking Equipment QLogic (NASDAQ: QLGC) is a global leader and technology innovator in high performance server and storage networking connectivity products. Leading OEMs and channel partners worldwide rely on QLogic for its server and storage networking solutions. Members from QLogic's senior executive team will be at Mobile World Congress 2016 to discuss its family of connectivity products that deliver greater flexibility, scalability and economical value for the scale-out architectures of the fast moving telco, MSP, cloud and enterprise markets. For more information, please visit [www.qlogic.com](http://www.qlogic.com).

Email: [qlogic411@qlogic.com](mailto:qlogic411@qlogic.com)  
Website: <http://www.qlogic.com/>

**IBM**  
**UNITED STATES**

Cloud Services, Consulting, Mobile Enterprise Solutions and Services, Network Operating Software, Systems Integration  
Join IBM at Booth 3.H30 in Hall 3 to gain insight on how communications service providers can succeed in the cognitive era by developing deep capabilities to engage customers, creating new products and services, infusing agility into the infrastructure, and managing the forces of change profitably and securely. Cognitive computing can help identify new possibilities; improving customer engagement, helping call centers with real-time access to data, and leveraging data to troubleshoot and fix network issues. And through IBM MobileFirst learn how you can engage customers and employees with increasing personalization, authenticity and meaningful context.

Email: [mwc@us.ibm.com](mailto:mwc@us.ibm.com)  
Website: <http://www-935.ibm.com/industries/communications/events.html>

**Ruckus Wireless**  
**UNITED STATES**

Antennas, Aerials, Masts and Towers, Cloud Services, LTE Network Infrastructure, Small Cells, Wi-Fi Services & Management Ruckus Wireless delivers simply better wireless for more than 61,000 enterprise, service provider, government and small business customers worldwide. The company is focused on technology innovation, partner ecosystems and customer service — yielding the best possible wireless experience for the most challenging indoor and outdoor environments. Its Smart Wi-Fi platform delivers scalable, high-performance Wi-Fi with simplified control and management for on-premise and cloud-based Wi-Fi deployments, along with new services for secure on-boarding, policy management, location services and analytics that enable new business opportunities.

Email: [info@ruckuswireless.com](mailto:info@ruckuswireless.com)  
Website: <http://www.ruckuswireless.com/>

**Asentria Corporation**  
**UNITED STATES**

M2M / Telemetry Systems, Modems, Monitoring Systems and Equipment, Network Management, Network Operating Software Asentria's proven solutions provide mobile network operators (MNO) with not just alarms on power, security, and environmental conditions at cell sites, but also overall "Cell Site Optimization". Optimization of individual cell sites results in improvements in Quality of Service (QoS),

Mean-Time to Repair (MTTR), and CAPEX and OPEX reductions across the entire network. Asentria solutions reduce over-provisioning of HVAC, rectifiers, batteries, or fuel, allow better management of HVAC set points, and reduction of overall truck rolls. Asentria solutions support operator's efforts to become more green by reducing overall power usage, as well as providing detailed reporting of the savings achieved.

Email: jon.baars@asentria.com  
Website: <http://www.asentria.com/>

**Procera Networks, Inc.**  
**UNITED STATES**

Network Management Procera Networks Inc. structures mobile and fixed broadband network data, transforming it into actionable intelligence to empower operators to make informed business decisions and improve the quality of Subscriber Experience.

Email: info@proceranetworks.com  
Website: <http://www.proceranetworks.com/>

**Codal Inc**  
**UNITED STATES**

Application Development – General, Consulting, Mobile Enterprise Solutions and Services Codal is an established global consulting firm focusing on business intelligence, design, development and compliance testing. Delivering solutions of any complexity to clients worldwide. With more than 7 years of IT business expertise, Codal has a strong team of skilled and experienced business and technical experts. Codal's customer base includes companies of all sizes, ranging from startups to large enterprises. Our clients have a common awareness that they need a professional and accessible solution to maximize their business goals, revenue streams, establish communication channels or streamline business operations.

Email: mgierut@codal.com  
Website: <http://www.codal.com/>

**Lemko Corporation**  
**UNITED STATES**

In-Building Systems, ISP, LTE Network Infrastructure, M2M / Telemetry Systems Lemko makes innovated 2G, 3G and 4G cellular solutions for carriers, first-responders and industry IoT users. At MWC, Lemko is featuring the LTE EZ Access Point, a Private LTE scalable network deployable out of the box. EZ LTE is Drop-n-Go solution that is as simple to install and provision as Wi-Fi. EZ delivers LTE benefits with Wi-Fi economics. EZ LTE connects to your existing IP network securely behind an enterprises' firewall. EZ LTE is available on most LTE bands. EZ LTE is ideal for the Industrial Internet

and broadband wireless use-cases that demand security and LTE Quality of Service.

Email: info@lemko.com  
Website: <http://www.lemkocorp.com/>

**Radisys**  
**UNITED STATES**

Network Planning and Design, Small Cells Radisys helps communications and content providers, and their strategic partners, create new revenue streams and drive cost out of their services delivery infrastructure. Radisys' wireless access technologies, service-aware traffic distribution platforms, and real-time media processing engines enable its customers to maximize, virtualize and monetize their networks.

Email: lmlm@radisys.com  
Website: <http://www.radisys.com/>

**Escape Communications**  
**UNITED STATES**

Backhaul Solutions, BTS Fronthaul Solutions, Modems Escape Communications is a modem supplier for Wireless Backhaul. We offer modems with 1Gbps, 2.5 Gbps, and 10 Gbps. Our E band modems are fully integrated with the RF chipsets from our partners offering customers low cost, fast time to market solution with outstanding performance.

Email: mpope@escapecom.com  
Website: <http://www.escapecom.com/>

**Vasona Networks**  
**UNITED STATES**

Backhaul Solutions, Cloud RAN, Core Network Equipment, Data Analysis, Network Management Founded in 2010, Vasona Networks, Inc.® works with global mobile network operators to deliver better user experiences. The company's pioneering SmartAIR™ edge application controller and the SmartVISION™ analysis suite elevate capabilities to overcome network congestion, and to understand network activities for better management and planning. The technology leverages strategic network edge locations for comprehensive perspective on all data activity within every cell at any time. The company has deployments in major networks around the world and has received investments from Bessemer Venture Partners and New Venture Partner. Vasona Networks is headquartered in Santa Clara, California, with offices worldwide.

Email: skenvin@vasonanetworks.com  
Website: <http://vasonanetworks.com/>

**ERATO Wireless Audio CO., LTD**  
**UNITED STATES**

Antennas, Aerials, Masts and Towers, Bluetooth



Accessories, Consumer Electronics (CEM), Intellectual Property Erato innovates wireless and audio technology to develop premium Bluetooth audio products. Erato has created the world's first true wireless headset with unmatched sound quality. Established in 2015 with a simple aim of creating high fidelity audio devices without compromise, Erato is located in Brea, California where its team of audio experts continuously push the technology limit. From incredible acoustic detail and clarity to breathtaking immersive audio experience, Erato sets a new standard for true wireless audio.

Email: [alvin\\_chen@adata.com](mailto:alvin_chen@adata.com)  
Website: <http://www.erato-audio.com/>

**JQL Electronics Inc**  
**UNITED STATES**

Backhaul Solutions, Devices, In-Building Systems, LTE Network Infrastructure, Small Cells JQL Electronics Inc, is a technology company, designing and manufacturing microwave passive components and subsystems, for the wireless network infrastructure market. Our technology includes ferrite isolator/circulators, cavity filters, directional couplers, power dividers, combiners, ceramic filters, waveguide components and solid state power amplifiers. With cutting edge design capabilities and world class manufacturing, JQL's innovative design, rapid prototyping, precise manufacturing and short lead-time delivers high quality product to the customer backed up with excellent customer service.

Email: [info@jqlelectronics.com](mailto:info@jqlelectronics.com)  
Website: <http://www.jqlelectronics.com/>

**Vector Data**  
**UNITED STATES**

Core Network Equipment, Data Products and Services, IP Networking Equipment, Power Systems, Systems Integration Vector Data offers VectorPod, a complete carrier-grade NFV & SDN infrastructure platform. Fully customizable, AC or DC powered, NEBS/ETSI/KCC/VCCI certified, and based on proven technology, VectorPod is certified for OpenStack and VMware, and pre-validated for repeatable, consistent deployment anywhere in the network including data center, central office and MTSO.

Email: [sales@vectordata.com](mailto:sales@vectordata.com)  
Website: <http://www.vectordata.com/>

**4G Americas**  
**UNITED STATES**

Government and Regulatory. 4G Americas is an industry trade organization composed of leading telecommunications service providers and manufacturers. The organization's mission is to advocate for and foster the advancement and full capabilities of the LTE mobile broadband technology and its evolution beyond to 5G, throughout the

ecosystem's networks, services, applications and wirelessly connected devices in the Americas. 4G Americas, the voice of 5G for the Americas, is invested in leading 5G development for the Americas and maintaining the current global innovation lead in North America with LTE technology. 4G Americas is headquartered in Bellevue, Wash. More information is available at [www.4gamericas.org](http://www.4gamericas.org).  
Email: [heidi.mills@4gamericas.org](mailto:heidi.mills@4gamericas.org)  
Website: <http://www.4gamericas.org/en/>

**SevOne Inc**  
**UNITED STATES**

Backhaul Solutions, Cloud Services, LTE Network Infrastructure, Monitoring Systems and Equipment, Network Management SevOne provides the only digital infrastructure performance monitoring solution engineered for Speed at Scale for the world's most demanding service-delivery environments. The patented SevOne Cluster™ architecture leverages distributed computing to monitor any device in the service-delivery path, integrating performance metrics, flows and logs at scale, and providing answers in seconds to prevent performance-impacting outages. SevOne's global customer base includes 5 of the 7 top global investment services companies, enterprises, CSPs, MSPs and MSOs. SevOne is backed by Bain Capital Ventures and named a Visionary in Gartner's 2015 Magic Quadrant for Network Performance Monitoring and Diagnostics. Follow SevOne on Twitter @SevOneInc.

Email: [info@sevone.com](mailto:info@sevone.com)  
Website: <http://www.sevone.com/>

**InterDigital**  
**UNITED STATES**

Backhaul Solutions, M2M / Telemetry Systems, Network Management, Small Cells, Wi-Fi Services & Management InterDigital designs and develops advanced mobile technologies that enable and enhance communications.

Email: [patrick.vandewille@interdigital.com](mailto:patrick.vandewille@interdigital.com)  
Website: <http://www.interdigital.com/>

**InfoVista**  
**UNITED STATES**

Backhaul Solutions, Managed Network Services, Monitoring Systems and Equipment, Network Management, Network Planning and Design InfoVista is the leading provider of cost-effective network performance orchestration solutions at the service of a better connected and collaborative world. Our award-winning solutions empower mobile operators and communications service providers to ensure a high-quality subscriber experience across the entire life-cycle, all technologies and all domains of both the mobile and fixed networks.

Email: [d Rodrigues@infovista.com](mailto:d Rodrigues@infovista.com)  
Website: <http://www.infovista.com/>

**NetComm Wireless**  
**AUSTRALIA**

gloria.vincent@netcommwireless.com  
<http://www.netcommwireless.com/>

NetComm Wireless Limited (ASX: NTC) is a leading developer of Fixed Wireless Regional Broadband and wireless M2M devices that underpin an increasingly connected world. Leading telecommunications carriers, core network providers and system integrators utilise NetComm Wireless' 3G, 4G LTE and new generation Fixed Wireless solutions to optimise network performance and to support their connected products and services. For the past 34 years, NetComm Wireless has developed a portfolio of world first data communication products, and is now a globally recognised wireless innovator. Headquartered in Sydney (Australia), NetComm Wireless has offices in the US, Europe/UK, New Zealand, Middle East and Japan.

**World Telecom Labs**  
**BELGIUM**

rubin.rose@wtl.be  
<http://www.wtl.be/>

World Telecom Labs is a leader in the provision of VoIP & SMS switches and Small-Cell solutions with a large installed base in 30+ countries in Africa. Products include: • Rural Telephony– GSM coverage, voice & data for remote sites. Includes cloud-based billing • VoIP to TDM E1 and STM-1 backbone switches • High density Multi-Service SBC with integral Pre-Paid, IVR & Billing. • SMS Hub High Performance, Cost Effective SMS Hub platform with SMPP & SS7 • Bandwidth cost saving Instant ROI, cuts IP bandwidth for VoIP traffic by 70% – compatible with satellite or fibre networks ackhaul Solutions, Voice Products and Services, VoIP Systems

**DATACOM**  
**BRAZIL**

sales@datacom.ind.br  
<http://www.datacom.ind.br/en>

DATACOM is the leading manufacturer of telecommunication network equipment in Latin America, focused on Ethernet and IP solutions. Established in 1998, the company's headquarter is located in the south of Brazil. Providing complete solutions from backbone to access, DATACOM supplies regularly the main carriers and service providers in South America. Export sales have reached more than 40 countries. The fast evolution of the communication industry is closely followed by DATACOM's own R&D team of more than 300 designers and engineers. DATACOM deploys the latest electronic engineering processes in the production of data telecommunication equipment. Backhaul Solutions, Core Network Equipment, IP Networking Equipment, Modems

**EXFO**  
**CANADA**

marie-anne.grondin@exfo.com  
<http://www.exfo.com/>

With over 30 years serving the industry, EXFO empowers communication service providers to continually improve the overall performance of their networks, and ultimately the service experience of their subscribers. EXFO couples intelligent, automated, cloud-based test and monitoring solutions as well as contextually relevant analytics with a comprehensive end-to-end view of service experience. EXFO transforms data generated by its solutions into knowledge about end-to-end service experience that is actionable and meaningful to its customers. EXFO moves CSPs forward with solutions, analytical capabilities and knowledge to cover the entire chain from service turn-up out to the subscriber's device and back. Backhaul Solutions, Data Analysis, Monitoring Systems and Equipment, Test and Measurement Equipment, Testing and Certification

**ReFleX Wireless Inc.**  
**CANADA**

info@reflexwireless.com  
<http://www.reflexwireless.com/>

ReFleX Wireless offers analytic software and wireless sensors/devices for health and wellness applications. We are actively seeking local service partners to take advantage of our end-to-end m2m solutions. Some of our recent collaboration includes our work with Weight Watchers International on the creation of "Weight Watchers Smart Food Scale" nutrition solution and with Sleep Specialists LLC on SleepAngles home monitoring service. For 2016, we will be releasing an array of 2G/3G based location and environmental sensors. Speak to us and learn how you can leverage our technologies to reach our corporate goals. Backhaul Solutions, Data Analysis, Data Products and Services, M2M / Telemetry Systems, Mobile Health Services and Solutions

ItalConsul is an engineering services enterprise. Its Core Business is the Logistics Engineering, ie RAMS Analysis (CENELEC - Norm EN 50126) that make up the Integrated Logistics Support to Design of Systems and Equipments.

Decades of experience gained in RAMS Analysis led ItalConsul to develop its ability to Design in the fields of Mechanical, Electrical, Electronics Engineering (Machinery and Equipment), Software and Assessments. Moreover, ItalConsul extended over time its skills to simulations by software, such as Finite Element Analysis, Multi-domain and circuit simulations, too. The work-areas of ItalConsul concern Aerospace, Naval, Railway, Power Plants and manufacturing.

Then Italconsul is engaged in Research & Development activities. Among its results it includes three patents, seventy scientific publications (also in prestigious journals) and the realization of "RelySoft", a software-tool, based on the revolutionary methodologies, which have been accepted by RIAC and often have made possible to find original solutions to very complex problems, considered sometimes even insoluble. "RelySoft" was produced internally and certificated by the University of L'Aquila.

Italconsul employs Human Resources with longest experience, gained over decades. They work in symbiosis with young talents, supported and trained constantly to highly advanced projects. Italconsul is also qualified in the suppliers panel of Rheinmetall, Finmeccanica, Sogin. Italconsul uses the software tool SUITE-CARE for its Analysis of Integrated Logistic Support and makes use of advanced analysis and project tools:

**AVG Technologies**  
**UNITED STATES**

Cloud Services, Devices, Mobile Privacy / Spam Prevention, Mobile Security Systems AVG Technologies N.V. (NYSE: AVG) is the leading provider of software services to secure devices, data and people. AVG's award-winning consumer portfolio includes internet security, performance optimization, location services, data controls and insights, and privacy and identity protection, for mobile devices and desktops. The AVG Business portfolio, delivered through a global partner network, provides cloud security and remote monitoring and management (RMM) solutions that protect small and medium businesses around the world. For more information, visit [www.avg.com](http://www.avg.com).

Website: <http://www.avg.com/>

**CableLabs**  
**UNITED STATES**

Testing and Certification. CableLabs is a non-profit research and development consortium that is dedicated to creating innovative ideas that significantly impact our cable operator members' business. CableLabs also serves to define interoperable solutions among our members and their technology vendors in order to drive scale, reduce costs, and create competition in the supply chain. CableLabs membership is comprised of the major cable operators worldwide.

Email: [info@cablelabs.com](mailto:info@cablelabs.com)  
Website: <http://www.cablelabs.com/>

**GSMA Marketplace**  
**UNITED STATES**

Antennas, Aerials, Masts and Towers, Consulting, Core Network Equipment, Devices, Mobile Enterprise Solutions and Services GSMA

Marketplace is a new online portal to connect buyers and sellers in the telecoms industry. With 2,400+ sellers and 500+ buyers onboard now, this platform is becoming the premiere destination for procurement and business development activity in the ecosystem. Over the last several months, RFX worth over \$161,000,000 USD in value and ongoing opportunity have been run on the site. Sellers can build virtual storefronts, post product/service catalogues and respond to RFXs. Buyers can search for products, connect with new suppliers and initiate RFXs. Learn more at [www.GSMAMarketplace.com](http://www.GSMAMarketplace.com)  
Email: [marketplace@gsma.com](mailto:marketplace@gsma.com)  
Website: <http://www.gsmarketplace.com/>

**BTI Wireless**  
**UNITED STATES**

In-Building Systems, Small Cells As global experts in wireless communication, BTI Wireless (BTI) continually delivers innovative solutions that allow mobile users worldwide to experience reliable coverage in the highest-profile, highest-capacity and hardest-to-cover public, private and government facilities. BTI prides itself on its technology expertise, designing and manufacturing products that include high-performance power amplifiers, DAS, small cells, and other RF subsystems. Founded in 1999, the privately held company is headquartered in Cypress, California with offices across the Americas and Asia-Pacific.  
Email: [ronp@btewireless.com](mailto:ronp@btewireless.com)  
Website: <http://www.btiwireless.com/>

**JMA Wireless**  
**UNITED STATES**

Antennas, Aerials, Masts and Towers, Cloud RAN, In-Building Systems, LTE Network Infrastructure, Small Cells JMA Wireless is the leading global innovator in mobile wireless connectivity solutions that assure infrastructure reliability, streamline service operations, and maximize wireless performance. Employing powerful, patented innovations their solutions portfolio is proven to lower the cost of operations while ensuring lifetime quality levels in equipment and unrivaled performance for coverage and high-speed mobile data. JMA Wireless solutions cover macro infrastructure, outdoor and indoor distributed antenna systems and small cell solutions.

Email: [sgriffin@jmawireless.com](mailto:sgriffin@jmawireless.com)  
Website: <http://www.jmawireless.com/>

**eVolution Networks**  
**UNITED STATES**

Utilities (Smart Grid) eVolution Networks is a leading innovator in telecom energy efficiency, allowing Mobile Network Operators to immediately reduce their electricity bills by as much as 35% by powering off redundant capacity during low traffic hours.

Email: [inbar.bremner@evolution-networks.com](mailto:inbar.bremner@evolution-networks.com)  
Website: <http://www.evolution-networks.com/>

### **Intel Corporation UNITED STATES**

Application Development, General, Cloud Services, Mobile Enterprise Solutions and Services, Network Management, Semiconductors Intel makes the most amazing experiences of the future possible. Intel's innovations expand the reach and power of computing in personal devices and enterprise servers, the Cloud, make the Internet of Things smart and connected, and help ensure the security of our digital lives. The work of the company's more than 100,000 employees transforms businesses, propels new discoveries and improves human experiences. More information about Intel is at [newsroom.intel.com](http://newsroom.intel.com) or [intel.com](http://intel.com).

Email: [pauline.daniels@intel.com](mailto:pauline.daniels@intel.com)  
Website: <http://www.intel.com/>

### **nnJoo Technology L.L.C UNITED ARAB EMIRATES**

Device Accessories, Devices, Tablet Devices. InnJoo is a technical startup born with Internet DNA. Its Internet journey was started by joining hands with the largest e-commerce sites in the region. Based in Dubai, InnJoo became the fastest-growing company by providing smart devices as well as software services in the MEA area.

Email: [service@innjoo.com](mailto:service@innjoo.com)  
Website: <http://www.innjoo.com/>

### **Aptilo Networks SWEDEN**

Voice Products and Services, Wi-Fi Services & Management. Aptilo Networks is a leading provider of carrier-class systems to manage data services with advanced functions for authentication, policy control and charging.

Email: [sofia.andreasson@aptilo.com](mailto:sofia.andreasson@aptilo.com)  
Website: <http://www.aptilo.com/>

### **Cybercom Group SWEDEN**

Augmented Reality, Consulting and Engineering Services, M2M / Telemetry Systems, Network Planning and Design, Testing and Certification. Cybercom is an innovative ICT consulting company with 20 years of experience in IT and communications technology. Our

consultants enable businesses and organisations to benefit from the opportunities of the connected world, to enhance their competitiveness or to achieve efficiency gains. Cybercom's expertise spans the entire ecosystem of this communication – Connectivity – and our delivery is both local and global. Cybercom's principal market is the Nordic region, with established operations in Sweden, Finland and Denmark. Poland, India, Dubai and Singapore are international centres of expertise. The group has approximately 1,300 employees.

Email: [bo.stromqvist@cybercom.com](mailto:bo.stromqvist@cybercom.com)  
Website: <http://www.cybercom.com/>

### **INFACOM SPAIN**

In-Building Systems, LTE Network Infrastructure, Monitoring Systems and Equipment. Infacom, manufacturer of passive and active components, communication systems for civil and military applications, turnkey system up to 40 GHz. Products with low PIM figure for applications in communication bands as Tetra, UHF, VHF, and all bands of telephony up to LTE. Radio coverage for use in buildings, tunnels, rail, rural areas, etc. Repeaters, amplifiers, and all components used in antenna distribution systems. Custom software to integrate our products to customers requirements in public safety, cellular and satellite communications.

Email: [info@infacom.es](mailto:info@infacom.es)  
Website: <http://www.infacom.es/>

### **Government of Catalonia SPAIN**

Government and Regulatory. Catalan companies stand out for being active, innovative, export oriented and competitive. The Government of Catalonia, through the Ministry of Business and Knowledge, is committed to creating the best environment for businesses, to fostering talent and innovation / breakthrough, and to strengthening sectors such as ICT and mobile technologies that are able to boost regional competitiveness. The Government of Catalonia supports the presence of Catalan companies at the Mobile World Congress for growing internationally and expanding business.

Email: [catalonia@catalonia.com](mailto:catalonia@catalonia.com)  
Website: <http://catalonia.com/>

### **INFOPOLE Cluster TIC BELGIUM**

Government and Regulatory. INFOPOLE Cluster TIC is the business cluster that brings together and unites professionals from Information and Communication Technologies (ICT) in order to

promote business and innovation through partnership. Our ambition is to contribute to the implementation of a specific and original response to strengthen synergies and allow operators to better position themselves on the market. Several application areas are the foundation of our actions : eHealth, intelligent transports (Intelligent Transport Systems), the public sector (eGov), Internet of Things (IoT), the Serious Game, Big Data, Open Data, Transmedia, ...

Email: [charlie.feron@infopole.be](mailto:charlie.feron@infopole.be)

Website: <http://www.infopole.be/>

### **WebRadar BRAZIL**

Data Analysis, M2M / Telemetry Systems, Network Management, Operational Support Systems (OSS), Utilities (Smart Grid) With IoT, everything generates data: Smartphones, network elements, smart-meters, connected vehicles, etc. Webradar is the right company to help you transform data into business advantage.

Email: [eric.soligo@webradar.com](mailto:eric.soligo@webradar.com)

<http://www.webradar.com/>

### **BaiCells CHINA, PEOPLES REPUBLIC OF**

Core Network Equipment, Devices, Femtocells, LTE Network Infrastructure, Small Cells. Baicells is a high-tech company dedicated in wireless broadband access solutions. Our products and solutions cover small cells, core network, network management billing system, smartphones, home gateways, etc. With the vision to connect the unconnected and provide free connection within everyone's reach, Baicells has introduced some real breakthrough technologies, like moving LTE system to an unlicensed spectrum and building it based on IT architecture. With Baicells' turnkey end-to-end solution, it becomes much easier to provide service at a low cost. Baicells' innovative solutions can be used by mobile operators, broadband access operators, cable operators, virtual operators, governments and enterprise networks.

Email: [wujiong@baicells.com](mailto:wujiong@baicells.com)

Website: <http://www.baicells.com/>

### **Shuangdeng Group Co., Ltd CHINA, PEOPLES REPUBLIC OF**

Batteries, Environment / Recycling Services, Power Systems. Shuangdeng (Shoto) group is a leading integration service provider of green energy storage. For Telecom Industry, Shoto offers a broad portfolio of highly efficient customer-centric solutions and services, including stable and reliable backup power, batteries for harsh environments, and deep cycle/high power battery series. Shoto keeps the biggest market share among major domestic telecom operators. Our

products are exported to more than 120 countries and our overseas sales volume is constantly growing. As a sustainable and responsible company, we are the first to construct in China the recycling chains for lead acid battery. Welcome to our stand to discover more!

Email: [office@shuangdeng.com.cn](mailto:office@shuangdeng.com.cn)

Website: <http://www.chinashoto.com/en/>

### **PrometalTech Co. LTD CHINA, PEOPLES REPUBLIC OF**

Application Development "General, Consumer Electronics (CEM), Device Accessories PrometalTech Co. LTD provides high quality amorphous metal (AM) products with state of the art process technologies, with enough capability and capacity for volume scale production to meet customer's requirements, for mobile electronic devices, wearable electronics, luxury goods, sport goods, medical devices and other related industries.

Email: [rooney.lieu@prometaltech.com](mailto:rooney.lieu@prometaltech.com)

<http://www.prometaltech.com/>

### **Huawei Technologies Co., Ltd. CHINA, PEOPLES REPUBLIC OF**

Core Network Equipment, Devices, Mobile Enterprise Solutions and Services, Network Management, Small Cells. Huawei is a leading ICT solutions provider. Our telecom network equipment, IT products, and smart devices provide solutions in 170 countries and regions worldwide. Huawei ranked 228th on the Global Fortune 500 based on its revenue in 2014. In 2014, the company's revenue reached approximately USD 46.5 billion. Together with our partners, we are building a Better Connected World.

Email: [website@huawei.com](mailto:website@huawei.com)

Website: <http://www.huawei.com/>

### **Shanghai Wind Communication Technologies Co.,Ltd. CHINA, PEOPLES REPUBLIC OF**

Mobile Enterprise Solutions and Services. Shanghai Wind Communication Technologies co., Ltd (hereinafter refers to WIND) is a famous Chinese Original Design Manufacture of smart phones and smart devices. WIND is focusing on massive design, R&D, manufacture of all kinds of smart phones and devices for the big brands and internet channel customers all over the world. WIND is keeping its pace of highspeed expanding and always on the top notch of the area. WIND owns its R&D center in Shanghai, Shenzhen, Beijing, Taiwan and India, with an R&D team of 1500 staff. At the same time, WIND also owns large manufacture base in Shenzhen and India. Wind has the complete capability of product design, research and

development and testing as well as complete supply chain and over-all unit delivery so that it is able to provide the customers with all-round service and technology support.

Email: [xiatian@wind-mobi.com](mailto:xiatian@wind-mobi.com)  
Website: <http://www.wind-mobi.com/>

**Shanghai Tianma Micro-electronics Co.Ltd.**  
**CHINA, PEOPLES REPUBLIC OF**

Application Development “ Film, Mobile Advertising and Marketing. Tianma Micro-electronics Co., Ltd. (Tianma) specializes in providing display solutions and efficient support services worldwide. We were originally established in 1983 and publically listed on the Shenzhen Stock Exchange (SZ. 000050) in 1995. Our company is committed to providing leading technology and quality products to the consumer and professional display industries that are used in applications to include smart phones, tablet PCs, smart wear, automotive instrumentation, industrial and medical instrumentation, avionic display, home automation, etc. We strive to offer optimal products and solutions by utilizing dual-brand strategy (TIANMA brand and NLT brand)to meet various demands of our customers.

Email: [jianhao\\_qiu@tianma.cn](mailto:jianhao_qiu@tianma.cn)  
<http://www.tianma.com/>

**ZTE Corporation**  
**CHINA, PEOPLES REPUBLIC OF**

Cloud RAN, Consumer Electronics (CEM), Core Network Equipment, LTE Network Infrastructure, Network Management. ZTE Corporation is a globally-leading provider of telecommunications equipment and network solutions. With operations in 160 countries, the company is a leader in technology innovation, delivering superior products and business solutions to clients all over the world. Founded in 1985, ZTE is listed on both the Hong Kong and Shenzhen Stock Exchanges and is China’s largest listed telecoms equipment company. Offering the industry’s most comprehensive product range and end-to-end solutions, ZTE delivers cutting-edge technology to telecommunications clients in wireless, access & bearer, value-added services, terminals, managed network services, and ICT solutions for enterprises and government agencies.

Email: [info@zte.com.cn](mailto:info@zte.com.cn)  
Website: <http://www.zte.com.cn/>

**Power HF Co., Ltd**  
**CHINA, PEOPLES REPUBLIC OF**

Devices, Power Systems. Power HF Co., Ltd is a pioneer in research and development of new energy and hybrid power generators. Founded in

1920, company has adhered to its core values of “innovation, progress, harmony and excellence”. Today, company has established modern facilities capable of large scale manufacturing of quality hybrid power generators. Its R&D team has been constantly testing new frontiers in reduction of fuel consumption and emissions that bring operating cost savings and reduced carbon footprints. Deployed extensively in Asia, Africa and South America, our products have passed tests of demanding operating environment as well as stringent requirements of our customers.

Email: [echozhang@powerhf.com](mailto:echozhang@powerhf.com)  
Website: <http://www.powerhf.com/>

**Reeko Communication Technology Co., Limited**  
**CHINA, PEOPLES REPUBLIC OF**

Devices, LTE Network Infrastructure, Small Cells, Voice Products and Services. Reeko Communication Technology Co., Limited was established in August, 2013 with its headquarter in Shenzhen. Since the foundation, Reeko has focused on the design, development and production of the clamshell phones & senior phones, providing competitive products for our customers. We regard innovation as our soul, quality as our life: committed to working with the customers, creating the product localization and globalization, providing the reliable product through the innovation and high quality.

Email: [sales@reekotech.com](mailto:sales@reekotech.com)  
Website: <https://www.reekotech.com/>

**Narada Power Source Co.,Ltd**  
**CHINA, PEOPLES REPUBLIC OF**

Established in 1994, Narada has become one of the largest batteries manufactures in the World and the top global battery supplier in telecom industry. The business range covers communication back-up power supply, motive power supply, power storage, system integration and related products R&D, manufacturing, sales and service, we have products lines of VRLA, Lithium batteries, fuel cell and related materials which are widely used in telecom, electric power, railway and other infrastructure industry, solar energy, wind energy, smart grid, electric vehicles, energy storage power station and other emerging industries of strategic importance, electric bicycle batteries, and other industries.

Email: [ray@narada.biz](mailto:ray@narada.biz)  
Website: <http://www.naradapower.com/>

**Sprocomm Technologies CO.,LTD**  
**CHINA, PEOPLES REPUBLIC OF**

Devices, Tablet Devices. Sprocomm Technologies

Co., Ltd was founded in September, 2009. It is a high-tech company that specializes in the research, development, production, and sales of mobile communication terminal products. Sprocomm has clients all over the world and its products are sold to Southeast Asia, Europe, Russia, America, and Latin America. The company provides customized phones for local kings in various countries. And it has reached a delivery scale of 3 million cell phones per month.

Email: [jason.zhang@sprocomm.com](mailto:jason.zhang@sprocomm.com)  
Website: <http://www.sprocomm.com/>

**TRANSCOM INSTRUMENTS  
CHINA, PEOPLES REPUBLIC OF**

Consulting, Data Analysis, Test and Measurement Equipment. Transcom Instruments, focuses on T&M in wireless communications, microwave and GNSS field is established in year 2005. Throughout these years, Transcom has developed a number of T&M instruments and has gained the ownership of several Intellectual Properties of it's core technologies. Transcom is becoming the leading edge T&M instruments and solutions provider for the industry.

Email: [tiger.chen@transcom.net.cn](mailto:tiger.chen@transcom.net.cn)  
Website: <http://www.transcom.net.cn/>

**Avast Software  
CZECH REPUBLIC**

Avast Software, maker of the most trusted mobile and PC security in the world, protects 230 million people and businesses with its security applications. Avast's consumer mobile portfolio includes free apps for Android and iOS that protect smartphone and tablet users from hackers, spies, theft, and data loss. Avast also removes obsolete files from phones, creating more space for data that matters. The Avast Virtual Mobile Platform (VMP) addresses enterprise mobile security risks, helping businesses eliminate confidential data leaks from corporate apps on employee devices. Avast's mobile apps are certified and top-ranked by leading testing institutions, including AV-Comparatives and AV-Test.

Email: [pr@avast.com](mailto:pr@avast.com)  
Website: <http://www.avast.com/>

**Dell Inc.  
DENMARK**

Core Network Equipment, Data Products and Services, Network Planning and Design, Systems Integration, Tablet Devices. Dell empowers communities and people everywhere to use technology to realize their dreams. Customers

trust us to deliver solutions that help them achieve more, whether they're at home, work, school or anywhere in their world. In 2013 Michael Dell and private equity firm Silver Lake Partners buy back Dell from public shareholders to accelerate our solutions strategy and to focus on innovations and long-term investments with the most customer value. One year post-privatization, Dell is the fastest growing, large integrated IT company in the world with revenue growth across our businesses and PC and server share gains outpacing the market.

Email: [charlotte\\_aspeheim@dell.com](mailto:charlotte_aspeheim@dell.com)  
Website: <http://www.dell.com/>

**Hansen Technologies  
DENMARK**

Business Support Systems (BSS). Hansen Technologies supports with the convergent naviBilling software solution the day-to-day operations of small to medium sized telecom operators working in any combination of markets – mobile telephony, wire line, mobile broadband, TV, IP/broadband and interconnection – within one single platform. Our signature product naviBilling is a scalable, flexible, role-tailored and future-proof BSS solution based on Microsoft technology ready to suit the telecoms industry specific needs. naviBilling provides a multi-function solution for telecommunications companies seeking efficient, flexible and convergent billing, customer care, customer relationship management (CRM), and process & workflow management.

Email: [info@telebilling.dk](mailto:info@telebilling.dk)  
Website: <http://www.telebilling.dk/>

**HOI MEA  
EGYPT**

Antennas, Aerials, Masts and Towers, Consulting and Engineering Services, LTE Network Infrastructure, Managed Network Services, Operational Support Systems (OSS). HOI-MEA group, established in 2001, is a leading company in telecom, engineering, manufacturing and consulting services. HOI-MEA instituted a total of 7 manufacturing facilities to construct Greenfield and Rooftop decorative/non-decorative towers, and enhance the full turnkey capabilities in telecommunications projects. HOI-MEA is the 1st company to be granted TowerCo license in Egypt. Headquartered in Egypt; HOI-MEA has branches in Qatar, UAE, KSA, Sudan and Morocco. Our portfolio is diversified in 10,000+ built or managed sites and is experiencing steady growth. With sales revenues reaching over \$50 million in 2015, HOI-MEA group is committed to creating and maintaining excellent customer relationships.

Email: [ayman.homosany@hoi-mea.com](mailto:ayman.homosany@hoi-mea.com)  
Website: <http://www.hoi-mea.com/>

**Information Technology Industry Development Agency (ITIDA).  
EGYPT**

Government and Regulatory, Outsourcing. Information Technology Industry Development Agency, was founded in 2004 as an executive IT arm of Ministry Of Communications and Information Technology to spearhead the process of developing Egyptian IT industry. ITIDA aspires to build momentum in IT industry, by making Egypt one of the top global hubs for technology and business services, the agency strives to further develop Egypt's competitive advantages for FDIs seeking to enhance their global offering and help IT industry increase IT/ITES exports. ITIDA works with entrepreneurial spirit to serve public and private bodies, industry players and associations, universities, and individuals to help grow Egyptian IT industry.

Email: [egypton@itida.gov.eg](mailto:egypton@itida.gov.eg)  
Website: <http://itida.gov.eg/>

**Giza Systems  
EGYPT**

Business Support Systems (BSS), Consulting and Engineering Services, Managed Network Services, Operational Support Systems (OSS), Systems Integration. Giza Systems, a leading systems integrator in the MEA region, designs and deploys industry-specific technology solutions for asset-intensive industries such as the Telecoms, Utilities, Oil & Gas, Transportation and other market sectors. We help our clients streamline their operations and businesses through our portfolio of solutions, managed services, and consultancy practice. Our team of 800 professionals are spread throughout the region with anchor offices in Cairo, Riyadh, Dubai, Nairobi, Dar-es-Salaam and Abuja, allowing us to service an ever-increasing client base in over 40 countries.

Email: [lara.shawky@gizasystems.com](mailto:lara.shawky@gizasystems.com)  
Website: <http://www.gizasystems.com/>

**Smart Villages Company  
EGYPT**

Consulting, Location Technologies and Services. SMART VILLAGES DEVELOPMENT AND MANAGMENT COMPANY (SVC) was founded in November 2001 as a Public-Private-Partnership (PPP) investment with a mandate to establish and manage a branded chain of Technology cluster and Business parks as well as variety of other products and services available here. We

specialize in the establishment and management of communities through innovative thought and practical work. Our multipurpose ecosystems are built on quality, collaboration and trust to the satisfaction of all stakeholders

Email: [anaim@smart-villages.com](mailto:anaim@smart-villages.com)  
Website: <http://www.smart-villages.com/>

**Pulse Electronics  
FINLAND**

Antennas, Aerials, Masts and Towers. Pulse Electronics boosts appealing mobile devices by providing intelligent antenna design and manufacturing solutions for handsets, tablets and laptops. Our aim is to optimize antenna radiator and mechanics design for complex multi-radio environments under all circumstances without limiting the industrial design. The carefully developed Pulse solutions truly delight end users. Pulse has also developed unique printed electronics technology to print conductive circuits and patterns directly on 3D parts. Company serves customers delivering printed products but also offers printers to who prefer to print their prototypes in own R&D or have production capability in-house.

Email: [antennas.eu@pulseelectronics.com](mailto:antennas.eu@pulseelectronics.com)  
Website: <http://www.pulseelectronics.com/>

**Convergentia Ltd.  
FINLAND**

Antennas, Aerials, Masts and Towers, Device Management, Mobile Health Services and Solutions, Tablet Devices, Testing and Certification. Convergentia, a privately-owned technology company based in Oulu, Finland, offers virtual prototyping, simulation-aided design services and project management for the electronics industry. Convergentia has a strong expertise in antenna, audio, EMC, structural mechanics, and thermal design as well as simulations and measurements. The company's offerings provide significant benefits to their clients including improved product insights, cost savings, and more rapid design evaluations. Convergentia's target is to cut down product development costs while maintaining short product development cycles and quality.

Email: [info@convergentia.com](mailto:info@convergentia.com)  
Website: <http://www.convergentia.com/>

**Varaani Works Oy  
FINLAND**

Cloud Services, Consumer Electronics (CEM), Data Products and Services, Devices. The volume of digital content is rapidly increasing both at



home and at work. All of your content should be secure, always available, shareable and in your control.

Email: [tuomas.laine@varaani.com](mailto:tuomas.laine@varaani.com)  
Website: <http://www.varaani.com/>

### **Indalgo FINLAND**

CRM Systems, Data Analysis, Data Products and Services, Fraud Management and Solutions, Network Management. Indalgo provides tailored analytical solutions. Our telecom solutions accelerate product development times, enable finding root causes from complex network structures and help to segment and target customers. We deliver the analytical solution implemented as part of your business process, design user interfaces and maintain the solution for your business.

Email: [perttu.laurinen@indalgo.com](mailto:perttu.laurinen@indalgo.com)  
Website: <http://www.indalgo.com/>

### **IT-Development FRANCE**

Antennas, Aerials, Masts and Towers, Monitoring Systems and Equipment, Network Management, Network Operating Software, Operational Support Systems (OSS). ITD publishes a software application designed for mobile and fixed network operators to deploy infrastructure, manage upgrades, O&M, supervision, logistics, budgets and onsite services.

Email: [pr@it-development.com](mailto:pr@it-development.com)  
Website: <http://www.it-development.com/>

### **IPDiA FRANCE**

Antennas, Aerials, Masts and Towers, Application Development “General, NFC Services and Solutions, Semiconductors, SIM Cards and Smart Cards. IPDiA portfolio includes silicon capacitors from pF to tens of  $\mu$ F, with a range of specialty capacitors composed of: – Low Profile Capacitor < 80  $\mu$ m thin for decoupling inside critical space application such as IC decoupling, MOS sensor, broadband modules, RFID; - High Temperature Silicon Capacitor up to 250°C with very high stability; - Ultra Broadband Silicon Capacitor up to 60 GHz; - High Reliability Medical and Automotive grade silicon capacitor. - 2.5 and 3D Silicon interposers for integration with and without passive components in System in Package (SiP) or MultiChip module (MCM). - Passive components arrays/networks Silicon chip.

Email: [sales@ipdia.com](mailto:sales@ipdia.com)

Website: <http://www.ipdia.com/>

### **POLE STAR FRANCE**

Data Analysis, Location Technologies and Services. Created in 2002 and based in Europe and the United States, Pole Star is the pioneer and world leader in indoor location. The mission is to deliver scalable and long lasting quality of service to venue owners and mobile solution providers. With over 10M sq.m covered by NAO Campus, We already have an impressive customer portfolio and trusted partner network. Pole Star delivers SDK to its partners enabling an easy integration into mobile app and APIs offering several level of services from the “Blue dot” and Indoor Positioning to Real time Indoor Location Analytics through precise geofencing and proximity detection.

Email: [anne.monie@polestar.eu](mailto:anne.monie@polestar.eu)  
Website: <http://www.polestar.eu/>

### **Linxens FRANCE**

Antennas, Aerials, Masts and Towers, SIM Cards and Smart Cards. Linxens is a pioneer and world leader in the design and manufacturing of smartcard connectors, with revenues of € 320 million (fiscal year 2015). Present in the Payment, Telecommunications, eID and Transport & Access markets, it offers innovative connectivity solutions to card manufacturers, chip makers and integrators. Building on its customer intimacy, unique technology portfolio and large scale industrial capabilities, Linxens has broadened its solution-based product offering to include antennas and specialty IC substrates. Linxens employs over 1000 employees worldwide, with manufacturing and R&D sites in Europe and Asia.

Email: [nathalie.varennnes@linxens.com](mailto:nathalie.varennnes@linxens.com)  
Website: [www.linxens.com](http://www.linxens.com)

### **Coriant GERMANY**

Backhaul Solutions, Data Products and Services, Network Management, Network Planning and Design, Operational Support Systems (OSS). Coriant is a proven supplier of innovative networking solutions to leading network operators in over 100 countries. Coriant customers include 9 of the top 10 global Tier 1 Communications Service Providers (CSPs), as well as cloud providers, enterprises, and government agencies. With hundreds of thousands of networking systems deployed, Coriant solutions serve as the resilient foundation for billions of dollars in end-user service revenue. The company delivers best-in-class packet optical transport and mobile backhaul solutions built upon a distinguished heritage of over 35 years of technology

innovation. Learn more at [www.coriant.com](http://www.coriant.com).

Email: [barbara.biadati@coriant.com](mailto:barbara.biadati@coriant.com)  
Website:

**SAP SE  
GERMANY**

Enabling Digital Transformation with SAP SAP is at the center of today's Digital Transformation: 296,000 customers worldwide work together more efficiently and use business insights more effectively. SAP helps organizations of all sizes and industries overcome complexity. With Run Simple as our operating principle, SAP's nearly 75,600 employees focus on a singular purpose that inspires us every day: To help the world run better and improve people's lives.

Email: [info@sap.com](mailto:info@sap.com)  
Website: <http://www.sap.com/>

**avinotec GmbH  
GERMANY**

Application Development " General, Consumer Electronics (CEM), Mobile Entertainment, Mobile TV, Systems Integration. avinotec, Solution Provider for Mobile-Live-Video Streaming.

Email: [sales@avinotec.de](mailto:sales@avinotec.de)  
Website:<http://www.avinotec.de/>

**GP TECHNOLOGIES LIMITED  
HONG KONG**

Batteries, Devices, Intellectual Property, Mobile Security Systems. Batteries, Devices, Intellectual Property, Mobile Security Systems

Email: [rachel@gpehk.com](mailto:rachel@gpehk.com)  
Website: <http://www.lockphone.com/>

**Wipro Limited  
INDIA**

Business Support Systems (BSS), Consulting and Engineering Services, Operational Support Systems (OSS), Outsourcing, Systems Integration. Wipro Ltd (NYSE:WIT) is a global information technology, consulting and outsourcing company with 170,000+ workforce serving clients in 175+ cities across 6 continents. The company posted revenues of \$7.6 billion for the financial year ended Mar 31, 2015. Wipro helps customers do business better by leveraging our industry-wide experience, deep technology expertise, comprehensive portfolio of services and vertically aligned business model. Our 55+ dedicated emerging technologies 'Centers of Excellence' enable us to harness the latest technology for delivering business capability to our clients.

Email: [jaysurya.deb@wipro.com](mailto:jaysurya.deb@wipro.com)

Website: <http://www.wipro.com/>

**Intex Technologies (India) Ltd.  
INDIA**

Consumer Electronics (CEM), Device Management, Mobile Advertising and Marketing, Mobile Enterprise Solutions and Services, Tablet Devices. Intex Technologies (India) Ltd., incepted in the year 1996 is a major player in India in mobile handset, consumer durables and IT accessories. The company has a PAN-India presence through its wide network comprising 30 stock and sales offices and over 1100+ service touch points. With years of innovation and invaluable asset of more than 6000+ employees, Intex Technologies has established itself as a trusted name in the industry today. The Brand exhibits an exhaustive portfolio of more than 15 product categories ranging from mobile handsets, multimedia speakers, LED TVs, washing machines to name a few.

Email: [piyush.panchal@intex.in](mailto:piyush.panchal@intex.in)  
Website: <http://www.intex.in/>

**Indus Net Technologies  
INDIA**

Application Development " Gaming, Application Development " General, Application Development " Shopping, Mobile Enterprise Solutions and Services, Outsourcing. Indus Net Technologies is an innovative, enterprise and consumer mobility solution provider, offering custom application development, testing & digital marketing services to enable clients to make their businesses future ready.

Email: [mainakb@indusnet.co.in](mailto:mainakb@indusnet.co.in)  
Website: <http://www.indusnet.co.uk/>

**Alpha Wireless  
IRELAND**

Antennas, Aerials, Masts and Towers, LTE Network Infrastructure, Small Cells. Alpha Wireless designs and manufactures high performance base station antennas for 4G applications. A full range of tri-sector (canister) antennas are now available, along with an extensive portfolio of small cell antennas to help improve coverage on macro networks. All antenna designs have optimized radiation patterns which helps to improve overall network performance, and real trials have shown significant throughput and sector capacity improvements when Alpha Wireless antennas are used. Alpha prides itself on its expertise and its response times to customer needs, and that's why the world's major equipment vendors and operators have chosen to work with us.

Email: [mbolger@alphaantennas.com](mailto:mbolger@alphaantennas.com)  
Website: <http://alphaantennas.com/>

**Vistatec  
IRELAND**

Content Provider, Outsourcing. Vistatec works with many of the world's most iconic brands to create compelling content journeys and product experiences for their customers. By providing powerful, accurate and culturally relevant language versions of products and commercial content, Vistatec clients can engage and scale their global customer base in a consistent, timely and cost effective manner. What sets Vistatec apart is our ability to take content, in any form, and align the intended impact with the most effective localization methodology. Our Intelligent Automated Translation solutions allow us to scale localization and translation solutions to satisfy each globalization opportunity in the most optimized way.

Email: [info@vistatec.com](mailto:info@vistatec.com)  
Website: <http://www.vistatec.com/>

**imobmedia  
IRELAND**

Location Technologies and Services, Mobile Advertising and Marketing. iMobMedia is a white label, permission based marketing platform that enables mobile operators to target consumers with offers in real-time based on preference, profile and and/or proximity.

Email: [talk2us@imobmedia.net](mailto:talk2us@imobmedia.net)  
Website: <http://www.imobmedia.net/>

**Google  
IRELAND**

Application Development, Gaming, Application Development "General, Cloud Services, Mobile Advertising and Marketing, Mobile Gaming. Google's suite of cross platform products for app developers helps them develop great apps, grow their users and earn revenue. Our best-in-class solutions, including Google Cloud Platform, AdWords and AdMob, have supported the growth of millions of app businesses globally. Learn more at [developers.google.com](https://developers.google.com).

Website: <https://developers.google.com/>

**Noveto Systems Ltd  
ISRAEL**

Augmented Reality, Consumer Electronics (CEM), In-Building Systems. Noveto presents "Privet Sound", a disruptive technology capable of transmitting focused sound beams from devices to user's ears only, without any use of intermediate/external hardware. "Private Sound" dynamically tracks and focuses the acoustical energy into the user's ear, enabling: • Full privacy – Only the user hears the audio coming from his device. • Quieter surrounding – Others are not disturbed when a user listens to his media. The solution fits multiple markets: Smartphones, Laptops, TVs, and more... Same technology engine can fit multiple B2B biz models:

Implementing Standalone/Embedded (OEM) devices while targeting both consumer electronics and premium professional verticals

Email: [tomers@noveto.biz](mailto:tomers@noveto.biz)  
Website: <http://www.noveto.biz/>

**AppDome  
ISRAEL**

Application Development General, Mobile Enterprise Solutions and Services, Mobile Financial Services. AppDome's dynamic wrapping SaaS technology provides an essential shield that secures enterprise and consumer-facing mobile apps from advanced cyber threats, mobile fraud, and data theft. Within minutes, AppDome's dynamic wrapping technology defends iOS and Android apps from a range of attack vectors. The dynamic wrapper operates on the final application package, and does not require any source code modifications or SDK integration during the development life cycle. The solution is used by the world's leading financial, healthcare and Ecommerce companies to ensure productivity, compliance, and security for consumers and employees. For more information, visit [www.appdome.com](http://www.appdome.com).

Email: [maya@handson-events.com](mailto:maya@handson-events.com)

**ECI  
ISRAEL**

Backhaul Solutions, Core Network Equipment, Encryption and Security Equipment, Network Management, Utilities (Smart Grid). ABOUT ECI® ECI is a global provider of ELASTIC Network™ solutions to CSPs, utilities as well as data center operators. Along with its long-standing, industry-proven packet-optical transport, ECI offers a variety of SDN/NFV applications, end-to-end network management, a comprehensive cyber security solution, and a range of professional services. ECI's ELASTIC solutions ensure open, future-proof, and secure communications. With ECI, customers have the luxury of choosing a network that can be tailor-made to their needs today as well as be seamlessly and cost effectively upgraded to future requirements. For more information, visit us at [www.ecitele.com](http://www.ecitele.com).

Email: [connect@ecitele.com](mailto:connect@ecitele.com)

**Allot Communications  
ISRAEL**

Allot Communications (NASDAQ, TASE: ALLT) is a leading provider of security and monetization solutions that enable service providers to protect and personalize the digital experience. Allot's flexible and highly scalable service delivery framework leverages the intelligence in data networks, enabling service providers to get closer to

their customers, safeguard network assets and users, and accelerate time-to-revenue for value-added services. We employ innovative technology, proven know-how and collaborative approach to provide the right solution for every network environment. Allot solutions are currently deployed at 5 of the top 10 global mobile operators and in thousands of CSP and enterprise networks worldwide.

Email: [info@allot.com](mailto:info@allot.com)

Website: <http://www.allot.com/>

### **SIAE MICROELETTRONICA**

#### **ITALY**

Backhaul Solutions, IP Networking Equipment, Network Management, Network Planning and Design, Systems Integration. SIAE MICROELETTRONICA is an Italian company recognised as one of the most established market leaders in delivering innovative wireless transport solutions. Our product lines include microwave and millimetrewave radio systems from 6GHz to 80GHz designed for mobile backhauling, including the first 4096QAM full outdoor dual-carrier system offering 2Gbps capacity in one box, the ALFOplus2. Carrier Ethernet aggregators, Network Management Systems and Network Analytics Performance tools complement our portfolio. SM Optics, a daughter company, is an excellence centre for Packet Transport Network solutions. With our Network Services organisation we deliver all that is required from professional services to network roll-out worldwide

Email: [marketing@siaemic.com](mailto:marketing@siaemic.com)

Website: <http://www.siaemic.com/>

### **Microtel Innovation srl**

#### **ITALY**

IP Networking Equipment, Monitoring Systems and Equipment, Network Management. Microtel Innovation is leading provider of network products, solutions and services to Telecom Operators, Service Providers and Corporate Users throughout the world. Our core business is supplying high technology products and services for Data Capture, Filtering and Protocol Conversion to Telecom Operators, Service Providers and Corporate Users. Our strengths are competence and flexibility, to provide solutions for any type of telephone or network interface, feeding any monitoring device with the relevant data. Microtel is constantly innovating its products, that nowadays are up and running in many countries all over the world: Far East, Europe, Africa, North and South America.

Email: [rita.tanferi@microtelinnovation.com](mailto:rita.tanferi@microtelinnovation.com)

Website: <http://www.microtelinnovation.com/>

### **Azcom Technology**

#### **ITALY**

Cloud RAN, LTE Network Infrastructure, M2M / Telemetry Systems, Small Cells, Test and Measurement Equipment. Azcom Technology, a leader in advanced wireless communication with two decades of experience, provides a complete suite of software and

hardware products to build commercial and special purpose LTE/HSPA+ wireless networks for defense, public safety and rural applications. Employing this product suite, Azcom provides reference platforms & solutions for 4G/3G base-stations, small cells, relay-nodes, Network-In-a-Box, C-RAN, EPC and handset testers. The software suite comprises of carrier-grade standards compliant LTE FDD/TDD and HSPA+ L1, L2/L3 stacks for both base-station and UE along with a scalable EPC. Built around this rich product line, Azcom offers comprehensive customization services facilitating rapid solution deployments.

Email: [claudio.canosi@azcom.it](mailto:claudio.canosi@azcom.it)

Website: <http://www.azcom.it/>

### **NEC**

#### **JAPAN**

Backhaul Solutions, Cloud Services, LTE Network Infrastructure, M2M / Telemetry Systems, Systems Integration. NEC is a leader in the integration of IT and network technologies that benefit businesses and people around the world. By providing a combination of products and solutions that leverage the company's experience and global resources, NEC's advanced technologies meet the complex and ever-changing needs of its customers. NEC brings more than 116 years of expertise in technological innovation to empower people, businesses and society. Collaborating closely with customers and business partners, NEC is committed to achieving our goal of making the world a brighter place. For more information, visit NEC at <http://www.nec.com>.

Email: [a-kashiwada@ap.jp.nec.com](mailto:a-kashiwada@ap.jp.nec.com)

Website: <http://www.nec.com/>

### **Fujitsu**

#### **JAPAN**

Cloud Services, Data Products and Services, Devices, Mobile Enterprise Solutions and Services, Systems Integration. Fujitsu is the leading Japanese information and communication technology (ICT) company, offering a full range of technology products, solutions and services. Approximately 159,000 Fujitsu people support customers in more than 100 countries. We use our experience and the power of ICT to shape the future of society with our customers. Fujitsu Limited (TSE: 6702) reported consolidated revenues of 4.8 trillion yen (US\$40 billion) for the fiscal year ended March 31, 2015. For more information, please see <http://www.fujitsu.com>.

Email: [wilfried.frewert@ts.fujitsu.com](mailto:wilfried.frewert@ts.fujitsu.com)

Website: <http://www.fujitsu.com/>

### **Japan Radio Co., Ltd.**

#### **JAPAN**

BTS Fronthaul Solutions, ISP, LTE Network Infrastructure. Japan Radio Co., Ltd.(JRC) is the

leading company of communications and information technology fields. Known for “JRC Technology”, we have , been garnering our abundant knowledge, technology and extensive experience throughout our over 100 years history since 1915. Based on our core technologies, we are operating three business units, Marine Electronics, Communications, and Solutions – creating new worlds of communications from people to people and to environments by providing products, service, and solutions with the value expected from JRC. For more information, please visit our web site <http://www.jrc.co.jp/eng/index.html> In MWC2016, we will demonstrate LTE solution for WISP and public safety.

Email: [uchida.kazuhiro@jrc.co.jp](mailto:uchida.kazuhiro@jrc.co.jp)  
Website: <http://www.jrc.co.jp/eng/index.html>

**Nihon Dengyo Kosaku, Co., Ltd.**  
**JAPAN**

Antennas, Aerials, Masts and Towers, In-Building Systems, Small Cells. Nihon Dengyo Kosaku Co., LTD., known as DENGYO, is a manufacturer of RF devices, specializing in antennas and filters; catering for the mobile communication and broadcasting industries. Established in 1947, we have been supplying customers with our products for nearly 70 years. Our catalogue of antennas includes mobile base station antennas and indoor antennas. Our filter products include, band pass filters, multiplexers, antenna combiners and directional couplers. DENGYO is a major supplier of high quality RF products for mobile operators and broadcasters in Japan. “DENGYO – Enriching the Future through Better Use of Radio Waves”.

Email: [shitara-ryota@den-gyo.com](mailto:shitara-ryota@den-gyo.com)  
Website: <http://www.den-gyo.com/english/index.html>

**Artiza Networks**  
**JAPAN**

Cloud RAN, LTE Network Infrastructure, Monitoring Systems and Equipment, Test and Measurement Equipment. Artiza Networks is the leader in 3G/3.5G/4G RAN and core network node testing. We have collaborated with major operators and vendors in the most advanced markets for over 20 years. Our high-density load testers have dominated the Japanese market since they were selected for the first ever LTE trial in Japan. With powerful engineering resources we meet the full range of customer needs through fully in-house development of innovative products and solutions combined with award-winning customer service and support. We are proud of our world-class line of testing solutions, and we’re ready to build the future with 5G.

Email: [ask@artiza.co.jp](mailto:ask@artiza.co.jp)  
Website: <http://www.artizanetworks.com/>

**Globitel**  
**JORDAN**

Messaging, Network Operating Software, Roaming Solutions, Voice Products and Services. Globitel, a 20 years old company, one of the few who offers a wide range of telecom solutions serving MNO’s and contact centers in more than 45 countries. Globitel has a global footprint with local presence in Jordan, UAE, KSA, Tunisia, Pakistan & USA. Globitel offerings include Roaming Solutions, VAS, Provisioning Gateways , Customer Interactive Management and Workforce Optimization Solutions (Quality Monitoring, WorkForce Management, Performance Management Platforms & Speech Analytics) . Globitel’s products are innovative and reliable, providing seamless integration with existing customer infrastructure. Globitel is dedicated to providing high-quality products that fully comply with GSM and other Telco industry standards.

Email: [fadi.qutaishat@globitel.com](mailto:fadi.qutaishat@globitel.com)  
Website: <http://www.globitel.com/>

**Hannam University, ICT Marketing Center**  
**KOREA, REPUBLIC OF**

Business Support Systems (BSS), Consumer Electronics (CEM), Government and Regulatory, Managed Network Services, Systems Integration. We are overseas marketing center for ICT SME in Hannam University, Dae Jeon, Korea. On this time MWC Mobile World Congress, we’d like to introduce 2 reputable company as Han Kyung I-Net Co., Ltd. & Max Wave Co., Ltd. First of all, Han Kyung I-Net Co., Ltd. is manufacturing for M-Prime. M-Prime is as 19” server & network cabinet installed with 7” monitoring LCD touch screen which makes it possible to efficiently manage the Rack environment such as Temperature, Humidity, Security, Etc. Secondly, Max Wave Co., Ltd. is manufacturing Mobile phone charger which has Wrap cable & NFC Tag inside.

Email: [peterbio7@naver.com](mailto:peterbio7@naver.com)  
Website: <http://sh.hannam.ac.kr/>

**Union Golden Rich**  
**KOREA, REPUBLIC OF**

Antennas, Aerials, Masts and Towers, Application Development “ Film, Application Development “ Music. In adopting the oscillator technologies, currency functionality has been improved to the effect that you want to see and entrepreneurship in creating a product that can give full security features of the business objectives. 1. Call feature (using a vibrator expressive negative compared to conventional bluetooth earphone rich because they transmit sound.) 2. Security features (secure, because a strong currency with a solid delivery system) 3. Waterproof function (adoption of wireless charging waterproof manner possible) 4. Versatility (NFC, may be combined with the technique of the beacon to perform various functions in the wearable device.) 5. Bluetooth communication method adopted

Email: thguy@naver.com  
Website: <http://www.drivingpay.com/>

**The Alpha Labs Co., Inc.**  
**KOREA, REPUBLIC OF**

Application Development “ General, Augmented Reality, Devices. The Alpha Labs Co., Inc is technology startup company developing AR Smart Glasses ‘Alpha Glass’ and AR Platform ‘Alpha Glass Platform’. ‘Alpha Glass’ is smart glasses with new optical system and eyeglasses-like design, which solves design weakness of traditional smart glasses. We are shaping the future of smart glasses and AR to show new world to people from everywhere, at anytime.

Email: [jhlee@thealphalabs.com](mailto:jhlee@thealphalabs.com)  
Website: <http://www.thealphalabs.com/>

**3D World**  
**KOREA, REPUBLIC OF**

Business Support Systems (BSS), Data Products and Services, Devices. ‘3D World’ was founded in early 2015 to provide solutions and future-oriented technologies like 3D Scan data editing and Laser Engraving. It has developed personally customized figure businesses and programs teaching how to operate 3D Printers and Scanners since then.

Email: [caesar123@hanmail.net](mailto:caesar123@hanmail.net)  
Website: <http://null/>

**X Engineering**  
**KOREA, REPUBLIC OF**

Device Accessories, Devices, Fraud Management and Solutions, Mobile Financial Services. X Engineering is a fintech startup inaugurated in February 2015 to disrupt the offline payment system with its self-developed magnetic flux emulation technology as well as two patent pending security technologies. X Engineering’s product, SpendWallet, solves the problem of traditional wallet that lacks storage and security by consolidating all types of cards and paying with just a tap. The company, which consists of five engineers, one designer and one operator, received two rounds of funding from Neowiz. SpendWallet is expected to be launched on the crowdfunding platform, Kickstarter, in the first half of 2016.

Email: [contact@xengineering.co](mailto:contact@xengineering.co)  
Website: <http://spendwallet.com/>

**Daegu Technopark(Mobile Technology Convergence Center)**  
**KOREA, REPUBLIC OF**

Government and Regulatory. To lead the technology innovation of ICT and new industries, ‘Mobile Technology Convergence Center’ established the Total Solution Support System through internationally recognized test certification business that directly tests and certifies if mobile terminals comply with the international standards, R&D business, technology support business, marketing business etc. and has been providing the quality service

to relevant companies. In addition, it has provided differentiated ONE-STOP, ONE-SITE company support services to secure the global business competitiveness and discover new business model and supported our companies in firmly positioning themselves as strong leaders in the world market.

Email: [gaya0225@ttp.org](mailto:gaya0225@ttp.org)  
Website: <http://www.mtcc.or.kr/>

**Samsung Electronics Networks**  
**KOREA, REPUBLIC OF**

Core Network Equipment, In-Building Systems, LTE Network Infrastructure, Network Planning and Design, Small Cells. Samsung Electronics Co., Ltd. inspires the world and shapes the future with transformative ideas and technologies that redefine the worlds of TVs, smartphones, wearable devices, tablets, cameras, digital appliances, printers, medical equipment, network systems, and semiconductor and LED solutions. We are also leading in the Internet of Things space with the open platform SmartThings, our broad range of smart devices, and through proactive cross-industry collaboration. We employ 319,000 people across 84 countries with annual sales of US \$196 billion. To discover more, and for the latest news, feature articles and press material, please visit the Samsung Newsroom at [news.samsung.com](http://news.samsung.com).

Email: [email@samsung.com](mailto:email@samsung.com)  
Website:  
<http://www.samsung.com/global/business/networks/>

**KT**  
**KOREA, REPUBLIC OF**

Backhaul Solutions, Consulting, LTE Network Infrastructure, M2M / Telemetry Systems, Network Operator. KT represents the biggest telecom company in Korea which leads world ICT industry. Through 2016 MWC, KT is willing to show the capacity of a Global 5G Leader. You can meet a various range of services including smart cars, fintechs, drones, O2O’s and etc. These are services which will later lead the world into a fourth industrial revolution. Also, KT is becoming a global company by helping countries which are in need of cooperation in the development of ICT. KT will continue developing all abilities as a Global No.1 ICT company.

Email: [jjeun.kim@kt.com](mailto:jjeun.kim@kt.com)  
Website: <http://www.kt.com/eng/main.jsp>

**K Telecom**  
**KOREA, REPUBLIC OF**

Application Development “ General, Cloud Services, LTE Network Infrastructure, Network Management, Network Operator. Established in 1984, SK Telecom is Korea’s largest mobile operator with nearly 50% of market share. As the

world's first company to commercialize CDMA, WCDMA, HSDPA and LTE-Advanced service, SK Telecom has been leading the global mobile industry through cutting-edge network technologies. Now, based on its strength in telecommunications, SK Telecom is now transforming itself into a platform company, pushing for innovations in areas of customer lifestyle, media, and IoT. At MWC 2016, SK Telecom will share its vision of 5G and its enabling technologies, and showcase platforms and services that deliver new value to users.

Email: [hyunsub.woo@sk.com](mailto:hyunsub.woo@sk.com)

Website: <http://www.sktelecom.com/en>

**National IT Industry Promotion Agency (NIPA)  
KOREA, REPUBLIC OF**

Content Management, Government and Regulatory. NIPA devotes itself to reinforcing the competitiveness of the IT industry and contributes to the economic growth through the efficient support and laying the groundwork for the industrial technology promotion. Major Business: Policy research and development support for the IT industry Help establish the foundation of the IT industry and cultivate its human resources Vitalize the distribution market for the development of the IT industry and support marketing Promote businesses related to the convergence and utilization of IT technology Support international exchange, cooperation, and overseas expansion related to the IT industry.

Email: [hsim@nipa.kr](mailto:hsim@nipa.kr)

Website: <http://www.nipa.kr/>

**RF Window Co., Ltd.  
KOREA, REPUBLIC OF**

Antennas, Aerials, Masts and Towers, Batteries, Device Accessories, In-Building Systems, Network Planning and Design. Since our establishment in 2004, RF Window had developed and commercialized ICS Digital Repeater solution for the first in the World. We have been providing many global wireless operators with dramatic CAPEX & OPEX reduction as well as cost effective wireless solution for coverage expansion and enhancement. Besides, we have also extended our business sector to supply total wireless solution such as Antenna; Outdoor sector & Indoor Omni, Passive solution; Hybrid Combiner & POI(Point of Interface) etc. and Optical products; Optical MUX. RF Window will make seamless effort to become global leading wireless equipments solution vendor in 2016 continuously.

Email: [parker@rfwindow.com](mailto:parker@rfwindow.com)

Website: <http://www.rfwindow.com/>

**YAP Company  
KOREA, REPUBLIC OF**

Content Management, CRM Systems, Location Technologies and Services, Mobile Advertising and Marketing, Mobile Payments and Remittances. YAP is a leading Integrated O2O Commerce platform covering

all services related to mobile commerce, including searching, mobile stamp saving, coupons, membership and payment. Powered by its unique Hybrid beacon technology that combines only the benefits of ultrasonic wave and Bluetooth, YAP enables a highly intricate identification of user location and advanced targeting for marketers. The unique technology of YAP beacon also covers virtually all types of smartphone devices through the hybrid system. To learn more about YAP and the wide range of services offered by us, visit [www.yap.net](http://www.yap.net).

Email: [fangfang@yap.net](mailto:fangfang@yap.net)

Website: <http://www.yap.net/>

**Contela, Inc.  
KOREA, REPUBLIC OF**

Femtocells, Network Management, Small Cells. Over 15 years, Contela has accumulated commercial experience of telecommunication industry with CDMA/WCDMA/LTE Products in Korea and Japan. With a wide range of Small Cell End-to-End Solution including Small Cell(Home, Public/Enterprise, Outdoor), Gateway, and Management System, Contela has been providing the reliable wireless network service with our advanced LTE Small Cell Solution that enables wireless carriers to enhance the capacity to high traffic areas, offering low CAPEX & OPEX for LTE.

Email: [yoonsy@contela.com](mailto:yoonsy@contela.com)

Website: <http://www.contela.com/>

**Quram  
KOREA, REPUBLIC OF**

Cloud Services, Content Provider, Data Compression, Devices, Utilities (Smart Grid). Quram is a creative and professional company which takes care of data, image, video compression and image processing to produce the best solution of all. Since the start, Quram has been helping the customers. 1. Maximize performance of their imaging solutions in order to serve optimal end-user experience. 2. Build more efficient media delivery systems for mobile devices and servers, which use less bandwidth while keeping visual quality. Quram already licenses its innovative solutions to the world's leading mobile phone manufactures, the most leading E-commerce providers, innovative cloud service providers and global top heavy industry companies.

Email: [yanlee@quramsoft.com](mailto:yanlee@quramsoft.com)

Website: <http://www.quramsoft.com/>

**Dasannetworks  
KOREA, REPUBLIC OF**

Manufacturers of network equipment for fixed and

mobile broadband services. From core-edge to access and terminals, DASAN established end-to-end capabilities across the Carrier and Enterprise markets. The main solutions include FTTx, Mobile backhaul/fronthaul, G.fast, Ethernet Switch and Wi-Fi solutions.

Email: [leehk@dasannetworks.com](mailto:leehk@dasannetworks.com)  
Website: <http://www.dasannetworks.com/>

### **Tiberlab**

Via del Politecnico,1 00133 Roma  
**T (+39) 06 72597781**  
[www.tiberlab.com](http://www.tiberlab.com) [info@tiberlab.com](mailto:info@tiberlab.com)

Tiberlab Srl is a spin-off of University of Rome "Tor Vergata". Our mission is to develop innovative software solutions aimed to the design and simulation of electronic and optoelectronic devices, focusing in particular on nanostructured devices.

Modern nanostructure devices pose new challenges due to the wide range of length and time scale involved. We provide tools for multiscale simulation able to perform analysis and optimization at all the relevant length scales, through state of the art physical models ranging from continuous to atomistic level.

Tiberlab offers consulting services and end-user software. Our core product is TiberCAD, a software for modeling and design of innovative nanostructured devices. tiberCAD software has been and is presently used as a main simulation tool in several FP7 EU projects, for the design and the study of optoelectronic properties of quantum well and nanowire based LEDs and of advanced solar cells.

### **TELEFIELD Inc. KOREA, REPUBLIC OF**

M2M / Telemetry Systems, Mobile Health Services and Solutions. Telefield is a unique telecommunication solution company in that we provide optical transmission systems as well as IoT solutions based on our own development capability since our establishment in 2000. Hyper-connected internet environment of IoT era that everything such as things, space and data have been connected through internet. Also, creating, gathering, sharing and using information in there. Telefield provides the relative solutions and systems necessary for U-Care and U-Health in order for caregivers or related government body to look after the elderly and disabled more easily. It also allows for shorter response times to those in need.

Email: [andrew@telefield.com](mailto:andrew@telefield.com)  
Website: <http://www.telefield.com/>

### **Kisan Telecom Co., Ltd. KOREA, REPUBLIC OF**

Backhaul Solutions, In-Building Systems, LTE Network Infrastructure, Small Cells. Kisan Telecom is an innovative solution provider in the field of DAS, RF

Repeater, and Wi-Fi over 20+ years. We deliver compact RF repeaters with no delay for the best 3G/LTE performance and multiband DAS with flexible connectivity (UTP, Coaxial, Optic) for easy and cost effective installation as well as neutral DAS. Kisan also delivers the premium Wi-Fi AP with large coverage and capacity, high throughput for wireless backhaul, public-zone and enterprise, and has first commercialized 4x4 Wi-Fi AP with 802.11ac MU-MIMO for public zone in the the world.

Email: [dhkim@kisantel.co.kr](mailto:dhkim@kisantel.co.kr)  
Website: <http://www.kisantel.co.kr/>

### **SINGAPORE TELECOMMUNICATIONS LIMITED**

**Contact:** Tan Tian Seng  
**Job Title:** Director, Capacity Management and Business Development, Satellite  
**Address:** 31 Exeter Road #26-00, Singapore 239732.  
**Tel:** +65 6838 3732  
**Fax:** +65 6334 6110  
**Email:** [smlead@singtel.com](mailto:smlead@singtel.com)  
**Internet:** [www.singtel.com/satellite](http://www.singtel.com/satellite)

Singtel Satellite is a global provider of one stop satellite communications and ICT solutions. Leveraging on our telecommunications infrastructure, we are particularly strong in harnessing infocomm technology for innovative solutions for enterprises in industries such as broadcasting, banking, energy, maritime, government agencies and more. With more than 35 years of experience in fixed satellite services, we have established a satellite footprint that covers Asia, Middle East and Africa. We own three teleports that point to more than 30 satellites and are supported by an extensive terrestrial network of more than 200 Point of Presence (PoPs) in over 160 global cities.

### **Electronics and Telecommunications Research Institute(ETRI) KOREA, REPUBLIC OF**

Antennas, Aerials, Masts and Towers, NFC Services and Solutions, Small Cells. Since its establishment in 1976, ETRI, a global ICT research institute, has been putting forth immense efforts to provide Korea with remarkable growth in the field of ICT. In the 1980s, a one-phone-per-house era, which brought significant changes to the everyday lives of Koreans, was realized through the development of TDx, Korea soon started to dominate the world's semiconductor industry through the successful development of 4M DRAM. During the 1990s, ETRI once again astonished the world by commercializing CDMA for the first time. In the 2000s, ETRI developed DMB, WiBro, and 4G LTE-A, which became the foundation of mobile communications.



Email: [jdjang@etri.re.kr](mailto:jdjang@etri.re.kr)  
Website: <http://www.etri.re.kr/>

**NexStreaming**  
**KOREA, REPUBLIC OF**

Mobile Entertainment, Mobile TV, Systems Integration. NexStreaming is a global mobile software company with Headquarters in Seoul (Korea) and branches in Spain, US, Taiwan, Japan and China. NexStreaming is known for its excellent customer support and highly competitive time to market.

Email: [carlos.lucas@nexstreaming.com](mailto:carlos.lucas@nexstreaming.com)  
Website: <http://www.nexstreaming.com/>

**IPT PowerTech Group**  
**LEBANON**

Batteries, Managed Network Services, Power Systems, Systems Integration. IPT PowerTech Group delivers specialized solutions to the power, industrial and telecom sectors in Africa, Middle East and Asia. Combining power expertise with telecom infrastructure specialization, we are market leaders in providing power products and solutions, telecom services, and managed maintenance services. Our self-manufactured enclosures allow us to successfully implement new concepts in space and energy efficiency and site renovation, and to create customized energy efficient/hybrid and renewable energy solutions.

Email: [info@iptpowertech.com](mailto:info@iptpowertech.com)  
Website: <http://www.iptpowertech.com/>

**Spectronite**  
**LEBANON**

Antennas, Aerials, Masts and Towers, Backhaul Solutions  
Spectronite is shaking the microwave radio landscape bringing unreached uptime & resilience to your wireless backhaul.

Email: [mwc@spectronite.com](mailto:mwc@spectronite.com)  
Website: <http://www.spectronite.com/>

**LigoWave**  
**LITHUANIA**

Backhaul Solutions, Femtocells, IP Networking Equipment, Small Cells, Wi-Fi Services & Management. LigoWave develops high performance wireless products with emphasis on innovation, versatility, and affordability. The LigoWave team strives to revolutionize the way people see wireless, with the ultimate goal to better connect the world; we have succeeded in doing so by putting our products into the hands of customers in over 150 countries. Our

products have connected people who live in areas with no access to data, enhanced security of industrial applications, and empowered many others in ways previously thought impossible.

Email: [jonas.jr@ligowave.com](mailto:jonas.jr@ligowave.com)  
Website: <http://www.ligowave.com/>

**Western Union Digital**  
**LITHUANIA**

Clearing House Services, Financial Clearing and Settlement, Mobile Financial Services, Mobile Payments and Remittances. The Western Union Company (NYSE: WU), is a Fortune 500-ranked, global leader in cross-border money-movement services. Western Union has a rich history encompassing more than 165 years of innovation and has successfully diversified and transformed its business model to a global FinTech company. Today, the company is rapidly growing its online presence with transactional website and mobile apps in more than 35 countries, as well as B2B and retail money-transfer capabilities across more than 500,000 worldwide agent locations, over 100,000 ATMs and kiosks and via connections to hundreds of millions of bank accounts and mobile wallets. For more, visit [wu.com](http://www.wu.com).

Email: [algirdas.bogdevicius@westernunion.com](mailto:algirdas.bogdevicius@westernunion.com)  
Website: <http://www.westernunion.com/>

**Multimedia Development Corporation Sdn Bhd**  
**MALAYSIA**

Application Development “General, Cloud Services, Content Management, Government and Regulatory, Mobile Enterprise Solutions and Services. The Multimedia Development Corporation (MDeC) was incorporated in 1996 to strategically advise the Malaysian Government on legislation, policies and standards for ICT and multimedia operations to spearhead the Malaysian Multimedia Super Corridor (now MSC Malaysia).

Email: [azura@mdec.com.my](mailto:azura@mdec.com.my)  
Website:

**MEASAT Global Berhad**

Jalan Teknokrat 1/2, Cyberjaya 63000, Selangor, Malaysia.  
Malaysia  
Email: [info@measat.com](mailto:info@measat.com)  
website: <http://measat.com>

**Infinet Malta Ltd**  
**MALTA**

Backhaul Solutions, LTE Network Infrastructure, Mobile Enterprise Solutions and Services, Mobile

Health Services and Solutions  
Established in 1993, InfiNet Wireless is one of the largest privately owned Fixed Broadband Wireless Access (FBWA) development and manufacturing companies in the world. With more than 20 years of intense customer based research and product development, InfiNet's range of wireless solutions is the preferred choice of service providers of all types who require uncompromising connectivity.

Email: [salesglobal@infinetwireless.com](mailto:salesglobal@infinetwireless.com)  
Website: <http://www.infinetwireless.com/>

### **Digitata MAURITIUS**

Managed Network Services, Mobile Advertising and Marketing, Mobile Gaming, Network Management, Tariff Modelling and Revenue Analysis. Digitata's trusted flagship product Dynamic Tariffing™, used by over 80M subscribers, lets mobile operators intelligently change Call, SMS and Data pricing according to operator strategy and network and subscriber elasticity, offering subscribers better value while protecting the network and maintaining or improving revenue. Accompanying app, SnapTariff allows tighter control of data spend.

Email: [contact@digitata.com](mailto:contact@digitata.com)  
Website: <http://www.digitata.com/>

### **Inteqsoft/ Queretaro Mexico Information Technology Cluster MEXICO**

Application Development “ Shopping, Augmented Reality, Cloud Services, CRM Systems, Government and Regulatory. Our organization is composed of private companies, academic institutions and Secretariats of the Federal and State Government, to promote and link the products and services our associates offer in Information Technology matters aimed at improving their capacities through certifications that enable offering world class services in the benefit of society.

Email: [cluster@inteqsoft.com.mx](mailto:cluster@inteqsoft.com.mx)  
Website: <http://www.inteqsoft.com.mx/>

### **Dial Technologies MOROCCO**

Application Development “ General, Content Provider, Messaging, Mobile Enterprise Solutions and Services, Outsourcing. Dial Technologies is the leader in mobile solutions and services for Enterprises and Telecom operators In north and West Africa. We provide a wide portfolio of services covering: Mobile applications Development, SMS Routing, micro-payment and voice solutions. We have deployed powerful solutions for more than 8 telecom carriers, 600 companies and 30 millions mobile customers in 6

countries. We received several innovation awards at national and international levels (World Summit Award 2015, African Content Award 2014, Mobile Peers Award Africa 2009, Moroccan innovation award 2013). Dial Technologies is part of Medtech Group a national and regional leader in IT services.

Email: [zlakhdissi@dialy.net](mailto:zlakhdissi@dialy.net)  
Website: <http://www.dialy.net/>

### **INGECYS TELECOM MOROCCO**

Consulting and Engineering Services, Education and Training, Managed Network Services, Network Planning and Design, Test and Measurement Equipment. INGENCYS TELECOM is a Moroccan RF Engineering & Consulting company that offers services and products to telecom operators, vendors, regulators and ministries. Our services consist in particular of 2G/3G/4G engineering and consultancy, Networks auditing, performance measurements, project management, Telecom Application development and technical training. Our product family covers QoE Measurements and Analysis, OSS Performance Monitoring, Project Management and Tracking Time and Spectrum Management. Our business is principally based in Morocco, but also in North, West and Central Africa and Europe and it's delivered locally or remotely depending on customer needs.

Email: [contact@ingecys.com](mailto:contact@ingecys.com)  
Website: <http://www.ingecys.com/>

### **Digital Virgo MOROCCO**

Content Provider, Mobile Advertising and Marketing, Mobile Entertainment, Mobile Payments and Remittances, Voice Products and Services. Publisher and monetizer of digital content and Audience, Digital Virgo directly provides a wide range of digital entertainment offers to the users. Digital Virgo also offers a wide scope of tools and solutions to the media, publishers and wireless carriers in order to monetize their audience.

Email: [rganascia@digitalvirgo.com](mailto:rganascia@digitalvirgo.com)  
Website: <http://www.digitalvirgo.com/>

### **HERE Europe BV NETHERLANDS**

Cloud Services, Content Provider, Data Products and Services, Location Technologies and Services, Mobile Enterprise Solutions and Services. HERE is a leader in mapping and location technology. We enable rich, real-time

location applications and experiences for consumers, vehicles, enterprises and cities. HERE is backed by a consortium of leading automotive companies. To learn more about us, including our work in the areas of connected and automated driving, visit <http://360.here.com>.

Email: [info@here.com](mailto:info@here.com)  
Website: <http://360.here.com/>

### **KPMG International NETHERLANDS**

Business Support Systems (BSS), Consulting, Data Analysis, Mobile Enterprise Solutions and Services. KPMG is a global network of professional services firms providing Audit, Tax and Advisory services. We operate in 155 countries and have 174,000 people working in member firms around the world.

Email: [go-fmglobalmarketsic@kpmg.com](mailto:go-fmglobalmarketsic@kpmg.com)  
Website: <http://www.kpmg.com/telecommunications>

### **Timeline Global Telecom Solutions NETHERLANDS**

Environment / Recycling Services, Managed Network Services, Network Management. TIMELINE GLOBAL TELECOM SOLUTIONS provides complete Asset Lifecycle Management and Recovery Services which enables to Telecom Operators, Service Providers and OEMs to maximise the financial return, while reducing the Environmental impact and electronic waste. TIMELINE is specialised in delivering telecom solutions including Asset Recovery, Environmental Recycling, Multi-Vendor Hardware Support, Spare Parts Management, Test and Refurbishment, Warehousing and Logistics. TIMELINE understands the necessity for maximising existing assets value, use of alternative sources for telecommunication equipment and providing professional services which are required to reduce capital and operating budgets. TIMELINE is Your Partner for surplus, de-installed and multi-vendor telecom network equipment.

Email: [admin.emea@timelinegm.com](mailto:admin.emea@timelinegm.com)  
Website: <http://www.timelinegts.com/>

### **Highside NETHERLANDS**

M2M / Telemetry Systems, Messaging, Systems Integration, Voice Products and Services, VoIP Systems. Our Voice API platform makes it easy to setup voice triggers for your applications and programs within a glimpse of time.

Email: [info@highside-telecom.net](mailto:info@highside-telecom.net)  
Website: <http://highside-telecom.net/>

### **CM Telecom**

### **NETHERLANDS**

Messaging, Mobile Enterprise Solutions and Services, Mobile Financial Services, Mobile Payments and Remittances, Voice Products and Services. CM Telecom specializes in SMS, Push, Security, Payments and Voice offering one platform. We power your mobile interaction needs and put you in the heart of the mobile ecosystem.

Email: [info@cmtelcom.com](mailto:info@cmtelcom.com)  
Website: <http://www.cmtelcom.com/>

### **VimpelCom Ltd NETHERLANDS**

Government and Regulatory, Mobile Financial Services, Network Operator, Telecoms Authorities / Associations, Voice Products and Services. VimpelCom, an international telecoms company operating in 14 countries and headquartered in Amsterdam, is one of the world's largest integrated telecommunications services operators providing voice and data services through a range of traditional and broadband mobile and fixed technologies in Russia, Italy, Ukraine, Kazakhstan, Uzbekistan, Tajikistan, Armenia, Georgia, Kyrgyzstan, Laos, Algeria, Bangladesh, Pakistan and Zimbabwe. VimpelCom's operations around the globe cover territory with a total population of approximately 740 million people. VimpelCom provides services under the "Beeline", "Kyivstar", "WIND", "Mobilink", "banglalink", "Telecel", and "Djezzy" brands. As of September 30, 2015 VimpelCom had 217 million mobile customers on a combined basis.

Email: [mwcenquiries@vimpelcom.com](mailto:mwcenquiries@vimpelcom.com)  
Website: <http://vimpelcom.com/>

### **Telenor Group NORWAY**

Network Operator. Telenor Group is one of the world's major mobile operators with more than 200 million mobile subscriptions. The company has mobile operations in 13 markets in the Nordic region, Central and Eastern Europe and in Asia, as well as an economic stake of 33 per cent in VimpelCom Ltd., operating in 14 markets. Headquartered in Norway, Telenor Group reported revenues of NOK 107 billion in 2014, and has a global workforce of about 33,000. For more information about Telenor Group, please visit [www.telenor.com](http://www.telenor.com)



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