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WELCOME



literally. It explains why satellite launches and space activities have multiplied in recent times and while the first half of 2020 may have been sluggish for the commercial launch industry, things are expected to accelerate again.

Connectivity and communications have become critical in today's world not just for businesses and individuals but also for the aid industry, telemedicine and other such sectors. In all these scenarios, satellite has emerged the biggest hero, offering greater and more efficient connectivity than any other technology in the world.

In the Middle East, several new deals to the tune of millions of dollars have been inked for new birds. Arabsat has investments of US \$300m in Badr-8 while Yahsat has signed up Airbus to build Thuraya 4-NGS, its new mobile telecommunications system. Inmarsat has two I-6 launches in the pipeline.

On the space side, the UAE has entered the elite league by sending

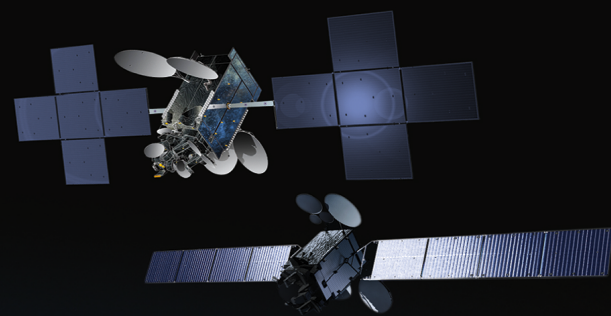
the Hope Probe on its way to Mars. And news has just come in that the UAE intends to send its first Arab mission to the moon by 2024.

We have literally touched the skies with our ambitions and I am so delighted that we have several women also making history in this industry. In fact, *SatellitePro ME* has had the opportunity to feature three high-profile women in this edition.

From Michaelyn Thomas, the Head of Affordability at Virgin Orbit, which is looking to democratise space with affordable launch services for smaller satellite players to Dr. Adimbola Alale, CEO of Nigcomsat, who is a key influencer in Africa's space world, and Fatema Ali Al Hajri, who manages the development of new technologies at Yahsat, we have an amazing mix of female leaders in the space and satellite segment featured in this issue. Happy reading!

VIJAYA CHERIAN
Editor
SatellitePro ME

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2nd February 2021



About the Annual Event

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ASECNA, Nigcomsat and Thales Alenia Space offer SBAS services in Africa

The Agency for Air Navigation Safety in Africa and Madagascar, ASECNA, has started to broadcast an SBAS (Satellite-Based Augmentation System) signal over Africa & Indian Ocean (AFI) region, providing the first SBAS open service in this part of the world. The service is provided via the Nigcomsat-IR satellite, which is managed and operated by Nigerian Communications Satellite Ltd (Nigcomsat) under the 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 metre, and boosted integrity, availability and continuity of safety-related applications, these SBAS services will improve flight safety and efficiency in Africa. It will also benefit the economy in areas such 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 showcase 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, whose 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 & 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 & Indian Ocean” is based on the European EGNOS [1] 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 the SAGAIE network deployed by CNES and ASECNA with the support of Thales Alenia Space.

The signal is broadcast via the SBAS payload on the Nigcomsat-IR GEO satellite 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.

"We are proud to be part of this ambitious programme to provide satellite navigation services in the Africa and Indian Ocean region. The

use of our geostationary communication satellite Nigcomsat-1R navigation payload to broadcast the first signal will be Africa's premier contribution to SBAS as a regional satellite-based augmentation system for the continent," commented Dr. Abimbola Alale, MD and CEO of Nigcomsat Ltd.

“The provision of the first African SBAS early service is a crucial step forward in the development of satellite navigation in the AFI region, and in the deployment of the ‘SBAS for Africa & Indian Ocean’ system, the navigation solution for Africa by Africa. It demonstrates the ambition and commitment of ASECNA to enhance air navigation safety for the benefit of the whole continent, in line with my vision for the unification of the African Sky,” added Mohamed Moussa, Director General of ASECNA.

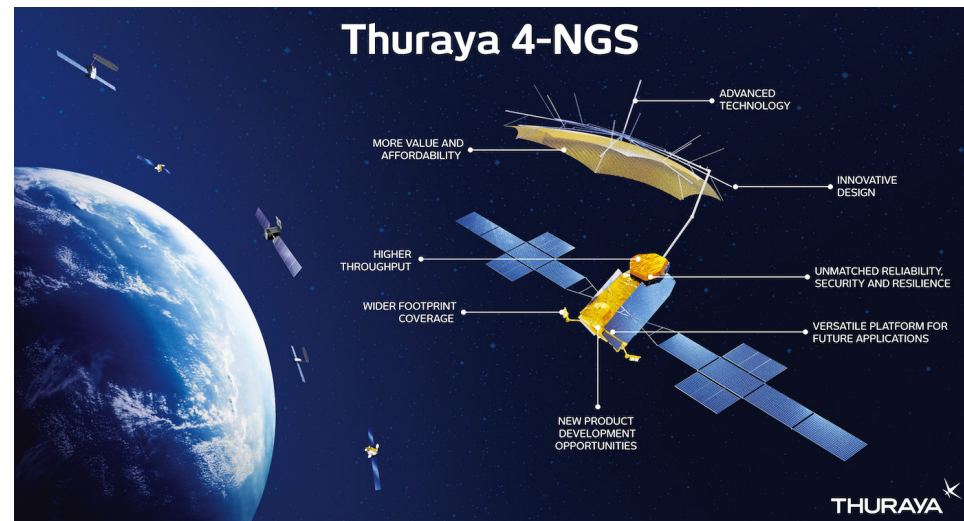


Yahsat signs contract with Airbus to build Thuraya's next generation system

NEW SATELLITE

Yahsat has selected Airbus to build Thuraya 4-NGS, its new 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 new 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.

With this deal, Yahsat takes its total investment to date to over \$500m, 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.

Ali Al Hashemi, CEO of Thuraya and GM of Yahsat Government Solutions (YGS) said: "Thuraya 4-NGS represents a significant evolution of our L-band capabilities, enabling a wider range of interoperable FSS/

MSS solutions for Thuraya and YGS customers. This will be critical in delivering superior defense solutions, such as battlefield communications, to our government users, while offering a complete MSS portfolio to all of our current and future customers and partners to drive the next phase of innovation and growth."

Azercosmos and Globecast extend partnership to deliver satellite services in Africa

PARTNERSHIP

Satellite operator Azercosmos has signed an extended partnership agreement with Globecast to increase capacity and coverage across Africa. With this, Globecast can supply its customers across the

continent with increased C-band capacity on the Azerspace-1 satellite.

Globecast's platforms 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.

For instance, the *Big Brother Naija* reality shows will be aired exclusively on the Multichoice DSTV platforms across Africa utilising 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.

Arabsat contracts Airbus to manufacture Badr-8

NEW SATELLITE

The Arab Satellite Communications Organisation (Arabsat) has inked a deal with Airbus Defense and Space to manufacture Badr-8, the first of its 7th generation satellites, expected to be launched at the beginning of 2023. Badr-8 will replace and increase Arabsat's capacity and augment its core business at the Badr hotspot 26°E.

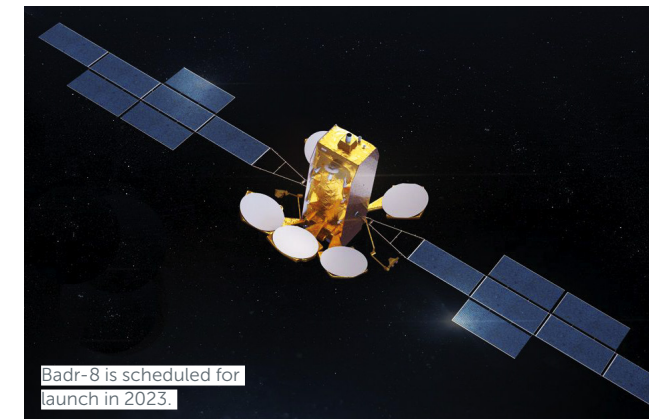
Badr-8 will be based on the Airbus Eurostar Neo electric orbit raising platform giving access to a wide range of launchers, covering Europe, the Middle East, Africa and central Asia. It will also include the Airbus-developed TELEO optical communications payload demonstrator. This payload will enable 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.

Khalid Balkheyour, President & CEO of Arabsat said: "Badr-8 will carry massive satellite transponders for satellite TV broadcasting, satcoms and information exchange services in Ku-band and C-band. Arabsat investments in Badr-8 will reach approximately \$300m

including launch, insurance and ground infrastructures."

The satellite is scheduled for launch in 2023 and its electric propulsion system will enable it to reach geostationary orbit in four to five months, depending on the type of launcher used. It has been designed to remain in service in orbit for more than 15 years. The satellite will have a launch mass of around 4.5 tonnes and power of 17kW.



Oman's Public Authority for Water to use satellite tech to detect leaks

SATELLITE IMAGERY

The Public Authority for Water (Diam) in Oman has deployed satellite technology among an array of tools to combat leaks in the country's ever-expanding water transmission, distribution and supply networks.

According to the authority, leak detection

using imagery from satellites helped save an estimated 4.2m cubic metres of potable water across the network in 2019.

The technology, coupled with a plethora of other innovations adopted by Diam, helped cut "commercial losses" down to 28m m³ last year,

from 40m m³ in 2018, the authority noted in its 2019 annual report.

Diam estimates the natural rate of rising of leakage at approximately four million m³/year, stemming from several factors including pressure in the network, age of pipes, and pipe material and quality.

MBRSC and NASA tie to train four Emirati astronauts

UAE SPACE INITIATIVE

The Mohammed Bin Rashid Space Centre (MBRSC) and NASA have signed a strategic agreement to train Emirati astronauts at the US space agency. Under the agreement, four Emirati astronauts will be provided advanced training. Two astronauts will be selected from the second batch of the UAE Astronaut Programme to join the 2021 NASA astronaut candidate class. The training programme will be conducted at NASA's Johnson Space Center.

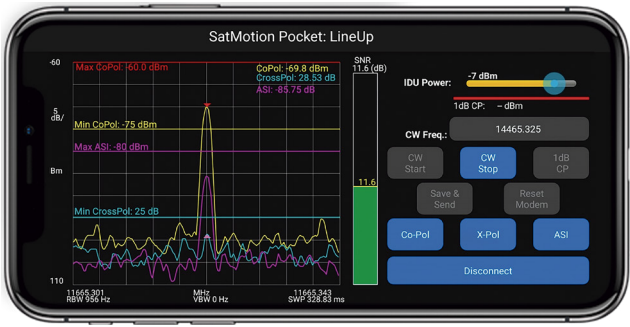
The programme includes the same modules and components featured in the training of NASA astronauts. The astronauts will be trained to manage various missions on the International Space Station, including simulated spacewalks and long-duration stay, along with training in major systems, robotics, extravehicular activity, T-38 jet courses, water and land survival, Russian language skills and theoretical training.

SpaceBridge rolls out Integrasys solution in Greece

PARTNERSHIP
SpaceBridge has successfully rolled out an ASAT-II Redundant Hub and over 100 sites across Hellas SAT. To facilitate the deployment of the network and minimise staff time and efforts on-site, SpaceBridge selected Satmotion Pocket, Integrasys' Auto Commissioning tool. Satmotion Pocket is a VSAT auto-commissioning system that minimises deployment time and effort while ensuring the highest quality and interference-free installation for optimal performance. It is a software-based solution that simplifies and guides installers by providing feedback on important key performance indicators (KPI) such as Copol, Xpol and Adjacent Satellite Interference,

verifying that the antenna and receive/transmit chain of the solutions are optimally installed and allowing sites to generate revenue earlier. David Gelerman, President and CEO of Spacebridge commented: "Our goal at SpaceBridge is to ensure our customers can rapidly monetise upon the offering of their value-added services. The Satmotion Pocket allowed our partners to provide high-quality

installations efficiently resulting in much faster deployment, saving time and resources, and delivering revenue sooner." Alvaro Sanchez, CEO of Integrasys added: "This partnership opens the door to new customers, who can tangibly benefit from our technology for simplifying the access while generating additional revenue and faster time to market, and commissioning."



Russia plans 2022 launch for Angosat-2

NEW SATELLITE
Russia is developing a telecoms satellite called Angosat-2 for Angola and plans to launch it in March 2022. The development and launch of the Angosat-2 telecoms satellite has been assigned to the Reshetnev Information Satellite Systems Company, General Director Nikolai Testoyedov confirmed. Reshetnev Company will also assume all the rights and obligations for stating, maintaining and formalising the rights to orbital frequency assignments. The communications payload for Angosat-2 has already been sub-contracted to the Airbus Defense and Space.

Intelsat signs deal to acquire Gogo's commercial aviation business for \$400m

ACQUISITION
Intelsat has entered into an agreement to acquire the commercial aviation business of Gogo, a global provider of in-flight broadband connectivity. The deal has been pegged at \$400m in cash, subject to customary adjustments. The transaction is expected to close before the end of Q1 of 2021, subject

to regulatory approvals and other customary closing conditions. 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 commercial aviation business provides Intelsat with key airline relationships and customer-facing capabilities, including a software platform, ISP and network management infrastructure. It currently serves 21 commercial airlines, including nine of the top 20 global carriers. "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 CEO Stephen Spengler.

Dubai ruler Sheikh Mohammed announces Emirates Lunar Mission

UAE SPACE INITIATIVE
His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President, Prime Minister and Ruler of Dubai, has announced the launch of the Emirates Lunar Mission, the first Emirati and Arab mission to explore the moon. The Emirates Lunar Mission is part of the new 2021-2031 strategy launched by the Mohammed bin Rashid Space Centre (MBRSC), which includes the development and launch of the first Emirati lunar rover named "Rashid", after the late Sheikh Rashid

bin Saeed Al Maktoum. The explorer will be designed and built entirely in the UAE by a team of Emirati engineers, experts, and researchers. If successful, the UAE will become the first Arab country and the fourth country in the world to land on the lunar surface after the United States, Soviet Union, and China. MBRSC will partner with an international entity to assist in landing the Rashid lunar rover on the moon. Sheikh Mohammed bin Rashid said: "By exploring the moon, we are drafting a new inspiring chapter in

the UAE's growing list of achievements in space and beyond. We chose to name the lunar rover 'Rashid', after the builder of the modern renaissance of Dubai and one of the founders of the UAE. This project is the largest national and humanitarian project in the region." A team of Emirati engineers, researchers and experts at MBRSC is working towards completing the design of the lunar rover by 2021. The rover is set to be manufactured in 2022, while preliminary experiments and tests of the prototype are expected

to start in 2023. The MBRSC aims to launch the lunar rover by 2024, setting another record in its growing list of achievements in the space sector. The mission will conduct tests to study various aspects of the lunar surface, including the lunar soil and its formation and components, thermal properties of the surface including thermal amplitude and conduction characteristics. During its mission period, the lunar rover will capture multiple images and relay it back to the control room in Dubai.

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Kuwait's Orbital Space fast-tracks CubeSat launch

SATELLITE LAUNCH

Orbital Space, a private entity involved in the promotion of space education and technologies in Kuwait, has announced that the launch of its CubeSat project has been fast-tracked to February 2021. QMR-KWT is a 1U CubeSat intended to be Kuwait's first nanosatellite. The name "QMR-KWT" means "Moon of Kuwait", translated from Arabic.

Orbital Space has partnered with Bulgarian satellite manufacturer EnduroSat to develop the bus system for its CubeSat. They, in turn, contracted US company Momentus to deliver the spacecraft to its low earth orbit. Momentus is planning to launch several satellite missions in February 2021 on the second Vigoride demo mission onboard a SpaceX Falcon 9 rocket.

Orbital Space founder and CEO Bassam Alfeeli said: "We have reached a major milestone, which is securing a launch opportunity. We were aiming to develop a CubeSat in time for a 2022 launch, which



Bassam Alfeeli is founder and CEO of Orbital Space.

is the typical timeframe for such a project. For a country that does not have a national satellite registry like Kuwait, we anticipated an even longer time frame to secure approvals and the necessary licenses. But thanks to our partnership with EnduroSat, we have now secured the launch window."

Alfeeli added: "EnduroSat is assisting Orbital Space in building its capabilities and in gaining the knowhow to plan, build, and operate CubeSat missions. Right now, we are gearing up to integrate the different subsystems of the satellite. As a startup, we are excited to

work with other startups to meet our mutual objectives. Once in space, QMR-KWT will be the outcome of efforts from all young companies including Orbital Space, EnduroSat, Momentus, and even SpaceX, which is less than 20 years old."

The CubeSat project was initiated by Alfeeli to create a platform for space enthusiasts in Kuwait. QMR-KWT will allow students to learn more about satcoms, and also test and develop new software solutions by writing software code to be uploaded and executed on one of the satellite's onboard computers.

Egypt to monitor building violations via new satellite centre

MONITORING

Egypt has opened a satellite centre to monitor building violations and encroachments on agricultural land, according to the Planning and Economic Development Ministry.

The centre, which will be a ministry affiliate, will also follow up on government projects and investments by facilitating access to geographical data by government bodies, Planning and Economic Development Minister Hala El-Said said.

There will be four central units, including one for satellite imaging to help reduce government spending and another to monitor new construction sites.

The announcement comes as Egypt continues to crack down on building violators to meet a six-month deadline set by President Abdel-Fattah El-Sisi to end violations in the country.

The centre also serves an agricultural use by capturing photos of the numbers of crops planted by villagers nationwide.

Turksat showcases communication satellite scheduled to launch this year

NEW LAUNCH

Turkish satellite operator Turksat showcased its communication satellite Turksat 5A for the first time at the Global Satellite & Space Show

held last month.

Turksat 5A, which is scheduled for launch later this year by SpaceX, is expected to have more than 30 years of life in orbit. Turkey is also

building its own Turksat 6A craft for launch in 2022. Turksat 5B is also under construction and is expected to launch next year. This will also be launched by SpaceX.

Tawazun joins forces with Airbus and NSSTC for new satellite centre in Al Ain

NEW FACILITY

Abu Dhabi's Tawazun Economic Council has collaborated with Airbus and the National Space Science and Technology Centre, (NSSTC) from UAE University to build and develop a Satellite Assembly, Integration and Testing, (AIT), Centre in Al Ain. The aim of the satellite centre will be to manufacture components and assemble, integrate and test small to medium satellites.

The AIT satellite centre will develop and build communication, navigation and hyperspectral satellites ranging in size between 50kg and 250kg, and it is planned to commence operations at the beginning of 2021.

Airbus will support NSSTC during the

design, outfitting and commissioning of the facility. Airbus will also manage the procurement, installation and operational qualification required for the equipment.

The collaboration was facilitated by Tawazun to drive a collaborative defence and security ecosystem, securing and progressing technology

development, and building national competencies and skills within the UAE.

"This is our second project after Yahsat, and there are many more to come, as Tawazun works to further develop the UAE space sector," said Matar Ali Al Romaithi, Chief Economic Development Officer of Tawazun. "The UAE is building and acquiring

the knowledge required to become a regional hub for space activities and advanced research and development. This centre is an integral part of those plans and consequently, Tawazun has worked to make sure that it operates as a sustainable resource for the next five to seven years with a view to becoming permanent."

In parallel, the UAE plans to launch a navigation satellite to demonstrate the country's technological capabilities. The first satellite will be launched in 2021 and the second, in 2022, according to Dr Khaled Al Hashmi, Director of the National Space Science and Technology Centre, NSSTC.

The UAE's navigation satellite will be AIT's first project.



Matar Ali Al Romaithi is Chief Economic Development Officer at Tawazun.

Azercosmos ties with iSAT Africa for satellite services

PARTNERSHIP

Satellite operator Azercosmos has partnered with internet service provider iSAT Africa to provide satellite services in the African continent.

The services offered by iSAT Africa 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.

Also, 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.

UAE entities partner to establish space technology and innovation centre

NEW CENTRE

Khalifa University of Science and Technology, the UAE Space Agency (UAESA), and YahSat, have signed a three-way funding agreement to establish and operate the Khalifa University Space Technology and Innovation Centre (KUSTIC), committing to scientific innovations and laying the foundations for further inspiring the UAE's future space missions.

The main objectives of KUSTIC will be to achieve the UAE's vision in space exploration technologies, and applications. The centre will play a very 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 region. It will also promote and inspire entrepreneurship in the space sector; while supporting space science and technology initiatives of the UAE Space Agency, as well as focus on the design and assembly, integration and testing of small satellites through the Yahsat Space Lab.

The centre will incorporate the existing YahSat Space Lab (YSL), which was established in 2017 as the nationwide focal point in the design and Assembly/Integration/



HE Dr. Ahmed bin Abdullah Hamid Belhouli Al Falasi is Chairman of the UAE Space Agency.

Testing (AIT) of CubeSats, both in terms of facilities and 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.

Commenting on the partnership, HE Dr. Ahmed bin Abdullah Hamid Belhouli Al Falasi, Minister of State for Entrepreneurship and Small and Medium Enterprises and Chairman of the UAE Space Agency said: "We are looking forward to achieving a fruitful collaboration with Khalifa University of Science and Technology, and YahSat. Earlier this year, we launched a national strategy for the space sector that will help our country

gain insights matching the level of advanced countries in this vital sector. Our wise leadership has spared no effort in developing scientific research facilities in the UAE, and providing young nationals with training and professional qualifications, as they are the key drivers to move forward towards achieving the government's vision in this field."

Dr Arif Sultan Al Hammadi, Executive VP at Khalifa University added: "Khalifa University continues to remain the perfect training ground for students in science and technology, providing the right infrastructure for future scientists to seek new worlds and reach beyond today's frontier."

According to the agreement, KUSTIC will

specifically empower the development of various research thrusts covering major aspects of space mission development. KUSTIC will be an important partner in raising awareness about the space sector among Emirati youth, and the importance of their role in the advancement of national research and development. In addition to focussing on the design and Assembly/Integration/Testing (AIT) of small satellites, the centre will also aim to establish component, assemblies, and subsystem manufacturing capabilities.

Dr Mohammed Nasser Al Ahbabi, Director General of the UAE Space Agency, noted: "Our collaboration with Khalifa University and YahSat will help in supporting young Emiratis' ambitions in becoming productive individuals in the space sector, thus enhancing the UAE's leading status in the region and the world."

Two already existing Khalifa University research centres will contribute to KUSTIC's activities. The 'space robotics' research thrust shall be covered under the leadership of the research staff from the KU Centre for Autonomous Robotic Systems (KUCARS) while the 'space power' and 'energy storage' research thrust shall be covered under the leadership of KU Advanced Power and Energy Center (APEC), another existing research centre.

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With the Middle East moving rapidly towards a digital economy across various industries, satellite communications is starting to play an increasingly critical role in connecting people and businesses in the region and globally. *SatellitePro ME* looks at one major operator that has consistently pushed forward with new satellite launches and technologies with the aim of boosting connectivity and value-added services in various industry verticals including oil and gas, maritime and aviation

CONNECTING THE MIDDLE EAST

Inmarsat's GX5 satellite was launched in November 2019.



While Covid-19 continues in full swing, satellite operator Inmarsat is busy making its fifth GX satellite operational while simultaneously prepping for the launch of two of its sixth-generation (I-6) satellites. Inmarsat claims to be the first commercial operator in the world to feature Ka-band payloads hosted on L-band satellites. In parallel, the satellite operator, which has made significant inroads into the Middle East in recent years by delivering additional focussed capacity across Europe and the Middle East through its Global Xpress fleet, is now looking to further strengthen its position in the region with the new launches. The two I-6 satellites are being constructed by Airbus Defence and Space and are scheduled to enter commercial service in 2022, with the first due for a 2021 launch. They will carry payloads for GX6A and B on the ultra-high-speed Ka-band as well as on L-band, providing crucial extra capacity for the kind of safety systems required as growth and digitalisation continue to accelerate across the region. The I-6 fleet will also support a new generation of capabilities for the 5G era as well as global safety services, long into the 2030s and beyond.

GX5 and the two GX payloads on the I-6 satellites are part of what Inmarsat calls its "Technology Roadmap" strategy. This programme will see an additional five GX satellites launched within the next three years. It will deliver further capacity in MENA as well as across the world, including two GX satellites dedicated to the Arctic region.

With these launches, Inmarsat will also help to significantly boost the massive digital disruption that is taking place in the Middle East, as we speak.

"The Middle East is heading rapidly towards a digital economy," says Carl Statham, Vice President of Inmarsat Enterprise. "Of course, every region across the world wants to accelerate digitalisation. But an economy based on smart, efficient use of data can create wealth, improve public health, generate jobs and modernise industries. Today, evidence from several nations in the Middle East – and several sectors of industry – suggests that even with the recent challenges posed by Covid-19, the region really is starting to build momentum as a digital powerhouse for the next decade and beyond."

Statham goes on to add that "strong connectivity – especially in remote or complex industries and communities that require consistent, reliable access to data – will be key to ensuring this potential is realised".

This is where satellite-based connectivity comes in. Sometimes overlooked amid the talk of ultra-fast broadband, fibre optic connections and gigaspeeds, the ability of "satcoms" to provide secure, consistent connections in places that cables just cannot reach is going to prove vital to realising the Middle East's digital ambitions, he points out.

This need for satcoms is why Inmarsat, a major player in this sector, has continued to increase its focus and resources available to companies and governments in the Middle East in recent years.

The company's fifth Global Xpress satellite (GX5) was especially designed to increase the availability of satellite-based mobile broadband over the Middle East. Based on a clear surge in demand for this kind of connectivity in recent years, GX5 will deliver double the capacity of Inmarsat's entire existing GX fleet (GX1-GX4) and will help enable the Middle East's digital transformation.

Longstanding industries are one of the key beneficiaries of satellite-based connectivity.

Oil and gas extraction, for example, has benefitted from satcoms data for several years already.

Statham explains: “When drilling equipment fails on an oil well hundreds of kilometres out in the desert, the cost of repair becomes critical. The combination of raw materials required to fix it, the labour needed and time taken to transport the materials out to the site quickly add up. In addition, every hour the well is out of action is an hour’s worth of oil or gas lost from production targets.

“Because of their remote location, traditional ground-based connectivity may not be an efficient, reliable option for these wells. So instead, many have turned to Inmarsat and



“ Besides the I-6 fleet, additional launches are planned between 2022 and 2024 that will also include new satellites over the Arctic region”

Carl Statham, Vice President, Inmarsat Enterprise



Superyachts

When the pandemic subsides, it appears likely that working remotely will continue to be a feature of business culture. The stigma of not being there in person has been removed during the current outbreak, meaning that the only obstacle now in the

way of meetings being conducted from yachts at sea is a reliable broadband partner. Guaranteed global bandwidth ensures that yacht owners can stay connected in all conditions, enhance operational efficiency and guest welfare, and, in turn, run a yacht

more effectively. Fleet Xpress plans have been designed specifically for superyacht owners and users and provide added flexibility to meet seasonal demand changes – high bandwidth during peak demand and service standby off-season.

its satellite-based data.”

Today, drilling equipment is monitored constantly to identify excess weights, load or torque that could lead to critical failure of the well. That data, transmitted through an Inmarsat broadband global area network (BGAN) terminal, is closely monitored remotely, ensuring a safe, well-operating well that will not shut down from equipment failure.

Another traditional industry that has increasingly been powered by satellite-based connectivity is shipping, which alone contributes to 12% of Dubai’s gross domestic product, according to global law firm, Ince & Co.

Eric Griffin, Vice President of Inmarsat Maritime points out that seafarers have relied on satcoms to provide SOS and distress signal services for over 40 years.

“This was Inmarsat’s founding mission, but new technology is enabling this role to expand to the digitalisation of vessels and the growth of applications. One such example is the increasing trend towards remote survey inspections. These are vital to ensure vessels continue to meet international safety standards, and it is satellite-based connectivity that helps make this possible,” he says.

With supply chains stretched and many seafarers being asked to take on extraordinary duties during the Covid-19 pandemic, crew welfare has become another important consideration in 2020, Griffin points out.

“Weeks or even months at sea without family made satellite phone calls and video links even more important to mental health onboard,” he explains.

Perhaps one growing trend that has been observed in the region is vessel owners using connectivity to not only save money from operating efficiencies, but to open up new revenue opportunities.



Private jets

Inmarsat has offered reliable and secure connectivity to the official aircraft of more than 100 heads of state and governments as well as numerous blue-chip companies. Its Jet ConneX product promises an in-the-air broadband experience comparable to on-the-ground connections, to provide seamless in-flight connectivity for every passenger.

“Satcoms again serves a critical role here to create the infrastructure necessary for the adoption of more effective digital technologies,” Griffin explains.

Another key market that has benefitted significantly from satcoms is the aviation market.

“While flying numbers declined at the height of the pandemic, as passengers return, they will find in-flight Wi-Fi becoming more and more common on the journeys they take,” Statham says.

In the meantime, we see consumers also becoming keen advocates of satellite connectivity just as much as businesses and governments.

Statham cites a recent agreement concluded alongside Globalbeam Telecom and Virgin Megastores in the United Arab Emirates recently.

“This agreement will see Inmarsat’s satellite phones (the IsatPhone 2) and portable Wi-Fi terminals (the Inmarsat BGAN product) become available on sale to the general public,” explains Statham.

“The IsatPhone 2 is now available in Virgin Megastores across the UAE and we are seeing a lot of interest in the product. It is an incredibly robust, reliable

“ Satcoms again serves a critical role to create the infrastructure necessary for the adoption of more effective digital technologies”

Eric Griffin, Vice President, Inmarsat Maritime



phone and perfect for travellers moving through remote places, adventurers driving through desert regions or simply as a backup for peace of mind.”

These same BGAN terminals are becoming an increasingly common sight on big infrastructure projects as well.

“Construction companies can now routinely track and ensure the safety of their crews on the growing number of high-speed road and rail connections being built to connect cities across the Middle East. And once they are built, Inmarsat satellite connectivity is helping trains run at optimal efficiency, arriving safely on time after journeying hundreds of miles across the desert,” explains Statham.

An interesting but not often recognised use of satellite connectivity is also how it helps the traditional pastime of falconry in providing reliable connectivity deep in the wilderness for those venturing out with their birds of prey.

In an historic recent development, Inmarsat, through its partner Sada Alammah and subsidiary Globalbeam Telecom, was also granted market access to

Saudi Arabia to provide satellite services to government, business and consumers. Inmarsat's entry into the Kingdom will help make a significant contribution to the nation's 2030 digital vision by providing highly reliable mobile connectivity to assets on land, at sea and in the air. Already, several Saudi Arabian shipping and offshore companies have started using Inmarsat services, with more set to follow.

This range of use cases – covering traditional industries, new infrastructure projects, consumer demand and traditional pastimes – highlights the speed at which governments and businesses in the Middle East are moving towards a connected, digital way of living.

"Inmarsat continues to build on its space-based infrastructure and even during a period of economic turbulence, we have continued to announce new launches. Besides the I-6 fleet, additional launches are planned between 2022 and 2024 that will also include new satellites over the Arctic region," says Statham.

No doubt, connectivity will become even more critical and power the Middle East's development well into the 2030s. Making sure that every industry and every government can benefit – no matter how remote, complex or challenging its operating conditions – will rely increasingly on the power of satellites to connect people and the data they rely on. **PRO**



Inmarsat launched satellite services in Saudi Arabia recently through its partner Sada Alammah and subsidiary Globalbeam Telecom.



Inmarsat's BGAN service provides voice and broadband data communications globally from lightweight satellite terminals.



Remote workers and travellers

With many of the region's industries situated in remote and rugged areas, the safety of people is paramount. Oil and gas, mining, agriculture and rail infrastructure organisations need to know where their crew are at all times and know that they can communicate with their teams and manage resources wherever they are. Equally, adventurers travelling in remote areas need the assurance they can call for help in the event of an accident. However, reliable mobile connectivity can be difficult

to come by in these areas.

Inmarsat's BGAN push-to-talk (PTT) offering has been designed to offer voice and data for fleets of maintenance workers so control centres can always monitor their teams. The BGAN unit provides a Wi-Fi bubble so workers and adventurers can send and receive critical data wherever they are, or just browse the internet as needed. Workers and adventurers can also use its Isatphone 2 satellite phone, which promises reliable call quality in the Middle East and worldwide.

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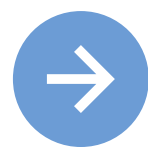


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GAINING GROUND

Long relegated to second place behind its more glamorous space counterpart, the ground segment is finally coming into its own with new form factors, greater use-case flexibility, and a range of new technologies. **Keith J. Fernandez** explores three ways in which the sector is changing



When Michael Hollenbeck, CTO of Optisys, demonstrated the world's largest 3D-printed antenna, he also unwittingly offered an insight into just how the satellite ground segment infrastructure is changing.

The 75cm-long, flat-panel slotted antenna was printed in

metal as one continuous piece, and the ultra-large tile serves as the basis for a larger array in ground applications, although it can also be used in aerospace, sea and satellite applications. Made in just one print, the new product is both scalable to a considerable size and cheaper to produce than more traditional antennae requiring tens of parts from multiple vendors.

"This new capability is especially applicable for marine, ground and satellite antennas, which are all normally very big due to the distance their signal has to travel. Now these systems can enjoy better performance and have lighter weight options, at a much lower cost than traditional antenna technologies," Optisys CEO Janos Opra stated a while ago, while emphasising the

reduction in costs for customers.

Additive manufacturing is just one of several new technologies being pressed into use as satellite ground infrastructure finally begins to catch up to space segment developments. Long relegated to second place, ground segment technologies are now often developed alongside space solutions. Indeed, the sector may well be at a tipping point, thanks to the confluence of several different factors: a reinvigorated space race, a greater demand for connectivity across the maritime, in-flight, and consumer sectors, and a wave of cutting-edge technologies that can be leveraged to address these demands – if not quite yet at the scale or cost required.

Market research and consulting firm NSR estimates that cumulative revenues for the entire ground segment through to 2028 will total \$145bn. The market will generate \$14.4bn annually by 2028, the firm states in its recent report, *Commercial Satellite Ground Segment*, 4th Edition (CSGS4).

Pulling back for a big picture view, the overall global space economy was worth \$366bn in 2019, a 1.7% increase over the previous year, the Satellite Industry Association (SIA) said in its 2020 state-of-the-industry report. The commercial satellite industry accounted for \$271bn, or close to 75% of the world's space business. Ground equipment accounts for 48% of this total, the SIA says.

Changing business models

The ground segment has therefore become a strategic network element for both operators and service providers, NSR says. The segment now offers a crucial competitive advantage thanks to developments such as changing form factors in the shape of cutting-edge flat panel and phased array antennas, sophisticated



"The combination of more, higher powered, and closer to earth satellites will drive innovation much more exponentially"

David Harrower, Senior Vice President of Global Sales, Kymeta

network management to cater to increased bandwidth demands, efficient MHz utilisation, complex traffic manipulation and open bottom-of-the-pyramid markets.

Perhaps the biggest general trend putting the ground segment at the forefront of innovation is the way the business model is changing, moving from the wholesale business model to providing end-to-end solutions, says Lluç Palerm-Serra, Senior Analyst at NSR.

"Satellite operators have realised the need to incorporate the ground

segment into their data strategy, so you see them investing heavily on the ground. Earlier, they just thought about the satellite. Now, they think about the satellite together with the ground segment – and they're designing both elements in parallel for an end-to-end solution."

He offers the example of Viasat here. It's Real-Time Earth satellite ground network is already becoming a reality; the launch of the Viasat-3 constellation (now delayed because of the coronavirus pandemic) is expected to connect groups that currently have limited or no internet access, among them billions of people on land, at sea and in the air with uniform coverage, and vastly improved speeds and data capacity.

The great rush to LEO

Simultaneously, the rush to develop low-Earth-orbit (LEO) and medium-Earth-orbit (MEO) satellites could see around 50,000 active satellites orbit overhead within ten years, up from about 2,500 presently, according to McKinsey estimates.

Against the development of LEO constellations, flat-panel antennas (FPAs), in particular, electronically steerable antennas (ESAs), are expected to soon be a necessity for satcom, according to NSR. FPAs' higher price points have seen them restricted to the premium end of a market largely serviced by traditionally parabolic antennas. However, the parabolic dish is poorly suited to LEO constellations, which will have numerous satellites all rapidly crossing a ground receiver's field of view at the same time.

ESAs can track and scan large numbers of satellites quickly and deliver multiple capacity types from multiple orbits – without physical movement of their own. This flexibility will see FPAs assume greater market importance as the trade and end consumer look for next-generation solutions.



The Kymeta u8 terminal offers a low-profile form factor with native DC power input for easy integration into mobile platforms.



“The biggest factor driving technological development is moving satellites into low-Earth orbit so that everything becomes mobile. Existing user terminal technology is not effective in optimising the value of the LEO satellite constellations. The combination of more, higher powered, and closer to Earth satellites will drive innovation much more exponentially,” explains David Harrower, Senior Vice President of Global Sales at Kymeta.

“The inherent attributes of some flat-panel antennas allow for deployment on platforms that satellite has never been able to reach before, which is opening new markets for mobile connectivity and helping narrow the gap in the digital divide.”

In August, the antenna technologies’ developer announced a beta trial programme of the Kymeta u8 terminal with select partners and customers globally. A full launch of the Kymeta u8 ESA is planned for Q4 of 2020. The u8 will support global land mobility, covering the full Ku-band with improved efficiency, with its integrated satellite and cellular modems offering seamless hybrid satellite/cellular connectivity over a multi-WAN configuration.

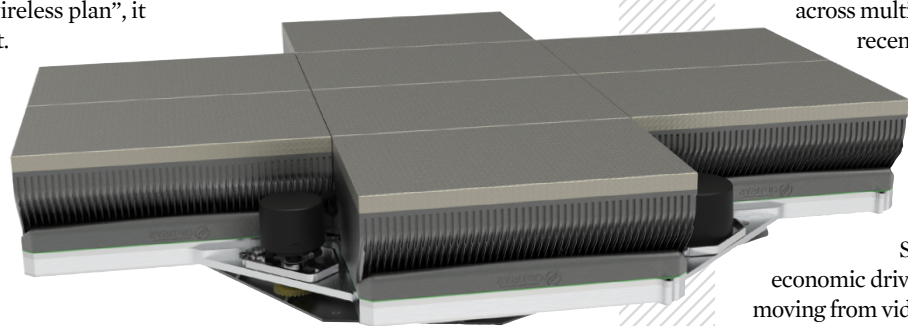
Along with the new terminal, Kymeta is also beta trialling its new Kymeta Connect suite of services offerings – “making connectivity as easy as buying a wireless plan”, it said in a statement. Together, the two create a complete turnkey solution for public safety, DOD/MOD, enterprise, and other markets requiring always-on, on-the-go communications.

Kymeta recently also announced securing approximately \$85m in

“ Satellite operators have realised that need to incorporate the ground segment into their data strategy, so you see them investing heavily on the ground”

Lluc Palerm-Serra, Senior Analyst, NSR

financing led by Bill Gates with members of the leadership team personally investing approximately \$1m led by Executive Chairman, Doug Hutcheson. The funds will be used to accelerate new product development and commercialisation for satellite and cellular communications globally. Its goal, according to Hutcheson, is to produce tens of thousands of products by 2023 – provided, that it can build a production line to perform at that scale.



This phased array antenna from Optisys is designed for ground applications and aircraft.

Don't write off GEO just yet

But while the size of those deals and development of LEO players in the commercial sector continue to grab headlines, GEO operators continue to invest in the HTS services already available today, says Jerry Adams General Manager, SATCOM Products Division at L3Harris Technologies.

“This, in turn, is driving ground segment efforts to develop new terminals — with L3Harris leading the way — able to take advantage of increased coverage, higher power and advanced capabilities offered by next-generation GEO for bandwidth-intensive applications,” he says.

“CONOPS are more demanding,” Adams adds. “The appetite for bandwidth continues to grow as CONOPS transform from the large-scale deployments of the past to smaller, more complex missions that demand deployment agility coupled with high data throughput. Capabilities like VoIP, full motion video, and near-instant communications need to be supported with reliability, and above all, portability. This is where VSATs play a critical role in developing and maintaining complete situational awareness.

“Higher-power HTS GEO allows smaller aperture terminals the ability to capture the same or higher amounts of throughput as much larger terminals.”

The rising importance of data across multiple points in

recent years has seen corporations around the world rushing to embrace this new opportunity. As NSR’s Palerm-Serra notes: “The

economic driver for the industry is moving from video to data. And for data, the ground segment is much more important, so we’re seeing an explosion in data requirements.”

Where does 5G fit in?

That data requirement is part of a larger trend occasioned by the advent of Fourth Industrial Revolution technologies such as artificial intelligence, 3D printing, cloud computing and blockchain. As the consultancy Deloitte points out, these are being combined for a compounded effect to drive transformational change across the industry. Yet, all of them rely on the advanced connectivity provided by fifth-generation cellular technology (5G).

“The satellite industry must not underestimate the transformative power of 5G,” Palerm-Serra says.

The technology offers a new way to conceive networks and service delivery, he adds, opening a window of opportunity to make satcom seamlessly integrable with terrestrial technologies. “5G-fortified networks are creating a lot of pressure on the ground segment, in the sense that the satellite industry needs to be interoperable with 5G, and the capacity for that is on the ground side. So, we see a lot of vendors working at making satellites 5G-ready because it touches on all the different verticals. 5G is a totally new way to conceive network architecture, so all the major trends – software-defined networks, network orchestration, flexible satellites, mobility – are all related to 5G to some extent. 5G will create a new framework which will bring all these technologies under the same umbrella,” he adds.

But there's that cost question

For now, however, cost remains a major restriction to technological advances in the ground segment – more so in a market where the coronavirus has dented demand considerably. As Optisys’ Janos explains, the form factors and the use case of any ground system equipment depends entirely on the customers’ budget.

“Parabolic antennas offer the best cost and are available for thousands of dollars. They are the most cost-effective and are very high performance, but you do have a larger structure,” he points out. “FPAs are the most expensive – hundreds of thousands of dollars – but are also very smart. On the other hand, a parabolic can take 40-50 watts, while a phased array may perform similarly but give you kilowatts of power. So, there will always be a trade-off.” **PRO**

“ Parabolic antennas are the most cost-effective and are very high performance, but you do have a larger structure. FPAs are the most expensive ... but are also very smart”

Janos Opra, CEO, Optisys



Coronavirus takes its toll on the ground segment

As with every other business, the coronavirus pandemic will hit the deployment of ground segment technology in the satellite business. Existing developments will be pushed back, and growth will slow down, according to analysts.

“Covid-19 does have an impact on the satcom industry in general and consequently will delay growth on ground segment,” NSR Senior Analyst Lluc Palerm-Serra tells *SatelliteProME*. The impact depends on the vertical, he explains. While mobility – in particular, the aeronautical and maritime consumer sectors, but also antennas, modems and RF chains – have been hard-hit, others such as cellular backhaul are more resilient.

In addition, he says, supply chain issues will come into play. “Installers are not able to get to the field to deploy sites due to lockdown measures, for example.”

However, the crisis has accelerated some previously observed trends, he adds. While the sector is likely to see greater consolidation in terms of mergers and acquisitions, technological developments such as the adoption of the cloud and the uptake of 5G are expected to gather speed.

Top: Dr. Abimbola Alale, MD and CEO of NIGCOMSAT, and below, Fatema Ali Al Hajri (l), VP of Products & Solutions Engineering at Yahsat, and Michaelyn Thomas, Head of Affordability at Virgin Orbit.



DRIVING NIGERIA'S SATELLITE AMBITION

Dr. Abimbola Alale, MD and CEO of Nigcomsat, has worked in the space sector for the last 20 years and is a key influencer on Africa's space landscape. She has been actively involved in some of Nigeria's national priority projects including the development of Nigcomsat-1 and related initiatives and is presently driving the full commercialisation of the company. She talks to *Vijaya Cherian* about Nigeria's space ambitions and how she is helping to drive that vision



Where does Nigeria stand in terms of satellite, satcoms, broadband

and space?

Nigeria, as a country, is not doing so bad in terms of satellite-related activities and I believe we keep improving as a country. As of July 2020, our broadband penetration index stands at 40.14%. This shows a good rise from 39.58% in May this year. For the residents of rural areas, the role of satellite communication is evident in bridging the digital divide as the government continues to roll out more intervention initiatives such as knowledge-access centres, rural broadband initiatives, school access projects and so on. So, I will say that Nigeria is on the right path to improving its national broadband penetration index with a mix of hybrid communication technologies.

Could you tell us more about

yourself and your evolution as a space professional?

I have a PhD in Security & Strategic Studies from Nasarawa State University, Keffi-Nigeria, and hold a Masters' degree in Space Studies (MSc) and an MBA degree from the International Space University (ISU), Strasbourg-France. My education at ISU, France adequately prepared me for a career in the space sector. Soon after my Masters' at ISU, I joined the National Space Research and Development Agency (NASRDA), where I started as Principal Scientific Officer in 2001; and worked on space education seminars and linkages with relevant institutions amongst other roles. In 2004, I was selected as Assistant Project Manager for the Nigcomsat-1 project. At the establishment of Nigcomsat Limited in 2006, I became the pioneer Marketing Director for the company, a position I held for eight years until 2014 when I was appointed as Managing Director.

How has Nigcomsat developed as a satellite operator since its inception in 2006 and can you elaborate on some of its milestones?

Nigcomsat is the first communication satellite operator in Sub-Saharan Africa, so taking that lead has not been an easy task. During the procurement process for the Nigcomsat-1 satellite, a know-how-technology-transfer programme was embedded. The training has enabled Nigerian engineers to handle satellite in-orbit operations and payload management without any hiccups.

Presently, I can tell you that the company has grown to the extent of carrying out in-orbit tests, spectrum management and hosting of services for other satellite operators and ISPs. In addition to the provision of core satellite services, we also provide tailor-made digital/communication solutions to government and private clients.



Dr. Abimbola Alale was part of the team that championed the manufacture and launch of the first sub-Saharan African communication satellite, NigComSat-1 in May 2007.

Is the GEO satellite you have right now sufficient to cater to Nigeria's satellite needs? Do you have plans for more satellite launches?

Nigcomsat-1R is the only active GEO satellite we have in orbit. In terms of Nigeria's capacity needs, we are able to meet it presently. However, as we are moving into a full digital economy, the company is planning to put another bird in space.

My vision is to see the growth of space activities in Africa become more promising for local investors to put their money in it"

Dr. Abimbola Alale, MD and CEO, Nigcomsat

You sit in the hot seat. What do you perceive as some of the big challenges within Nigeria as well as Africa in terms of satellite connectivity and addressing those needs?

One of the major challenges with satellite connectivity in Nigeria is the issue of the high cost of customer premises equipment (CPEs) and satellite modems especially for young individuals in rural areas who wish to start small-to-medium enterprises (SMEs) and have need to ride on satellite connectivity. Things could be better if we do have some of these CPEs and modems manufactured in Nigeria. The original equipment manufacturers (OEMs) need to consider bringing the manufacturing ecosystem to Nigeria in order to serve Africa. After all, Africa is considered a very big market for the sector.

Another challenge is the issue of funding for space programmes. While funding can be sourced through Public Private Partnership (PPP) and from space investors, the



Nigcomsat's headquarters in Nigeria.

satellite business is capital-intensive globally. Local investors are yet to understand fully how investment in this sector works especially because of the high-risk nature of the space segment.

Is Nigcomsat capable of fulfilling Nigeria's specific satcom needs solo? If not, are partnerships the way forward?

While Nigcomsat is capable of providing all sorts of satellite communication needs for Nigeria and about 54 countries in Africa, we still have other foreign operators providing services within our space. Nigcomsat encourages and wants partnership with satellite original equipment manufacturers to ease the deployment of satellite connectivity across Nigeria and Africa.

Does Africa have an indigenous industry to support the development of its space initiatives?

I think this is what we eventually want for Africa - an indigenous satellite industry such as it exists in India and China for the Asian continent. However, ours is still in the incubation stage as active space activities commenced in Africa only in the late 1990s; therefore, we cannot compare ourselves with other continents that started this business in the 1960s and 1970s.

What is your opinion about LEO, MEO, GEO and which still works best for Africa?

These are orbits that complement each other in terms of payload functions/service delivery of a satellite. However, the best option to serve the remote parts in Africa is still GEO because of the wider footprint and in-orbit station keeping.



"The space industry is gender free and in Nigeria, we believe in 35-40% female participation in all sectors ... In Nigcomsat, we have maintained that policy of 35-40% participation from women as a lay-down policy of the federal government"

Dr. Abimbola Alale, MD and CEO, Nigcomsat

However, to put a satellite in GEO is more expensive but it is safer in GEO with less debris as compared with other orbits.

Any upcoming satellite launches, and new initiatives planned for the coming years?

I think we are doing well as some of our plans related to this will be released in the second quarter of 2021.

What percentage of Nigcomsat's workforce are women and how are women contributing to this sector?

The space industry is gender free and in Nigeria, we believe in

35-40% women participation in all sectors within the country. In Nigcomsat, we have maintained that policy of 35-40% participation from women as a lay-down policy of the federal government.

Women are doing well in the space industry as far as Nigeria is concerned. The Women in Aerospace, Nigeria chapter runs a lot of annual competitions that focus on various space-related activities. We organise career days and pep talks in order to encourage and develop the interests of young girls in pursuing space related careers. About four female Nigerian engineers were among those that were trained in space operations and control between 2006 and 2007; they have, in turn, trained several others. Other than female engineers, we have trained other female professionals in strategy, space law and policy.

What is your vision as a space professional and what you think should be Africa's satellite and space dream?

My vision is to see the growth of space activities in Africa become more promising for local investors to put their money in it. I think this is achievable with proper planning, more seminars on satellite financing hosted in Africa and good policy in place to encourage prospective investors. With these, I think in about a decade, space activities/programmes in Africa will be more competitive.

What is Nigcomsat's vision and your vision for Nigcomsat?

Nigcomsat's vision is to be the leading satellite communication solutions provider in Nigeria and Africa. My vision is to add more satellites into orbit for Nigcomsat and position the company to achieve its set vision. **PRO**

ENGINEERING INNOVATION

Fatema Ali Al Hajri, VP of Products & Solutions Engineering at Yahsat, has worked with the UAE satellite operator for the last 14 years. She is part of a growing circle of Emirati women, who make up 30% of the workforce in the UAE's space and satellite segment. Fatema speaks to *SatellitePro ME* about her role in developing new technologies at Yahsat



The UAE leadership has encouraged diversity in all of its sectors, and the Space and Satellite segment is no different. Proof of that is the number of women working in various space and satellite initiatives across different entities. For instance, women make up 34% of the Emirates Mars Mission team and 45% of the UAE Space Agency consists of women. At the Mohammed Bin Rashid Space Centre, 42% of the staff are women. The core science team, involved with the Hope Probe, consists of 80% female staff. Yahsat is part of this mix, and 76% of its female employees are Emirati.

Fatema Ali Al Hajri started off with the company as a Teleport Systems Engineer and grew into her present role after successful stints within the Abu Dhabi-based entity as Business Development Specialist, Manager, Senior Manager and Associate Vice President of Solutions Engineering. She manages an integrated range of fixed and mobile satellite solutions for Yahsat as part of her current role.

"I manage the product engineering teams engaged in the development of innovative communication solutions for Yahsat's customers, while ensuring consistency of user experiences. I also look after the technical aspects of all projects involving Yahsat's strategic partners like ADNOC, Abu Dhabi Media Zone and the Government of the UAE," she says.

Yahsat claims to be the first satellite operator in the world to offer an integrated mix of fixed and mobile satellite services and solutions. As a result, the operator is often able to guarantee its customers a better value proposition and seamless communications on any platform across land, sea

or air, comments Fatema.

Having spent more than 14 years with the UAE satellite operator, Fatema has had the opportunity to see the company complete several milestones. For instance, she was part of the Yahsat Pioneers' team that launched its first two communication satellites - Al Yah 1 and Al Yah 2. As part of the Al Yah 3 satellite programme, she led the RF Gateway project. Subsequently for Thuraya 4-NGS, she has been actively involved in the development of its new product and solution portfolio.

In parallel, she has also worked on some exceptional projects in Africa that she believes are "unforgettable" and contribute positively to the African community.

"My involvement in the development of the Facebook Wi-Fi Express solution is especially important to me as it opened up high-speed Wi-Fi connections for a large population of users in remote Africa, making a huge difference in their lives. Similarly, the maritime voice and tracking solution, Thuraya MarineStar, which was launched last year is a big success story in Asia, effectively enabling affordable and reliable connectivity for fishermen on the high seas."

Yahsat's mobile services subsidiary Thuraya also recently commenced its next-generation satellite programme.

"We are building a new portfolio of next-generation mobility solutions and products to cater to market requirements. At the same time, this advanced family of mobile satellite solutions designed to support government and defense users will accelerate Yahsat's leadership in this market, both within the UAE, regionally and globally," explains Fatema proudly.

She adds that Thuraya's space and ground segments will continue to support existing products



and solutions, enabling service continuity during and after the completion of the Thuraya 4-NGS satellite programme.

Fatema says she is fortunate to work in a sector, where the UAE leadership has particularly encouraged diversity.

“30% of Emirati employees in Space and Satellite segments are female,” Fatema points out.

More importantly, she says Yahsat has helped nurture “the careers of its female Emirati employees” and “empowered them through on-the-job training and also by providing numerous opportunities to learn from experts from all over the world, which could be through satellite programmes, overseas conferences or training stints”.

She attributes her success to a mix of different initiatives from the company. Besides training and mentorship, Fatema lauds the Abu Dhabi entity for “grooming us to handle bigger responsibilities in the future”.

“I have been ably guided by my senior colleagues and over the years, many lady colleagues have approached me for advice and

“Despite the advances made by women, the global space market is still largely male-dominated. We need to see more female technical experts and engineers in this field”

Fatema Ali Al Hajri, VP of Products & Solutions Engineering, Yahsat

guidance on career growth. My office is always open to support and guide them. In addition, we mentor and support Emirati youth

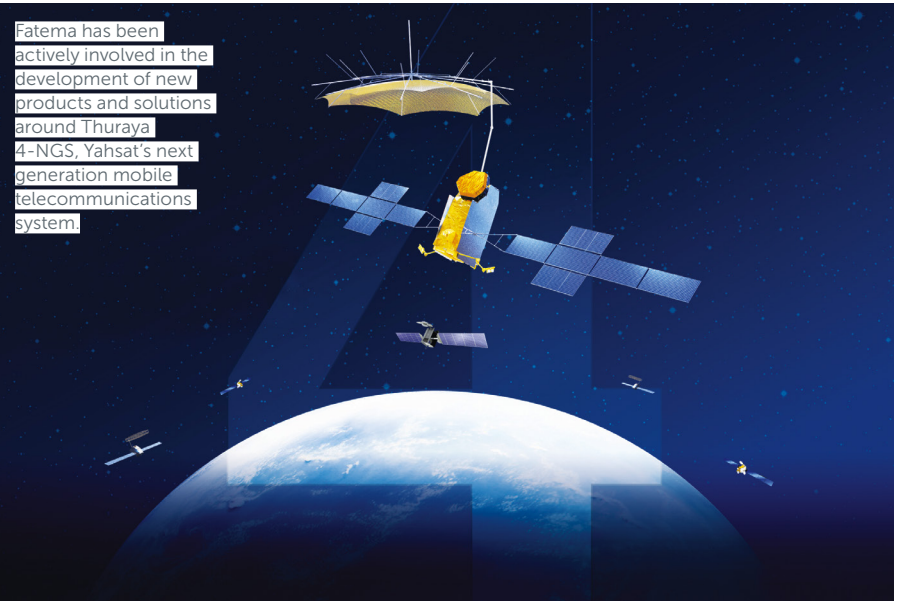
and homegrown engineering talent through initiatives like Yahsat Youth Council and Yahsat Space Lab, which is now part of Khalifa University Space, Technology and Innovation Center (KUSTIC).

Although the space sector itself is still relatively new in the UAE, she says all-round support has been available for women to make progress in this industry. However, she agrees the sector still remains male-dominated.

“The new generation of Emirati engineers and technology experts look to us for advice and insights. However, when I started out in 2007 as a novice engineer, I had to read and research a lot about space and satellites in order to understand more about them. I remember purchasing my first book on satellite - *Satellite Communications Systems* by Gerard Maral and Michel Bousquet. It marked my entry into the sector. Despite the advances made by women, the global space market is still largely male-dominated. We need to see more female technical experts and engineers in this field.”

Fatema, however, does not rest on her laurels. Despite having her hands full as the mother of four boys and a full-time job, she insists that one needs to constantly update themselves in this field if they are to remain competitive.

“I have done multiple courses in satellite communications, including intensive training in Link Budget. I am currently enrolled for MSc in Major Programme Management from the University of Oxford. It is a part-time postgraduate course for experienced programme managers tackling complicated assignments. The course trains us to handle challenges proactively, providing the right tools to drive a project or programme to completion on time, adhering to budget and defined deliverables.” **PRO**



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ADVOCATING AFFORDABILITY

Virgin Orbit has long promoted the idea of making space available to all nations. In an exclusive interview with *Vijaya Cherian*, Michaelyn Thomas, Head of Affordability at Virgin Orbit and a strong advocate for diversity at the workplace, discusses the novel ways in which the company has attempted to make space affordable while also sharing how women can change the dynamics within any sector



What does Virgin Orbit do and as Head of Affordability, what does

your role entail?

Virgin Orbit is on a mission to democratise and open space for everyone by providing affordable, dedicated, and responsive launch services for small satellite customers. From connecting rural communities to monitoring global climate change, our customers are using space to drive lasting positive change in order to make Earth a better place for all. With our LauncherOne system, we are able to widen access to space by providing agile launch services for all kinds of new small-satellite customers.

As the Head of Affordability, I am laser-focussed on the recurring cost of our LauncherOne programme. I partner cross-functionally across all teams to find innovative ways to lower the overall cost of the system. Also, because of the unique mobility of our system, we are discovering we have tremendous appeal from customers in other nations, many of whom want us to bring the

launch system to their satellite, rather than the other way around. Because of this, I also serve as the project manager for spaceport site activation around the globe.

How have you made launch services affordable for small satellite customers?

At Virgin Orbit, our rocket launches are air-launched and focussed on catering to the small satellite community by accessing their intended orbit on their schedule. Essentially, we have a mobile launch pad which is a modified Boeing 747 aircraft named Cosmic Girl, and we're combining that with our LauncherOne system, which leverages proven technology alongside state-of-the-art manufacturing techniques to maximise our agility and affordability. Because we have the capability to launch from anywhere in the world, our system brings greater flexibility and high value to our small satellite customers.

Within the same context, how has affordability propelled innovation and how has this helped

countries around the world?

The affordable launch services Virgin Orbit provides will help nations that currently do not have launch capability. We can use existing infrastructure, like a commercial airport or military base, to outfit a spaceport. It's really about utilising existing in-country resources and offering an affordable, rapid response launch. With this air launch service, Virgin Orbit eliminates the traditional costs of maintaining a ground launch facility, which allows the flexibility of launching from multiple places to reach different orbits.

In addition to our affordable, rapid response air launch solution, the Virgin Orbit team has been 3D printing key parts of our rocket engines for some time. Early on, we recognised 3D printing as a great enabler and an effective way to reduce schedule and lower costs. We have partnered with NASA's Marshall Space Flight Center (MSFC), and our collaborative goal is to study the use of 3D printing to build multimetallic combustion chambers. The benefit of developing multimetallic parts is that you can take advantage of their strength and conductivity to create a

higher performing end-product. We use our hybrid additive-subtractive manufacturing machine to help us accomplish this quicker. An extensive hot-fire test campaign proved that the combustion chamber we tested together with NASA MSFC could hold up under realistic operational conditions, and it matched the performance of a traditionally manufactured unit.

Do you have any numbers on what percentage of women work in the space industry now?

2019 research studies reveal that women make up 20% of the workforce at the employee level and women make up 16% of the senior leaders' levels in aerospace and defense companies. The aerospace industry continues to see more women represented as compared to the past. However, women are still underrepresented at all levels including the most senior levels of leadership. Generally, the more women who hold top leadership positions within organisations will typically have a workforce made up of more women. Barriers to women inclusion and advancement are still prevalent and are related to the lack of representation, stereotyping, exclusion from professional and social networks, impossible work-life balance, and the list goes on. Until organisations can truly embrace inclusion and recognise top talent, the lack of women will continue to remain.

How have you helped influence more women to make career moves within this sector?

Throughout my professional space career, I have participated in and have developed women empowerment business resource groups in efforts to create an inclusive environment for everyone. On International Women's Day in 2018, I had the honour of delivering a keynote address to



"Diversity drives innovation, and in an industry like space, it's important to have people who think differently and approach problem-solving differently"

Michaelyn Thomas, Head of Affordability, Virgin Orbit

our workforce on the importance of women advancement in the aerospace industry. This talk was rooted in my doctoral research, which took me years to develop. I discussed barriers women tend to face in the aerospace industry and strategies that enable success.

After my presentation, a group of dedicated and inspirational employees kept the conversation going. Over the course of several months, we brainstormed many ways to get a company-recognised group going, and Teammates for Women Empowerment was formed with the amazing support of our CEO and senior leadership staff. I serve as the executive sponsor of this important group.

Teammates for Women Empowerment is an inclusive, employee-led group that promotes positive change through a shared vision of women empowerment

in the workplace. It has a robust operating rhythm, managed by a small group of dedicated employees in efforts to promote professional growth and development, inclusion, and overall employee happiness for everyone. The group also aims to create a trusted environment for employees to practice and learn leadership skills, as well as share experiences, ideas, and strategies that enable career success and professional development in the aerospace industry. It's about identifying and breaking down barriers through collaboration and education.

Further, I have been invited to speak around the United States and the world, including the Middle East and Europe, on women empowerment initiatives in the aerospace industry. Women empowerment objectives should be a shared vision for everyone looking to succeed in the space business.

I also volunteer with various organisations in the greater Los Angeles, California, area in efforts to encourage girls and women to pursue STEM education and careers.

What can women bring to space that is unique or perhaps different from men?

It's more about introducing as much diversity as possible. Diversity drives innovation, and in an industry like space, it's important to have people who think differently and approach problem-solving differently. Ultimately, a great balance of everyone is what's needed in the space business.

What new trends do you see specifically within the space sector and how do you see women contributing there – and specifically, to which areas?

I started my space career in 2007 and today in 2020, so many new space companies have popped up. This means there are more space

opportunities for women and other underrepresented groups. And through the use of social media with space companies highlighting their capabilities for all to see, it's attracting a diverse population. Social media plays a new role because more companies are sharing their program milestones, highlighting their launches, engaging their customers, and generating excitement for new demographics. As the space landscape changes, it should begin with diversity and people, because great ideas come from different people, and diversity solves some of our toughest problems through healthy conflict and innovation.

Leadership, particularly at the executive management ranks, is a key area that women should continue to break into. As mentioned, diversity should be at the forefront of innovation and decision-making, and women can bring their experience, strategic vision, and technical acumen to the highest levels of leadership. Not only will women enhance an organisation's ability to become an industry space leader, companies who promote women into high ranking positions demonstrate their commitment

"Early on, we recognised 3D printing as a great enabler and an effective way to reduce schedule and lower costs"

Michaelyn Thomas, Head of Affordability, Virgin Orbit

to advancing women's careers.

Another important area would be space policy. Women can play a major role in shaping this new space landscape. Policy continues to evolve with this incredible space boom, and I believe that it's driven by the cool ideas for technology and businesses we see today. It's critical that a fresh perspective helps to shape policy and space access to reach as many nations and people as possible.

What would you consider to be your dream achievement?

Virgin Orbit is already doing it—democratising space for everyone through affordable launch products and services on a global scale for existing and new

small satellite customers. To have contributed to this is a dream.

What is your vision for women within the space segment?

My vision for women in the space sector is to repair the talent and employment pipeline. Many have heard the term "leaky pipeline," which is a metaphor to describe the lack of women and other underrepresented groups pursuing STEM education and careers. But in my opinion, the pipeline is not leaky, rather it is completely broken. As a woman leader in the space industry, I believe I have a fiduciary duty to mentor, sponsor, and purposefully seek out talented women to ensure they are invited to have a seat at the table. Most people feel comfortable around people who look like them, and for the few of us in leadership, it is important to create a welcoming and inclusive environment for everyone.

They often say a mentor helps to guide us to where we are today. Do you have someone like that?

Yes, I most certainly have a mentor. I actually have several mentors for different things. Mentorship is the cornerstone to growing and expanding your career. Not only are mentors necessary, but sponsors are equally central to professional growth and development. A sponsor is very similar to a mentor, but a sponsor will advocate for you when it's promotion time or if there is a particular new job you are interested in. Additionally, I have what is called a reverse mentor. A reverse mentor is someone who has less professional experience than you. As an example, my reverse mentor coaches me on new tools to improve the efficiency of my job and they share their experience as an early career professional which allows me to understand how to fine-tune my leadership and to make it more inclusive. **PRO**



An aerial view of Virgin Orbit's Long Beach manufacturing facility. Credit: Virgin Orbit/Greg Robinson.



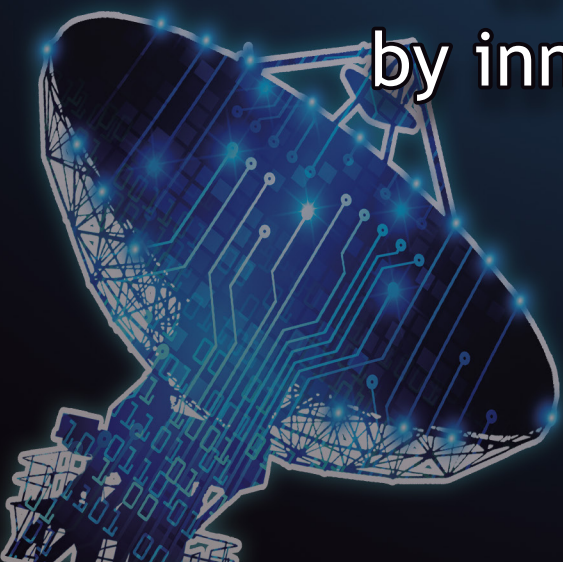
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ZOOMING INTO A NEW ERA WITH SATELLITE SOLUTIONS

A key aspect of the satellite arm of CABSAT has been the GVF conference. With the coronavirus pandemic having disrupted physical events, GVF began a series of webinars to look at the critical role of satellite technologies in addressing today's communications requirements. **Martin Jarrold** looks at some of the key points that have been addressed in previous weeks and what to expect at CABSAT's virtual event in November



The coronavirus pandemic has brought the prime focus of global attention to the vital contribution of satellite communication – and Earth Observation – technologies to dealing with different crises. Naturally, for the last nine months the crisis of overwhelming concern

has been the recurrence of yet another zoonotic virus, with SARS-Cov2 following on from bird 'flu, swine 'flu, MERS, SARS, and a chain (an RNA chain, perhaps!) of others.

Response to disasters and the facilitation of communications solutions to support humanitarian assistance has long been a part of the remit for satellite-based solutions. These will still

function and can be swiftly deployed when terrestrially-based infrastructures have been crippled by disaster at the very time when they are needed the most.

Whilst Covid-19 has not directly compromised communications infrastructure, it has impacted how the world communicates and this has placed extra demand on existing infrastructure and

services. For the developed world, the pandemic has led to increased demand for telecommunications services which require a greater role for satellite communications connectivity. For lower-income countries with far more vulnerabilities, the effects have been much broader with delays in mass programmes of immunisation against diseases like measles and rubella being just one impact.

GVF's work in the development of the United Nations Crisis Connectivity Charter exemplifies the satellite imperative in humanitarian assistance and disaster response (HADR) arena. That is why this subject will be one to be tackled in a future panel discussion in the GVF Webinar Series, which, since its inception in May 2020, has gained an audience from over 120 countries and thousands of viewers.

In the context of today's public health circumstances, our communications technologies have been the only resource at our disposal to enable us to continue communications. We have not had the baseline of in-person meetings, workshops, conferences and exhibitions. We have had to be creative in building a greater digital reality than the one we had before.

GVF's webinar on HADR – The Evolving Role of Satellites in Disaster Response, number 13 in the overall series and scheduled for November 5, 2020 – clearly has a powerful continuing relevance.

On Zoom on alternate Thursdays, this series kicked-off on May 21 with an evaluation of The Satellite Industry's Response to the Covid-19 pandemic. The theme was followed by 'WRC-23: Spectrum Dialogues in a Post-Pandemic World', which assessed the nature and magnitude of any significant impact from Covid-19-related travel restrictions on the preparatory dialogues for the 2023 ITU World

“Whilst Covid-19 has not directly compromised communications infrastructure, it has impacted how the world communicates”

Martin Jarrold, VP International Programme Development at GVF

Radiocommunication Conference.

Participating satellite operators expressed general agreement that the processes and procedures to support the rounds of national and regional decision-making were now being fully supported through cycles of “virtual” meetings, with the ITU concurring. If the pandemic had happened just a few months earlier, the decision-making at WRC-19 in Egypt would very likely not have taken place until other arrangements had been established. The insightful array of discussion points which followed, concerning the function of spectrum regulation in centrally

underpinning the functioning and scope of the industry's operations and understanding the effects of the pandemic as an example of an external factor impacting its regulation.

The next theme was about 'Space Segment Disruptive Evolution: GEO, MEO & LEO – Does a Global Crisis Make a Difference?' The term “disruptive evolution” had already established its place in satellite industry dialogues before the current public health crisis. The orbital environment had become the subject of much analysis exploring potential impact scenarios of emerging LEO mega-constellations on the established technologies and business models of existing satellite operators. With the advent of a global crisis without precedent, many new questions have arisen. This session reflected the issues behind these questions, many raised by attendees from across the world.

The fourth webinar 'Will Working from Home Render the Cloud a Different Animal' focussed on the consequence of officially directed disease response strategy such as the maintenance of social distancing and remote working. It



explored the interrelationship of satellite and the cloud, examining if the social distancing-related/public health crisis phenomenon of a mass migration to WFH has impacted satellite, the cloud, and more precisely, the developing satellite-cloud interrelationship.

5G & Satellite: Driving Forward the 'Network of Networks' – the next topic in the series - opened with discussion on whether the satellite industry is clear on exactly where it stands as a partner in the phased transition to 5G as a networking architecture. Comments focussed on the extent to which the evolving 3GPP standard is heading, specifically citing key functional roles for non-terrestrial networks. Agreeing that it is the unique characteristics of satellite that makes it so essential to realising the full potential of 5G, the panel addressed inter-related issues pertaining to the major opportunities for satellite in the 5G satellite communication market over the next decade.

The sixth and seventh webinars focussed on the Ground Segment, specifically on Transformational Antennas from the perspectives of End of the Parabolic Paradigm? (Part 1) and Will terminals realise the promised LEO Connectivity Revolution? (Part 2).

Recognising the need for new antenna and terminal technologies such as FPAs to fully realise the potential of the combined parallels of LEO constellation technology roll-out, and increasing demand for satellite services to mobile platforms (such as aircraft, ships, and land vehicles), it was acknowledged, during Part 1, the parabolic antenna will not disappear from the industry or from our skylines. It will still feature in hubs/gateways. Fixed satellite or GEO-based services will not really require new technologies to continue, based on the excellent



"We have had to be creative in building a greater digital reality than the one we had before"

Martin Jarrold, VP International Programme Development at GVF

performance of qualified and type approved parabolics. Questions on the buzz about FPAs and advantages they have over parabolic antennas were addressed in this session.

In Part 2, it was noted that discussion about achieving elevated connectivity gains for more markets and users around the world so often only focusses on advances in the space segment, on the satellites launched to orbit, whereas it needs to be more fully acknowledged that the achievement of those gains is dependent on critical changes in equipment on the ground. It was agreed that a better balance needs to be brought to open and public discussion. This was the first public platform taken by OneWeb since its post-Chapter 11 acquisition by an investment consortium of the United Kingdom Government, Bharti Global, and Hughes.

Our next panel dialogue on Serving Underserved Communities had a two-strand rationale. One, the continuing existence of the digital divide between developed nations with advanced communications

infrastructures and countries with a poorly developed capacity to secure reliable internet broadband access; and two, brought into particular focus as a result of the broadband demand structural shifts arising from the pandemic, highlighting the digital divide between well-served urban, and underserved rural and remote areas, within nations that are otherwise seen to have extensive advanced broadband communications capabilities.

Panellists addressed a wide range of issues, for example, identifying the principal barriers to serving the underserved. They looked at whether it was connectivity, affordability, regulatory or the role of Universal Service Funds and discussed the search for solutions to the digital divide. Discussing the role of satellite in meeting the challenges of bridging the divide, comparison was made between the respective advantages and disadvantages of GEO/GSO satellites and NGSO systems, and particular attention was paid to MEO characteristics in extending the reach of government, education and health to underserved communities.

Most recently, the webinar focus was GEO/MEO/LEO – Satellite in the Finance Markets with high-profile players from key verticals addressing the issues raised here.

The series will continue to explore more key satellite industry themes during the GVF Virtual Summit at CABSAT 2020. The event will have a virtual conference track from November 9-10, 2020 while the physical exhibition will take place in May 2021. I hope to see you in cyberspace in November. **PRO**

Martin Jarrold is Vice President of International Programme Development at GVF. Discussions from all of the above the webinar series can be viewed at <https://gvf.org/webinars/>

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NETWORK SOLUTIONS ARE THE BACKBONE OF HUMANITARIAN OPERATIONS

Satcom-powered network solutions define the future of the aid sector



More than 126m people require humanitarian assistance globally, including 70m who are forcibly displaced.

Governments and the global community are stressing the significance of on-time medical and humanitarian responses. Satellite communication plays a critical role, enabling operations in remote and austere environments with little to no infrastructure. While satcom phones and portable modems have been of service to first responders, they are insufficient to support the growing demands for higher bandwidth dictated by the digitalisation of humanitarian operations. Network management solutions, powered by satcom, define the future of the aid sector.

Rapid Network Deployment in Remote Areas

The first 72 hours post any crises is critical. Frontline workers need to be able to respond immediately and effectively to mitigate the wider secondary impacts. Comprehensive portable solutions with a lightweight terminal and a network management system often provide field missions with a VSAT-like experience. Equipped with bandwidth optimisation and advanced filtration tools, these solutions are able to offer up to 2+ Mbps speed, which then allow first responders to take full advantage of digitalisation,

including videoconferencing and remote maintenance, as soon as they initiate relief operations.

Hybrid Solutions for Uninterrupted Connectivity

Some humanitarian missions, such as mobile clinics, that move between urban and rural areas, rely on rapid network deployment solutions to remain connected with automatic seamless switching between GSM and satellite networks. Moreover, the hybrid terminal optimises consumption by switching to the satellite back-up channel only in case other networks are out of reach.

Keeping camps connected

According to a UNHCR report, refugees spend a third of their disposable incomes on staying connected. Access to news, social media, and instant messaging apps give them a better chance to adapt and integrate in the “world outside the camp” in the future. However, 7% of refugee communities lack the digital infrastructure for internet access and 31% can rely only on 2G. Network management solutions come in handy here. Using Wi-Fi enablers, the satellite signal can be spread across the camp so that inhabitants can connect to the Internet on their own devices.

Likewise, satcom solutions enable the smooth operation of camps, keep track

of both people and assets, and facilitate the exchange of high data volumes between camp units and headquarters via DSL-like broadband connectivity.

Telemedicine and E-Health Programs

Even before the pandemic, the global telemedicine industry was expected to grow by 15% during this decade. Now, not only does the World Bank report that growth to have accelerated to 19.3% with a projected value of \$175.5bn, a Fortune Business Insights report predicts the market to rise 23.5% between 2019 and 2026. In the humanitarian sector, this means satellite technologies can extend the scope of telemedicine to remote areas and empower e-health programmes and locally-stationed doctors to transfer electronic health records, view X-rays and digital images, and hold voice or video advisory sessions with healthcare professionals based in any clinic across the world.

Digital network management systems are actively supporting humanitarian missions in their important work no matter what part of the world they operate in. Whether on the move, or stationed in a camp, relief workers can rely on satcom channel for continuity of their critical operations. **PRO**

Nabil Soussia is CEO for Asia, Middle East and CIS at IEC Telecom Group.

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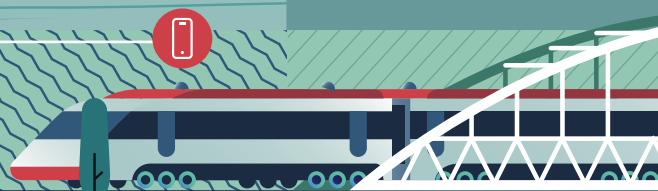
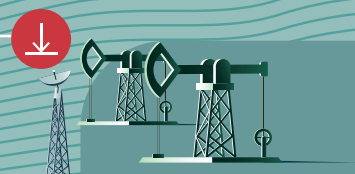
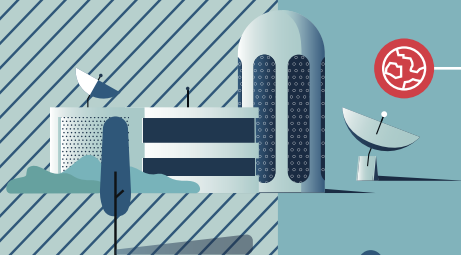
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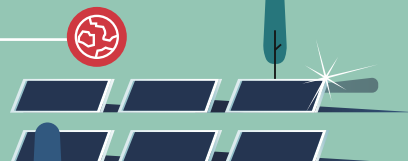
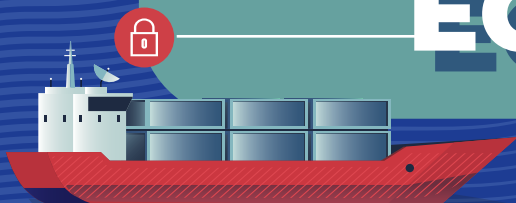




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