ISSUE 75 | APRIL 2020

SATELLITE PRO
TECHNOLOGY INTELLIGENCE FOR THE SATCOM MARKET
MIDDLE EAST

STARTING LOCAL, AIMING UNIVERSAL

CEO and founder of Universal Satcom, Reema Omari, ventures into conflict zones to provide enterprises with connectivity

SATELLITEPRO MIDDLE EAST

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WELCOME

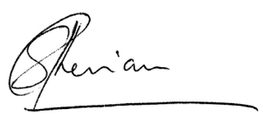
Who is the new inflight customer, and what is the key to tapping into the $33bn opportunity in this space? Is the inflight customer the traditional business person looking to be continuously connected to work, or does a new generation of digital natives, wont to be connected to their devices 24/7 for entertainment, social media and purchases, create a bigger opportunity for airlines? Understanding the shifting demographics of passengers, how they think and where their loyalties lie will be key to the success of many airlines of the future, we learned in a very interesting interview with Neale Faulkner, Regional VP at Inmarsat Aviation.

Inmarsat has just launched its GX5 satellite, which it claims will revolutionise onboard connectivity. The capacity and bandwidth the GX5 will pump into this region will reportedly be more than the combined capacity of the four satellites launched thus far in the GX network. If true, this will be a real game changer and will capitalise on the needs of the Gen Z passenger, who is likely to make his/her hotel bookings and tourist attractions onboard if connection is quick, easy and secure.

That connectivity would enable airlines to grab a predicted $28 per Gen Z passenger, with their tendency to delay a purchase decision until they're onboard.

There were some interesting conversations, not just around inflight connectivity but also diversity, at the Dubai Airshow last month. We saw other interesting numbers emerge from ADIPEC and Global MilSatCom last month.

With the oil & gas industry under intense pressure to improve operational efficiencies as lower oil prices continue to crimp margins, digitisation, for instance, offers the potential to create $1tn of value for this sector, with benefits worth about $640bn for the wider society. But I'm not going to give it all away here. The facts and figures are all in this edition.



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SatellitePro ME

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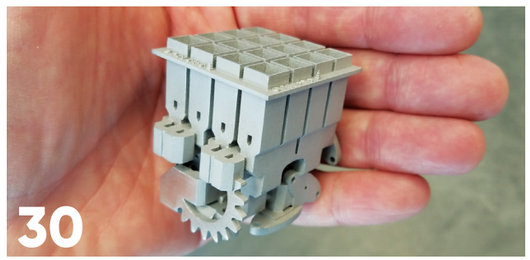


SpaceX to launch Nilesat-301, Thales Alenia to build satellite

SATELLITE LAUNCH

Nilesat has signed a deal with SpaceX for the launch of the Nilesat-301 geostationary communications satellite, due in 2022. Thales Alenia Space will build the satellite, based on the Spacebus 4000-B2 platform, which will weigh about four metric tons at launch. It offers a design life exceeding 15 years.

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

Thales Alenia Space will be responsible for satellite design, production, testing and in-orbit acceptance tests. It will also provide satellite control system for Nilesat in Cairo and Alexandria.

The satellite is scheduled for Q1 2022. Following Nilesat-201, Nilesat-301 is the second geostationary communications satellite built by Thales Alenia Space for Nilesat, and the fourth payload developed by Thales Alenia Space for the Egyptian operator.

Nilesat-301 is scheduled for launch in 2022

Egypt proposes new space laws, signs deals with France

SPACE POLICY

The Egyptian Space Agency (EgSA) held a meeting with its board of directors last month to propose a new national space programme, as well as space law. The meeting was held at the HQ of the Ministry of Higher Education and Scientific Research and chaired by the Minister, Khaled Abdel Ghaffar. EgSA CEO Mohamed Quosy and members of the council were also present.

During the meeting, Abdel Ghaffar stressed the need to submit a proposal to develop a database of all equipment, research laboratories and scientific cadres, to identify the scientific specialities required in the field of space. A committee has been formed to put together the agency's organisational structure and the national space programme in its final form. A meeting, chaired by Abdel Ghaffar, also proposed a budget for projects including human capacity building, space science and culture for 2020-21.

In related matters, the Council approved the proposed organisational structure of the Egyptian Space Agency and drafted the Egyptian space law for submission to the Council of State.

On an aside, EgSA signed a bilateral space cooperation agreement with France's Centre National d'Etudes Spatiales (CNES) on the sidelines of the first Egypt-France Space Seminar in Cairo earlier this year. Abdel Ghaffar also announced that Egypt will look to sign cooperation space-related agreements with countries such as France, Kazakhstan, Italy, China and the US.

Egypt plans Satellite City Industrial-isation and Assembly Centre

SPACE INITIATIVE

Egypt's Minister of Higher Education and Scientific Research, Khaled Abdel Ghaffar, has been tasked with establishing the country's Satellite City Industrialisation and Assembly Centre, in conjunction with China. The announcement was made by the minister on February 16, which is celebrated as Egyptian Space Day. The government entity also hopes to create a blueprint over the next decade to cater to Egypt's space ambitions. Besides satellite launches, the country will look to research space medicine and waste, Abdel Ghaffar said.

Mohamed al-Qousy, CEO of the Egyptian Space Agency, also took the opportunity to share plans to work closely with Egyptian universities and support their efforts in setting up space science laboratories. He further outlined the agency's proposed training programmes.

Kuwait's Orbital Space announces code initiative with global partners

SPACE INITIATIVE

Kuwaiti space entity Orbital Space, in collaboration with Bulgaria's Space Challenges Programme and NanoSat manufacturer EnduroSat, has announced Code in Space, an international online programming opportunity for students to send and execute their code in space (Low-Earth orbit).

As part of the programme, selected student submissions will be uploaded to a nanosatellite orbiting the Earth in the UHF frequency range. The programme is open to all students globally and the deadline to submit proposals is October 30.

The code will be executed by EnduroSat's Onboard Computer and tested under real space environment conditions. The results will be transmitted back to Earth via a satellite ground station. Proposals will be evaluated based on criteria such as solution/concept objective and justification, clarity and critical thinking, creativity, and practicality/feasibility of executing the code by the satellite onboard computer.

Satellite operators split over FCC order on C-band spectrum

C-BAND

The Federal Communications Commission (FCC) released its final report and order on repurposing C-band spectrum for 5G last month, shifting the amounts that satellite operators can receive in accelerated relocation payments to clear the spectrum quickly.

The document was released after the FCC voted 5-3 on February 28 to repurpose the spectrum. Satellite operators are required to clear the spectrum and the FCC will hold a public auction for licences to that spectrum, starting December 8 this year.

The C-band represents some 500MHz of spectrum from 3.7 to 4.2 GHz. The FCC argues that satellite companies no longer need the same amount of spectrum and can offer the same services with less bandwidth.

Satellite operators with licences for the spectrum will receive compensation both for the cost of relocating and accelerated relocation payments to incentivise them to clear the spectrum quickly – $9.7bn divided between Intelsat, SES, Telesat, Eutelsat and Star One. Intelsat will receive a bit more, about $4.87bn rather than the $4.85bn specified in the draft order. SES will receive about $3.97bn, Eutelsat will receive about $507m, Telesat will receive $344m and Star One will receive $15m.

While SES and Telesat welcomed the decision, ABS claimed it was fatally flawed, adding that it would challenge the order in court after the FCC rejected its request to make incumbent space station operators eligible for reimbursement of space station facilities that it says "will not remain comparable after the transition".

ABS Global Chairman and CEO Jim Frownfelter said: "This order is fatally flawed by its misinterpretations of the Communications Act. The Small Satellite Operators (SSOs) are going to be harmed by the unlawful revocation of the right to use 60% of their licensed C-band spectrum, and we will ask the courts to overturn this order and to instruct the FCC to start the entire process again."

Meanwhile, SES and Telesat congratulated FCC Chairman Ajit Pai and the Commission on the adoption of the C-band Report and Order.

Saudi Space Commission announces training base for research

TRAINING

The Space Generations Programme (Ajyal), launched by the Saudi Space Commission, will establish a national training base for scientific research, Abdul Aziz Al Al-Sheikh, said CEO of the Saudi Space Commission. Ajyal will cooperate with specialised academic circles to achieve progress in research related to space science and its applications. The programme will focus on learning in STEM areas. Commenting on the Ajyal programme, Al-Sheikh said: "We derive our inspiration from the experience of Prince Sultan bin Salman bin Abdul Aziz, Chairman of the Board of Directors of the Saudi Space Commission, and his team, who were passionate, creative and determined to reach space."

Inmarsat announces connectivity services in Saudi Arabia with partners

CONNECTIVITY

Inmarsat has launched maritime, aviation and enterprise connectivity solutions to Saudi customers through new deals. Inmarsat also announced that it has secured new spectrum licences to deliver both its narrow-band (L-band) and high-capacity broadband (Ka-band) Global Xpress (GX) services in KSA, enabling Saudi businesses to deploy these services for the first time.

Khaled al Saleh (CITC), Abdullah Sulaiman (Sada), Neil Pringle (Inmarsat), Ronald Spithout (Inmarsat), Zeina Mokaddem (Inmarsat), Faris al Alam (CITC), Malik Sulaiman (Sada), Shabeer Mohammad (Global Beam Telecom).

Sada Al Ammah and Global Beam Telecom will work with Inmarsat's enterprise business to bring its connectivity services to land-based users in the Middle East. Inmarsat's maritime business will partner with Sada Al Ammah to distribute connectivity services for merchant and offshore vessels operating in Saudi waters, with full access to Inmarsat's Fleet Xpress services. The firm's aviation business will work with the same company to deliver cockpit safety services and passenger cabin broadband WiFi connectivity to companies in the Kingdom.

Mike Carter, President of Inmarsat Enterprise, remarked: "Our partners have a wealth of experience and understanding of the local markets, which, coupled with the strength and reliability of Inmarsat's services, make a powerful combination that we feel will provide a foundation for connectivity excellence and growth in the region."

Eutelsat reports $689m revenue for H1 2019-20

REVENUE

Eutelsat Communications has reported total revenue of $689m for H1 2019-20. Revenues of the five Operating Verticals (ie, excluding Other Revenues) were $688m. Q2 revenues were $345m, down 1.2% on a reported basis and down 3.4% like-for-like. Revenues of the five Operating Verticals were $345m, down 3.7% year-on-year and up 0.4% quarter-on-quarter on a like-for-like basis.

H1 Broadcast revenues were down 1.6% like-for-like to $421m, reflecting notably the termination of a contract in Sub-Saharan Africa and the effect of the return of a couple of transponders in Russia. Q2 revenues were $211m, down 1.5% year-on-year and stable quarter-on-quarter.

H1 Mobile Connectivity revenues were $44m, down 0.6% like-for-like. The ramp-up of capacity contracts on KA-SAT and maritime business, as well as the carry-forward effect of the UnicomAirNet contract on EUTELSAT 172B, offset the end of a temporary wide-beam contract in FY 2018-19.

Azam TV partners with Azercosmos in Tanzania

PARTNERSHIP

Azercosmos and Tanzanian digital satellite services provider Azam TV have signed an agreement to provide digital terrestrial transmission (DTT) services to Tanzania, with Azercosmos providing DTT services to viewers via its C-band telecommunication satellite, Azerspace-1.

UAE surveillance satellite launch delayed: Arianespace

SATELLITE LAUNCH

Arianespace announced that the Soyuz launch carrying the UAE's Falcon Eye 2 surveillance satellite had been postponed. Falcon Eye 2 is a high-performance optical observation satellite for commercial and military users in the UAE. Arianespace said in a statement: "Due to additional checks to be performed on the Fregat upper stage of the Soyuz flight VS24, the launch initially scheduled for March from the French Guiana Space Centre is postponed. The launch vehicle and its satellite payload have been placed in standby mode and maintained in fully safe conditions."

MBRSC opens registration for UAE mission to Mars

UAE MARS MISSION

The Mohammed bin Rashid Space Centre (MBRSC) has opened registration for Analog Mission#1, an eight-month mission in Moscow as part of preparations for the UAE's plan to enter Mars. The mission, part of the Mars 2117 Programme, studies the effects of isolation and confinement on human psychology, physiology and team dynamics to help prepare for long-duration space exploration. Shortlisted candidates will be reviewed and interviewed, and the finalists will undergo various tests before the final members of CrewONE are announced.

The Mars 2117 Programme aims to establish human colonies in Mars by 2117. By simulating space-like conditions on Earth, Analog missions enable space scientists to conduct experiments, develop countermeasures for space hazards and test new technologies designed for space.

HE Yousuf Hamad AlShaibani, Director-General of MBRSC addresses the press.

Adnan AlRais, Mars 2117 Programme Manager at MBRSC, said: "We will conduct a series of behavioural experiments, the results of which will enable us to better prepare for crewed missions to Mars. The participants will be confined within the laboratories for the duration of these experiments and carry out various experiments and simulated tasks. We are looking forward to the outcome of these results, as it will enable us to better understand the effects of isolation and confinement on the human body and mind."

ITU issues deadline for satellite list submission

AFRICA

The International Telecommunication Union (ITU) has issued a deadline of May 22 to African countries on the submission of the proposed number of satellites to be launched in space. This is in line with the aim to implement the agreement reached by member states at the World Radiocommunication Conference (WRC-19) in Sharm el-Sheikh, Egypt last year.

The notice is to be filed with the ITU. Application of the procedure will allow 31 countries to choose new channels to replace their current assignments in the Broadcasting Satellite Service plan.

33% of applicants to second batch of UAE Astronaut Programme are women

UAE SPACE

The second batch of the UAE Astronaut Programme has received more than 3,000 applications. The registrations for the second batch of the programme were meant to close on 31 March, 2020, but the deadline may have been extended owing to the coronavirus outbreak.

There are some interesting facts about this batch of applicants. 33% are women. 17% are pilots and 31% are engineers, out of which 28% are female engineers. The programme has received the most applicants working in Etihad Airways, the UAE Armed Forces and Dubai Police. While the average age is 28, the youngest applicant is just 17 and the oldest is 60. The majority come from Abu Dhabi, Dubai or Sharjah.

The UAE Astronaut Programme was initiated in April 2017 to prepare an Emirati astronaut corps for scientific space exploration missions, creating a culture of systematic endeavour and motivating young people to pursue space science.

After reviewing all applicants, a committee of 10 specialists, including astronauts Hazzaa AlMansoori and Sultan AlNeyadi, will shortlist the applicants based on initial interviews and evaluations. The shortlisted candidates will undergo a selection process, and two will be selected as the next Emirati astronauts.

Exolaunch to deliver UAE-developed MeznSat into orbit on Soyuz-2 rocket

SATELLITE LAUNCH

Exolaunch will launch MeznSat, a 3U cubeSat aboard a Soyuz-2 rocket, for the UAE Space Agency in June 2020. The purpose of the satellite is to study and monitor greenhouse gases, specifically CO2 and methane, over the UAE.

MeznSat is a nanosatellite for climate observation manufactured by the Khalifa University of Science and Technology (KUST) in partnership with the American University of Ras Al-Khaimah (AURAK) and funded by the UAE Space Agency. The satellite's primary payload will be a shortwave infrared (SWIR) spectrometer that makes observations in the 1,000-1,650nm wavelength range to derive atmospheric greenhouse gas concentrations.

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

MeznSat will be accommodated on one of the upcoming Soyuz-2 federal launches as part of the small satellite cluster launch contract between Exolaunch and Glavkosmos, the operator of international commercial activities for the Roscosmos State Corporation for Space Activities.

"We are proud to apply our expertise and utilise our EXOpod deployer for this Soyuz-2 mission," said Jeanne Medvedeva, Commercial Director at Exolaunch.

UAE Space Agency announces space law details

SPACE POLICY

The UAE Space Agency has announced details of the new UAE Space Law issued by HH Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE. The law was passed by the Cabinet in late 2019, headed by HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai.

The Space Law aims to create a legislative and regulatory environment for the national space sector, in line with the UAE laws and regulations. It also aims to protect UAE interests by establishing a balance between economic and commercial requirements, encouraging innovation, adhering to security and safety requirements, and protecting the environment.


At a workshop organised in Abu Dhabi to discuss the UAE space law.

During the workshop, UAE Space Agency employees reviewed the regulations of the new law, consisting of nine chapters and 54 articles that regulate space activities across the UAE and govern the Agency's role in this regard. It clarifies the mechanism for issuing space activity permits, registering space objects and vehicles, responsibility and insurance regulations for space activities, accidents and risks regulations, the transitional period for current operators regulations, the provisions for regulating the construction of facilities on other planets, as well as the utilisation of space resources and developing space debris mitigation measures.

HE Ahmed bin Abdulla Humaid Belhoul Al Falasi, Minister of State for Higher Education and Advanced Skills and Chairman of the UAE Space Agency, said: "The new law sets a clear framework for the rights and duties of officials and establishments operating in this sector and guarantees the rights of all relevant parties, in compliance with the international agreements and treaties signed by the UAE."

The UAE space sector has provided 1,500 rewarding jobs at 57 space-related entities, five space research and development centres and three universities offering space degrees.

SpaceX to launch Intelsat 40e satellite in 2022

SATELLITE LAUNCH

Satellite telecommunications company Intelsat has selected SpaceX as its launch partner for the Intelsat 40e (IS-40e) satellite. The launch is planned for 2022. Intelsat 40e is a geostationary satellite that will provide Intelsat government and enterprise customers across North and Central America with high-throughput, coast-to-coast services. Maxar Technologies will manufacture the satellite.

Intelsat 40e is scheduled for launch in 2022.

In 2017, SpaceX launched Intelsat 35e, a satellite currently providing high-throughput coverage for Intelsat customers in portions of North and South America, Europe and Africa.

Intelsat Chief Services Officer Mike DeMarco said: "IS-40e will join the Intelsat Epic high-throughput satellite fleet and integrated IntelsatOne ground network to provide our customers with the managed hybrid connectivity they need in today's ever-changing world."

Satellite and Space Show in Turkey postponed

EVENT POSTPONED

The Global Satellite and Space Show, originally scheduled for April, has been postponed to June 24-26 and will take place at Antalya International Airport in Turkey. Measures in place include a historical analysis of official delegates, a thermal camera for the exhibition area entrance, and microbacterial cleaning of exhibition areas.

Morocco distributes satellite phones in remote areas

CONNECTIVITY

The Moroccan government has distributed 150 satellite phones in villages in mountainous areas in preparation for cold weather. Satellite phones connect to the telephone network by radio through orbiting satellites, instead of the terrestrial cell sites that mobile phones use. These phones work in areas that are off the telephone network grid.

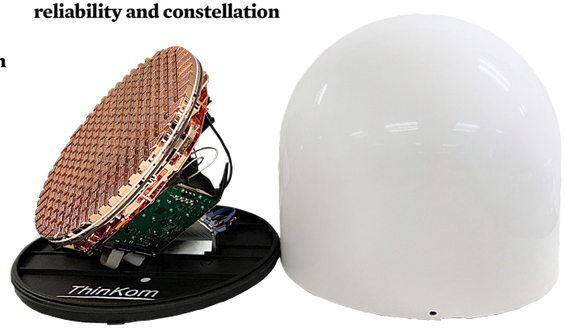
ThinKom develops prototype for user terminal

PRODUCT LAUNCH

ThinKom Solutions has unveiled a prototype low-cost, lightweight user terminal for the emerging consumer and enterprise satellite communication markets. It is a compact, lightweight unit that offers the spectral efficiency, beam agility and switching speeds to work efficiently on satellites in low-Earth orbit (LEO), medium-Earth orbit (MEO) and highly elliptical orbit (HEO).

The new user terminal is built on ThinKom's patented CTS parallel plate flat-panel antenna technology, which is field-proven and deployed by government and commercial users across the globe. ThinKom has worked closely with a Tier 1 contract manufacturer to incorporate high-volume manufacturing processes and materials that have reduced manufacturing costs without compromising performance in terms of spectral efficiency, reliability and constellation interoperability.

The full-duplex antenna terminals boast 60% lower profile and 75% less weight, compared to traditional parabolic dishes of comparable performance. ThinKom's user terminals reduce both installation costs and maintenance costs.



SES to connect aid projects in Africa

CONNECTIVITY

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

As part of the solution, SES will provide antennae, installation, satellite bandwidth and end-to-end services to allow Enabel and its partners to upgrade the skills of African professionals, elevate the healthcare system and improve living conditions.

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

Nicole Robinson, Senior VP of Global Government at SES Networks, added: "We are incredibly proud and humbled to provide Enabel with connectivity so that training programmes and various critical applications can be deployed, and quality of life in remote locations can be improved."

Eutelsat to offer DTH satellite services across Sub-Saharan Africa

BROADCASTING

Channel network and content distributor AfricaXP has signed multi-year agreements with Eutelsat Communications for Ku-band capacity on two of its satellites, positioned at 16° East and 7° East. This capacity will enable AfricaXP to extend the reach of its DTH FTA platform, Premium.Free.

Currently broadcast in West Africa, the platform will leverage the coverage of Eutelsat's 7° East hotspot to roll out a regionally customised offer of 23 channels across eastern and southern Africa from mid-February.

In addition, AfricaXP will launch an inaugural 10-channel French-language bouquet from Eutelsat's 16° East position, with its powerful footprint over French-speaking African countries.

Commenting on the agreements, Craig Kelly, AfricaXP CEO, said: "Eutelsat's 7º East and 16° East positions offer us comprehensive geographic reach in Africa's key western, eastern and southern markets, where they serve large audiences."

Nicolas Baravalle, Director of the Sub-Saharan Africa region at Eutelsat, added: "This partnership reinforces the strength of these two orbital hotspots for the Sub-Saharan region, which are becoming increasingly sought after by broadcasters."

Spacecom enables satellite broadcasting in Nigeria

BROADCASTING

Spacecom is providing Ku-band capacity to German company PanAccess for broadcast operations in Nigeria. Spacecom operates the AMOS satellite fleet, which comprises four Ka- and Ku-band satellites: Amos-3, -7, -17 and -4.

Communication satellite AMOS-17 was launched last year to expand and strengthen Spacecom's coverage of the growing satellite market in Europe and the MENA region.

BeepTool Communications to roll out services in Nigeria

CONNECTIVITY

BeepTool Communications, a Nigerian satellite-as-a-service and integrated digital ecosystem provider, is set to officially roll out its services across the country in Q2. The Lagos-based company aims to deliver digital inclusion services to millions of people in remote and rural communities in Africa, and is also developing a range of services and products across mobile connectivity, telehealth, edtech, agrotech, fintech, messaging and voice.

Starting with rural communities in Nigeria, BeepTool carried out a market study of 200 communities across the country's six geopolitical zones, to understand how digital services can be deployed. As a result, it is on track to roll out its digital services and technology solutions to about 200 rural communities in Nigeria.

STARTING LOCAL, **AIMING UNIVERSAL**

Entrepreneur, survivor, innovator – Reema Omari knows how to overcome the odds. Showing the courage to restore connectivity in two of the world's most challenging conflict zones, she's also no stranger to competition, creating successful niche businesses in turbulent high-profile markets as CEO and founder of Universal Satcom

Connectivity is every economy's lifeline today – and a big casualty in any conflict zone. In fact, according to ratings agency Standard & Poor's, in 2019 the economies of nations engulfed in conflict underperformed by more than $900bn, and a key reason cited for this shortfall is the loss of connectivity. A floundering internet service means companies cannot contact customers and suppliers, pay staff, distribute products or effectively promote goods and services.

Businesses also typically shy away from operating in conflict zones – but not Universal Satcom. Helmed by Reema Omari, one of the few women heading a satellite solutions company in the MENA region, the company has fearlessly navigated the hazards in such countries to put vital infrastructure in place and restore connectivity to enterprises.

"The reality is that challenging circumstances define a need in the market," explains Omari. "We try to identify that need and provide a solution to address those challenges."

That quest for commercial opportunity led her to create a bespoke set of enterprise- and SME-focused services for Yemen, supported by a technically adept team that is able to lay down infrastructure and fully customised services.

"You have to remember that there are many people and companies that have no connectivity at all because of the dispute there. We started in Yemen with a small network providing services for eight locations. We work mainly with the region's SMEs and the smaller oil & gas businesses who generally need data connectivity. We had contacts there who were interested in upgrading their network, and I looked at how best we could develop that opportunity."

Omari took a bold step that most people young in the business wouldn't dare to take: she secured a whole beam on Arabsat when the operator launched a new satellite last September.

"We got an exclusive beam from Arabsat and offer customised solutions ranging from 60GB to 1TB," she clarifies. "We are the newest service provider in Yemen and still an early player, but we hope to be one of the recognised service providers in the country soon. It took us one year to find the right satellite capacity to serve the area. We sourced services that would provide very good value without affecting the quality. To suit the SME market, we also successfully launched two smaller packages recently. Our plan, though, is to slowly expand our Ka-band SATNET solution to a

global service, with more regional coverage in many countries."

This high quality means that while SMEs remain a primary focus, the service also appeals to public institutions, civil government agencies and defence corps, all of whom depend on secure and reliable communications. Whether operations focus on emergency response, humanitarian aid, intelligence, security or defence, Universal Satcom "is able to provide flexible and robust high-performance solutions that can rapidly be put in place", says Omari.

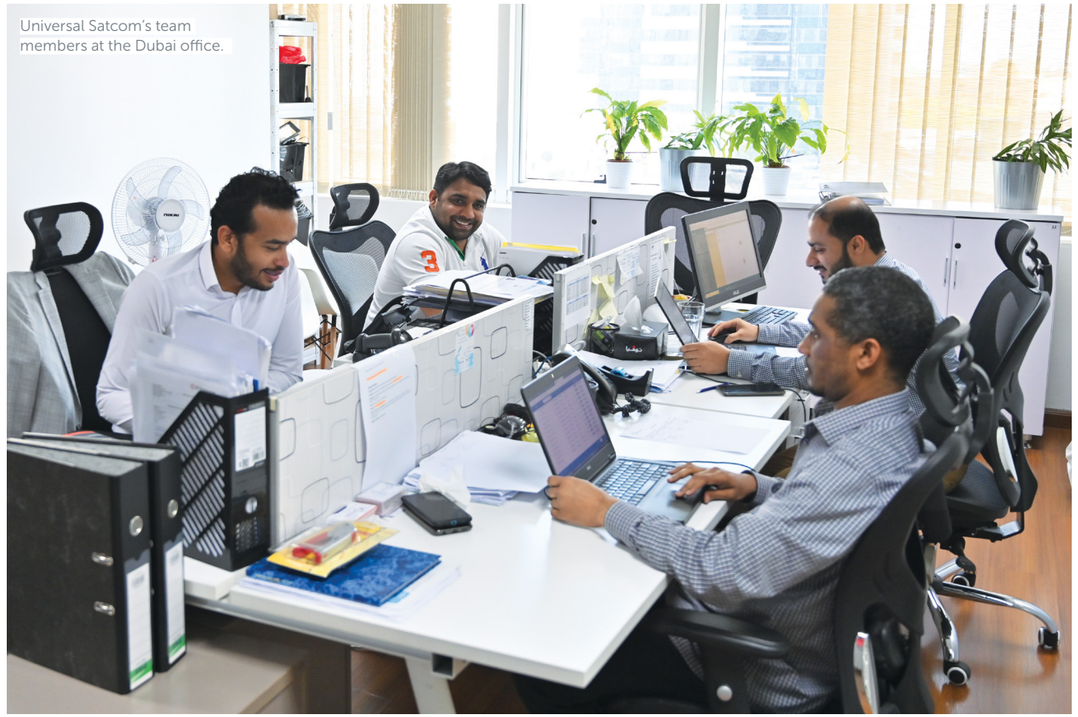
Achieving this outreach, of course, is not without its challenges.

"Having CPEs [customer-premises equipment] in the country was the biggest challenge," replies Omari. "But I believed we had to be patient and get everything properly in place, not rush in before the service offer was correct. In the first year, we made the equipment available in Yemen – and once we launched, it was fully-fledged. Everything was ready. We assembled and integrated the infrastructure in Yemen with the team we had there on the ground. Throughout, all the equipment is procured from Europe and comes through Dubai, with installation being done on the client side. We send it there to Yemen and the team know exactly how to integrate it."

> "We are the newest service provider in Yemen and still an early player, but we hope to be one of the recognised service providers in the country soon"
>
> **Reema Omari, CEO, Universal Satcom**

Omari is also particular that infrastructure and systems are put in place for the long term.

"Our solution is developed to last five years or more; we are confident there will be a huge demand from Yemen. Our service isn't the cheapest, but with most of the lower price options, you have to ask – will it work? I sell quality solutions. Things have changed there so much as a result of the war. Previously it was a monopoly, hugely controlled and with very restricted licensing. Now there is room to work in the market."



Universal Satcom's team members at the Dubai office.

Given that Universal Satcom specialises in serving the largely rural parts of the country, isn't there the problem of people not really understanding how a satellite solution works and how it's relevant to them?

"Well, the bottom line is that everyone needs to be connected these days. It's true that most people don't know much about satellite. I tell them that whether it's from a satellite or from a cable, you'll have internet at the end! The bottom line is, without our service there is nothing in the more rural areas."

Seeing how Universal Satcom has supported enterprises in Yemen, Omari has now expanded into Libya, another country where connectivity leaves much to be desired.

"The situation in Libya," explains Omari, "is very similar to Yemen. Outside of Tripoli, there is very little infrastructure. Businesses desperately need connectivity and we are there to provide it. In Libya, we currently offer VSAT services through Ku-band, but soon it will be on Ka-band. Libya is another major opportunity for us."

Omari's rugged entrepreneurship in two of the world's most threatening war zones is a stark contrast to her early days. With a master's in Quality Management Systems from the University of Wollongong, Dubai, and a certification as an internal auditor for ISO 9000 and ISO 14000, she began her satellite journey in quality management with a regional VSAT operator, where she stayed for eight years until 2014.

"There, the CEO taught me everything I know, but sadly he passed away. I gained a lot of knowledge as a quality manager about standards and legal procedures, as well as in-depth knowledge of the business. The CEO gave me a lot of freedom for self-development. I'd been able to work as if I was the owner of the company; this was my training and the start of my ability to build a business from scratch. I developed all my contacts and network at this stage, so when he was gone, I maintained the same standards that he did. But his departure also meant a change in culture and it was time for me to start out on my own."

> "The situation in Libya is very similar to Yemen. Outside of Tripoli, there is very little infrastructure. Businesses desperately need connectivity and we are there to provide it"
>
> Reema Omari, CEO, Universal Satcom

The initial approach of Universal Satcom was very different.

Omari explains: "At first I found a different niche, which was the aviation industry. This was the original purpose of Universal Satcom, to provide satellite services for aviation. After thoroughly researching the sector, I created a unique turnkey solution to equip, certify and operate a satcom solution for private business jets. We spoke to business jet owners and thanks to four partnerships with US and European companies, we were able to provide niche solutions in the aviation sector.

"But even small projects in aviation take two to three years to complete, and survival in the interim can be hard while those complex deals are finalised. Our involvement in the sector, though, was impacted when the whole economy changed in 2014; we'd been targeting VIPs, but this segment almost disappeared."

However, Omari has a never-say-die streak.

"My approach is always that I can lose a battle, but I don't lose the war. We continued to refine and evolve our aviation offer so that today we are serving aircraft with airtime, passenger connectivity, safety and operational services in global datalink. We provide hardware support, from initial engineering design to final delivery and worldwide ground support.

Universal Satcom's VSAT internet can be used in a wide range of applications and is suitable for any environment

> We noticed that many companies in the sector ... were experts in radio and navigation, but weren't VSAT specialists like us"
>
> Reema Omari, CEO, Universal Satcom

"Those earlier changes in the aviation market meant that we also started targeting the maritime industry, which is another key sector. Today, satellite communications technologies can transform life at sea. They enable company owners to track their ships and cargo around the globe, and the crew can be fully up-to-date with meteorological developments, track other ships' movements and, of course, stay in touch with family back home. At Universal Satcom, we can offer regional and global coverage, with installation by experienced maritime or IP engineers and with services and infrastructure proactively monitored and controlled 24/7.

"Our VSAT solution for ships, with connectivity with Ku-band, VSAT and Airband solution, has been a big success and to date, we have achieved more than 100

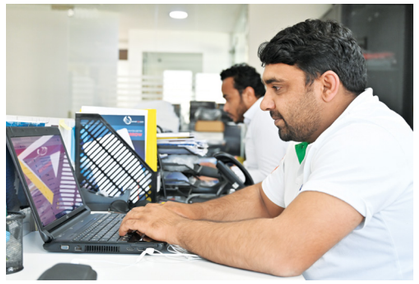
VSAT systems for vessels. We were offering as a back-up system Fleet Broadband from Inmarsat and Iridium Open Port, so we were unique in this market.

"We noticed that many companies in the sector weren't really satcom people. They were experts in radio and navigation, but they weren't VSAT specialists like us. This gave us an ongoing competitive edge, and today the maritime industry remains a key market for us. We have now established ourselves as a communications service provider and systems integrator, focussing on land and maritime. On land, we have Ka-, Ku-, VSAT, with a full turnkey solution. For maritime, we provide a VSAT solution (Ku- mainly), with technical support and a back-up solution based on L-band from Inmarsat and Iridium."

Universal Satcom's VSAT internet can be used in a wide range of applications and is designed for any environment. It delivers internet capabilities even in the remotest places, straight from the satellite to the company's teleport. This means users are never at risk of being disconnected from email, phone calls or critical business applications, even in the most isolated areas.

Universal Satcom operates three distinct divisions as a result, Land, Maritime and Aviation, with highly specialised technical skill sets in each. It's a strong testimony to Omari's entrepreneurship that this has in no small measure been achieved through a very powerful series of partnerships, working with global partners such as Intellian, Iridium and Inmarsat.

"To be successful in these challenging markets, you have to be aligned with the companies who have set high standards in terms of technical ability and coverage – companies whom our clients can totally rely on."



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> Reema Omari, CEO, Universal Satcom

terms of technical ability and coverage – companies whom our clients can totally rely on."

One key reason Omari has been able to shine in this market is the fact that bigger corporations didn't pay much attention when a small company showed up, giving her the opportunity to blossom away from watchful eyes.

"Big corporations don't take smaller players like us seriously, and that means we have the opportunity to go out and shine because no one is watching us closely or seeing the need to compete with us. So we can go in under the radar and create real market success in otherwise challenging places like Yemen and Libya, and highly competitive segments like the maritime sector. By the time they noticed us, we managed to hold a strong position in the market."

So what's it like to work at the company? Is there an X-factor behind this successful mesh of talent? Omari believes it may be her commitment to a very flat organisational structure.

"I love the phrase 'simplicity is our complication'. We don't have elaborate hierarchies; I believe in teamwork and I don't micro-manage at all. The result is that while we might be a small team, we appear in the market as a huge power! In reality, everyone in the team is a salesperson, representing the business and adding value to as many client conversations as possible.

"I also think it's important to work around people's needs and obligations, so we have a flexi-time system in place where the emphasis is on getting the job done right, rather than arriving or leaving at exactly the same time each day. I must add, though, that that doesn't seem to apply to me – the reality is that whenever you text me, you'll find me!" PRO

INTERFERENCE, 5G AND MORE FROM SIG

Satcoms Innovation Group (SIG) recently appointed Helen Weedon as MD, while her predecessor has joined the group's advisory board. In a chat with *SatellitePro ME*, Weedon discusses interference, 5G and other trends that are now part of SIG's remit, as well as the next steps for the group in the coming months

Satcoms Innovation Group (SIG), formerly known as the Satellite Interference Reduction Group (SIRG), was initially formed to address the issue of interference, raise awareness and give the industry the means and processes to tackle it. SIRG was known for spearheading several initiatives, most notably around carrier ID.

More recently, the group rebranded as SIG because interference is mostly under control and other technical challenges required the organisation's dedication and focus. With three directors, seven full-term members, 20 associates and three academicians, the group aims to stay focussed on the technical concerns within the satellite industry.

Helen Weedon is no stranger to the satellite world. Apart from having been with SIG since 2011, where she has helped develop and implement membership and public relations strategies for the group, she has also worked with several satellite companies on their public relations activities. Her new remit, however, is to run and grow SIG as well as plan its events and initiatives.

"In my role at SIG, I am supported by an excellent team of directors who are able to advise on a more technical level and update me on the challenges they are facing which we should address. It is important that the group keeps its focus on bringing together the technical operatives to solve challenges and promote innovation. It is my job to make that happen," Weedon tells *SatellitePro ME*.

Former MD Martin Coleman helped drive the group forward and created "a unique technical forum for the satellite industry ... I would like to build on his momentum and enthusiasm to make SIG an invaluable resource for the industry, an incubator of innovation, and the group that the entire industry sees value in joining", she adds.

As a member of the small but growing group of women in the satellite industry, Weedon feels it is important to get "in front of aspiring satellite professionals at a young age to encourage them, both boys and girls, to join this industry".

"At SIG, women are still under-represented but I do have another woman on the Advisory Board – Angela Wheeler of Intelsat. Generally, it is good to have women in leadership roles in any industry and satellite is no different. I am also not technically trained, which has meant over the years that I have had to listen and learn so much, and I still have a long way to go with my technical knowledge and understanding. However, what I hope that brings is a different outlook on the challenges we face, while being supported by the directors who are in the thick of it with technical operations."

Under Weedon's guidance, SIG hopes to explore newer areas within the satellite industry, though its core achievement continues to remain interference and raising awareness of both the problem and the tools available to combat it. Although jamming is very rare across the world, the Middle East has historically been the biggest problem area, owing to the political volatility within the region. Still, it has reduced considerably even here.

"The challenge is that we don't have tangible statistics, although we have tried on numerous occasions to collect this. However, anecdotally we believe that instances of interference are reducing; and perhaps more important, time to resolution has decreased thanks in part to our efforts and to some great tools that have been introduced to the market," Weedon explains.

> "Given that a huge percentage of all interference is caused by faulty equipment, ensuring good antenna performance will undoubtedly make a difference"
>
> **Helen Weedon, Managing Director, Satcoms Innovation Group (SIG)**

Interference has also diminished thanks to a steady stream of new technologies entering the market. Verisat, for instance, launched a tool to make it quick and easy to detect VSAT interference several years ago. The tool was so successful that the company was soon acquired by Kratos Communications, which has further developed its capabilities, Weedon says. More recently, QuadSAT launched a tool using drones which is set to revolutionise the way antennas are tested.

"Given that a huge percentage of all interference is caused by faulty equipment, ensuring good antenna performance will undoubtedly make a difference," she says.

Integrasys is another company that has launched some innovative tools for interference reduction, making it easier to set up antennas correctly without causing mispointing, she points out. While tools are available, most interference is "caused by human error, followed by equipment failure as the second element", Weedon points out. "The more tools we have that eliminate those problems, the better. Initiatives such as SOMAP, of course, go a long way to helping with that."

SIG is now looking to include topics around 5G and satellite's role in it, including the challenges faced by LEO operators and the problem of debris, says Weedon.

"Our main goal is to bring the right people together to discuss those challenges within the satellite space, so that we can collectively find resolutions. Our next workshop, which takes place in May at Goonhilly in the UK, will address LEO challenges and opportunities."

Although a big satellite programme was being planned at ConnecTechAsia in June along with SIG's traditional innovation tours, where it takes participants to member booths on the show floor, the recent global pandemic and the subsequent postponement of the Singapore show have dampened some of those efforts.

But that has not deterred the group, which has launched an innovation hub to help companies get their latest innovative solutions in front of the industry. SIG also has plans to launch a brand-new awards programme later this year, though details have not been announced yet. PRO

LEADING FROM THE FRONT

Yahsat is the world's eighth largest satellite services operator and the UAE government has tasked a young generation of Emiratis with taking this business forward. In an exclusive interview with *SatellitePro ME*, four UAE nationals who were promoted within the company share how they will leverage their experience to grow the company

Eisa Al Shamsi
Deputy GM – Yahsat Government Solutions

How is Yahsat's government arm different from, say, its commercial arm?

Yahsat Government Solutions (YGS) provides managed communications solutions to the UAE government and administrations around the world for defence and other mission-critical applications. YGS enables secure capacity and turnkey satcom platforms to optimise solutions for its customers. It provides governments satellite-based products and services through its proprietary and partner operator-supported satellite network, with the option to uplink from its highly secure UAE teleport connected to the secure UAE government network, or from customer facility-hosted hub anchor stations, or from forward operating bases for certain government customers.

Essentially, YGS supports the UAE and regional governments through leveraging a government-secured teleport infrastructure; a strong international network of partnerships with satellite equipment and service providers; a highly responsive NOC and field service team supporting onshore, offshore and air operations 24/7; international and security-cleared staff with expertise in satellite communications and Earth observation services; and offering expertise in supporting satcom-based beyond line of sight (BLOS) for multiple command and control (C2), intelligence, surveillance and reconnaissance (ISR) programmes installed on airborne, naval and land-based platforms.

What are the current challenges in any military or government network around the world, and how can satcom technology improve current military communications systems?

Government and defence agencies share a critical mission – mainly to protect lives. Whether that's on the battlefield or across the nation/homeland, this demands failsafe communication capabilities. And today, government and defence agencies around the globe are pushing communications further to give them every advantage to get the mission done.

For military organisations these days, it looks like this: military aircraft exchanging data, voice and high-definition ISR video with troops on the ground and at sea. Navy vessels rigged with full broadband capabilities. Land-based vehicles transformed into mobile command units. Soldiers on the ground equipped with total communications access through portable, lightweight, power-efficient terminals. The goal is full situational awareness and coordination at every level of command.

These capabilities require complex applications and operations, and that's where the challenges reside. Today's militaries cannot achieve their mission's goal without a secure and reliable network that they can fully trust. Furthermore, the networks that the militaries operate cannot rely solely on ground infrastructure that can be targeted or easily compromised. Militaries have limited theatres of operations with common terrestrial and mostly line-of-sight communications. Lastly, the threat of jamming and signal interception as governments become more dependent on these satellite-based technologies is becoming more prominent. Today, wars are fought asymmetrically, so military forces require secure military-grade networks that provide continuous communication to in-motion and stationary personnel, vehicles, and equipment, giving commanders and troops always-connected, secure access to applications and information, and improving situational awareness and mission effectiveness. There is little room for security breaches or outages of any kind – for even a few minutes' delay could result in fatalities and influence the outcome.

Trained at the UAE Armed Forces Signal Corps, Eisa Al Shamsi was part of the Yahsat satellites' (AY1 and AY2) programme in Toulouse, France.

> "The global tactical military communications sector [will] witness substantial growth over the decade ... it will be worth $151bn by the end of 2028"
>
> **Eisa Al Shamsi, Deputy GM – Yahsat Government Solutions**

Additionally, expectations of connectivity on the battlefield are high but largely unmet. Users expect the same level of connectivity and access to trusted and timely information on the battlefield as they get in the civilian world. However, most feel they do not have the level of connectivity needed to successfully execute their mission objectives. Often, connections are disrupted to a point where they have zero connectivity on the battlefield, especially when it comes to scenarios involving dismounted troops or soldiers. Communications have always been a weak link between the various mobile units of armed forces, whether between ground, airborne and seaborne units, or between forces and non-aligned units such as foreign coalitions. The need to deploy such satellite-based networks in a short time frame in the field also poses its own challenges in many cases. This is where satellite-based communications and solutions come into play – especially as bandwidth requirements surge, technology budgets fall and end-user specifications grow increasingly sophisticated.

That's the context in which YGS, together with Thuraya, has to work in order to address those challenges and gaps, and that is how it is focusing on a portfolio of high-performance, extended security products and solutions designed for reliable throughput and service requirements, and meeting stringent industry and military standards to serve in the toughest field assignments. These can exploit a variety of frequency bands – from L-band to Ku-, C- and Ka-band – to support a wide range of mobile and fixed applications.

What does your new role at Yahsat entail?

My responsibilities entail the successful delivery of all projects undertaken by YGS, besides facilitating its role as Yahsat's government network design authority. In addition, I handle managed communications solutions and consultancy services for the government sector to address specific needs. I also lead the YGS team's technical roadmap and strategy to foster growth in line with the YGS mission and objectives. Because I am often in challenging situations that afford no room for error, I have grown more detail-oriented. YGS is highly trusted by our anchor customer, the UAE government, to deliver technical consultancy and mission-critical solutions design and delivery requirements, which require that my team and I constantly retrospect and innovate so that we are always at the top of our game.

I hope to see YGS become a trusted and regional centre of excellence when it comes to satellite-based programmes supporting governments.

What plans do Yahsat and Thuraya have to develop their unique solutions? Do they intend to expand to more

regions as a single entity?
The global tactical military communications sector, which consists of airborne, naval, man-portable, vehicular and stationary segments, is set to witness substantial growth over the coming decade. According to estimates, it will be worth $151 billion globally by the end of 2028.

For government customers, Thuraya and Yahsat are developing a full portfolio of products and solutions based on existing products, as well as future solutions that are in development. The L-band portion of that offering is unique in that it is based on the Thuraya L-band network, which guarantees resilience and assured connectivity mainly for quick deployment, mobile portable and communications-on-the-move applications.

Together, we offer a ubiquitous and large footprint spanning more than 190 countries, with flexibility against adverse weather conditions, hardware comprising small-form terminals, and bandwidth pricing models that enable cost-efficient deployments and implementation on small mobile platforms.

You were part of the Yahsat satellite programme in France. How has that helped you?
The experience I have gained from working with a professional team in France on such a critical and technically demanding programme is already proving to be priceless in how we address other programmes at YGS. Challenging programme timelines, constantly changing dependencies, evolving issues and risk mitigation are commonplace in government programmes we are involved in, and this was no exception. This has helped me understand the programme partners' capabilities, working modes and quality standards that can be used for other programmes.

What will be the biggest trends in the ground segment in the coming years?
The global government satellite industry is going through a profound transformation, and the effects are felt on the ground segments too. Shrinking budgets struggle against evolving technological requirements (e.g. software-defined networking, higher throughputs and sophisticated traffic management tools), new architectures (e.g. hybrid of star/mesh topologies and interoperability between different frequency band networks) and evolving business models (e.g. infrastructure-as-a-service, risk-sharing schemes, fewer-larger deals) that will shape the future of the ground systems.

Governments are prioritising the on-the-ground components of their missions to avoid scenarios where satellites go under-utilised because of inadequate ground segment systems. There are several satellites that have been in orbit for years now without the right user terminals, because of ground segment infrastructure shortcomings.

If we do not treat the ground segment as a system, we will not build it as a system, and afterwards, run the risk of getting it delivered in components that are not compatible with one another. The ground element takes time to develop. Given the cost and technical constraints, we cannot implement a new ground system for each new generation. For example, the very popular small-satellite projects are built on short timelines and cannot spare the time to build new ground systems for each mission. As a result, operators are looking for common ground systems that they can reuse and upgrade repeatedly. They want their ground segments to support as many missions as possible without the need for major developments for each satellite.

Khalid Al Kaf
Deputy Chief Operations Officer – Yahsat

How did you come to join Yahsat?
I was recruited by Yahsat in 2017 to merge and lead its Operations team. I began my career at Etisalat as a Development Engineer within its Operations group and in 2006, moved to its start-up team to oversee the expansion of Etisalat into the Egyptian market. There, I worked in various capacities, as Application Developer, Development Manager and other senior management roles, before being appointed Director of IT Infrastructure & Operations to manage Etisalat's IT infrastructure and operations for applications, hardware, network, B2B, software and IT capacity management.

At Etisalat, I was focussed on developing and implementing innovative solutions, besides leading major advances in revenue generation. In 2017, Yahsat approached me to amalgamate and lead its YGS Operations team.

How do you intend to improve and balance Yahsat's position in the space industry?
Currently we are doing very well on the financial front, with no losses. But the main objective is to achieve the largest possible capacity in Africa to grow our returns and market shares. We do this through partnerships to ensure our core capabilities are complemented with what others may do best. Our partnership with Hughes is a case in point. We have been working together since 2011, with Hughes providing the broadband ground systems for the Al Yah 2 satellite and the Al Yah 3 satellite. This has evolved into the Africa and Brazil JVs that capitalise on the unique value proposition from each party in the market and across the value chain. In 2019, we collaborated with Morvest to implement a new go-to-market model for Africa, offering direct contract-based subscriptions to consumers and small-to-medium enterprise (SME) customers. We also launched a YahClick partnership with Facebook on Facebook's Express Wi-Fi platform, to expand its Wi-Fi product set.

After our acquisition of Thuraya, we are looking to widen the scope of our existing relationships within a much bigger footprint, besides actively seeking new partnerships.

Are there any plans for Yahsat to expand its satellite fleet?
Yahsat operates a fleet of five satellites at present: Al Yah 1, Al Yah 2, Al Yah 3 and Thuraya 1 and 2. In addition to these satellites, we

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> "I challenged the established thinking in the same way that I did in Egypt and was able to influence a wider circle of innovators"
> **Khalid Al Kaf, Deputy Chief Operations Officer – Yahsat**

supported the designing, testing and launching of the UAE's first nanosatellite, MySat-1, aimed at training and educating the students of Khalifa University. Its successor, MySat-2, is scheduled for launch in Q4 2020. The students will go through all stages of operating the satellite, from design and model-making to building and launching, and eventually controlling and communicating with it. That's all we can say at present.


Khalid Al Kaf is focussed on addressing the strategic operational outcomes that influence business performance and efficiencies of cost at Yahsat.

What are some of the challenges ahead of you?
Prior to my appointment as Deputy Chief Operations Officer of Yahsat, I was the Executive Vice President of Operations. The various roles I have undertaken over the years have sharpened my focus on operational matters that are so vital to improving the overall business efficiency of the organisation. When I was working in more junior roles at the start of my career, I noticed that my superiors were reluctant to take risks in operations, due to the wide impact of changes across the business. Then, fifteen years ago, I was given the opportunity to work with a startup team setting up Etisalat in Egypt. I quickly learned that maximising efficiency required all established norms that I had accepted in the UAE business to be questioned.

I constantly challenged suppliers and service providers to deliver more. I looked at insourcing, outsourcing and technology as both improvement solutions and ways to improve bargaining positions. Through innovating in this way, we gained huge savings due to the scale of operational costs, and delivered significant value to the business.

At Yahsat, I was able to use those skills effectively to demonstrate how innovations can have a profound impact on productivity and performance in a larger business. I challenged the established thinking in the same way that I did in Egypt and was able to influence a wider circle of innovators and thereby accelerate the performance of the overall business. My next big project for Yahsat is Smart Spending, which could streamline company operations and activities in a big way.

As a recognition of his contributions, Al Muhairi was conferred with the Emiratisation Award for the Best Emirati in a Supervisor Role (2019) by Tawteen, the UAE Ministry of Human Resources and Emiratisation, in February 2020.

Adnan Al Muhairi
Deputy Technical Officer, Yahsat

What were you involved in before taking on your current role?

After completing college, I was asked to be part of a satellite development programme in South Korea. I participated for three years, working as a Research and Development Engineer on the UAE's first successful remote sensing spacecraft, Dubaisat-1 and Dubaisat-2. My next project was in France, overseeing Payload Engineering for the UAE's first communication spacecraft, Al Yah 1 and Al Yah 2 – a $2bn programme that now serves multiple commercial and governmental entities globally. This network introduced the first true satellite broadband service across the Middle East, Southeast Asia and Africa, enabling diverse commercial communication services in these regions.

Soon afterwards, I moved to the Engineering division at Yahsat, where we designed multiple future systems and ultimately implemented the Al Yah 3 satellite communications system, a highly advanced space network that expanded our services into Brazil. I managed this programme for nearly four years in Virginia in the US, managing a core team of seven professionals, HQ Engineering support as well as industry specialists. I personally designed this structure to be lean and cost-effective. During this time, I collaborated with many government entities and global industry leaders such as Boeing, Lockheed, Airbus, Thales, Mitsubishi, NEC, OrbitalATK, Tesat, L3 Technologies, ILS and Arianespace.

> "While innovation in the space segment is good, we must also consider overhauling the intelligence on the ground and continue to build the existing infrastructure"
>
> **Adnan Al Muhairi, Deputy Technical Officer, Yahsat**

What are some of the technical developments at Yahsat?

We are embarking on an ambitious space and ground systems replacement programme for Thuraya in Q1 of 2020, which includes two advanced L-band spacecraft. With the induction of the new satellites, the overall capacity and performance of the Thuraya network is set to increase considerably. Enhanced L-band performance means higher data rates through smaller terminals that can support a wider range of voice, narrowband and broadband applications for current and new user segments. Subsequently, we will be developing new products and services that require higher bandwidth and throughput.

We will disclose more information about Thuraya's next-generation system in due course. But it will be a shot in the arm for our aero mobility and IoT/M2M businesses.

What responsibilities does your new role entail?

As Deputy CTO, I ensure that Yahsat and Thuraya implement optimal satellite solutions to serve our customers. This includes addressing parts of the world that do not have access to communications. I make sure that our satellite fleet and ground systems are secure and reliable. I also help train and mentor young Emiratis at Yahsat. I lead three great teams: Space Segment Engineering, Systems Engineering and Ground Engineering. We are responsible for many engineering tasks such as design, integration and delivery of satellite systems and various engineering analyses to support our customers.

With LEO and MEO gaining ground, is Yahsat exploring any partnerships on this front?

While LEO and MEO constellations are finally gaining traction, they are not without their set of challenges. We are still unsure of the cost of these deployments and if there is sufficient demand for multiple constellations to coexist. We are in discussions with key players to explore different options.

One thing is certain: we are not considering launching a LEO or a MEO constellation. We will be paying close attention to the operators to see how we can drive win-win partnerships. While these conversations are happening, let me add that the new space and the old space can definitely coexist. While innovation in the space segment is good, we must also consider overhauling the intelligence on the ground and continue to build the existing infrastructure, because this greatly impacts our deliverables to end consumers. Ultimately, they are interested in what they get from the service provider.

Tell us about the challenges you have faced in your career.

I was Programme Director for the Al Yah 3 satellite. I was responsible for the whole programme, from the Request for Proposal stage to the spacecraft delivery to the launch site. This $250m programme entailed a three-and-a-half-year assignment at the manufacturer in the US and a programme management team, which comprised Emirati engineers and local contractors, to oversee all aspects of the spacecraft integration, testing and launch campaign. Al Yah 3 used a new design with a lot of new developments and a challenging schedule. It was launched in January 2018 and has been operating flawlessly, as are Al Yah 1 and Al Yah 2.

Sulaiman Al Ali
Deputy CEO, Thuraya

What brought you to the satellite industry?

I joined Yahsat in 2014 as Director Satellite Projects and was tasked with delivering end-to-end managed satcom solutions for government customers. Since then, I have played many roles before being appointed now as Deputy CEO of Thuraya. In this role, I aim to augment the company's operations and revenue growth through enhanced communication services for both our government and commercial customers. I am also responsible for strengthening Thuraya's commercial strategy and leveraging its extensive offerings to provide our customers with flexible, adaptive solutions that address a wide range of critical communication needs.

How will you use the expertise you have built at Yahsat to make Thuraya profitable?

I believe solutions and business strategies that are backed by genuine insights, market research and pre-emptive customer service will unlock opportunities for growth. When you remove certain functionalities, stick to the essentials and add features that customers really need, you stimulate interest. We factored this simple yet crucial detail when developing our latest maritime voice solution, Thuraya MarineStar. The post-launch results from Asia are adequate proof that our readings were accurate – an unprecedented demand for Thuraya MarineStar has eclipsed supply. In a market of declining profits, last year was exceptional for us in terms of revenue growth.

What do you think are some of the big needs and trends in satcom market verticals, and how do you see Thuraya supporting those markets?

We perceive great opportunities in the aerospace market. The launch of our aero mobility platform – Thuraya Aero – last year marked Thuraya's entry into the high-speed connected aerospace market. We held a couple of highly successful aerial surveillance demos of the Aero solution for key UAE government customers.

Demand for aeronautical connectivity could be driven by new markets and projects such as the One Belt One Road initiative to connect China to Europe, and to East Africa through Central Asia. Most of these trade routes pass through remote areas with little to no connectivity. The supply chain and aerial logistics tracking requirements on these routes will be huge, requiring reliable solutions that we can supply.

We are also excited about the Internet of Things (IoT). Since terrestrial cellular networks do not provide full coverage of the Earth's landmass, the need for more satellite-based connectivity for the IoT sector to reach its full potential is undisputed. Although 5G is right around the corner, the next generation of cellular mobile networks will not fit every need. Thuraya can fill the gap by enabling wide-area IoT deployments.

Maritime, especially its entry-level segment, also holds great promise. More than 80% of the world's fishing regions lie within Thuraya's footprint, so ours is a truly inclusive service. Governments now require fishing vessels to report their catches electronically and log their movements while at sea. Thuraya makes compliance simple by bundling all the essential elements into simple solutions backed by flexible pricing.

What will Yahsat's backing help Thuraya do that it could not do before?
The acquisition of Thuraya in 2018 has helped Yahsat-Thuraya to become the world's eighth-largest satellite services operator, providing an integrated mix of fixed and mobile satcom technologies in more than 160 countries across Asia, Europe, Africa, South America and Australia. By effecting a total convergence of Ka-, Ku-, C- and L-bands, we have demonstrated our commitment to a fully connected world with safer borders, seas and skies. From consultancy, customisations for products and applications to operations and maintenance, we provide governments and multinational enterprises a secure, interoperable and multiband communications platform that never fails in times of need.

In 2020, Yahsat will initiate an ambitious satellite replacement programme for Thuraya. As its majority stakeholder, the company has a clear vision and a well-defined roadmap for Thuraya's future development.

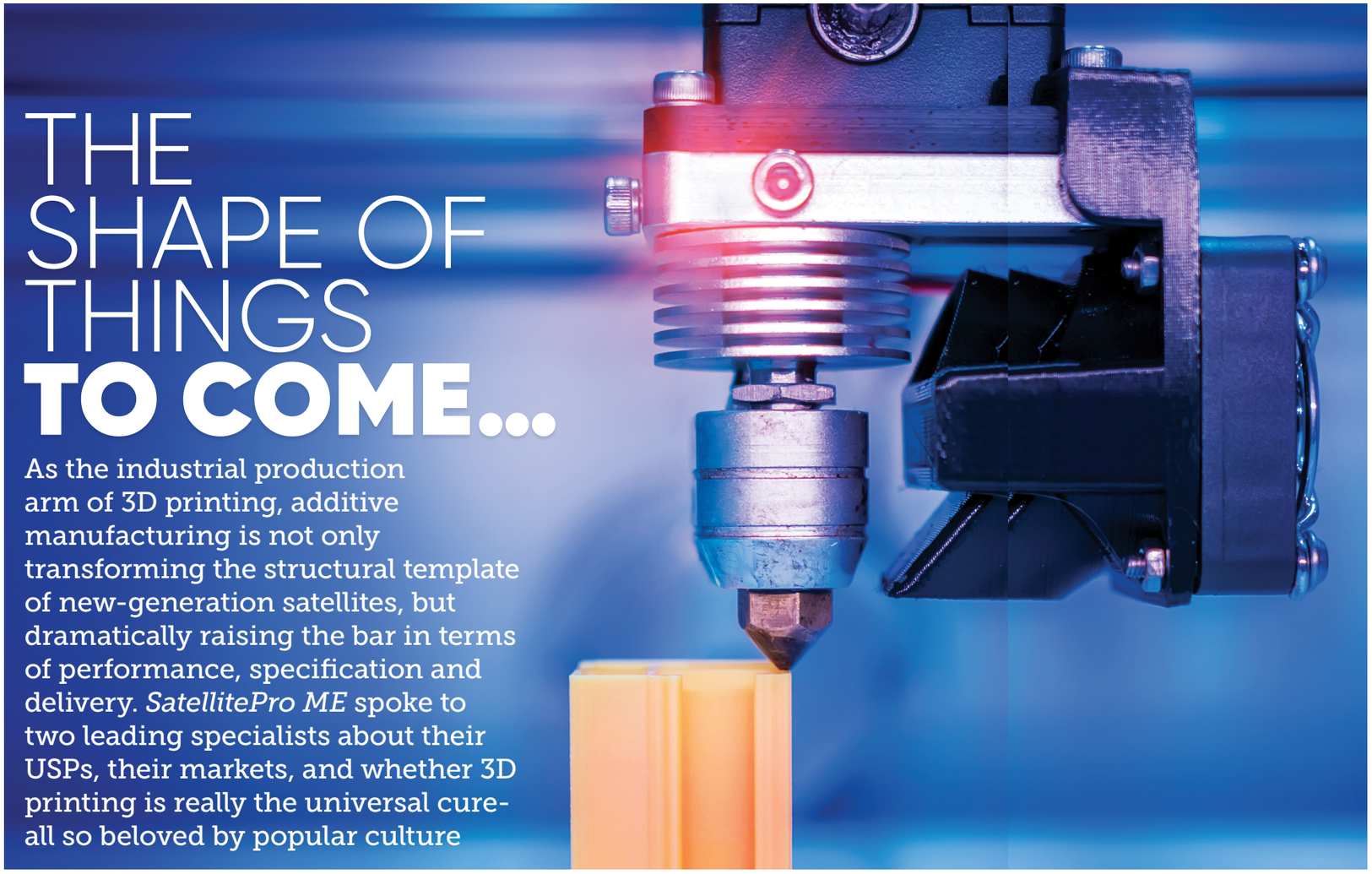
In your 17 years of experience, what have been your biggest challenges?
Very early in my career, I received international exposure through stints in tough environments like Nigeria, Pakistan and Ivory Coast. Each day presented a new set of challenges. Rather than viewing them as impediments, I learned to identify the hidden opportunities they contained. After joining Yahsat, I managed government and military customers who do not take no for an answer. No matter how difficult the situation is, there is no room for delay or excuses in the critical communications sector. Such experiences compel you to be innovative and develop solutions in line with customer requirements, within stipulated timeframes.

> "In 2020, Yahsat will initiate an ambitious satellite replacement programme for Thuraya"
>
> **Sulaiman Al Ali, Deputy CEO, Thuraya**

What opportunities do you foresee in 2020, and how will Thuraya address them?
Thuraya has consolidated its position overall, optimising revenue inflows and reining in operational expenses. Diversification in terms of deliverables and distribution channels is vital for future growth. Therefore, the challenge for us now is to establish our presence in newer market segments such as IoT and maritime.

Satellite operators need to transform from capacity providers to service providers, offering their customers an entire package. Following Yahsat's lead in this regard, Thuraya could go deep into the value chain by providing managed solutions – a process that can involve designing, building and even operating a network, depending on customer demands. This could very well be the future for us. PRO

Sulaiman Al Ali has more than 17 years of experience, working in the regional and international telecommunications sector across the UAE, Nigeria, Pakistan and the Ivory Coast.



THE SHAPE OF THINGS TO COME...

As the industrial production arm of 3D printing, additive manufacturing is not only transforming the structural template of new-generation satellites, but dramatically raising the bar in terms of performance, specification and delivery. *SatellitePro ME* spoke to two leading specialists about their USPs, their markets, and whether 3D printing is really the universal cure-all so beloved by popular culture

It's a truism that space exploration and deployment has always been among the earliest of adopters when it comes to new technology. So just as the world was sitting up and taking notice in 2016 when a Vulcan 2 3D printer was used to create homes in Latin America – at a cost of only $6,000 per building – the space industry was quietly getting on with its own adaptations of the technology. More than $9bn of venture capital was finding its way to Silicon Valley pioneers specialising in 3D printing processes for aeronautical and space vehicle componentry.

Since then, the pace of change has been remarkable, with even industry titans such as Boeing progressing from traditional multi-component assembly to additive manufacturing on large-scale satellite projects. When a Boeing satellite was launched in May 2019 with arguably the first-ever 3D printed metal antenna, it showed that a major sea-change had taken place, and the development of one-of-a-kind, custom-made designs had become the new normal.

So what exactly are the benefits of additive manufacturing (AM), and what are the catalysts for the rapidly accelerating take-up of its advancing technologies in the satellite sector?

First things first. AM is used primarily because it's cheaper than conventional engineering assembly, right?

"That's a loaded question," says Janos Opra, CEO of Optisys, a metal additive manufacturing specialist focusing on 3D metal printing of commercial and military antennas and RF components. "In reality, it's important to compare like for like, oranges with oranges. In general terms, 3D printing would be four times more expensive. If you are only carving out a single piece of aluminium, that process is very cheap and you don't need to go down the 3D printing route. The 3D printing machines are very expensive and you wouldn't want to use them for a more simple, straightforward process.

"It's with the more complicated projects that 3D printing comes into its own. If you are adding a lot of new elements into the mix, it starts to be cheaper. Adding extra features with conventional processes can mean completely rethinking your assembly line, whereas with AM, you can simply make one change to the software blueprint and everything is taken care of in one step."

Opra's comments are echoed clearly by Ole Geisen, Head of Engineering Services for Additive Manufacturing for Siemens, one of the largest industrial technology companies in the world. He believes that in most cases today, the component cost is not reduced by AM.

"In sectors like space, aerospace and energy, many customers are more interested in the benefits generated by operating an optimised component, which is why these industries were among the early adopters of the process. So performance is usually the main concern when considering AM, and staying cost-neutral is a common requirement. Other important advantages of AM that customers usually try to leverage are the improved lead time or the possibility to source components on demand, which can lead to indirect cost savings."

The reality is that performance enhancement, not cost-saving for its own sake, is the core USP of AM. This is never truer than in relation to one critical feature: weight. Just as the astronaut Neil Armstrong called water "the gold of space", weight-saving is the Eldorado of satellite manufacture.

"In modular systems," continues Opra, "you have very heavy elements which may weigh 15-16 pounds, but with our processes, you are replacing these with pieces that may only weigh a few ounces. We can also add in extra elements within a week – for example, adding an additional filter and so on. The weight reduction can be 10-100 times! Plus, the beauty of the AM process is that we can specify the performance criteria the client requires and then create a programme to make the structure as thin and lightweight as possible, to save on the manufacturing cost. We add in just enough material to withstand the stress required."

Geisen concurs. "Even with simple topology optimisation, it is usually possible to reduce the weight of, say, a machined bracket by around 20% while improving the stiffness. Depending on the quality of the initial design and the possibilities to integrate multiple parts into one, the weight reduction can be higher still."

This weight-saving aspect is particularly important, given that the type of AM used in space applications is metal-based AM, not the plastic or acrylic styles of 3D printing that might first come to mind based on an awareness of domestic or construction usage.

"Metal is required for most aerospace applications," Opra explains. "Aerospace companies require a strong material – plastics can't handle the extreme

temperature variations. For antenna purposes, the best material is aluminium, because it has the highest signal conductivity (although in reality, gold is the best of all – but just imagine the weight. Not to mention the cost!). Plastics will often be used for prototyping, although they cannot generally be used in the finished aerospace application.

"There are many different processes, and each one is better suited for a different purpose. Some are better for making very large structures, some are better for making multiple structures. At Optisys, we use powder bed fusion. This is a very refined process of metal AM and gives the finest resolution, which you need for antennae."

This same process is used by Siemens.

"We have been among the very early adopters of AM, starting to use laser powder bed fusion in 2006 and collaborating with several printer OEMs to drive the technology from laboratory to industrial applications. At the same time, we have worked on the software solutions necessary to turn all the creativity of our designers into 3D-printed parts," says Geisen.

What about the actual composition of the alloys most frequently used? Geisen elaborates: "It's interesting to note that traditionally, the chemical composition of AM materials didn't really differ from conventional alloys, and this was mainly to improve the acceptance of the technology. But even with the same chemical composition, the printed material can behave differently due to its microstructure. Lately, we have seen a growing number of alloys designed specifically for AM, with better processability and performance. This is a very positive development, as it shows the increased confidence in the technology. AM is here to stay and not just a temporary trend, so investing in pure AM materials makes perfect sense."

> "It's with the more complicated projects that 3D printing comes into its own. If you are adding a lot of new elements into the mix, it starts to be cheaper"
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> Janos Opra, CEO, Optisys

For both Geisen and Opra, metal 3D printing is enabling both companies to support their clients' varying space ambitions. Opra says Optisys went directly to metal 3D printing when it started.

"That's why, four years ago, we started the company. No-one else was doing this. Then, within a month of launching the business, we launched the first design, and now we are building up a large library of designs."

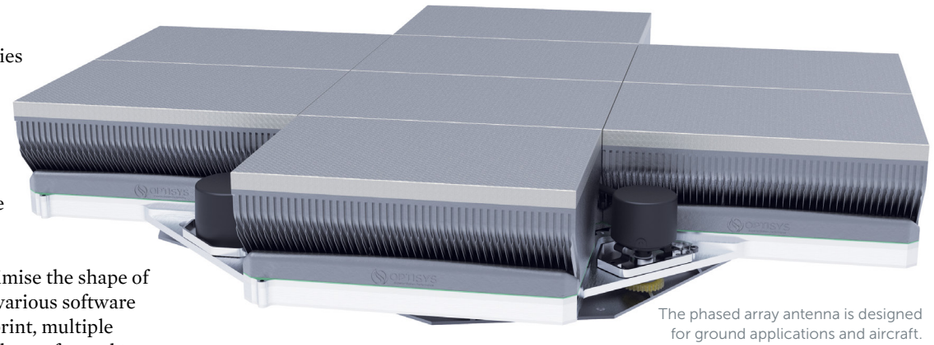
Geisen says Siemens' role in the space industry is to support customers by creating designs that fully use the potential of metal AM. "We then print the parts at the highest possible quality and provide expertise in qualification processes. Our partners are pioneering new satellite concepts – we help them to successfully implement AM on that journey."

Similarly, the early trend of using AM to replicate traditional assembly features has given way to the power of being able to make purpose-made parts that offer new levels of performance and technical quality. AM is also very quick so it's a brilliant solution for prototyping.

Opra explains: "3D printing allows for quick functional prototypes and can create objects a regular machining, brazing or casting process cannot. For example, curved internal features, air cooling features, lattice structures for decreasing weight, etc. But the reality is, every type of technology has its advantages and its problems. We picked AM because it gave us a new option – remember, antennas had been created the same way for the last 30-40 years. AM allows you to make very compact integrated structures, things that could never have been manufactured in the past because they would have needed 30 separate pieces and processes.

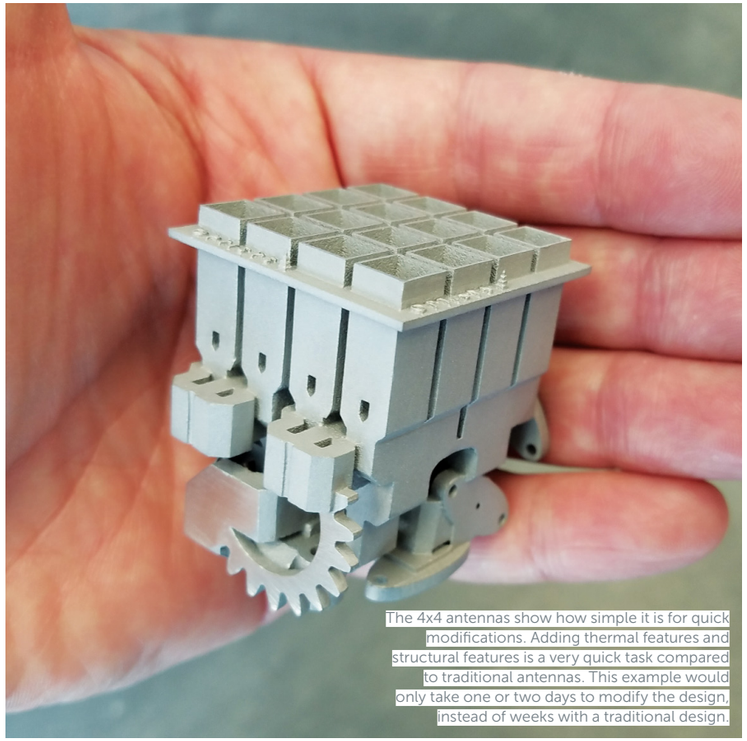
"It's also important to remember that AM has its own unique design process, and time and again we found we had to start the design process from scratch. Whatever designs you liked in the past don't work anymore. You may have designed it in a certain way to get certain results, but these criteria just don't exist anymore."

This step into the unknown can involve complex benchmarking tests to demonstrate that AM structures have the required compliance. Geisen reviews the typical timeline: "First, a machine and a process need to be selected and fine-tuned to guarantee reproducibility. Numerous test bars are then printed to analyse the material properties in a wide range of mechanical tests, for example, tensile and fatigue tests. The acquired data allows design engineers to optimise the shape of the structure in various software tools. After the print, multiple quality tests can be performed to guarantee conformity. This can include dimensional tests, surface roughness measurements or CT scans for critical structures."



The phased array antenna is designed for ground applications and aircraft.

In fact, the R&D process can be extremely complex when it comes to creating AM componentry and structures. Geisen continues: "If a customer component needs to go through full certification, the material data generation alone can last half a year. Adding the external certification process, we see programmes that easily run for a year or even more. The creative design process and a validation build job are only a small portion of the total development lead time – most of the time is spent on the qualification. While this can sometimes be frustrating, we strongly believe that the introduction of new standards and more cross-industry collaborations will help reduce the AM development times."



The 4x4 antennas show how simple it is for quick modifications. Adding thermal features and structural features is a very quick task compared to traditional antennas. This example would only take one or two days to modify the design, instead of weeks with a traditional design.

Once the compliance protocols are established, the manufacture is not only very quick but virtually free of waste and capable of completely raising the bar in terms of sheer accuracy.

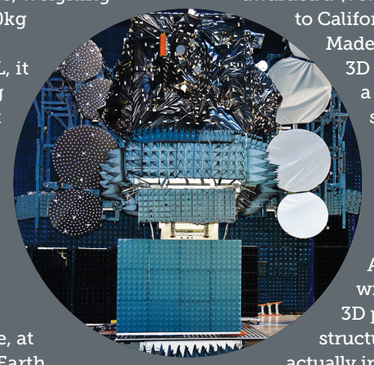
Opra says: "We don't have to have things on the shelf which aren't needed – all we need in stock is powdered aluminium. A traditional system can take 9-12 months to design. But we are down to two-three months, and we believe we can cut this down to several weeks in the future. The design is much faster, the manufacturing is much faster and the cost is much cheaper. Moreover, the likelihood of error is much less – there are fewer things that can be broken along the way.

"Once the 3D printers are in process, they are very accurate unless the machine has a malfunction. Of course, there can still be human error afterwards; for example, if someone drops the piece or breaks it while taking it out of the machine!"

In many cases, technological advances are making earlier aspirations a reality. "The key trends I see now are not new," says Geisen. "Functional integration and light weighting still have

Players, titans, imagineers – satellite innovators committed to additive manufacturing

The heavyweight 'brothers'
When Canadian operator Telesat launched the heaviest commercial satellite ever made, weighing in at a hefty 7,000kg from spacecraft manufacturer SSL, it was also breaking another record: it was the heaviest satellite built and customised using 3D printing.
The Telstar 19 Vantage orbits with its twin, Telstar 18 Vantage, at 36,000km above Earth. They not only have 3D-printed components in the antenna struts, supporting antennas, tracking equipment and satellite control equipment, but feature part-chassis printed assembly too.



Why stop with the satellite?
As for Telesat's lighter-weight offerings, Terran 1, the rocket set to carry them into LEO, will itself be the product of super-advanced 3D printing. Relativity Space, a Californian aerospace company, has signed a contract with Telesat to create an entirely 3D-printed rocket using the Stargate 3D printer. With this robot-operated system, Terran 1 can reportedly be built and deployed within 60 days.
Tim Ellis, CEO and co-founder of Relativity Space, says, "We've actually been able to come up with the world's largest metal 3D printer to print this rocket out of a custom aluminium alloy, which we're also developing ourselves."

Made in Space ... Literally
The ultimate frontier for AM is self-assembly in space. NASA has awarded a $73.7m contract to Californian startup Made in Space for 3D printing using a free-flying small satellite that additively manufactures solar array beams in space. The mission, Archinaut One, will be able to 3D print its own structures while actually in orbit. The small satellite is set for launch in 2022, and no prizes for joining the dots to future applications: NASA claims in-space robotic manufacturing can be vital for future human expeditions to the moon and Mars, where astronauts are distant from ground-based supply chains.

Thales' Moroccan 3D hub
French multinational Thales Group has invested heavily to create a global centre of AM expertise in Casablanca. It supports Morocco's ambition to progress in the aerospace sector and the new centre, which will specialise in metal additive manufacturing, is at the heart of the Thales group's Industry 4.0 development programme. Spread across an area of 1,000sqm in the Midparc zone in Casablanca, the centre is equipped with two selective laser melting technology machines, able to fuse metal alloy powders using a high-intensity laser and to manufacture metal parts of unrivalled complexity.

huge potential for satellite applications. Two of the main benefits in designing AM parts are the possibility to combine multiple parts into one (potentially with improved functionality) and topology optimisation – only putting material where it's really needed. We still see plenty of opportunities that can be covered by these approaches. Current developments like multi-material AM or a combination of different AM technologies will allow us to identify further applications in the space industry over the next couple of years."

Indeed, Geisen believes that, even with larger satellites, AM is now at the stage where it is actually enhancing the overall technical performance of the satellite.

"Light weighting, increased stiffness or functional integration using AM all can lead to a tangible performance improvement of a satellite today. Yet conversely, at the stage we are at, I do also see some limitations for using AM in satellite assembly.

"For example, a first and still very real challenge is the lack of education around AM. Even for companies that have been doing AM for several years, having a highly educated core of designers and development engineers is not enough to turn a prototype into a successful serial part. All the stakeholders in an organisation, such as quality departments, strategic purchasing, management, etc, need to have a solid understanding of AM to complete a qualification.

"A second challenge we are always facing in highly regulated industries is the time and money needed for full qualification and certification of a new component, as described above. The certification bodies often have limited experience with the new technology and do not have pre-defined requirements, leaving it up to the user to make reasonable proposals. Really, the international standards for AM clearly need to catch up with the needs of the industry today. But we have seen some very positive developments recently, for example, the cooperation between ASTM and ISO."

In terms of the technology platforms available, it is, of course, the case that, as Opra explains, "Every few years the machines have a major improvement. Our Holy Grail is to find a machine that can do everything better – to find a machine that lifts our performance, reduces our costs and lessens our lead times, etc. From our point of view, certain providers stand out in the sector; companies like Eos, Concept Laser and SLM are the leading manufacturer platforms."

The actual level of AI in the printing process has not necessarily changed very much, though, as Geisen points out. "Today, the use of AI in the printing process is still very limited. This is why at Siemens, in cooperation with our software division, we have developed a machine-learning tool to analyse the vast amounts of data generated during the monitoring of long build jobs. In addition, we're participating in research projects that target the use of AI to optimise process parameters and accelerate development programmes.
"For a wider implementation in the quality assurance of serial components, these types of AI-driven software tools need to mature, but it's only a matter of time until we see them in the AM market. That's when we'll be able to deliver the next quantum leap in terms of performance capability as applied in the satellite sector." PRO

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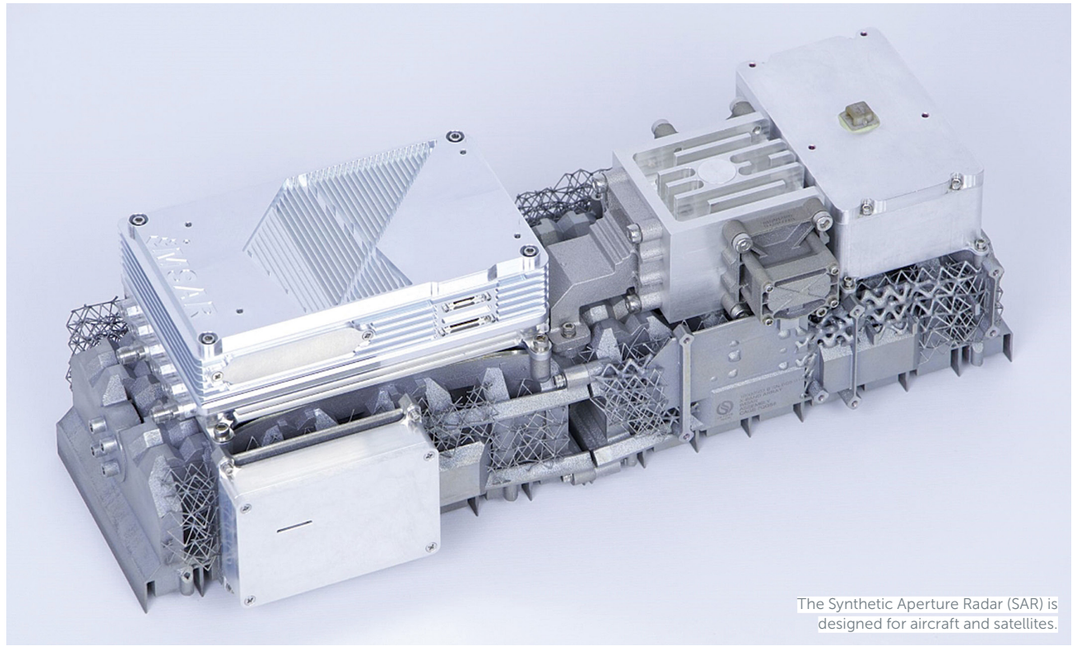
> **Ole Geisen, Head of Engineering Services for Additive Manufacturing, Siemens**



The Synthetic Aperture Radar (SAR) is designed for aircraft and satellites.

SATELLITE DISCUSSIONS AT WRC-2019

Martin Jarrold, Vice President International Programme Development at GVF, examines various resolutions around spectrum allocation that were passed at WRC-19, and then goes on to explore facets of a number of other vital industry topics

Late last year, GVF's Secretary General attended the most recent of the quadrennial gatherings of the International Telecommunication Union's Sector R (the Radiocommunication Bureau), popularly called the World Radiocommunication Conference (WRC). Regulators and industry representatives gathered to discuss competing claims for spectrum among different radiocommunications services, determining spectrum allocations between the satellite and other sectors such as IMT. It was an opportunity to create new spectrum rights for satellite and provide operational flexibility. These opportunities were largely successful.

Receiving most attention from the satellite industry was the proposed allocation of over 33GHz of spectrum to IMT, though actually only a little over half of that was ultimately identified for IMT, and important protections for key satellite spectrum in the C-, Ku- and Ka-bands were secured.

Identification of spectrum for mobile uses via satellite, providing high-bandwidth services in transport, also saw a positive outcome. ESIM (Earth Stations in Motion) satellite services are enjoying a growth cycle, which is forecast to continue. WRC-19 increased the spectrum for ESIM services in the 28GHz band and harmonised the international framework for authorising ESIM services. The Conference also decided to have a study performed for WRC-23 to define the conditions for communications of ESIMs with geostationary satellites.

A further positive outcome was the decision to allocate spectrum, 51.4GHz to 52.4GHz, for uplinks for fixed satellite service (FSS) gateways. This will improve services to end users by freeing Ka-band spectrum for user uplinks, which can be used to provide new services such as 5G.

Also established were new rules regarding NGSO satellites, which mitigate the risk of signal interference between the NGSOs and the GSOs sharing the same frequency bands. Protection of GSO satellites from NGSO satellites at C-band frequencies was maintained and a framework for NGSO satellites to operate in the Q/V-bands (40-50GHz) was established.

In relation to the building of the NGSO mega-constellations, rules were adopted requiring these systems to adhere to a specified milestone schedule, with failure to meet deadline targets leading to possible loss of assigned spectrum.

WRC-19 carried risks that satellite would lose spectrum rights as new technologies emerge and others develop. Advances in mobile telecommunications technology such as 5G, and the development of High-Altitude Pseudo Satellite (HAPS) platforms, also rely on spectrum. WRC-19 considered proposals that could have provided spectrum to enable these technologies at the expense of the satellite industry. Several decisions were taken to mitigate these risks.

Another area of keen interest for the IMT and satellite industries is the provision of C-band services. Satellite video and business services delivered via C-band are currently used by millions of customers worldwide. Billions of dollars have been invested by the satellite industry in providing the infrastructure needed to deliver these services. This spectrum is also attractive to IMT, as it does not possess many of the shortcomings of the higher-frequency millimetre wave bands. At WRC-19, the decision was taken to protect C-band downlinks in Africa and Asia using the 3.6-4.2GHz range, and it will not be on the agenda for WRC-23.

> "WRC-19 increased the spectrum for ESIM services in the 28GHz band and harmonised the international framework for authorising ESIM services"
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> **Martin Jarrold, VP International Programme Development at GVF**

Decisions taken at WRC-19 lay the groundwork for future spectrum battles. Studies initiated at WRC-19 create the possibility of battles with mobile (not IMT) in the European region over primary status in the 3.6-3.8GHz. Similarly, a study to be completed for WRC-23 creates the possibility of a spectrum battle with IMT in the Americas around the 3.3-3.4GHz and 3.6-3.8GHz bands. Another study initiated at WRC-19 for conclusion at WRC-23 calls for studying the use of IMT for fixed wireless broadband in the frequency bands allocated to the fixed services on a primary basis and identified for IMT.

While these studies carry risks for the satellite that will be addressed at WRC-23, other decisions carry the potential of favourable decisions at WRC-23. The 2023 agenda will address concerns for both the mobile and fixed satellite service spectrum, along with ESIMs operating with GSO/NGSO in Ku- and Ka-band respectively. Studies to be concluded prior to WRC-23 will also evaluate inter-satellite ('space-to-space') links, which are important for global NGSO and hybrid NGSO-GSO networks.

Also important to the satellite industry is what is not on the WRC-23 agenda. Specifically, C- (3.6-4.2GHz), Ka- (particularly 28GHz) and Ku-band are all off the WRC-23 agenda. This should deter some of the initiatives launched by other telecommunications platforms to acquire spectrum at the expense of satellite communications.

GVF has a keen interest in NewSpace, or Space 2.0 as it is also called. Indeed, I write this just as GVF has announced a new membership package for start-ups in the NewSpace

Smaller private companies are propelling the NewSpace ecosystem forward, says Martin Jarrold.

ecosystem. Smaller private companies are propelling the sector vigorously forward. The industry is undergoing an entrepreneur-driven industrialisation process going beyond the potential offered by the smallsats segment. Some important questions around this subject are: What are the limits to NewSpace? How does it relate to AI/machine learning? How much of a driver is the Industrial Internet of Things (IIoT)?

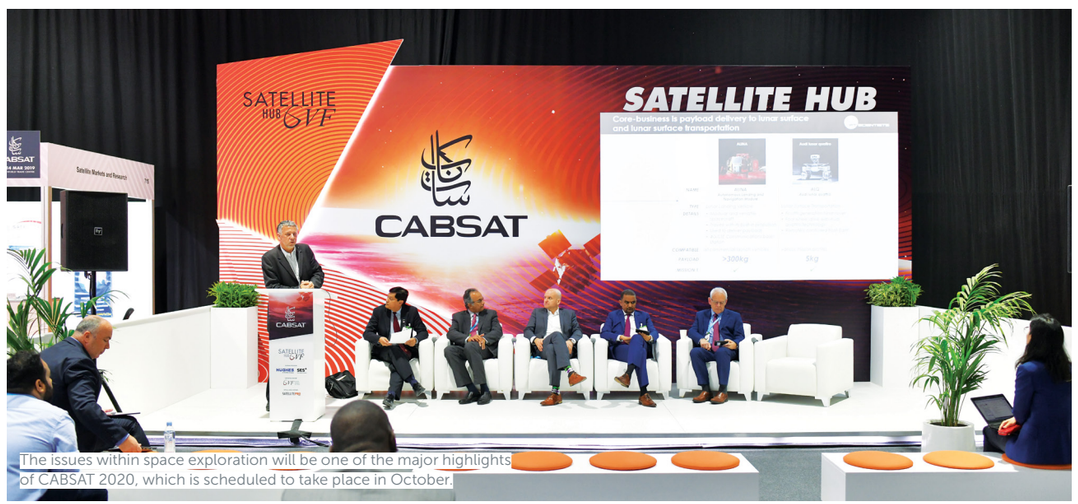
Smallsats: The growth of the smallsats segment in Earth imaging/remote sensing applications has fundamentally changed the scale, scope and potential of Earth observation. Once limited to government space agency big budgets, the technology, build and launch costs of remote sensing spacecraft are now altogether within the scope of myriad private companies, including new start-ups and spin-offs from academia.

Earth imaging/observation evolutionary drivers for new applications; new big data generations and imagery-based geospatial analytics GIS applications; high-resolution imaging and frontier technologies; the satellite communications interface with Earth imaging/observation; and building a global digital ecosystem – together with facilitating insights for sustainable decision-making and achieving the UN Sustainable Development Goals – are all key points requiring deeper exploration.

Disruptive technology continues to manifest itself in both space and ground segments of the satellite industry. With in-orbit technology, the latest GEO high-throughput satellites are close to achieving near-terabit capacity; existing MEO constellations are evolving into more powerful systems; and the first LEO mega-constellations are launching. The phenomenon of small satellites is a generational disruption, with miniaturisation and low-cost manufacture, improved link budgets, reduced latency and elevated constellation functionality, not forgetting opportunities for new customer markets and applications.

Ground infrastructure is undergoing a game-changing shift too. Teleports are evolving and their operations are virtualising to the cloud, and antennas/terminals are expected to soon feature cost-effective form-factor and performance departures from the traditional parabolic paradigm. This is not only of technological significance but opens new markets.

Mobility is another big issue in satellite and a growing market. The aeronautical segment has, until very recently, been increasingly delivering a substantial market. Analysts had forecast that the number of connected aircraft would increase significantly over the next four to eight years, with bandwidth demand increasing 20-fold and provider revenues eight-fold. An Inmarsat/London School of Economics study highlighted that the aero connectivity market would be worth $45bn by 2029. However, there are uncertainties with such themes as gate-to-gate WiFi; high-throughput broadband applications over multi-orbit interoperable seamless beam switching; service providers and airline operational efficiencies; and predictive maintenance using big data and analytics technologies. Now, however, the greatest uncertainty comes with doubts about the immediate future of many airlines as viable commercial operations as passengers stay at home. These doubts will continue, at least until



The issues within space exploration will be one of the major highlights of CABSAT 2020, which is scheduled to take place in October.

there is a solution for COVID-19.

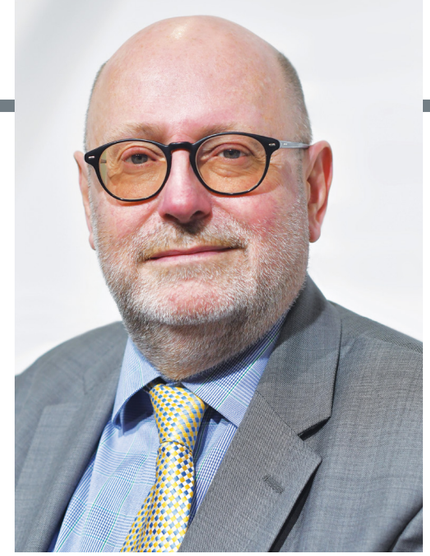
Military use of commercial satellite capacity is a continuing trend. Key issues in this subject area include provision of military-critical bandwidth capacity gap filling; the evolving satellite communications needs of the military – war-fighter, peacekeeper, disaster recovery first responder; military demand for satellite capacity and adoption of communications-on-the-move (COTM) and communications-on-the-pause (COTP) ground segment technologies; remotely deployed unmanned aerial vehicles; and other bandwidth-hungry intelligence and reconnaissance assets.

Shipping has a long relationship with satellite services – ships were really the first platforms to feature ESIMs. The market has been more vibrant with ship-owners transitioning to next-generation connectivity. The merchant, passenger and leisure segments have been yielding revenue growth. Oceanic coverage by high-throughput satellite continues to improve, and capacity and terminal pricing trends are favourable for maritime communications solutions buyers. Overall demand has been forecast to grow, driven at least partly by shipping companies outsourcing many of their operations and gaining from bundling of value-added services.

I noted above the role of the modern military in disaster response. For military first responders, and others such as NGOs across the entire Humanitarian Assistance & Disaster Response sector, satellite communications are mission-critical. GVF is an industry signatory to the United Nations Crisis Connectivity Charter and is the only private sector representative body on the Emergency Telecommunications Cluster, operated by the World Food Programme to meet the connectivity requirements of all UN agencies.

Satellite has a well-recognised and critical role in reporting on disaster assistance and appeals for funding, but it is also mission-critical in organising and delivering humanitarian aid and resources into the field. It is also integral to the success of the current and future roll-out of 5G networks. Important dialogue around the role of satellite beyond the 3GPP 5G use cases include such key themes as the enhanced technological contributions of HTS/VHTS in GSO, MEO and the new LEOs; emerging low-cost terminal technologies; terminal technology interoperability; and challenging mobile network operator negative perceptions about satellite.

Not so well-recognised are operational synergies with the cloud. Satellite's recognition of opportunities in partnering with the cloud is important – i.e., leveraging reductions in CAPEX and OPEX, rapid scalability, ease of development and accessibility – as it brings evolutionary change to the industry's value chain, to encompass data volumes and analytics products arising out of network operations and generated by NewSpace IoT and Earth observation. Today's satellite systems offer a reliable and robust connectivity that users depend on, but there are potential vulnerabilities, namely cybersecurity, interference and orbital debris.



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Cybersecurity is a concern for the entire IP-enabled global ICT infrastructure, not just for satellite. The European Space Agency (ESA) is calling for proposed solutions to determine the viability of satellite-based services in support of cybersecurity. Potential solutions will be enabled by space to mitigate security risks and enhance cyber resistance and the resilience of existing infrastructures, services and operations, contributing to enhanced end-to-end security. One key question: Is the satellite sector doing enough in the cyber security environment?

Interference is a vulnerability that the satellite industry successfully addresses through technological advancement and human capacity-building (i.e., GVF Training). There is a continuing focus on what still needs to be done, and this is being addressed through the terminal type approvals work of the GVF Mutual Recognition Arrangement Working Group (MRA-WG) and GVF collaboration with ESA and the ITU.

Orbital debris is an issue of more recent prominence. Topical here is the scale and operation of the new mega-constellations, and satellite operator responsibility for debris prevention and maintaining not only sustainable space, but a space sustainability-based future to support development on Earth.

The discussions will continue in Dubai in October when CABSAT 2020 is due to take place. PRO

CELLULAR BACKHAUL CAN TRANSFORM THE DIGITAL LANDSCAPE

Mobile network operators (MNOs) are poised to become the primary way in which we connect, and this is opening up new use cases

As 5G comes to fruition, the number of devices is continuing to boom and the demand for data is exploding across the globe. By combining the rapid drop in space segment prices with sophisticated and highly capable ground equipment, the cellular backhaul landscape is changing radically – and this is all thanks to reliable, efficient satellite connectivity.

And why satellite? Because providing access to high-demand applications, such as community internet access and mobile backhaul, can stimulate socio-economic activity in any region. This includes public institutions, which benefit from dedicated services. Due to the prohibitive costs and excessive time needed to deploy terrestrial backhaul networks on islands and other hard-to-serve areas, satellite is ideal to provide backbone connectivity to such regions. In the event of a cable failure or natural disaster, it is also the fastest recovering method of connectivity. Satellite has the power to bridge digital divides and fulfil universal service obligations (USO) anywhere in the world. Satellite-based cellular backhaul is therefore in high demand and a major growth area.

This is also opening up opportunities. Offloading traffic in congested areas, postponing or avoiding ground network upgrades, sporadic use cases like railroads or sporting events, and even first-responder networks are becoming profitable applications for the satellite industry.

Satellite backhaul, however, is still in its infancy, with a remarkable 50% of the world still not connected to the internet, according to the World Wide Web Foundation. Despite this, the opportunity to expand the number of sites that could be economically served using satellite backhaul from current levels of coverage is huge, with a total of 507,000 new broadband base stations.

But there are cellular backhaul challenges. Operators looking to deploy satellite backhaul must deal with increased latency and operational costs – which can be mitigated with the right solutions. In order to do this, MNOs need a reliable solution that also provides enhanced QoS and QoE. It should allow easy extension of connectivity to rural sites and integrate seamlessly within their terrestrial network. Multiservice capabilities also allow access to multiple market verticals – increasing revenue – while scalability is another important feature for large point-to-multipoint networks and for demanding high-speed trunks.

What we need is a collaborative approach. With a rich history of enabling MNOs to expand their service to remote and rural markets, cellular backhaul can play a key role in networks, from an initial 2G voice solution to a 4G/LTE data solution. As data rates around the world continue to rise and the profile of the mobile end user continues to change, we have no doubt that cellular backhaul will also evolve and play a key role in the new 5G landscape.

Of course, to truly narrow the digital divide across the world, more than just technology is required. Continued partnerships between satellite players and MNOs are also key and can create opportunities for both, as well as change the landscape of the cellular connectivity market for the better. Adding satellite into their network mix will give MNOs the power to extend the reach of their service and address new use cases. These include traffic offload for congested urban networks, over-the-top (OTT) content distribution and critical connectivity for disaster response efforts.

Hybrid networking also prepares MNOs to handle the next era of connectivity – 5G. This calls for total integration of satellite connectivity with the 5G network model. According to NSR, one-third of net satellite capacity revenue growth in backhaul over the next ten years will be generated by 5G-differentiated applications, such as 5G backhaul and hybrid networks. This is partly due to 5G backhaul capacity demand consuming four to five times the bandwidth of a 4G site. PRO

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