

ISSUE 73 | SEPTEMBER 2019

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# SATELLITE PRO

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## WELCOME



The first thing I do when I wake up in the morning is scan the news on my mobile phone, and check my email, social media accounts and, of course, WhatsApp. I'm aware that a digital detox is long overdue, but the thought that I might miss that all-important call from school, an exclusive news bite or a deal just when I decide to take a break has often served as a deterrent.

Connectivity, for me, is a given. It has perhaps become as important to mankind as food, water and shelter. I know for certain that I would suffer withdrawal symptoms if my phone was taken away from me. It's my link to family, to friends and to the world.

So the thought that a third of the world's population has no access to basic connectivity in the 21st century (of course, clean water and just plain fresh air can be a concern, but that's a discussion for another day) and have to travel four days to reach the nearest village; that they sometimes have to confine themselves to one meal a day because of the challenges of cooking a meal or having to pick up supplies from so far away; this sounds almost surreal, especially when, in the

same breath, mankind talks about space tourism and contemplates the possibility of living on other planets.

Our cover story this month, therefore, looks at how two satellite operators with two completely different ideologies are working in their own spaces towards the same cause – that of bringing connectivity to Africa. RascomStar, which represents 45 of Africa's 54 countries, is doing that on a grassroots level with its C-band satellite, while Sudasat is focused on bringing high-speed connectivity with Ka to enterprises. These don't just make for interesting reading; they make us deeply thankful for the technology that drives our devices, our ability to connect, communicate and conduct transactions. But I don't want to give it all away.

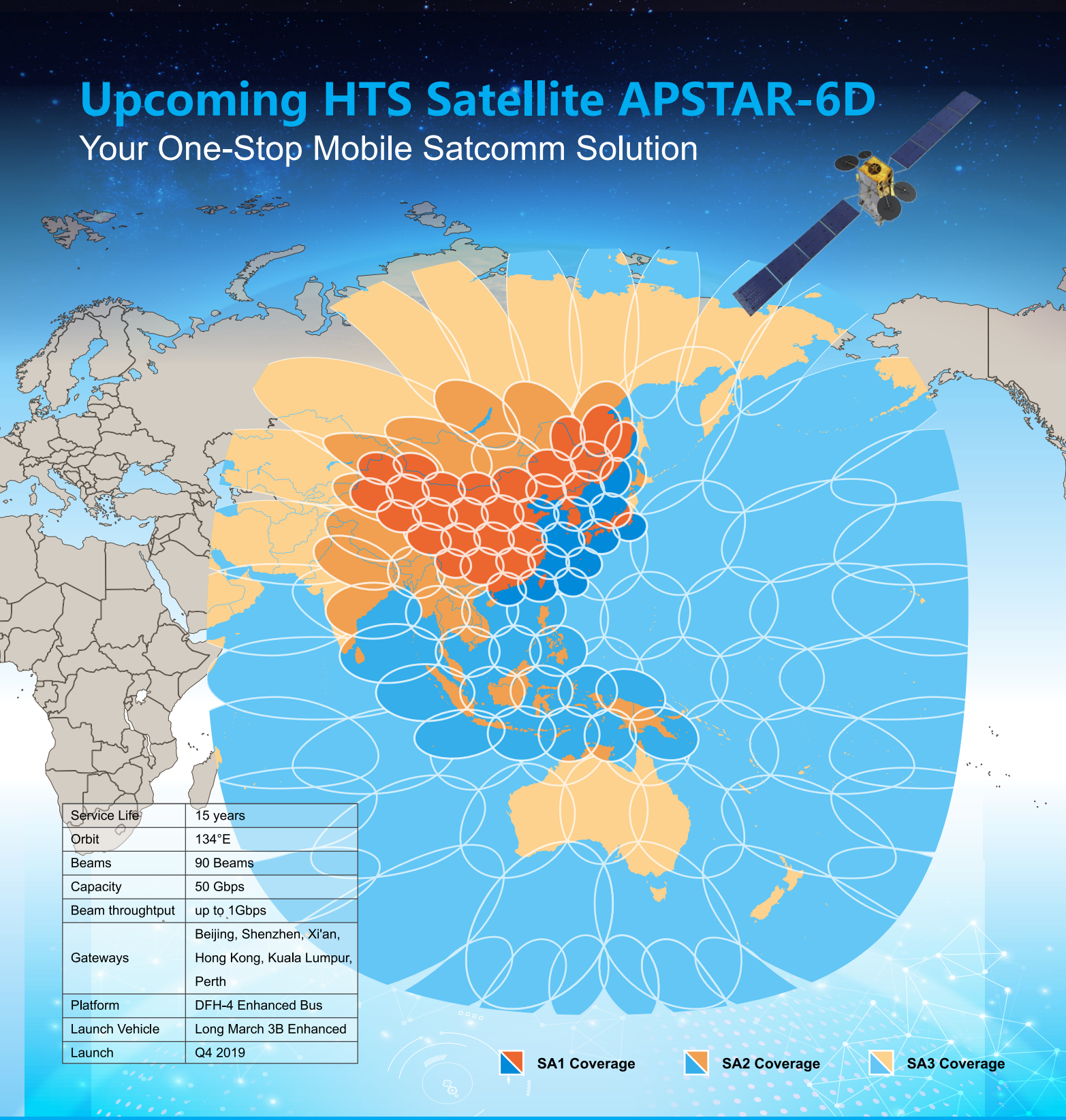
We also bring you a fresh round of discussion on the 5G versus satellite debate from some of the industry's most active voices. Until next time, au revoir.

**VIJAYA CHERIAN**  
Editor  
SatellitePro ME



# Upcoming HTS Satellite APSTAR-6D

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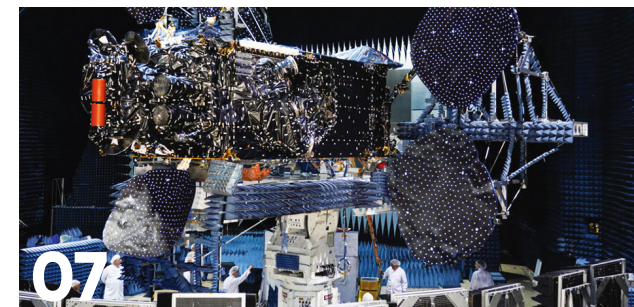
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## CPI to purchase SATCOM Technologies from GD

### ACQUISITION

Communications & Power Industries (CPI) has entered into an agreement to purchase SATCOM Technologies, the antenna systems business of General Dynamics Mission Systems, a business unit of General Dynamics.

SATCOM Technologies designs, manufactures and installs satellite communications antenna systems used in commercial, defence and scientific applications, and also provides related radio frequency products and electronics, including feed components, amplifiers, converters, antenna control

systems, and engineering and installation services.

This business will complement CPI's existing portfolio of communications products for government, military and commercial applications.

Commenting on the acquisition, Bob Fickett, President and CEO of CPI, said: "Satellite communications technology plays a vital role in modern communications, serving the seemingly insatiable thirst for more bandwidth and greater speeds. Acquiring SATCOM Technologies enables us to provide CPI's customers with a wide range

of complementary products, capabilities and resources to support this dynamic and growing market, making it an excellent fit for CPI. These capabilities and resources include extensive expertise in VSAT (very small aperture terminal), large and medium communications antennas, and very large, complex antenna systems. We look forward to welcoming the business's management and employees to the CPI family."

The acquisition is expected to close before the end of 2019, subject to customary closing conditions. Financial terms of the agreement were not disclosed.

## Arabsat CEO elected Chair of ESOA

### APPOINTMENT

The EMEA Satellite Operators Association (ESOA) has elected Khalid Balkheyour, President and CEO of Arabsat, as new Chair of the Association; Stephen Spengler, CEO of Intelsat, as first Vice-Chair; and Kyle Whitehill, CEO of Avanti Communications, as second Vice-Chair.

Balkheyour will lead the Association for the next two years, while it is mobilising the global satellite industry to unite ahead of the World Radio Conference 2019 to defend its spectrum and ensure a solid basis for the future development of the satellite industry. ESOA is also driving forward cooperation



Khalid Balkheyour, Arabsat.

with the mobile terrestrial industry. It is working on 5G standards through 3GPP and exploring synergies and avenues of cooperation to overcome the obstacles that stand in the way of enabling the integration

and interworking of satellite and terrestrial technologies required to deliver sustainable 5G services to the maximum number of people.

"We are united through our vision and will cooperate to better deliver on the growing need for satellite communications worldwide, whether in responding to natural and man-made disasters or in bridging digital divides in developed and emerging economies. The spectrum debate must not be used as an excuse to overlook the real needs of citizens on all continents. Satellite is a crucial, complementary part of the digital ecosystem," commented Balkheyour.

## Ghana uses Ecometrica to help end deforestation

### SPACE IMAGING

Ghana has partnered with Ecometrica, a downstream space and sustainability company to help end deforestation due to cocoa farming. The agreement sees the Forestry Commission of Ghana (FCG) adopt the Ecometrica mapping platform in its production and delivery of high quality maps and forest monitoring information.

Kwadwo Owusu Afriyie, Chief Executive of FCG, stated that the accurate and timely information is critical to the future success of the CFI and sustainable forest management. "The Ecometrica Platform will provide access to essential mapping and monitoring information to the cocoa industry, stakeholders and national institutions involved in the CFI, to ensure compliance with legal and voluntary commitments." Ecometrica supports the FCG to improve its monitoring and mapping to determine the effects of cocoa farming on forests for several years.



# IEC Telecom to enhance connectivity with Iridium Certus service

**CONNECTIVITY**

IEC Telecom has completed an interconnection with the Iridium Certus service, enabling it to provide reliable connectivity to humanitarian operations. The Iridium Certus service is the newest addition to IEC Telecom's portfolio of satcom solutions.

Providing pole-to-pole coverage, Iridium Certus promises reliability due to the advantages of the network's architecture. Located in LEO, with crosslinks enabling cross-satellite communication and L-band end user transmissions, the network is resilient to adverse weather conditions, does not rely on local ground

infrastructure and has very low levels of latency.

For the humanitarian sector and land-based customers, this means access to satellite connectivity anywhere on the planet, regardless of the size of the terrain, and real-time communications – helping mission-critical information to be passed on effectively.

Commenting on the announcement, Gwenael Loheac, Managing Director of IEC Telecom, said: "By using Iridium Certus, our customers will benefit from an enhanced user experience, thanks to the system's greater mobility and very low levels of latency – giving them real-time communications



with less room for error. This solution is easily deployable and will work everywhere, giving users the confidence they need in their critical connections."

Josh Miner, Vice

President of the Land-Mobile Line of Business of Iridium, added: "Iridium Certus is an ideal solution for humanitarian organisations, which require highly mobile vehicular or transportable solutions that can connect instantly with omnidirectional antennas. The MissionLINK by Thales terminal uses the Iridium Certus service to provide a multi-feature experience, especially useful for first-response teams that need a reliable broadband connectivity solution offering internet and email, high-quality voice, location tracking, data transfer and messaging capabilities, regardless of geography."

## ViaSat reveals plans to construct ViaSat-4

**NEW LAUNCH**

ViaSat, which has yet to complete its latest constellation of high-capacity satellites (the ViaSat-3 fleet), is already working on an improved version. Mark Dankberg, CEO at ViaSat, confirmed a ViaSat-4 iteration is currently in the works.

The current plan is to see the first ViaSat-3 (which can handle 1TB/s traffic) launched for service over the US early in 2021, and a European/MENA craft launching later in the same year. By the end of 2022, the third satellite

should be operating over the Asia-Pacific region.

Commenting on ViaSat-3, Dankberg said: "The ViaSat-3 versions incorporated a decade of innovation in space and ground network technology and the lessons learned from multiple generations of payload prototypes. It's a fundamentally new, highly integrated space-ground architecture, establishing a new set of tools for broadband satellite design and construction, with an emphasis on scalability. If things continue to go well,

ViaSat-3 is just the first instance of a new series of spacecraft delivering significantly more bandwidth, higher speeds and greater flexibility with each generation.

"We've now made enough progress on ViaSat-3 to begin designing and analysing the ViaSat-4 follow-on, that could achieve similar or better relative productivity advances as ViaSat-1, -2 and -3 did in their time."

ViaSat-3 craft are high-capacity satellites under construction, although Hughes Network

Systems' Jupiter-3 and Eutelsat's Konnect have similar specifications.

Dankberg added that the new – and still in the design stage – ViaSat-4 craft promises to deliver more capacity and "big improvements" in productivity.

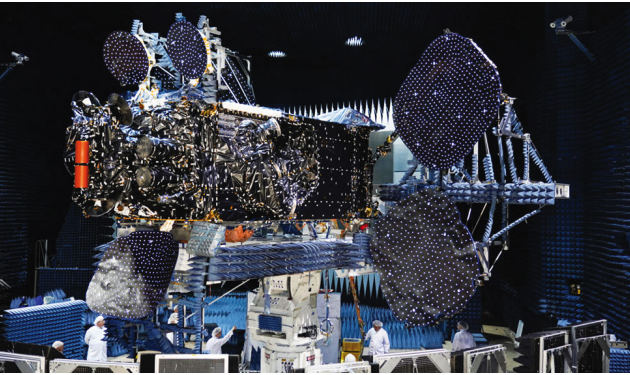
Although Dankberg did not specify figures, he said research and development for ViaSat-4 would be approximately 5% of the company's revenues. The company reported \$537m in revenue for April to June, a 22% increase in quarterly revenue.

# Intelsat 39 to enter service in Q4 2019

**NEW LAUNCH**

Intelsat SA successfully launched Intelsat 39 last month to provide video distribution and connectivity services for mobile network operators, enterprises and governmental entities, as well as aeronautical and maritime service providers operating in Africa, Asia, Europe and the Middle East.

Designed with wide beams and high-powered steerable spot beams, Intelsat 39 will deliver high-speed agile connectivity services. The steerable beams will provide additional flexibility,



enabling customers to rapidly reposition their service to respond to changing application or geographic requirements. The satellite's C- and Ku-band capabilities will add scale to Intelsat Flex managed

services, enhancing mobile connectivity for aeronautical, maritime, enterprise and government customers operating across these geographies. Intelsat 39 will replace Intelsat 902 at the 62°E orbital location. "Intelsat 39 adds to the

breadth of services and vast geographic reach that our global network provides," said Intelsat CEO Stephen Spengler. "Businesses and communities across three continents will have greater access to robust, reliable and resilient connectivity services whenever and wherever they need it."

Intelsat 39 will host both C- and Ku-band satellite services for Myanmar-2, which will enable the Ministry of Transport and Communications (MOTC) of Myanmar to significantly enhance its existing network. Intelsat 39 is expected to enter service in Q4 2019.



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## Satellite manufacturing to cross \$366bn: Frost & Sullivan

### ANALYST REPORT

Total revenue opportunities for the global satellite manufacturing market will cross \$366.06bn with global launch demand for 12,766 satellites and cumulative launch opportunities of \$102.52bn for the period 2019 to 2030, according to Frost & Sullivan's *Global Space Industry Outlook, 2019 and Beyond* report.

"Not only are satellite platforms becoming more agile and robust with the execution of software-based satellites, electric propulsion systems and spot beam offerings, but competition in the launch services market is lowering prices and new entrants with mega-constellation-based business models are poised



Arun Kumar Sampathkumar,  
Frost & Sullivan.

to disrupt the connectivity and Earth observation market," commented Arun Kumar Sampathkumar, Industry Manager, Space at Frost & Sullivan.

Currently, there is a clear gap between satellite launch demand and the

supply of launch services, with an average launch wait period of six months to two years for satellite operators. However, more than 40 global new participants are developing launch vehicles to bridge this gap.

"In the small-satellite launch segment, the major unmet needs include on-demand launch, independent mission from the primary launch payload, and launch cost," noted Sampathkumar. "Due to the existing gap between supply and launch, the launch service market is price inelastic. However, with the entry of new vehicles and reusable capabilities, launch supply is likely to increase and will lead the market towards price sensitivity."

## Tunisia and India enter agreement for space cooperation

### PARTNERSHIP

Tunisia and India have signed an MoU for cooperation in the exploration and peaceful uses of outer space. Nejmeddine Lakhel, Tunisian Ambassador to India, and Dr B. Bala Bhaskar, Joint Secretary, West Asia & North Africa Division of MEA, signed the agreement at the Indian Space Research Organisation (ISRO) HQ in Bengaluru, India. It will provide a policy framework for both nations to work together closely on joint research, technology and knowledge exchanges, and capacity development.

Tunisia established the National Commission of Outer Space in 1984 and the National Centre of Cartography and Remote Sensing in 1988, to coordinate the nation's outer space programmes for national development.

The MoU is part of Tunisia's efforts to adopt space technologies for security and sustainable development. In September 2018, India entered into similar bilateral agreements with Algeria, Morocco and the island of São Tomé and Príncipe.

## GlobalStar announces success in Africa

### APPOINTMENT

Globalstar, Inc has received mobile satellite services and terrestrial authorisations in South Africa, Mozambique, Gabon and Rwanda. These countries join Botswana in representing over 1.1m square miles of territory, an annual GDP of over \$500bn and more than 1.7bn MHz-POPs of licensed coverage across Africa.

Globalstar has obtained terrestrial LTE authority over its entire 16.5MHz of S-band spectrum, most with permissible power limits suitable



Jay Monroe, GlobalStar.

for both macro and small cell deployments. Globalstar's satellite services and flexible terrestrial authorisations

enable it to offer unique communications solutions in regions that have historically presented complex network deployment problems. Globalstar's team is now pursuing multiple private LTE opportunities across these licensed markets.

"Globalstar is committed to bringing its unique mix of solutions to the continent to meet the communications needs of African businesses and consumers," said Jay Monroe, Executive Chairman of the Board, Globalstar.



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# Ethiopia to host eighth edition of African Space Leadership Congress

## CONFERENCE

The eighth edition of the African Space Leadership Congress (ASLC) on Space Science and Technology for Sustainable Development, themed 'Prospects and Challenges of African Space Development', will be held in Addis Ababa, Ethiopia from 2-4 December 2019. It aims to capitalise on the efforts of African nations in space technologies to address key socio-economic challenges, and harness the opportunities that space science and technology could provide.

The main focus areas of this congress will be assessment of space



programmes in Africa; space research and development; space policy, strategy and implementation; and participation of youth and women in aerospace.

Issues like the voice of Africa towards equality in the use of space resources, space commerce and

entrepreneurship, space for peace and diplomacy, and collaboration in space will also be discussed.

The congress will serve as a primary and empirical platform for political leaders, space agencies, space vendors, entrepreneurs, scientists, engineers and technologists, and regional and international space institutions to address major issues. It will also link and network Africa with the rest of the world and showcase space products and services.

The event will host around 200 participants, including political figures, business people and companies of

the space industry, and youth and women from all African countries and international collaborating nations, as well as public and private space institutions.

The congress is expected to come forth with an adopted constitution that will govern the members, the congress and the secretariat; a resolution that contains fundamental decisions and directions for future action; proceedings of the congress and the way forward; and recommendations for member countries, African space institutions, vendors and the global space community.

## Ethiopian broadcasters migrate to SES

### BROADCASTING

SES has signed two agreements with the Association of Ethiopian Broadcasters (AEB) and the Ethiopian Broadcasting Cooperation (EBC), which will result in the creation of a dedicated Ethiopian TV environment.

Ethiopia presently has more than 4m TV households that access TV via satellite. The majority receive a signal currently broadcast from an orbital location that also supplies content to MENA countries, mixing local and international

content. The migration agreement with AEB creates a dedicated TV neighbourhood for Ethiopians on SES's East Africa Digital TV platform on NSS-12 at 57 degrees East.

This consolidation of content allows AEB's 14 members to expand their audience reach. These members together control more than 50% of Ethiopian viewership and will be able to foster healthy advertising markets that will strengthen the development of the country's FTA market.

In a separate

agreement with SES, public and regional channels including ETV News, ETV Entertainment, ETV Languages, OBN TV, Tigray TV, South TV and Amhara TV, led by public service broadcaster EBC, will also be distributed via this TV neighbourhood. The Ethiopian content via NSS-12 will be broadcast mainly in HD.

In addition to satellite capacity and video services such as content transportation and management, SES will also provide on-the-ground services to

ensure the success of the new neighbourhood. SES' local team will train local installers to correctly repoint the satellite dishes of each TV household, making the migration possible.

Commenting on the development, Amman Fissehazion, Chairman of AEB, said: "We are at a critical juncture in Ethiopia. We want to harness the momentum for change and create a truly Ethiopian TV neighbourhood that will deliver local content to viewers in high quality, and fuel growth in the Ethiopian media sector."

# MBRSC unveils IAC 2020 logo

## CONFERENCE LOGO

Mohammed bin Rashid Space Centre (MBRSC) has revealed the winning logo for the International Astronautical Congress (IAC) 2020, which will be hosted in Dubai for the first time in the Arab world. The event, which will be held in October 2020, will bring together leading space specialists and decision-makers from around the world.

More than 500 designers from Egypt, Jordan, USA, Australia, India, Indonesia, Italy, Greece, France, Sweden, China, Mexico and Hungary, as well as from other countries, participated



Salem Humaid Al Marri, MBRSC.

in the competition. Fifteen designs were shortlisted, out of which the winning logo was selected, designed by Hanan Seif, from the United Arab Emirates.

Salem Humaid Al Marri, Assistant Director General for Scientific and Technical Affairs at MBRSC and Chairman of the Dubai Hosting Committee for IAC 2020 said: "The winning logo ... expressed Dubai's future vision and its global position in hosting prestigious conferences."

The logo's design, selected by a specialised committee for the 71st IAC, consists of a light blue figure of Burj Khalifa, the letters IAC, and DUBAI 2020 placed at the bottom.

The winner received a cash prize and an invitation to attend IAC 2020.

## Moroccan bouquet on Arabsat-5C

### BROADCASTING

Al Maghribia, a leading channel on the SNRT bouquet, run with 100% Moroccan video production and targeting Moroccans living outside Morocco, is available on Arabsat-5C. The channel broadcasts in Arabic, English and French.

Arabsat-5C is equipped with a C-band beam that covers 100% of African satellite TV households and needs only a small dish to receive its channels.

## Egypt launches minisat, plans another

### NEW LAUNCH

Egypt launched a mini satellite into orbit last month. The CubeSat was designed, built and tested in Egypt, Mohamed Zahran, Chief of the National Authority for Remote Sensing and Space Sciences, told Egypt's MENA news agency.

Egypt worked with the Japanese Space Agency (JAXA) to test the satellite before it was shipped to the

US and launched into space by a Falcon-9 rocket from Cape Canaveral in Florida. It weighs 1kg and cost \$60,000.

The satellite is designed for research purposes. It will also test space systems developed by the Egyptian space agency. A similar satellite will be sent to space within two months, Zahran added.

## LeoLabs offers satellite tracking service for smallsat operators

### NEW LAUNCH

LeoLabs, a commercial provider of low Earth orbit (LEO) mapping and space situational awareness (SSA) services, has launched LeoTrack, one of the first commercial satellite tracking services tailored to the needs of today's smallsat and CubeSat operators.

LeoTrack, delivered as a web-based subscription, offers satellite operators a full range of monitoring capabilities, including precision tracking of satellites, orbital state vectors, predictive radar

availability, scheduled passes and real-time orbit visualisation for constellations as well as individual satellites.

Commenting on the announcement, Dan Ceperley, CEO of LeoLabs, said: "Operators need a reliable service that delivers high-quality orbital data and the ability to demonstrate visually how their operations are managed. This is what LeoTrack delivers. You simply subscribe to the service, and LeoLabs does the provisioning. The key is simplicity and

quality, and we believe LeoTrack exemplifies the emerging model for satellite constellation management."

LeoTrack builds on LeoLabs' multi-year history of providing satellite and space debris tracking services for leading constellation operators in LEO. Supporting missions ranging from advanced Earth observation to IoT connectivity, LeoLabs already serves a diverse set of commercial providers, such as Maxar, BlackSky, Planet and Swarm Technologies.



## Satellite solutions for OTT from Newtec

### STAND 1.A49

Newtec will showcase its solutions for the growing OTT market and all-IP newsgathering applications.

With OTT viewership expected to overtake traditional viewing before 2020, broadcasters are under pressure to evolve the way they cover live news events by deploying mobile solutions capable of transmitting video, voice and other services over a single multi-service communication link.

Both these trends are resulting in an increasingly wide audience for more content – especially live – which means exponential growth in traffic for broadcasters. At IBC2019,

Newtec will demonstrate how this traffic can be minimised by blending satellite and terrestrial communication links.

“The key to both OTT and all-IP newsgathering is successful transmission, with satellite being at the heart of this,” said Hans Massart, Market Director, Broadcast, at Newtec. “To achieve this, broadcasters need a flexible and adaptable satellite bandwidth management system which can send IP traffic over satellite as efficiently as possible.”

At IBC2019, Newtec will demonstrate how its



Newtec Dialog multi-service VSAT platform provides a solution for both OTT and all-IP newsgathering applications. With the success of the Newtec Dialog already established, it delivers successful broadcast

transmission through cost-effective scaling to a number of receivers, efficient content delivery to geographical areas, and provides customers with availability where no other terrestrial return channel exists.

Designed for mobile journalism, the solution ensures lower costs, quicker response times and greater mobility. This is backed by Newtec's work with a number of service providers, including Network Innovations (Maverick), Dejero/Intelsat (CellSat), SES/MX1 (OU Flex), and tier-one broadcasters such as the BBC.

## SAT>IP Alliance members to demo future of satellite

### IN HALLS 1, 5 AND 11

The SAT>IP Alliance, a global consortium of world-leading satellite operators, device manufacturers, broadcasters and service providers, will be updating IBC2019 attendees on SAT>IP's advanced UHD multi-screen content delivery capabilities.

SAT>IP enables a totally seamless multi-screen TV experience, including 4K content, without the need for a high-speed home broadband connection. The technology takes a conventional satellite TV

signal and converts it to an IP-based data stream. This can be transmitted across a standard wired or wireless IP network in the home, and viewed on multimedia and IP compatible devices such as smart TVs, PCs, tablets, gaming consoles and smartphones.

“IBC2019 is an excellent opportunity for members of the broadcast industry to learn about the numerous benefits of the SAT>IP protocol and how it can enable them to deliver innovative TV services and true multi-room 4K experiences,



irrespective of local broadband availability,” said Thomas Wrede, President of the SAT>IP Alliance.

The SAT>IP Alliance

brings together members including Arcadyan, Eutelsat, HISPASAT, Irdeto, MaxLinear, NAGRA, Panasonic, SES, Verimatrix and Zinwell. The group supports the use of SAT>IP technology as a way for satellite TV providers to deliver high-quality multi-screen capabilities.

The SAT>IP Alliance has created an ecosystem of flexible, easy-to-deploy solutions from over 40 manufacturers. SAT>IP can be delivered using satellites covering 95% of the globe, potentially reaching over a billion viewers.

## Jasat promises better management with BLOM-X ONE

### HALL 14.A39

Dutch company Jasat will exhibit for the first time at IBC this year. The focus of the stand will be its BLOM-X ONE set-top box, compatible with its new and first management system, RIVUM. The company says the BLOM-X ONE is “one of the fastest and most convenient and adaptable set-top boxes for the end user”.

The company also calls RIVUM “the first management system that helps content owners to manage, access and control the IPTV set-top boxes, Android



boxes, mobile applications and smart TV apps from a distance”.

“We have noticed that the demand for personalisation and

easy access to content everywhere is rising. Millennials are taking over and all they want is access on every device, everywhere and anywhere. Therefore, BLOM-X ONE and RIVUM combined provide the solution not only for the content owners, but also for the end user,” commented Anwar Ebdul, Account Manager at Jasat.

“At Jasat, we are constantly on the run researching and providing IPTV solutions for the whole world as we manage and research the needs and wants of

the market,” he added.

Although a first-time exhibitor, the company has often visited IBC and sees the event as a platform that “offers opportunities to discover new markets and acquire new clients”.

Ebdul added: “As the broadband market is expanding around MENA countries, the adoption of IPTV is increasing as well, which makes this market both interesting and challenging. We offer custom-made products and services to a niche market that will turn into a huge market in the future.”

## Speedcast advocates hybrid approach

### STAND 5.C45

Speedcast will demonstrate the latest enhancements to the Speedcast Media Network, a global hybrid infrastructure that combines satellite, fibre, cellular and internet networks



to provide media companies with scalable, ubiquitous coverage for the delivery of broadcast-quality content to consumer screens. It will highlight industry-first managed global IP transport and LTE mobility services.

Speedcast's global IP transport managed service provides full H.265 4:2:2 encoding and decoding on all edge devices, to ensure superior video quality at lower bandwidth and offer

both SRT and RIST interoperability. The service is fully integrated with legacy platforms with Layer 2 protocol.

Speedcast will also show how its partnership with AWS provides media companies with dedicated, direct connectivity to the cloud. Designed to handle bandwidth-heavy workloads, Speedcast's connection to AWS reduces network costs. As the first remote communication service provider to be awarded Advanced Consulting Partner status in the AWS Partner Network, Speedcast plays a leading role in developing end-to-end AWS and

Speedcast cloud solutions and simplifying the way media companies deliver content via the cloud.

“The video market is facing unprecedented and rapid expansion, with OTT video services projected to add billions of dollars of revenue to the direct-to-consumer entertainment market over the next few years. We view IBC2019 as a great opportunity to meet with global media companies and demonstrate how the Speedcast Media Network can help them deliver content to as many screens as possible,” commented Erwan Emilian, EVP of Enterprise and Emerging Markets.



# CONNECTING SUDAN

Plagued by poor connectivity and low bandwidth in a shaky political set-up, Sudan has never really managed to rise to its full potential. Local satellite operator Sudasat hopes to change the game with the introduction of Ka-band services, which it says will bring higher speeds at lower costs to more people, setting the stage for a better economy. In an exclusive interview with **Vijaya Cherian**, Sudasat GM Khalid Ehaimer unveils what's in store come November



A new dawn awaits Sudan as Sudasat, the country's largest VSAT operator, looks to fuel the

nation's growth trajectory and enhance connectivity in East Africa with customised products at competitive prices. To execute that vision, Sudasat recently entered into a partnership with Arabsat that will allow it to use the Ka-band transponders on the newly launched Arabsat 6A satellite, to provide broadband communications and services across Sudan to enterprises and telcos at much higher speeds than in the past. This service is due to launch on November 1, 2019.

"With the introduction of Ka-band, we intend to change how business is done in Sudan," says Sudasat General Manager Khalid Ehaimer, who has been tasked with "transforming Sudasat and bringing it on a par with the current era".

"By having Ka- along with C- and Ku-band, we hope to have a wider range of services

for our customers. We don't just want to be a service provider; we want to be known as a VSAT network operator," he clarifies.

A big part of this vision is Sudasat's teleport facility at Umm Haraz satellite station, which is currently being upgraded and is scheduled to be operational by the end of October. The teleport will also support the satellite ground station services for global satellite operators.

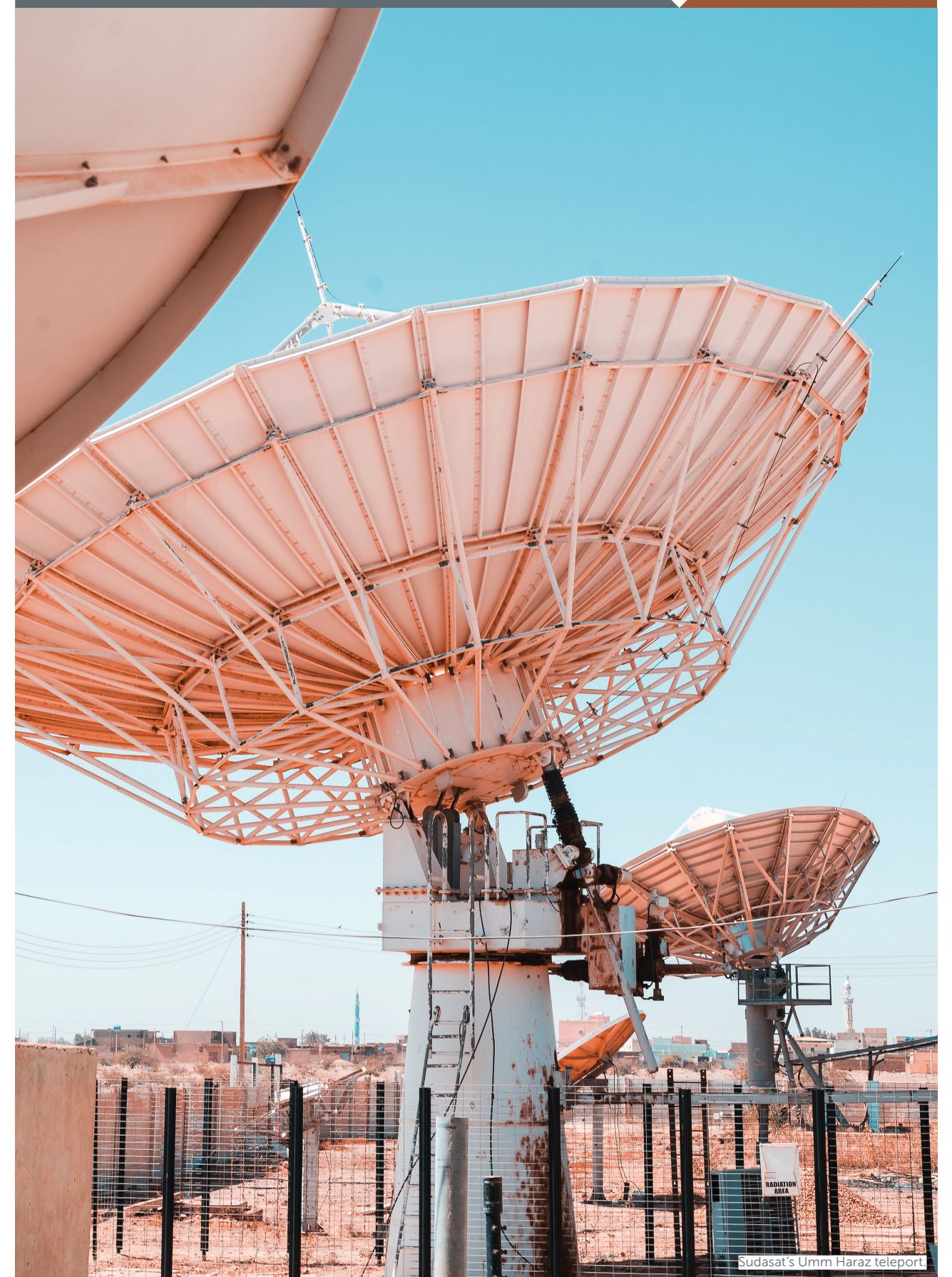
Sudasat is a young company by global standards. The result of a joint venture between Sudatel and Haggard Holding Company, Sudasat was set up in 2006 and provides voice and data connectivity. At present, only 40% of Sudan's population is connected – although mobile operators claim to cover 90% of the country, what they actually cover is 90% of the urban areas, says Ehaimer.

For instance, regions like Darfur and eastern Sudan are only well connected in populated areas. Likewise, the northwestern part of Sudan has until recently been devoid of people – like the Empty

Quarter – and connectivity has not been necessary. However, its gold and oil reserves are now attracting public and private entities and new job opportunities for civilians. Connectivity will become essential soon.

A considerable chunk of Sudasat's business will also include enhancing broadcast services. Sudan has 30 TV channels, 18 of them broadcast from Jordan. The aim is to build the infrastructure within the country – "We have big plans to bring all African channels to be broadcast from Sudan," says Ehaimer.

All this will become possible with Arabsat-6A, a high-capacity telecommunications satellite poised to deliver television, radio, internet and mobile communications to customers in the Middle East, Africa and Europe. Built on Lockheed Martin's enhanced LM 2100 platform, Arabsat-6A provides advanced Ka spot-beam communications services. Sudasat, in partnership with Canar Telecom, witnessed its launch at its orbital position



Sudasat's Umm Haraz teleport.



30.5 earlier this year.

“Ka is an evolution and can be managed through cheaper and smaller terminals. Through Ka, we will be able to reach areas that couldn’t be reached before, including northwest Sudan. We hope to reach 100% of the Sudanese population and offer services at a third of the existing price,” Ehaimer explains.

So far, Sudasat has had only two services for its customers: shared and dedicated networks. With the new partnership, 12 services are in the offing, with the first of these to be rolled out in November. One of these is WiFiSAT, a service aimed at rural areas. Sudasat will provide connectivity over satellite while last mile distribution will be through WiFi, as that requires no additional investment.

ProSAT, a second service targeting professionals, entities, enterprises and NGOs, which comes bundled with solutions like CCTV and IP phone services, will also be launched.

Also to be rolled out on Ka-band are VoIPSAT; NomadSAT, a portable solution; HomeSAT, a triple play service with internet, VOD, VoIP and IPTV in a set-top box; GoSAT, a connectivity service for aircraft, vessels, trains and the like; SiteSAT, which includes a tower, green power and GSM designed specifically as low-cost sites for Universal Service Fund; and GeoSAT for satellite imaging.

One service that Ehaimer is betting on is IoTSAT, which will cater to communities working in agriculture and mining – two ecosystems that are the heartbeat of Sudan’s economy. “We have active mining and agricultural ecosystems, and we are trying to offer solutions that are relevant to Sudan’s context. We believe this will be hugely successful and will be one of our first new product offerings,” he confides.



Khalid Ehaimer at Sudasat’s office in Dubai.

**“We have active mining and agricultural ecosystems, and we are trying to offer solutions that are relevant to Sudan’s context”**

**Khalid Ehaimer, GM, Sudasat**

Another new product scheduled for launch is CastSAT, a TV broadcasting service over Ku, while two new services – HaulSAT for backhauling and DrySAT for operators outside Sudan – will be available on C-band. HaulSAT will also be available on Ka-band.

“We will start with WiFiSAT, ProSAT, VoIPSAT, IoTSAT,

NomadSAT and GoSAT. Some of these will be rolled out in October. Testing and POCs for others will begin in October, and official roll-outs will begin in November for those,” explains Ehaimer.

A chunk of these services will rely on Arabsat-6A’s Ka-band spot beam, which promises to offer business enterprises in Sudan more bandwidth and stable connectivity at a much lower cost.

“Arabsat-6A includes many sophisticated services that make it the most up-to-date satellite, effective, flexible and versatile, as it has a high capacity and provides digital broadcasting, telecommunications and internet services to the customers in Sudan. We hope to leverage these aspects and capacities of the satellite to rediscover

how space communication technologies can impact Sudan and its people,” says Ehaimer.

WiFiSAT, for instance, is ideal for villages and people in remote areas.

“We couldn’t roll this out before with C-band, because it was an expensive proposition. C-band is first of all a limited resource, and the nature of the technology makes it more expensive. The maintenance of a C-band satellite is huge for an operator and the cost per Mhz is very high. C-band does cover a much larger footprint than Ka-band, but the capacity is also spread out, so bandwidth is limited,” he explains.

“By comparison, with Ka, the small size of the terminal and the flexibility to introduce different applications makes it very attractive. Also, the internet is

**“We hope to reach 100% of the Sudanese population and offer services at a third of the existing price”**

**Khalid Ehaimer, GM, Sudasat**

not just for entertainment; today, it significantly aids in improving people’s lives. If we can provide internet services to UN agencies and border security forces, imagine what they can do. It’s all about connectivity, and having bandwidth is a huge opportunity by itself.”

With Ka-band, more CCTV and teleservice opportunities will open up, and Sudasat is partnering with application companies to ensure this. Its strategy is to deploy Ka-band while retaining its services

on the other two bands. C-band is significant in some areas of Africa that have regular rains, but the new offerings will help Sudasat reach other parts of East Africa as well.

“While there are no market agency reports that can evaluate the size of the satellite industry in Sudan, our own internal research shows us that Sudasat occupies 60-70% of the market, followed by Canar Telecommunications and others. We hope to capitalise on our foothold with the introduction of Ka-band, but Ka-band is primarily for operations inside Sudan. Services to other countries will largely require C-band.”

Sudasat also hopes to ensure greater connectivity in places like Eritrea, Mauritania and Senegal, and to diversify its operations to be an end-to-end service provider.

But the ride is not without its

The Sudasat team installing a 7.3m antenna in southern Sudan.





challenges. Sudasat is inching closer to facilitating greater connectivity with partnerships, but a critical element in this mix is funding, often hard to come by. This is why Sudasat did not consider launching its own satellite, deciding to go with a stable partner like Arabsat instead. Preparing the ground infrastructure to take Sudasat's vision forward will require considerable investment, and the company is in talks with banks and financial institutions to secure funding for its business and to support its research and development arm.

In parallel, Sudasat is working closely with universities and technical institutions in Sudan to create new programmes to train and nurture a new generation of youngsters equipped with

the knowledge and tools to take Sudan's space ambitions forward.

"Enablement through partnerships is our way to grow. We believe that partners can bring a lot of ideas and expertise to Sudasat, and that is why we are teaming up with incubators and small businesses to further our growth story. Some of our partners include Newtec, IDirect and Cetel, and we are

**"The small size of the terminal and the flexibility to introduce different applications makes Ka-band very attractive"**

**Khalid Ehaimer, GM, Sudasat**

looking forward to bringing in more expertise through these partnerships," remarks Ehaimer.

While he is positive that Ka-band will bring greater connectivity to Sudan, we will have to wait and watch to see how satellite technologies will change the data dynamics in a country with only about 40% of its populace currently covered. Ehaimer, however, is hopeful about the future.

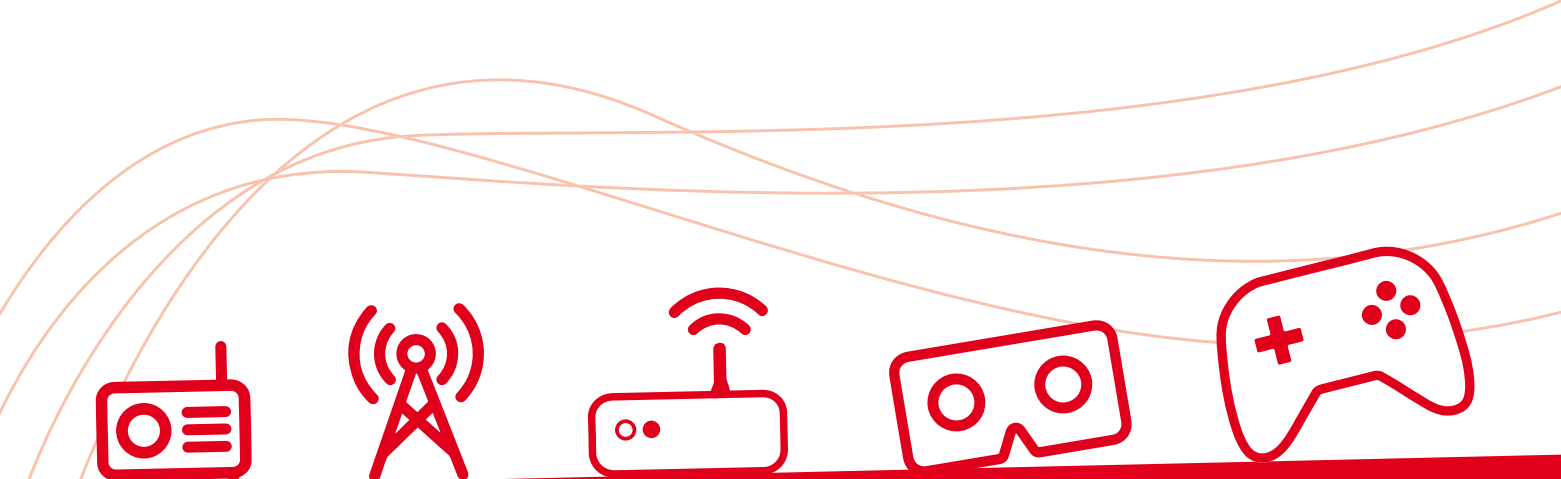
"We are a nation of dreamers and believers, and we have the talent. Sudan is like an African lion, waiting to seize every opportunity that comes its way. Despite the political instability, the country and Sudasat has shown tremendous resilience and we are certain that a time will come when our dreams come alive." **PRO**



Ehaimer says more funding could potentially accelerate connectivity within Sudan.



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A RascomStar installation in Nigeria

# LINKING AFRICA VILLAGE BY VILLAGE

Bringing connectivity to parts of Africa where the terrain is inhospitable and infrastructure is minimal can be a major deterrent for operators. Undaunted, and moving deeper into unfamiliar territory to offer that connectivity, is RascomStar-QAF. Managing Director Sherif Azzabi speaks to Paul Godfrey about the operator's vision as a pan-African provider



Libya's dramatic return to the headlines in May 2019 wasn't solely the result of factional disturbance or the breakdown of an uneasy militia truce. Rather, atrocious floods in the country's southwest – among the most severe the region had ever seen – were wreaking devastation throughout the regional capital, Ghat, forcing over 2,500 families to leave their homes. The only hospital was entirely flooded, with main roads completely blocked, leaving the UN to estimate that 20,000 people were in urgent need of humanitarian support.

Yet one vital factor enabled aid to get through to the worst-hit areas and allowed relief workers to deliver a measure of damage control: the area's digital connectivity remained unaffected, thanks to the Regional African Satellite Communication Company (RascomStar-QAF) – a major provider of satellite services to the whole of the African continent, and a business attempting to providing connectivity in some of the world's most rugged and impenetrable terrain.

**The Story of a 'People's Provider'**  
Imagine the sense of empowerment when an individual in one of the most remote places on Earth finds that he can connect with the rest of the world with a mobile phone.

Providing that connectivity is RascomStar's mission. It's a simple yet audacious quest that began with the goal of providing total coverage in C- and Ku- band and GSM connectivity in Africa. The roll-out was initiated by RascomStar-QAF, originally founded by governments in Africa and then registered as a private company in Mauritius and – now headquartered in Dubai – with the remit to implement an Africa-wide satellite project.

RascomStar claims to be one of the world's first pan-African satellite operators with the launch of its satellite RQ1-R in 2010, covering the whole African continent with some spillover into parts of Europe and the Middle East. Based on the Thales Alenia Space Spacebus 4000 B3 platform, and with a life expectancy of 18 years, the satellite is fitted with twelve Ku-band and eight C-band transponders and provides services to telecom operators, large corporations and TV broadcasters.

While still a grassroots provider, the company's services have evolved into offering a wider portfolio over the years, with integrated solutions including DTH services for TV broadcast in Ku, VSAT in C and Ku for private VPNs or internet (with active customers in 30 countries), WiFi access, and hybrid VSAT and GSM solutions.

**Driving the Changes**  
SatellitePro spoke to RascomStar Managing Director Sherif Azzabi, responsible since 2014 for driving the company's highly challenging agenda.

"When the company began in 2003, the idea was to ensure connectivity across all parts of Africa, including providing communication to rural areas where there was no coverage at all. The major operators are obliged to provide coverage, but the challenges are so immense that some operators on the African continent prefer to pay the fines and penalties imposed on them for not offering their service in rural areas than actually go into those areas and provide connectivity.

"People simply cannot fathom the difficulties of offering



connectivity in these remote areas. We are talking about regions where travelling to the nearest town or village takes four days. That's where families would have to go to buy their household essentials, which means an eight- to ten-day round trip – but when you have connectivity, you can simply make a call and have those goods delivered collectively for the community in half of the time. Plus it's not just the time involved; the terrain can be extremely inhospitable, and people generally will not have any means of transport available for carrying those goods – there are countless pictures of villagers balancing heavy goods on their heads, for example.

“So our first goal was to extend GSM services and/or fixed telephony over satellite in rural areas, where traditional fibre or microwave solutions are not economically feasible or sustainable, or even possible in some cases. In these areas, it is often impossible to lay cable; you face an enormous range of landscapes and every type of geographical challenge. We work with 45 African nations – thus we see every possible extreme of service challenge. But once connectivity is in place, it can make a huge social impact in these towns and villages. We always try to keep that original mission in mind.”

**The Harsh Realities**

On the one hand, RascomStar deals with highly sophisticated infrastructure connectivity in cities like Kinshasa and Abuja, and on the other, it also provides coverage to the hinterlands of Mali or Chad, with their age-old communities such as Timbuktu – for centuries, a metaphor for the ends of the Earth. Indeed, these are areas which, according to UNESCO's Human Development Index (HDI), are in the bottom 20 in the world in terms of standards of living and access to basic utilities and resources.



**“People simply cannot fathom the difficulties of offering connectivity in these remote areas. We are talking about regions where travelling to the nearest town or village takes four days”**

**Sherif Azzabi, Managing Director, RascomStar**

These environments pose massive challenges when it comes to creating a functioning communications infrastructure. To handle these realities, Azzabi says RascomStar offers “end-to-end managed services, including the ground equipment and stations, so that we can be absolutely certain of providing coverage, no matter what the level of isolation is”.

“Our integrated rural solutions are developed by Viasat for the exclusive use of RascomStar, and we deliver a full telecom solution while partnering with local tower companies for solar power and towers,” he explains.

These initiatives mean that even the smallest towns and villages can become part of the world global community through internet access.

For example, RascomStar has developed a managed service for rural WiFi via satellite – villagers can access the internet by logging on to the nearest WiFi hotspot connected by VSAT. The ability to interact with the world at large, whether that means accessing information about education or farming techniques, or simply catching up on Facebook with people in a town 50km away, has brought extraordinary transformation to these villages.

**Starting Out**

“We actually started the business in Libya, and in the same way as many of the North African providers, were originally government-funded,” says Azzabi.

“But the revolution and the subsequently unsettling political climate changed everything. It led us to broaden our footprint, and we first piloted our service in three villages in the Democratic Republic of Congo (DRC), expanding later to an eight-city pilot in the towns of Panu, Kalo, Bogoro, Yumbi, Tsumbiri, Kwamouth, Nkolo and Bolobo.

“We began by offering a simple GSM connection. The remote terminals were designed to be off-grid, with their energy source being the solar power operation and pay-as-you-go satellite backhaul connectivity. For clients, this literally involves minute-by-minute billing, and it enables GSM operators to have ease of deployment with low OPEX and maintenance costs.

“Today, we are a truly international business with teleport hubs in Alicante, Spain; Guildford, England; Nairobi, Kenya; and Douala, Cameroon, in addition to a



TV provider in Luxembourg. Given that we have a satellite position of 2.9 East, we can cover the whole of Africa and also parts of Europe and the Middle East on a single beam. This means that we can deliver on our remit of providing connectivity to literally every part of the African continent. Since we also have a heavy use of satellite in the north, we are well placed to target the telcos, hotel groups, banks and

the enterprise sector generally.”

RascomStar is now based in Dubai. Azzabi explains: “An in-depth report by KPMG showed us that Dubai is a hub, given that there are direct flights to almost all African countries. In addition, most of our suppliers have offices here.”

**Finding the Solution**

“In Africa,” says Azzabi, “Funding is the biggest problem. It is unreasonable to expect any sudden changes in general levels of infrastructure, because of the very high costs involved. But what we can do is provide access to connectivity that makes a real difference to the way people live and the kind of opportunities they can potentially access.

“That can be something as basic as being able to receive an SMS when a money transfer has arrived – a simple facility that affects tens of millions of people – and being able to make that money transfer online, rather than travel days to an exchange bureau. Or it might mean being able to keep in touch with loved ones on the other side of the country. Whatever it is, we believe connectivity offers the solution.” **PRO**





# Field Experience in DRC

Delivering telecom services in remote areas can be very challenging due to the variety of issues to address, like transportation, environment, human, technical. The RascomStar installation team relates their recent experience and some dos and don'ts in the remote and underserved locations in the Democratic Republic of Congo (DRC).

Transportation in underserved areas is the first challenge. One must find an experienced person who knows the location like the back of his hand. Traveling conditions can be harsh and risky especially on sandy, muddy or rocky roads. Boats are often the best means of transport to remote villages: common sense and field expertise is the recipe to overcoming various stumbling blocks along the way, but the key is still to plan, anticipate and prepare all the needed material like satellite phone, spare parts like tyres, batteries, and provisions for

fuel, oil, and technicians. Of course there is no electricity, fuel, or garage on the way.

## Living and Cross Cultural Conditions

Working in rural areas requires flexibility and the ability to adapt to local conditions: it can be a nightmare but also adventurous. You must be ready to experiment with all kinds of food, living places, forms of entertainment and language of communication. While some conditions might be tolerable, others like sleeping outdoors under tents or in mud huts with insects under extreme hot or wet climatic conditions, long-drop toilets, bucket shower baths with dirty running water in the dark or the use of candles can be challenging.

In the cross-cultural perspectives, one must be prepared to meet with people who communicate differently and will display

behaviour that is not what we consider the norm. One must be prepared to experience a completely different lifestyle.

## Working Conditions

During field installations, operations and maintenance, work usually begins at 7AM and can run until 11PM depending on the type of activity which can be very complex especially if it has to do with troubleshooting. Field team members may not always have favourable climatic conditions. Food can be a challenge: eating once a day is common as there are no shops or groceries or simply because it is difficult to find a cook and even cook. If you plan to cook, you have to bring your own tin cans. Be prepared to get dirty in the field. Again, planning and preparation cannot be stressed enough. Even simple tools like a screwdriver or an Ethernet cable cannot be sourced locally. If you want to charge

your electronic device, bring your own generator (and your fuel) until the solar panels are mounted and operational.

## Security and Safety

Security is a major issue. One cannot rely on security guards. The places you sleep and work have little or no security so we might experience cases of theft, pick pocketing and double dealing. Work tools and other personal belongings must be supervised at all times.

## Overall Goal of the Mission

Despite all these challenges, the main goal of the mission is to activate the various satellite and GSM sites as per the original project plan and deliver according to the customer expectation. Once the site is operational, the reward of witnessing the joy of the inhabitants being able to talk to their cousin in Kinshasa or in the US, helps one forget all the difficulties faced in the past days.



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**Dr Khaled Al Hashmi**, Director of Space Missions, UAE Space Agency



**Arfan Chaudhry**, Head of International Policy, UK Space Agency



**Sheikha Al Maskari**, Chief Innovation Officer, UAE Space Agency



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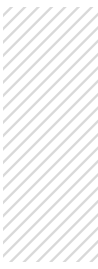
# WHAT'S NEXT IN SATELLITE SERVICES?

Since 2004, the World Teleport Organisation has been publishing the Top Teleport Operators rankings to draw attention to the important, often unsung, role of satellite service providers. WTA Executive Director Robert Bell shares some key highlights from its *Inside the Teleport Operators* report, in which the world's biggest and most innovative service providers talk about 2018 and the future



Where is the satellite communications business heading? It's the question on everyone's mind, because the rate of change has accelerated and long-stable industry relationships are shifting.

**Revenue Trends**  
Teleports generate revenue from several sources. The primary one is the service provided by the company itself. It is a long list, including everything from the basics of uplinking and routing to originating TV programmes, delivering non-broadcast



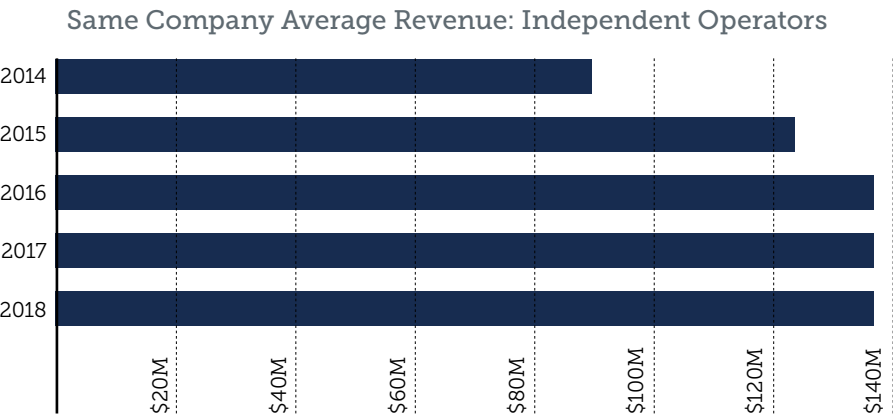
content, designing and managing complex networks, and providing end-to-end cybersecurity. In addition to charging for their own services, many operators mark up satellite and terrestrial capacity they buy on behalf of customers. The margins are thin but the revenue can be

large, making it a worthwhile contribution to total revenue. On average, teleports in our sample generated about half their revenue from value-added teleport services and half from capacity resale.

Total revenue growth, however, has leveled off in the past three years. Same-company results show that independent teleport operator revenues grew at double-digit rates from 2014 to 2016 but slowed to 1% or less per year from 2016 to 2018. Changing capacity prices are part of the picture: 57% of respondents said the price they could charge for satellite capacity resale fell during the year, and 46% said the same of terrestrial capacity. That has a meaningful impact on top-line revenues, much less so on profit margins.

The good news for service providers is that the value of their own services is rising. In 2014, no teleport operators reported being able to raise prices for the core value-added teleport services they provide, though 61% reported level pricing. In 2018, 56% reported no change in pricing but 13% reported being able to increase prices.

**Hottest Markets**  
The top operators saw their volume of business increase most in the enterprise markets of retail, maritime and 'other' – an average of 39%, equivalent to the



previous year's results. In 2017, 37% of respondents reported doing an increased volume of business with both terrestrial and satellite carriers. In 2018, those categories sharply diverged. Only 10% of respondents did an increasing amount of business with satellite operators, while 40% increased their business with terrestrial carriers.

The other major change from year to year was for the media sector. In 2017, 50% of respondents reported an increase in the business they did with the media & entertainment sector; in 2018, that fell by more than half to just 21%.

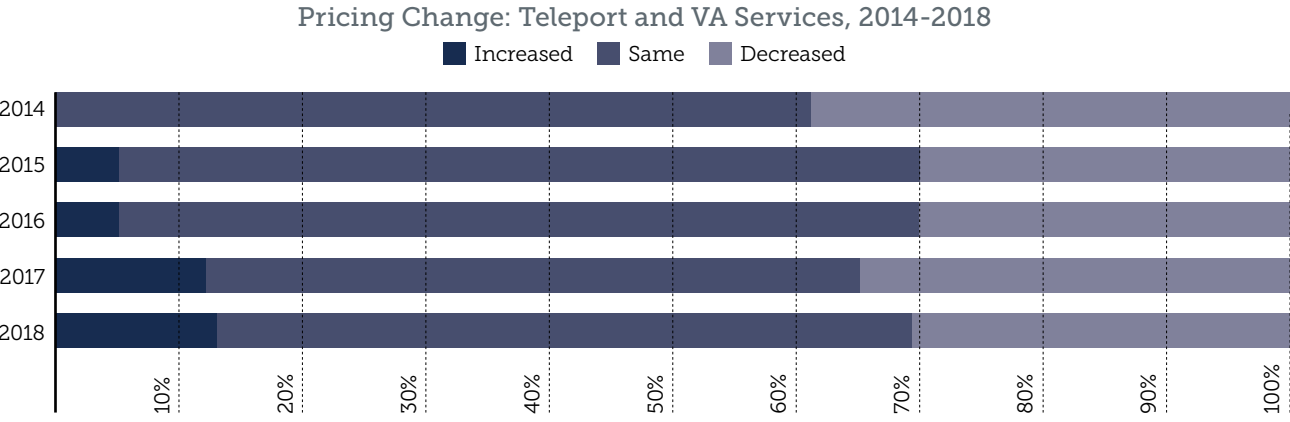
**The Value of Managed Services**  
These trends are broadly in line with the global changes running through the satellite business,



as an enormous increase in bandwidth on orbit is depressing prices but also increasing volumes as customers take advantage of more affordable service. For most satellite operators, these are challenging times, as they try to build more lower-price data network revenue while video revenue declines in most markets.

Service providers on the ground have much less exposure to capacity price swings, because the margins they can charge on capacity are slim. The winds of change, however, still blow cold. Driven by changes in their markets, satellite operators are moving into the complex managed services business that they have long left to teleport operators.

In another recent study, *Satellite Operator Benchmarks 2019*, WTA asked teleport





executives to rate the commercial practices and operational performance of the satellite operators they buy from. Our sample of 80 executives, responsible for 34GHz of capacity purchases, reveals that they are seeing increasing direct competition for managed services business from their satellite vendors. Five of nine satellite operators covered by the study were cited as competing directly more often in 2019 than in 2015. That competition was seen as increasingly unfair, as satellite operators bundle their capacity with the services on which teleport operators depend for most of their profits. Ratings in this area were the most negative in the nine years of the study.

As the report summarises: “Satellite operators have seen the future, and it is in managed services, particularly ones delivered across a global or at least large regional footprint.”

This makes commercial sense, because the value of networks lies not in connectivity but in the ability of that connectivity to solve problems or create opportunities for customers. Most teleport operators made this transition



**“The top operators saw their volume of business increase most in the enterprise markets of retail, maritime and ‘other’”**

**Robert Bell, Executive Director, WTA**

long ago, as the margins available from basic uplinking shrank to the vanishing point. With their satellite vendors now making the same move and ratcheting up the competitive pressure, teleports are in search of new efficiencies and new roles in the market.

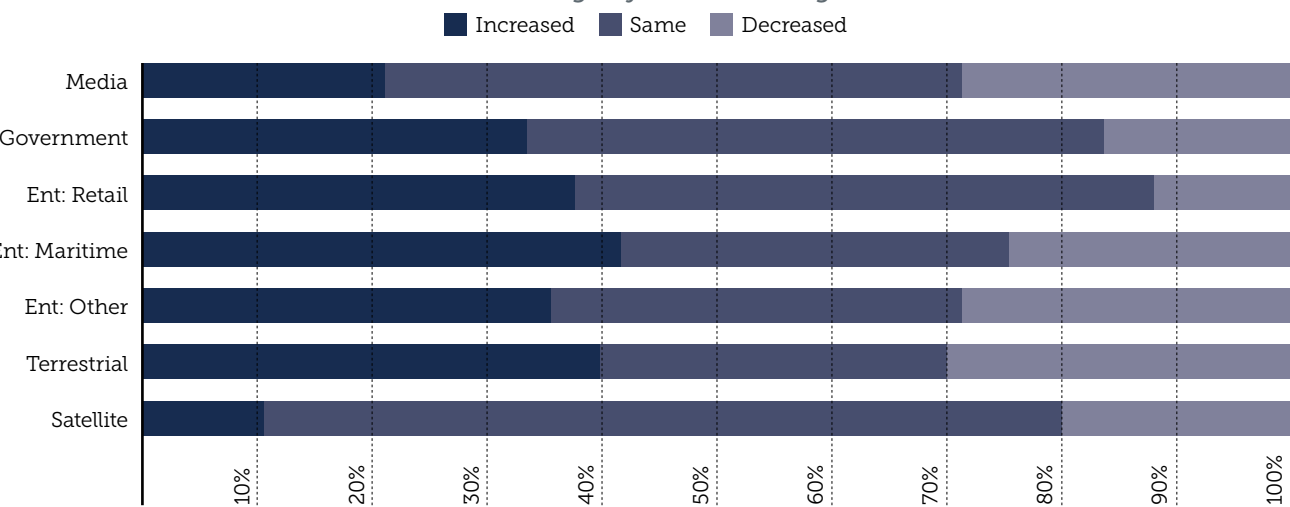
The strategies for adaptation are detailed in the research

reports that WTA publishes: on automation technology, 5G, cloud services, big data and LEO. They are pursuing new opportunities to serve as gateways for LEO smallsats, as ‘superPOPs’ for aggregation and distribution of media, and as field service organisations for the demanding fields of maritime, energy and land mobile. They are buying satellite capacity in smaller increments and for shorter terms to preserve their flexibility. They are also relentlessly pursuing partnership with other companies – including their satellite operators – that transform them from stand-alone entities to links in global value chains.

The challenge is high and the competitive pressure fierce. But the opportunities are also on a larger scale than ever before. **PRO**

*Robert Bell is Executive Director of the World Teleport Association, the only trade association that focuses on the business of satellite communications from the ground up. ‘Inside the Top Operators’ and ‘Satellite Operator Benchmarks 2019’ are available free to members and for sale to non-members at [www.worldteleport.org](http://www.worldteleport.org).*

Volume Change by Customer Segment



# LEO/GEO INTERFERENCE:

## A NEW SPACE APPROACH

With the launch of several thousand smallsats into space and the rise of the LEO constellations, the risk of LEO/GEO satellite interference is on the rise, and the need to coexist and neutralise interference is driving cooperation. One key player with solutions in this space is Kratos. **SatellitePro ME** offers a background into the current status quo and asks Guido Baraglia, Business Director, EMEA of Kratos, and Bob Potter, VP Signals and Ground System Technology, to shed more light on RF issues both globally and in the Middle East





Small satellites (smallsats) are creating new and disruptive opportunities

in today's space industry – applications once only provided by traditional satellites in geosynchronous equatorial orbit (GEO), such as Earth observation and imaging, are in a growing number of cases being performed by smallsats in low Earth orbit (LEO).

Thousands of smallsats will add to a growing RF interference issue. Big satellite programmes take decades to procure, build, launch and operate, at price tags in excess of a billion dollars. In contrast, the benefits of smallsats can be significant – lower costs to acquire and launch, plus a higher refresh cycle that supports rapid technology insertion as programmes and technology evolve.

Additionally, the reduced communication time lag (latency) of LEO satellites means they require less energy to place into LEO orbit and less powerful amplifiers for successful transmission. As such, they will be used for an increasing number of existing applications for communication applications in the future. However, unlike GEO satellites, LEO satellites are in non-geostationary (NGSO) orbits and thus require a constellation of smallsats to provide continuous coverage.

Rising demand for high-resolution imaging services, lower costs and continuing technological advances are some of the factors driving the market. However, the deployment of LEO constellations is apt to significantly escalate interference issues with GEO networks.

As constellations are launched and the number of LEO satellites increases exponentially, so too does the risk of LEO/GEO satellite



**“Most people have no idea how this resource is fundamental to all of mankind”**

**Guido Baraglia, Business Director, EMEA, Kratos**

interference. This is caused when a LEO satellite crosses the path between a GEO Earth station and a GEO satellite. This problem was first recognised during an earlier wave of proposed LEO constellations some 20 years ago. At that time, the International Telecommunications Union (ITU) stated that NGSO craft bore the responsibility for avoiding interference with GEO satellites.

Per the ITU, the responsibility was with the NGSOs to undertake measures, including power management pursuant to equivalent power flux density (EPFD) limits, repointing beams so as not to interfere with the beam footprint of a GEO beam, and changing frequency bands to avoid interfering with GEO transmissions.

Fast forward 20 years. Among the advances in GEO satellite technology is a significant increase in the sensitivity of GEO satellites, enabling satellite operators to use smaller antennas – 2m versus 6m. As LEO satellites are closer to Earth,

they also use smaller antennas.

While the smaller antennas have a big upside, including smaller footprint and reduced costs, they also have their downside. Smaller antennas have higher side-lobe gain, increasing the possibility of interference of operational power requirements. In the larger GEO antennas, side-lobe gain might be 60dB down.

As a result, GEO satellites previously protected from interference by LEO EPFD limits are now more susceptible to LEO satellite interference, even though they operate within the EPFD limits established by the ITU. Another concern is that the deployment of smallsat constellations will make the identification of LEO satellites violating ITU rules – whether accidentally or intentionally – much more difficult.

**Frequency Sharing:** To optimise the frequency spectrum, GEO and LEO satellite operators sometimes share the same Ku-/Ka-band frequency band once the LEO operators, in their licensing application, demonstrate how they plan to minimise this potential conflict. In this instance, LEO satellites crossing the equator have to change bands to avoid interfering with the GEO satellite, whose frequency rights take precedence. Once past the equatorial belt, they can resume frequency sharing with the GEO satellite. Should LEO satellites achieve the numbers forecast for them, frequency sharing between LEO satellites and existing GEO satellites could become the norm rather than the exception.

**Beam Pointing:** In the northern hemisphere, GEO antennas point to their satellite in a mostly southerly direction, while LEO antennas point in a northerly direction so as not to interfere with GEO signals. As LEO satellites cross the equator, their payload is switched off so as to not interfere,

or be interfered with by, the GEO antenna beam footprint. Once clear of the footprint, the LEO satellite is switched back on.

**Power Management:** Power management on the part of the LEO operator is another means to avoid LEO/GEO interference. The potential issue is that as satellites become more sensitive due to beam shaping, the ground GEO antennas are getting smaller, which means lower equivalent isotropically radiated power (EIRP) to the satellite, and also less gain on the receive side.

The consequence is that the side-lobe gain of the antenna becomes higher, compared to larger antennas. As a result, they are more susceptible to interference from legal third-party transmissions such as frequency sharing terrestrial systems, as well as LEO communication systems.

The question is: Will EPFD limits for LEO satellites need to be reduced... and will that power reduction have any negative effect on their ability to adequately perform their mission?

The bottom line is that while there are approaches to minimising LEO/GEO interference (power management, beam management and frequency sharing), these are going to become more difficult to manage as space is flooded with hundreds, if not thousands, of smallsats in multiple constellations. The majority of GEO satellite operators worldwide employ carrier monitoring and interference detection products such as Monics, which can provide early warning of potential LEO interference so that cooperative preventive/corrective action can be taken.

Today, a number of GEO satellite operators are either working with or investing in LEO operators. Cooperation is driven by their common need to coexist and neutralise interference.

## Kratos' approach to the GEO-LEO interference issue

Kratos works with LEO operators, leveraging capabilities that include carrier monitoring and interference detection (Monics), management and control, and data analytics. This approach, packaged for LEO operators, monitors the performance of a company's complete satellite network, drilling down to ground systems, satellite performance, beam pointing and power usage, to minimise interference with GEO satellites while maximising data throughput of the global network.

This will enable the new smallsat constellations to act as 'good neighbours' to their more established GEO counterparts. LEO operators will be able to monitor the total performance of the LEO satellite to include beam patterns and pointing, as well as measuring RF energy to monitor compliance with ITU EPFD requirements. For LEO satellites sharing

Ka-/Ku-band frequency with GEO satellites, Monics will monitor spectrum usage to ensure that there is no spectrum degradation to the primary user – the GEO satellite.

These algorithms and measurements are fast enough to adjust to any Doppler effects (shifts) that might occur during the satellite pass. Additionally, interference characterisation will determine local (terrestrial) interference affecting the LEO gateway. In this approach, all carrier spectrum monitoring is available through one logically organised client, increasing operational efficiency and reducing time needed to manage and protect the RF spectrum.

In addition to satellite performance, LEO operators can also monitor their ground operations, with complete visibility to monitor and control equipment from a

single management console, enabling them to change displays, add devices and perform configuration changes with an easy-to-use interface. This integrated approach ensures service-level assurance for the LEO operator. RF measurement becomes part of the data network management toolset, thereby assuring data throughput in bits/Hz rather than dBW and MHz.

These data aggregation capabilities and predictive analytics enable the LEO operator to compensate and correct potential performance anomalies (power usage, beam patterns, frequency sharing, etc). Should even two of the proposed mega LEO constellations become a reality, they will affect all GEO satellites; thus LEO and GEO operators will need to actively cooperate to ensure that the best both have to offer is made available to all.





# FINDING ANSWERS TO A RISING PROBLEM

## How are RF issues in the Middle East different from those in other international markets?

Guido Baraglia: Given the nature of new space, the RF congestion will be pretty much similar worldwide. What might change will be the interaction with existing or new terrestrial services. The Middle East, by nature, can use a number of different frequencies, although Ka-band in tropical regions will be a stretch. The industry is generally younger, and might be more aware of such issues.

## Is RF regulation in the Middle East up to date?

GB: Middle East representatives are fairly active in the field of regulation; events hosted by national agencies and the ITU are always attended by a high number of officials. The Space Radio Monitoring System deployed by the Telecommunications Regulatory Authority (TRA) of Oman is a clear indication of the region's interest in protecting the spectrum and mitigating interference.

## How will the growth of LEO and MEO constellations create a congested spectrum environment that must be monitored and managed to prevent interference?

GB: The frequency spectrum is a finite resource. To avoid mutual interference, frequency bands are licensed by service and operator; it would be catastrophic if the industry were to attempt any level of deregulation in this field. Each constellation, independently from the type of service (communication, Earth observation, radar, electronic

emission detection and more), will have to be strictly coordinated and managed, to allow each of the operators a safe and sustainable radio frequency environment.

There is a second issue, not strictly related to spectrum frequency management, that will have to be considered – that is the possibility of collisions between spacecraft, with unfortunate consequences. Orbit determination and collision avoidance should



**“LEO and MEO satellites should be equipped with some sort of active ID signature”**

Guido Baraglia, Business Director, EMEA, Kratos

be part of the same discussions. BP: Space situational awareness, in the form of spectrum space situation awareness, will become key for any of the LEO/MEO operators to be successful. The existing LEO/MEO operators have successfully coordinated spectrum usage in the shared band of Ka-band (18.8-19.3GHz D/L and 28.6-29.1GHz U/L), and mitigated spectrum usage in the LEO/MEO secondary band (17.8-18.6GHz D/L and 27.6-28.4GHz U/L), by use of special diversity techniques such as beam pattern, antenna pointing angles and power levels, complying with the ITU Article 22 of the Radio Regulations.

Article 22 will be the reference point for spectrum sharing between the LEO/MEO constellations and existing GEO satellite constellations. We can expect updates to this article as we learn more about how many satellites and in what orbit and frequency bands they are deployed. TRA of Oman is perfectly located to act on behalf of the Middle East, to measure and determine compliance to RR Article 22 and be a key reference point for updates as needed for the region.

## What kind of solutions to address this new ecosystem are available in the market?

GB: Here again there is a two-fold approach, one in space and a second on the ground. LEO and MEO satellites should be equipped with some sort of active ID signature, similar to the aviation ADS-B or the maritime AIS, to be easily detected and traced. Currently this activity is mostly passive, with little input from the constellations, resulting in limited accuracy. Secondly,

agencies and regulatory authorities should equip themselves with RF monitoring capabilities that allow permanent tracking and detection of LEO and MEO satellites.

## RF spectrum is precious. Which industries benefit the most from allocation, and who is losing out?

GB: Most people have no idea how this resource is fundamental to all of mankind, not necessarily limiting the use to the mere communication capabilities. Every morning, we watch news that comes from the other side of the world, most of which has travelled through space to get into our living room. We check the weather before deciding how to get dressed, not knowing that a bunch of satellites in the sky have collected data throughout the previous days that are used to forecast it. We jump in the car and set a destination into the navigation system, not necessarily knowing about those objects orbiting our planet that help us reach our destination. Even the simplest businesses rely on information that can be delivered through space.

BP: Spectrum should not necessarily be a tug of war between terrestrial and satellite, although at times the interplay with satellite and IMT in WRC12 and WRC15 would indicate that this might be the case. Terrestrial can be made to look like it's serving national interests, and satellite ultimately now serves global interests, but 5G and its associated applications will need satellite bandwidth to operate efficiently and may change this perspective.

The C-band discussions at WRC12 and 15 show how lack of cooperation can ultimately cause spectrum problems. C-band has effectively become a regional resource rather than a global resource, with much of the northern hemisphere moving to Ku- and Ka-band, but C-band



**“There needs to be a realisation that spectrum is not just a national resource”**

Bob Potter, VP Signals and Ground System Technology, Kratos

is still a very important resource in the tropical regions. The wide bandwidth provided by Ku- and Ka-bands (and future V- and Q-bands) are global resources, and cooperation between terrestrial and satellite will benefit all at national level as well as global level.

## How do we address cross-border RF interference issues?

GB: Coordination is the key. The ITU will have to step up its role of recommendation, to make sure all countries put the maximum effort in harmonising frequency usage (not only for space).

BP: There needs to be a realisation that spectrum is not just a national resource. In today's interconnected world, it is incumbent upon national regulators to work together on regional and global policy.

## What level of interference is considered permissible?

GB: It's hard to quantify a permissible level of interference. ITU recommendations call for specific protection of high-profile

services, but it is always down to national authorities to license services following specific technical requirements and interference avoidance rules, and to enforce those. In the end, interference disturbs the users of the affected service and may cause revenue loss for the company running the service with a consequent loss of jobs; it cannot be overlooked.

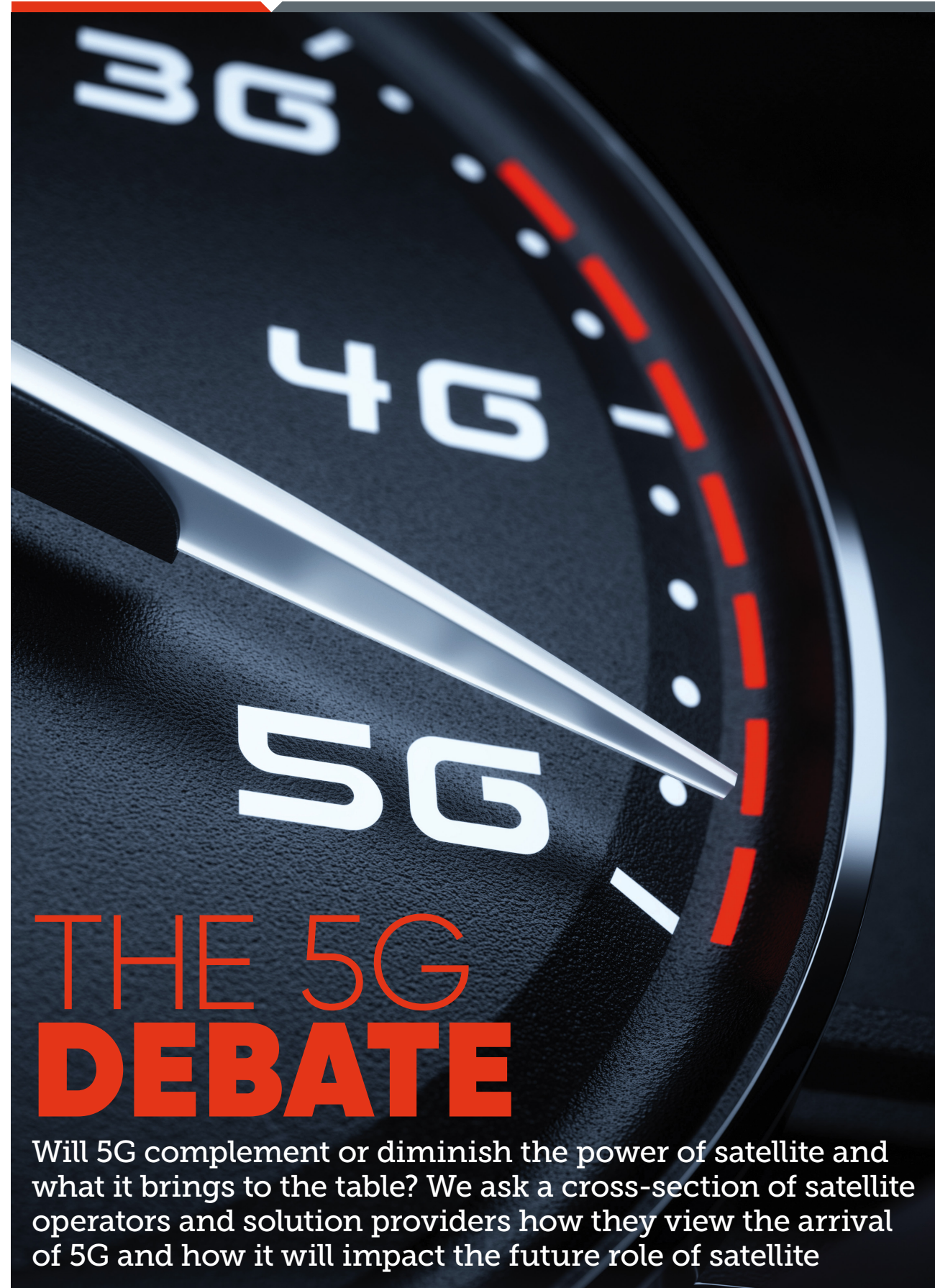
BP: Today's waveforms, terrestrial or satellite-based, can work through a certain level of interference, but at the cost of lower data throughput. Data throughput will ultimately be the measure of acceptable levels of interference. RR Article 22 provides current acceptable power levels for secondary spectrum users to avoid interference with the primary spectrum users. There are already calls to update this document – as satellite beams become smaller, meaning higher gain, ground-based antennas become smaller, which means wider beams, so the possibility of interference based on current power levels increases.

## Which verticals can benefit the most from RF?

GB: This is so embedded in everyday life that not having access to RF would have a disastrous impact on many operations. DTH television, satellite B2B communication, satnav, weather prediction, tracking of goods, security services, disaster relief and humanitarian operations – and many more – base their success on the use of reliable and affordable RF spectrum. Any disruption to this, even minimal, would have dire consequences for the affected vertical.

BP: Global mobility will certainly be a winner in the new space revolution. We already see aircraft and shipping connected. The advent of ESA antennas will shortly see the car connected, with all the benefits of wideband streaming to and from the car. **PRO**



**ETL****Alex Donnison,  
Business  
Development  
Manager**

Unlike the previous mobile communications generations, 5G will provide an overarching, intelligent 'network of networks' architecture via cloud-based software-defined networks (SDN) and network function virtualisation (NFV). These concepts also embody network slicing, where each slice is configured to a particular user's need, e.g. healthcare. Slices are created autonomically as and when they are required. This is a step change to previous evolutions of mobile networks. The whole system will verge on AI, with intelligent orchestration.

Due to the requirement of 5G to provide ubiquitous world-wide coverage, the underlying physical infrastructure will use a wide range of radio access technologies (RATs), including 5G, 4G/LTE, Wi-Fi, Wi-Max, MIMO and satellite communications. This means all these technologies must be integrated to provide a seamless and transparent 5G ecosystem.

This presents huge opportunities for satellite communications, which is the only communications system able to deliver truly ubiquitous coverage. Three examples are satellite backhaul; communications on the move (CoTM) for ground, sea and air transportation; and the Internet of Things (IoT).

A recent NSR report indicates that satellite backhaul market demand will double in the period 2018 to 2028, with revenue expected to increase from \$1.5bn to \$4.4bn. This is unsurprising, considering the potential to establish a connection in remote, unserved areas in terms of 5G.



**"This presents huge opportunities for satellite communications, which is the only communications system able to deliver truly ubiquitous coverage"**

**Alex Donnison, Business Development Manager, ETL**

In terms of ground transportation and COTM, road haulage and trains will be key areas. Although much is said about the connected car, this will be via terrestrial 5G due to the inherent cost of fitting cars with satellite communications and the fact that the vast majority of cars will have access to terrestrial mobile networks.

Leisure and merchant shipping will continue to have satellite communication requirements for business, entertainment and safety, albeit IoT-enhanced. This also applies to commercial air transport in-flight connectivity (IFC) for entertainment and business purposes.

5G will be a main driver for IoT. At the same time, the advent of HTS/VHTS and LEO constellations is

making it much more affordable to get large amounts of bandwidth via satellite. This makes it an attractive option for enabling IoT over 5G, which will in turn present massive opportunities in satellite communications as IoT increases bandwidth and device connection density requirements.

Ultimately, the attractions for the mobile network operators (MNOs) to work with the satellite industry are ubiquitous coverage for unconnected areas and falling OPEX (price per bit) with the advent of V/HTS GEOs, MEO and the new emerging LEO constellations. As the satellite ground infrastructure must support the space segment, this will present ongoing opportunities for ground segment equipment suppliers.



**AsiaSat**  
**Roger Tong, CEO**

The arrival of 5G services is imminent in various Asian markets. China will be rolling out 5G during the celebration of the 70th anniversary of the founding of the People's Republic of China in October 2019, while Hong Kong will be auctioning the 5G C-band spectrum in October as well. The 5G rollout is causing significant reduction of overall C-band satellite capacity, not only broadcast service but also essential services for mission-critical operations such as disaster recovery.

It is fortunate that telecom authorities in Asia reacted cautiously to this new rearrangement of spectrum use, with decisions made after extensive public consultation. Moreover, task forces and working groups were formed and field trials on mitigation solutions were all started before the planned deployment of 5G networks. For example, South Korea, Malaysia, China and Hong Kong have all done extensive studies in 5G compatibility.

As the deployment of 5G in C-band has become inexorable, the priority of Asia-Pacific satellite operators has shifted to protecting the existing services of our customers, while we will continue to lobby administrations, regulators and mobile operators on deploying 5G in a more logical alternate spectrum, such as the 30GHz or above frequency band. In the upcoming ITU-R WRC-19 in October/November, Agenda Item 1.13 will be identification in Ka-band and above 30GHz for the future IMT service. With the work conducted over the past four years following the WRC-15, administrations will conclude and decide new frequency bands for global use of



**AsiaSat has developed a series of high-performance 5G bandpass filters proven to work effectively in protecting our customers' C-band services against out-of-band interfering signals from nearby 5G base stations"**

**Roger Tong, CEO, AsiaSat**

5G networks while at the same time ensuring the protection of incumbent satellite services. AsiaSat has conducted multiple

studies and tests with regulators to explore various mitigation measures, including the use of bandpass filter, proper site selection and shielding. AsiaSat has completed the development of a series of high-performance 5G bandpass filters proven to work effectively in protecting our customers' C-band services against out-of-band interfering signals from nearby 5G base stations. These filters are being rolled out to customers and other service providers to protect our customers' standard C-band services. Coupled with traffic re-grooming of our customers' spectrum assignment, this is expected to mitigate the 5G rollout impact.

We look forward to working closely with mobile operators for the coexistence of 5G mobile services and existing satellite service.

**Yahsat**  
**Adnan Al Muhairi,**  
**Executive VP,**  
**Engineering**

5G is bound to create new verticals and applications, which present us with new opportunities and revenue streams. 5G deployment on a large scale is likely to happen after two to three years, hence the impact on Yahsat's markets will be minimal. We believe in complementing and augmenting terrestrial networks, whether through coverage extension or as a secondary (back-up) solution for applications in land, sea and air.

With the promise of high bandwidth and low latency, 5G is not only going to open up new verticals and use cases, but will continue to support traditional use cases for

satellite systems like backhauling, with increasing demand to support the high bandwidth requirements or delivery of data to network edges efficiently with the satellite's multicast/broadcast capability. Persistent use cases that 5G is intended to address in verticals include industry 4.0 (supply chain), healthcare (telemedicine) and automotive (telematics).

Yahsat is very well positioned to serve these future verticals, through its fleet of five satellites and access to HTS (Ka-band) and MSS (L-band). Yahsat's MSS satellites (T2 and T3), operating in L-band and covering two thirds of



the world, address needs in different verticals. This is due to the many characteristics supported by L-band, including high mobility, reliability, small form factor and wide coverage.

Similarly, our Ka-band satellites offer high-throughput services, providing suitable support to applications such as trunking or backhauling to the unserved and underserved areas of our footprint.

We are also advancing with our next-generation L-band system to offer higher speeds, wider coverage, higher security and many other features that will serve these new verticals and offer customers a seamless integrated service.

**APT Satellite Company**  
**Thomas Antony,**  
**Sales Director**

5G offers a huge opportunity to serve the huge bandwidth requirement which 5G applications will generate. Satellites will play a complementary role and help deploy 5G networks in areas where terrestrial or 5G base station deployment is uneconomical.

Satellite coverage will help support multiple access technologies for 5G, and in particular for mission-critical and industrial applications

where ubiquitous coverage will prove an asset. As in the case of current mobile technologies, satellite connectivity will help in the delivery of 5G backhauling and providing 5G connectivity to enterprises, aeronautical, maritime and other on-the-move applications. Also, satellite operators and ground segment providers are working with the 5G standards group to integrate 5G architecture.



Satellite 5G will help terrestrial 5G. As the bandwidth requirement for 5G will be massive, considering the download speeds will be exponentially high (78% of mobile data network will be video traffic by 2021, according to

Intel), mobile network operators can use satellite 5G broadcasting/multicasting capability to move the content to the edge of the network. 5G will increase the use of IoT devices and applications in various verticals; Intel estimates that around 50bn devices will be in use by 2020, 70% of them for B2B applications. Satellite will help connect devices located in areas not connected by mobile broadband or terrestrial networks. A use case could be in the oil & gas vertical, wherein pipeline management is important for oil production. In this scenario, IOT sensors and video surveillance are used for real-time monitoring and inspection of the systems and devices in remote and complex geographical environments. In such scenarios, satellite communication will provide the more secure, reliable, quickly deployable, scalable and robust connectivity, with minimal points of failure.



**Integrasys**  
**Alvaro Sanchez,**  
**CEO**

Rather than being a threat to the satellite industry, 5G is a positive opportunity for satellite. I believe it will generate significant traffic for satellite communications and represents a huge opportunity for satellite to become more mainstream, relied upon for many more consumer applications.

As part of the Steering Board of the 5G PPP, Integrasys has been very involved in ensuring satellite has a role to play for the 5G standard. It will be important to ensure that satellite networks are easy to install, error-free and as efficient and reliable as possible, in order to compete with terrestrial networks. Well-managed and efficient satellite networks will be ideal for enabling 5G in both urban and rural areas. We are working in multiple European projects where 5G terminal manufacturers are creating the ecosystem.

The launch of 5G means the ability to connect a massive number of devices and deliver much higher throughput, bandwidth and internet speeds, more than ever available on any other mobile technology. However, coverage areas are very narrow in size, which is driving a massive infrastructure upgrade and new infrastructure deployment. Considering that some areas are still waiting for 4G, and even 3G, the deployment phase looks challenging. Satellite can deliver coverage across the globe and has an opportunity to complement terrestrial in those otherwise uncovered areas. As well as great coverage, multicast capability remains one of the most significant advantages of satellite compared to any other technology.



**“A hybrid solution is definitely the way forward for 5G, with both technologies bringing something different to the table to complement or even enable each other”**

**Alvaro Sanchez, CEO, Integrasys**

A hybrid solution is definitely the way forward for 5G, with both technologies bringing something different to the table to complement or even enable each other. There are a number of areas where that will make

sense in particular, such as machine-to-machine, IoT and the connected car. The latter is a clear example of how in cities it will use 5G networks, and yet in rural areas (or for software upgrades pushed by multicast capability) it will use satellite technology.

Although 5G complements satellite, it also threatens the traditional business models for terrestrial and satellite. If we rest on our laurels, the satellite industry could lose out to 5G. However, if service providers invest in smart and efficient technologies, they can remain relevant and continue to be competitive, as well as being able to be used as a 5G enabler. This may well lead to winning new business in the new applications enabled thanks to 5G. So get on the 5G train now!

**Eutelsat**  
**Luis Jiménez**  
**Tuñón, Global**  
**Executive Vice**  
**President, Data**  
**Business Line**

Satellite is a viable alternative to 5G to connect the population in areas where it does not make economic sense for telcos to go, and can be a cost-effective backhauling solution in low-density areas. So satellite should be viewed as both a means to complement 5G coverage in order to offer universal coverage, and an enabler of 5G roll-out to provide backhauling connectivity. Whether satellite is

a means to complement coverage or as a backhauling solution, telcos should think of satellite operators as partners.

Due to the size of each market, satellite remains niche in comparison to the telecom business, but infrastructure development is not a one-size-fits-all domain. There are some instances where terrestrial development is more appropriate and others where satellite has an edge.

Satellite has a clear role to play in greenfield areas and rural areas,



which have a very low population density. The advantage of a satellite, once in orbit, is that the incremental cost of connecting a new site is negligible (just add an antenna), whereas the incremental cost of connecting a terrestrial site is higher (bring fibre up to the base station). Satellite will be key in facilitating a seamlessly integrated 5G network, making this technology an integral and necessary part of a telco's network infrastructure.

**Satcoms**  
**Innovation**  
**Group (SIG)**  
**Martin Coleman,**  
**Executive**  
**Director**

The two technologies will complement each other, and I believe 5G will be hugely positive for the satellite industry, but not necessarily in the way people have been assuming. For one thing, the 5G rollout doesn't mean that the whole globe will be covered by 5G, not for a long time. We will still end up with many areas getting 4G – or worse, 3G! In those (often rural)



areas, where they currently don't even have 3G or fibre, for example, satellite will most definitely remain vital for keeping those communities connected.

At the same time, however, 5G will deliver excellent connectivity at a fraction of the cost of satellite, so I don't imagine that we will see satellite antennas being used for consumer IoT applications, at least not anytime soon. Even for connected cars, most are already connected to mobile devices and, where 4G exists, get good service. With 5G, that will significantly improve, therefore why would you go to the trouble of fitting an expensive satellite antenna? It simply won't happen – or rather not yet, the cheap flat-panel revolution is years away!

That said, satellite does have a critical part to play. It comes down to connecting those mobile cells behind the scenes. The 5G structure requires significantly more cells, meaning lots of antennas are needed to cover a small area. For example, a typical university would need over 40 cells just to cover the campus.

The real push for satellite is cross-connecting those groups of cells together, acting as the pipeline to seamlessly interconnect those groups and network infrastructure within a country or across the globe, without any on-the-move difficulties to contend with and minimising the number of transmissions. Having an infinitely flexible and managed satellite backbone will ultimately make all IoT apps really fly.

A hybrid solution pairing 5G with satellite will really help 5G to have the impact it is hoping for, while at the same time retaining the importance and cost-effectiveness of satellite. **PRO**





## ARAB SPACE PROGRAMMES – AN UPDATE

**"In 2018, the region's combined total expenditures were just under \$1.3bn, led by the UAE (\$383m), Qatar (\$186m), Egypt (\$177m) and Saudi Arabia (\$165m)"**



According to Euroconsult's *Government Space Programs 2019* report, just over half (12 out

of 22) of the countries in MENA have government space programmes. In 2018, the region's combined total expenditures were just under \$1.3bn, led by the UAE (\$383m), Qatar (\$186m), Egypt (\$177m) and Saudi Arabia (\$165m). The region has demonstrated remarkable dynamism, posting a five-year cumulative annual growth rate (CAGR) of 11%, largely driven by strong growth-leading programmes but boosted also by new entrants such as Tunisia, Oman and Ethiopia, as they procure their first systems.

Regarding the top three regional powers, the UAE has sought to lead with a rapidly developing and ambitious space programme. With a heritage in Earth observation (both civil missions via DubaiSat and defence capabilities via the FalconEye programme) dating back to the late 2000s, in 2014 the country announced its Mars Hope mission, an unmanned orbiter which would measure the Red Planet's atmosphere by 2021. This was followed up by the announcement in 2017 of a human settlement on Mars within 100 years.

These activities were reinforced by organisational restructuring, a revamped policy and legal framework, and an expanded budget to support these activities and new ones, including

the country's first astronaut mission to the ISS in Q4 this year. Despite the recent failure of the FalconEye1 launch, the country is likely to retain its regional leadership position as it expands its space programme and spearheads regional cooperation activities – for example, it created the Arab Space Coordination group of 11 Arab countries working together to develop the first pan-Arab EO satellite, 813.

Saudi Arabia has recently announced plans to significantly upgrade its space activities, spearheaded by the creation of a new space agency. Today, satellite communications and EO take up 85% (63% and 22% respectively) of Saudi Arabia's total space budget. However, the country has announced an ambitious space programme and spending is likely to not only grow but also diversify, as it develops capacities in a number of different application areas, including satcoms, EO, technology development, launch vehicles (which could take the form of developing an indigenous launch capacity or developing a spaceport to attract commercial launchers), manned spaceflight and even space exploration missions by the end of next decade.

Qatar has traditionally focused on satellite communications via Es'hailsat, which took up over 90% of its space budget in 2018. With Es'hailsat buying full ownership in 2018 of Es'hailsat-1 – previously shared with Eutelsat – and the launch of Es'hailsat-2 in Q4 2018, as

well as a possible third satellite expected to be procured in the coming years to satisfy future demand, the country's space budget is forecast to continue its growth trajectory into the mid-2020s, boosted also by new defence spending for satcom and Earth observation ground assets.

While some countries still exhibit the cyclical boom and bust budget characteristics of countries which rely on foreign manufacturers to procure their space assets, a number of leading regional programmes have developed local space industries, transforming government space expenditure into long-term budgets required to support these industries.

Looking forward, the region's growth dynamism will continue, albeit at a slower pace, with CAGR hovering at around 5% over the next decade. Regional budgets are estimated to reach \$1.9bn by 2028. This strong growth is predicated upon Saudi Arabia's forecast budget growth, but other events may also have a big impact on budgets – for example, regional instability may increase governments' perceived need for defence space assets, successful regional cooperation initiatives may attract additional government funding, and regional rivalries may spur governments to unlock more funding as they compete with one another. **PRO**

*Simon Seminari is Senior Consultant and Chief Editor of Euroconsult's Government Space Programs 2019 report.*



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