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WELCOME



Every industry goes through a period of explosive growth, where a complete transformation is at hand and the rules are being rewritten. This is that period for space and satellite. A lot of the hard work and learning that went into putting dreams into action five or ten years ago are coming to fruition now for different entities.

Take Oman, for example. Five years ago, the Sultanate's TRA realised that it would need to re-visit its spectrum situation. With the rise of radio communications and wireless devices as well as TV and radio channels, there were growing concerns about congestion in its frequency spectrum and the threats around jamming and interference. A tender was released; Kratos won it. Over the next four years, the two entities worked untiringly to build an entire infrastructure that would enable Oman to run one of the most advanced regulatory operations in the region. We bring you a fascinating and exclusive story of the four-year journey that led to the opening of the Middle East's first Advanced

Space Radio Monitoring Station and one of only nine in the world in Oman last year.

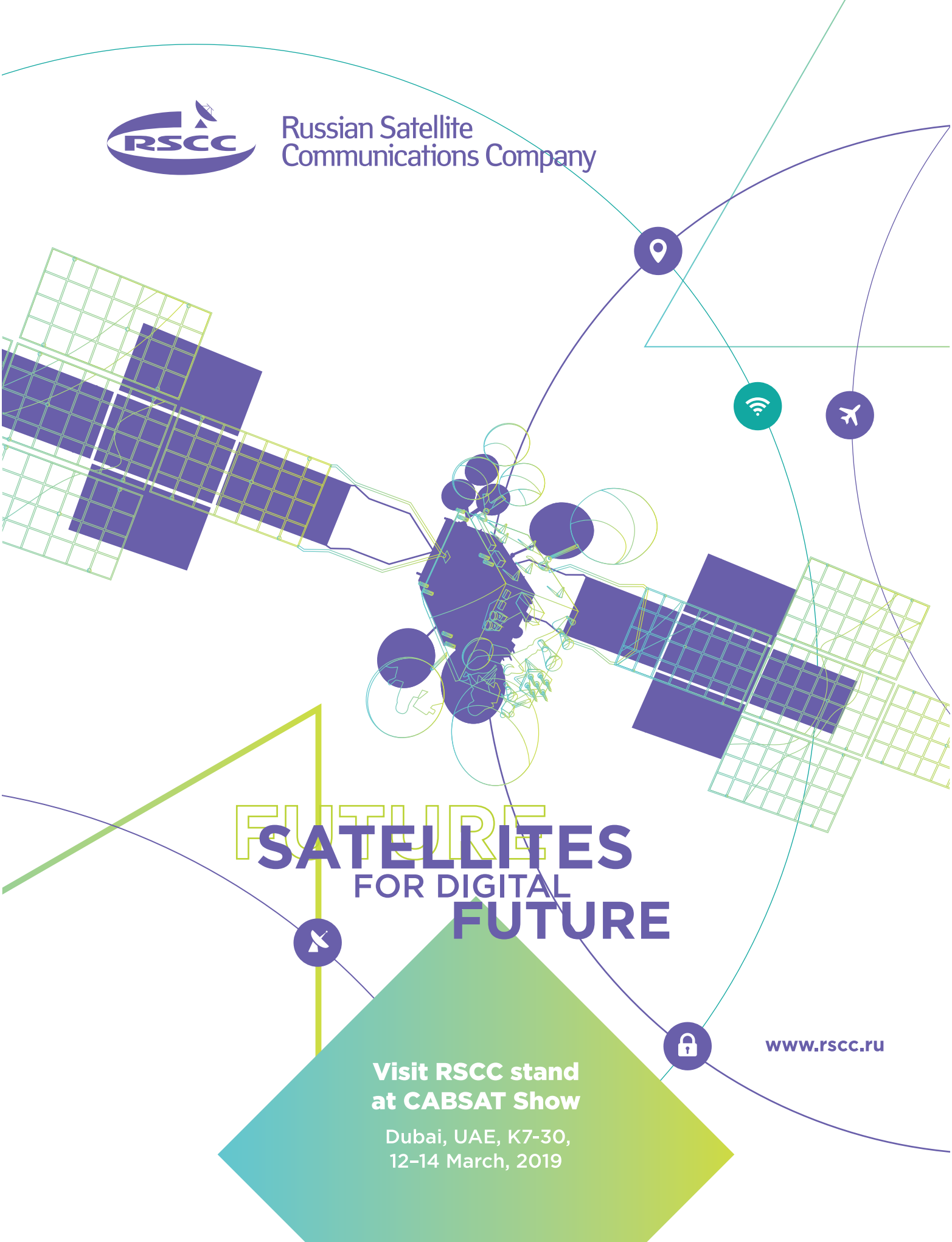
Likewise, ten years ago, Iridium started its NEXT project – and last month, the last pieces of the 66-piece jigsaw were put into place, bringing with it the promise of low-cost and reliable global data connectivity like nothing we have experienced before. A decade ago, the UAE began its space projects. As we go to press, the first two potential UAE astronauts have just come home after gruelling winter survival training in Russia, prepping for their historic September 2019 visit to the International Space Station.

This is a period of explosive growth, and we will feel this at the GVF summit that will be hosted at CABSAT from March 12-14. I feel honoured to be part of this era and look forward to covering more of the action in this space. See you at the show.

VIJAYA CHERIAN
Editor
SatellitePro ME



Russian Satellite Communications Company



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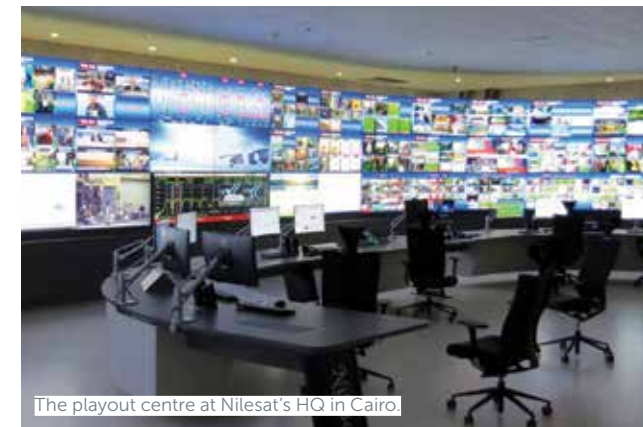
Nilesat expands broadcast playout with PlayBox Neo

BROADCAST

PlayBox Neo has completed a large broadcast playout system for Nilesat at its Cairo HQ. Nilesat provides a wide range of satellite-based facilities including the transmission of more than 700 TV channels, 600 of which are free-to-air. The new system was provided by PlayBox Neo's channel partner Modern Broadcast Centre (MBC).

Speaking about the installation, Mohamed Samir, Nilesat Broadcast Manager, said: "We required a solution that would integrate with our existing infrastructure. The primary requirements were a robust operating platform, user-friendly control, easy expandability and good technical support. PlayBox Neo's Channel in a Box was the logical choice."

MBC CEO Sabri Arafa added: "The system we



The playout centre at Nilesat's HQ in Cairo.

have supplied includes 40 AirBox Neo playout servers in one-plus-one configuration. The AirBox Neo is very modular and this allows us to specify the exact capabilities needed to accomplish each project. The elements selected for the Nilesat project comprise AirBox Neo playout, CaptureBox Neo ingest, Titlebox Neo graphics preparation

and titling, SafeBox Neo content and playout transfer, multi playout manager monitoring and control and multi-backup manager."

Installed in the apparatus room, the servers are currently being used for HD and SD channel playout and can be operated in UHD if required in the future. Playout is supervised from the facility's presentation control suite.

Arabsat's Greek subsidiary launches Hellas Sat 4

NEW LAUNCH

Hellas Sat successfully launched Hellas Sat 4 from the Guiana Space Centre in Kourou, French Guiana last month. Hellas Sat 4 is a Ku-band satellite and will be positioned at 39 degrees East, providing coverage over Europe, the Middle East and southern Africa.

The satellite is expected to commence service in Q3 2019. It will extend Hellas Sat's capacity and geographical reach to

meet the growing demand for applications that include video, maritime connectivity, cellular backhaul, corporate networks and government services. It will also serve as a back-up to Hellas Sat 3, located at the same orbital slot, which was launched in 2017.

Speaking about the launch, Christodoulos Protopapas, CEO of Hellas Sat, said: "Hellas Sat 4 is a powerful addition

to our network and a major milestone to our business plan. It brings new capacity that will enable our existing and new customers to unlock new growth opportunities in applications including broadcasting, mobility and private data networks. Moreover, it will enable us to deliver high-quality services at competitive prices as well as unmatched performance, resiliency and redundancy to our customers."

KSA launches 16th satellite

NEW LAUNCH

Saudi Arabia has launched the Saudi Geostationary Satellite 1 (SGS-1), the country's 16th satellite. The launch is aimed at strengthening telecommunications capacity, internet connectivity and secure communications in MENA. The satellite was developed by a team from King Abdul Aziz City for Science and Technology (KACST) and launched by Arianespace, which provides launch services for all types of satellites.

Lockheed Martin manufactured, tested and operated the satellite, with the participation of Saudi engineers and scientists trained in order to be able to work and contribute to the satellite project.

Saudi Arabia's Crown Prince Mohammad bin Salman and KSA's Minister of Defence oversaw the stages of manufacture during visits to Lockheed Martin's San Francisco HQ in April 2018. During the visit, the crown prince signed the final piece to be placed on the Saudi satellite before its launch, with the words "above the clouds".

MBRSC to host International Astronautical Congress 2020 in Dubai

PARTNERSHIP

Mohammed bin Rashid Space Centre (MBRSC) and the International Astronautical Federation (IAF) have signed an agreement to host the 71st International Astronautical Congress (IAC), from 12 to 16 October 2020, in Dubai. The event will be hosted for the first time in the Arab region. The agreement was signed during the World Government Summit by HE Yousuf Hamad Al Shaibani, Director General of MBRSC, and Jean-Yves Le Gall, IAF President.

Al Shaibani said: "The UAE's hosting of the 71st IAC, the world's largest space conference, highlights the UAE's strong global presence

in the space sector, its leading global position and outstanding achievements.

"IAC is a valuable addition to the conferences hosted by the UAE and a platform that brings together leading space specialists and decision-makers from around the world to share

experiences, build strategic partnerships and support international cooperation in space-related activities.

We are confident that hosting IAC in Dubai will be a milestone in the history of the event, especially with the launch of the Emirates Mars Mission (EMM) – Hope

Mission in 2020, the Expo 2020 Dubai and other major events in the UAE."

Salem Al Marri, Assistant DG for Scientific and Technical Affairs at MBRSC and chair of the local organising committee of IAC 2020, added: "IAC is the largest global event involving space industry experts. It is one of the key global conferences annually organised by the IAF, in cooperation with the International Academy of Astronautics (IAA) and the International Institute of Space Law (IISL)."

Al Marri noted that the conference will be accompanied by a large space-related exhibition, as well as a programme for students interested in the space sector.



HE Yousuf Hamad Al Shaibani, Director General of MBRSC

Eutelsat secures deals with Ethiopian broadcasters

BROADCAST

Eutelsat Communications has signed simultaneous multi-year contracts with the Ethiopian Broadcasting Corporation (EBC) and the Association of Ethiopian Broadcasters (AEB) for video capacity on its EUTELSAT 8 West B satellite. The aggregate of these contracts represents multi-transponder capacity, including incremental resources. EUTELSAT 8 West

B satellite's dedicated coverage of Ethiopia will enable both media groups to capture nationwide coverage for their FTA DTH platforms, representing a total of 30 channels. Eutelsat's 7/8° West orbital position will broadcast the vast majority of Ethiopia's channels, thanks to these new agreements.

Michel Azibert, Eutelsat's Chief Commercial and Development Director, said: "We are proud to

be working with leading broadcasters EBC and AEB in enriching the FTA experience for viewers across Ethiopia. These agreements also highlight the strength of Eutelsat's 7/8° West orbital position."

Messay Hurissa, EBC's Chief Technology Officer, added: "This partnership will allow EBC's customers to benefit from a much better performance with high-quality broadcasting and customer support."

Anman Fissehazion, CEO of AEB, noted: "Satellite technology plays a key role in reaching TV households across Ethiopia. One of AEB's goals is to increase and strengthen the number of TV households in our country.

"This goal can be reached if all broadcasters operate from a common orbital position to reach their audiences such as 7/8° West."

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Arab leaders to convene at Global Space Congress

SPACE CONFERENCE

The UAE Space Agency will host the Global Space Congress 2019 at St Regis Saadiyat Island Resort from 19-21 March. The Congress will bring together space agency leaders, aerospace executives, government representatives and leading scientists and academics to discuss challenges, policies, strategies and the latest technologies in the space sector.

HE Dr Eng Mohammed Nasser Al Ahabbi, Director General of the UAE Space Agency, said: "The space industry is one of the key drivers of human development and well-being. Through organising meetings and special sessions on the



HE Dr Eng Mohammed Nasser Al Ahabbi, Director General, UAE Space Agency

sidelines of the Global Space Congress for Arab space leaders, we hope to leverage the industry's capabilities to contribute to sustainable development across the region and inspire Arab youth to study science, technology, engineering and mathematics."

EgyptSat-A launched

NEW LAUNCH

EgyptSat-A, owned by Egypt's National Authority for Remote Sensing and Space Sciences and built by Moscow-based aerospace contractor RSC Energia, was launched last month from Kazakhstan. The \$100m satellite will replace the failed EgyptSat-A Earth-imaging satellite.

The new satellite features improved solar batteries and a high-speed radio link with ground stations. The spacecraft's electro-optical imaging system

includes an Earth-viewing telescope and camera that can spot surface features as small as 3.3 feet, with similar capabilities to those of EgyptSat 2. EgyptSat-A is the third Egyptian Earth observation satellite built in Russia.

Primary users of EgyptSat-A's imagery are expected to include Egyptian military and security forces, intelligence analysts, emergency responders, environmental monitoring experts and the agricultural sector.

Talel Kamel joins Collins Aerospace MEA

MEA APPOINTMENT

Talel Kamel has been named Vice President of Customer & Account Management at Collins Aerospace in the Middle East and Africa (MEA), to further increase the company's focus and footprint in the region. Kamel's remit is to create Collins Aerospace's enterprise strategy for MEA, with a focus on delivering new growth. He was previously MD, Middle East, Turkey and Africa for Rockwell Collins, prior to which he was a flight physics engineer at Airbus and Programmes Director at Strata Manufacturing PJSC, a Mubadala company. He has an MSc in Thermodynamics from Ecole Centrale Paris and an MSC in Aerodynamics from the University of Stuttgart.



Previously, Kamel has worked with government entities in North Africa and the UAE

Arabsat to launch two new satellites in 2019

NEW LAUNCHES

Arab Satellite Communications Organisation (ARABSAT) announced at its 146th Board of Directors Session in Muscat, Oman, that it would launch two new satellites in the next few months to enhance its orbital locations.

"We are working hard on several strategic important projects to meet our customers' needs. To ensure that we remain the best choice for customers in all services, we have also established a dedicated business unit to meet the needs of our customers in the African continent," commented Khalid bin Ahmed Balkheyour, President & CEO of Arabsat.

IN FIGURES

\$350 billion
Estimated worth of global space economy



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www.eshailsat.qa

Iridium announces completion of \$3bn satellite constellation upgrade

PROJECT UPGRADE

Iridium Communications Inc has completed its \$3bn satellite constellation upgrade campaign, known as Iridium NEXT. The campaign was completed once the final two satellites required to complete the network refresh were activated on 5 February. With a fully operational constellation, featuring 66 new Iridium satellites, Iridium has concluded its decade-long capital-intensive programme that created an upgraded network both in space and on the ground.

“The completion of the Iridium NEXT programme signifies a new chapter in the Iridium story, one that sees us transforming from a big cash spender to



a big cash generator,” said Iridium CEO Matt Desch. “This is the realisation of a long, successful climb, and reaching the peak, and reaching the peak, it’s gratifying to know the future of the company is secure and we have now financially matured as a satellite operator. We thank our friends at SpaceX

and our prime satellite manufacturer Thales Alenia Space and their teams.” The upgraded Iridium constellation enables services such as the Aireon global aircraft tracking and surveillance system and Iridium Certus, the company’s new broadband service, which

launched commercially in January 2019. The upgraded network is also fully compatible with the original satellite constellation’s services, a notable accomplishment given the size and scope of the upgrade. The Iridium satellite network comprises 66 crosslinked satellites that create a web of coverage around the entire planet. Unlike other satellite systems, Iridium’s crosslinked architecture enables real-time transit of data to and from any location on the globe without the need for abundant ground stations, and allows it to maintain consistent high-quality coverage, including over the oceans and polar regions.

Es’hailSat and BridgeSat to bring low-cost satcoms to MENA

SATCOMS

Es’hailSat and BridgeSat have partnered to provide Middle East businesses with affordable access to laser-based satellite broadband services. This is the latest milestone toward BridgeSat’s goal of providing organisations with a faster, less expensive and most secure alternative to traditional radio frequency (RF) solutions for LEO and GEO applications. BridgeSat owns and

operates a growing global network of optical ground stations (OGS) and complementary satellite terminals that provide high-bandwidth, high-security solutions for unique applications while complementing RF in hybrid networks. Es’hailSat owns and operates a growing number of Ka- and Ku-band satellites serving broadcasters, businesses and governments in the

MENA region and beyond. Under the relationship, BridgeSat will build its first OGS for the Middle East, which will be co-located at Es’hailSat’s new satellite operations centre in Doha. The new OGS will support LEO and other satellite systems owned by Es’hailSat and other companies that are equipped with BridgeSat and other compatible space terminals. “This relationship

gives us a critical gateway to MENA and is a major milestone toward our goal of providing organisations worldwide with fast, secure, enterprise-grade broadband services,” said Barry Matsumori, BridgeSat CEO. Es’hail-1 and Es’hail-2 satellites are fully operational, and the company recently commenced satellite control services from its Doha teleport.

UAE Space Agency adopts National Plan for the Promotion of Space Investment

SPACE POLICY

The UAE Space Agency (UAESA) has launched a National Plan for the Promotion of Space Investment. Aiming to increase domestic and foreign investment in the UAE space sector and encourage local investment vehicles to consider funding opportunities in the space sector, both domestically and globally, the initiative promises to transform the nation into a regional hub for commercial space activities and advanced research and development.

HE Dr Ahmad Belhou Al Falasi, UAE Minister of State for Higher Education and Advanced Skills and Chairman of the UAESA, said: “The Agency’s adoption of the National Plan for the Promotion of Space Investment comes within the framework of its strategy and the objectives of the sector in general. These objectives seek to contribute towards diversifying the national economy and developing advanced science, technology and applications in the UAE, along with supporting scientific research, building Emirati capabilities and instilling a culture of innovation, especially among the younger generations.

“The plan contributes to transforming the UAE economy into one based on knowledge, advanced



HE Dr Ahmad Belhou Al Falasi, UAE Minister of State for Higher Education and Advanced Skills and Chairman of the UAE Space Agency.

skills and innovation. It encourages cooperation and partnerships with relevant parties in the government, private, research and academic sectors. It also serves to encourage local and foreign investment in the space industry and attract leading space firms to establish regional and global headquarters in the UAE.

“In 2017, the total global space economy value amounted to \$348bn, 79% of which were commercial revenues while 21% were for government budgets and manned spaceflight. Private investment in space grew by 30.5% in 2017, as compared to 2016, and over the past

10 years the average yearly growth of private industry revenue grew at an average rate of 9.6%. Through this plan, we seek to bolster our leading position in the space sector and with the vision and support of our wise leadership make the UAE one of the leading countries in the field of space science,” concluded HE Al Falasi.

The UAESA recently signed a cooperation and funding agreement with Krypto Labs, as an incubator and accelerator for local entrepreneurs to develop and deliver commercially feasible geospatial, Earth observation and remote sensing applications, with

a special focus on solutions used in city planning, land management and coastal security, as well as solutions used in disaster management operations.

The UAE Cabinet also recently approved the National Space Law, which provides a forward-leaning framework that presents unique perspectives on current trends such as space mining and human spaceflight, to inspire investor confidence while balancing risk and liability and maintaining alignment with international obligations.

“The UAE Space Agency, as a federal government entity, will actively play the part of an enabler and facilitator to encourage local and foreign investment in the sector, and proactively design a conducive environment which ensures start-ups and investors feel welcome and have access to businesses in the UAE that can drive their growth potential,” commented HE Dr Mohammed Al Ahbabi, Director General of the UAE Space Agency.

“We are confident that by enabling their success, we will reap the benefits of the ancillary benefits and strategic value through development of human capital and intellectual property that will elevate the UAE’s contribution to the global space sector.”

SES-12 ready to serve APAC and Middle East

NEW LAUNCH

SES has announced that its newest satellite, SES-12, is now ready to serve its video, fixed data, mobility and government customers across Asia-Pacific and the Middle East.

The satellite, designed with state-of-the-art wide beams and high throughput beams, will join SES-8 at 95 degrees East. SES-12 is the latest satellite that SES has launched to that orbital position where it will operate under the authority of the Kingdom of the Netherlands. The all-electric satellite will replace and augment the services currently being provided on SES' NSS-6 satellite.

SES-12 is SES' third hybrid satellite with both wide beams and high throughput pay-load. Like SES-14 and SES-15 which serve the Americas, the SES-12 high throughput payload is SES' solution for

enhancing cost-effective connectivity solutions for aero-nautical and maritime customers across APAC and the Middle East. SES-12 will also be pivotal in enabling governments to provide connectivity programmes to bridge the digital divide, and in allowing telcos, mobile network operators and internet service providers to deliver reliable and enhanced cellular backhaul and faster broadband services.

Together with SES-8, SES-12 will reach key direct-to-home neighbourhoods. The satellites will provide pay-TV operators the reliability and scalability to improve viewing experiences by enhancing their content offerings, including delivering higher picture quality to address the audience's burgeoning demand for High Definition (HD) and Ultra HD content.



The all-electric satellite will replace and augment the services currently being provided on SES' NSS-6 satellite.

HEAD and partners win huge Ethiopian contract

AFRICA

China HEAD Aerospace Technology Co and its subsidiary HEAD Technology France (HEAD) have won a multi-million-euro contract from the Ethiopian Space Science and Technology Institute (ESSTI) to procure a commercial Earth observation (EO) satellite ground receiving station. The international tender was won through a consortium led by HEAD and its partner China Centre for Resources Satellite Data and Applications (CRESDA).

The contract includes the procurement of a ground receiving station, data processing software, satellite imagery and related training services.

The ground station, to be installed in the Entoto Observatory and Research Centre in Addis Ababa, will allow the country to receive the satellite data and develop applications including agriculture, forestry, land use management, urban mapping, natural resource monitoring, disaster monitoring and mining.

Integrasys announces new head for Jakarta



Ronny Manurung will head Integrasys new office in Jakarta

APAC APPOINTMENT

Integrasys is expanding its presence in Asia Pacific by opening an office in Jakarta, Indonesia, headed by Ronny Manurung, who has been appointed as APAC Sales Manager. Alvaro Sanchez, CEO, Integrasys, commented: "Satellite is increasingly important across Asia Pacific, where it is enabling connections in sparsely populated rural areas and continues to be the preferred method of video delivery. Ensuring accurate set-up and constant connectivity is critical to keeping these services on air, and our tools can enable that. One of our recent successes is with Bank BRI, providing four Satmotion Systems to deploy in ATMs."

Ronny Pramanta has a strong background in the telco industry, with recent experience working at a number of VSAT providers, including Metrasat and Patrakom.



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ASECNA to conduct study to supply satellite navigation services in Africa

AFRICA

The Agency for the Safety of Air Navigation in Africa and Madagascar (ASECNA) last month signed a contract with Thales Alenia Space, a joint company between Thales (67%) and Leonardo (33%), to conduct a preliminary design study (phase B) for its programme to develop a satellite-Based augmentation system (SBAS).

ASECNA's SBAS is based on EGNOS (European Geostationary Navigation Overlay Service). The agency aims to enhance navigation and surveillance operations during all flight phases, as well as significantly and sustainably improve flight safety and efficiency in the areas under its responsibility.

Starting in 2021-22, these services will improve the positioning performance of existing satellite navigation systems such as GPS and Galileo. The new system will improve precision to within a metre, as well as guaranteeing



From left: Bernard Molesti from Thales Alenia Space MEA with Mohamed Moussa, DG of ASECNA at the signing ceremony.

integrity, availability and continuity for safety-related applications. Other business sectors like maritime, rail and road transport and agriculture could benefit from these services, which will help drive economic and social development.

The phase B study should enable countries belonging to ASECNA to define the best system architecture to support the delivery of SBAS services, and to ensure transparency during the development, deployment and operational phases. The study is being financed by a grant from the

EU-Africa Infrastructure Trust Fund (EU-AITF), through a financing agreement with the French Development Agency (AFD). The European Commission and GSA (European GNSS Agency) will provide technical assistance as part of an international agreement between ASECNA and the EU, also including the French space agency CNES (Centre National des Etudes Spatiales).

The design study, to be carried out by Thales Alenia Space, will last for 18 months. During this period, the airlines associated with the

programme will be able to test a pre-operational service.

"Today's contract signature marks the culmination of ASECNA and Thales Alenia Space's work on SBAS over the last few years, and we are very pleased," said Jean Loïc Galle, President and CEO of Thales Alenia Space.

Mohamed Moussa, Director General of ASECNA, said: "This contract marks a milestone in ASECNA's SBAS programme, a key catalyser for Africa's 'single sky' which should eventually enable us to improve landing safety and routing flexibility and efficiency, while making isolated regions more accessible without requiring any additional technical and human resources at airports. It also illustrates our progress and shows ASECNA's ability to embrace and apply the latest innovative technologies, for the greater benefit of inclusive economic and social development in Africa."

HISPASAT and Media Broadcast Satellite to distribute FunBox UHD channel in EMEA markets

BROADCAST

HISPASAT and telecommunications services provider Media Broadcast Satellite have reached an agreement to distribute one of Europe's UHD channels,

FunBox UHD, in Europe and MEA. The deal is valid for an initial duration of five years.

The broadcast combines Media Broadcast Satellite's teleport capacities

in Germany with HISPASAT's high-power 30W-5 satellite (H30W-5), with extensive coverage throughout the region specifically designed to distribute top-tier multimedia contents.

This broadcast platform aims to become an efficient and flexible medium for 4K channels to be distributed in Europe and North Africa with HISPASAT's satellites in this region.



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SAFEGUARDING SPECTRUM

When Oman's frequency spectrum was under threat, Oman's TRA rose to the occasion by building one of the world's top Advanced Space Radio Monitoring Stations (ASRMS) in conjunction with Kratos. In a **SatellitePro ME** exclusive, Yousuf Al-Balushi, VP for Spectrum Management Affairs at Oman's TRA, and Jérôme Duboe of Kratos, take us through the milestones that led to the launch of the Middle East's only ASRMS, which went into operation last year



With a growing global satellite environment in the Middle East and North Africa (MENA) region and a rapid rise in the number of radio communication networks and wireless devices, an increasingly dense signal environment was emerging in the early part of this decade. This raised concerns that the frequency spectrum would become congested, leading to increases in interference and frequent illegal transmissions – a concern that the Telecommunications Regulatory Authority (TRA) of the Sultanate of Oman wanted to address before it got out of control. The environment also offered the perfect opportunity for the TRA to modernise its

telecommunications infrastructure and regulate the telecom market so as to benefit the economy.

“Satellite spectrum is a scarce national asset that can be subject to unauthorised usage, interference and other threats,” explains Yousuf Al-Balushi, Vice President for Spectrum Management Affairs at the TRA.

The broadcast industry in this region relies heavily on satellite technology to gather news and broadcast live events, especially with a very high volume of FTA channels. Over the last decade in the Middle East, there have been numerous cases of satellite interference. Satellite spectrum is a limited and precious resource, and telecommunication regulatory authorities are responsible for

controlling legal transmissions according to licences, as well as addressing and mitigating deliberate jamming.

“Foreseeing an issue and to protect the satellite spectrum, the TRA put a plan in place to develop a one-of-a-kind satellite radio monitoring station in the region to guarantee reliable licensed satellite services and interference-free operation,” clarifies Al-Balushi.

The aim was to build an Advanced Space Radio Monitoring Station (ASRMS) to monitor and enable better spectrum efficiency on the one hand (orbital slot scanning) and contribute to a smooth coexistence of terrestrial and satellite usage on the other.

The ASRMS was an ideal solution because it would include



The ASRMS in the Sultanate of Oman is one of only nine in the world.

all the capabilities to monitor the spectrum over a country. It would have a building hosting a data processing centre, an operations centre, an engineering back office and a facility to set up vehicles and to repair them. It would need a set of antennas to capture signals from 80MHz to 40GHz; satellite signal data processing facilities for the identification of all carriers on a given satellite, the geolocation of the transmitters and the recording of signals; and facilities to automate operations and manage the TRA's mission.

Without doubt, a project of this magnitude would take many years to bring to fruition. The TRA chose Kratos, after evaluating offers from multiple vendors, to implement a turnkey ASRMS.

Kratos is a major global ground station solutions provider with more than 30 years of experience delivering satellite antennas and complete ground stations for customers around the world. Turnkey integration of ground systems is often supported by its carrier monitoring, signal cancellation and network and service monitoring products.

"The Kratos solution has been selected because of Kratos' extensive experience in the arena of space radio monitoring systems. The ASRMS will enable us to better manage the satellite spectrum used in the Sultanate and enhance cooperation with other telecommunications regulatory agencies," explains Al-Balushi.

The project, which required a very intricate design and a complex infrastructure, was finally launched last year in the Muscat Governorate, bringing more than 100 people with a variety of skills to the table. The monitoring station is one of only nine of its kind in the world and has been built in accordance with the International Telecommunication Union (ITU) Report ITU-R



Using the ASRMS, the TRA has defined over 200 satellites with 2,000 transponders to manage hundreds of licences for local operators in Oman, says Yousuf Al-Balushi.

"Satellite spectrum is a scarce national asset that can be subject to unauthorised usage, interference and other threats"

Yousuf Al-Balushi, Vice President for Spectrum Management Affairs, Oman TRA

SM.2182-1 (06/2017) on facilities to measure emissions from both GSO and non-GSO. It is the first station of its kind in the Middle East.

Today, the ASRMS can monitor an extremely wide area from Europe to Asia. Using the ASRMS, the TRA has defined over 200 satellites with 2,000 transponders to manage hundreds of licences for local operators

in Oman (including satellite operators, mobile telecom backhaul operators and broadcasters).

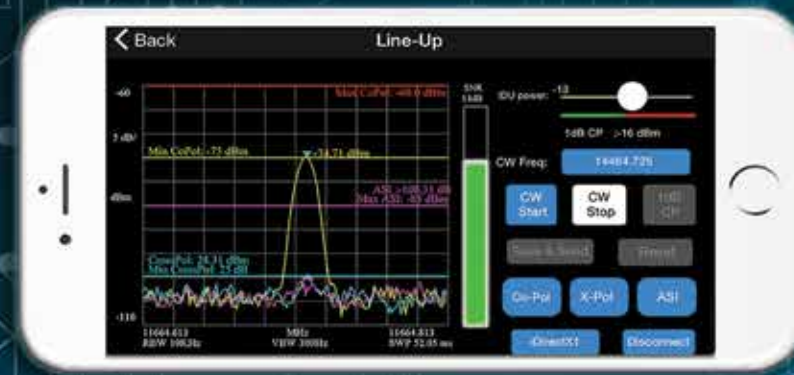
The TRA worked in cooperation with Kratos on the site design, with civil work architects and satellite field engineers providing an optimised site design for the antenna farm and site layout. This cooperation was performed in parallel with the overseas (factory) design, assembly, and integration of the system components.

Finally, design and testing allowed the integration of 14 hardware and software sub-systems into a comprehensive system.

"The project was very extensive, including civil works," explains Jérôme Duboe, Director of Middle East Delivery, Kratos Oman. "The site was very complicated, and it was a huge effort to prepare it, and construct the building and the

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antenna site. The project followed some well-defined stages to ensure the design fit the needs of the TRA.”

But let's start at the beginning. In the engineering phase, the TRA led the effort in completing the Critical Design Review (CDR), with the support of Kratos.

“The CDR is a critical milestone in such a project. It is aimed at demonstrating to the customer that all requirements are met in the design and that the operational concept fits the customer needs. The completion of this phase demonstrated that the team could move to the full-scale fabrication, assembly, integration and testing of the ASRMS,” explains Duboe.

The next phase was the build-out. Starting with a completely barren site, Kratos managed the build-out to support the ASRMS. This included the installation of seven antennas, one of the most critical parts of the implementation.

“The challenge was to cover all available extended frequency ranges with all polarisations, using full-motion antennas or large antennas with very advanced and reliable tracking systems”

Jérôme Duboe, Director of Middle East Delivery, Kratos Oman

“The TRA wanted to monitor signals from geostationary satellites in the orbital arc covering an extremely wide area from Europe to Asia. The challenge was to cover all available extended frequency ranges with all polarisations, using full-motion antennas or large antennas



Seven multi-band antennas from Kratos covering L-, S-, C-, X-, Ku- and Ka-bands were deployed to support regulatory operations.

The large scale build-out of the ASRMS included engineering and construction.



The ASRMS was inaugurated by HE Dr Ahmed Bin Mohammed Al-Futaisi, Minister of Transport & Communications in the presence of Houlin Zhao, ITU's Secretary General.

with very advanced and reliable tracking systems,” explains Duboe.

“To meet this need, Kratos developed and installed seven separate multi-band antennas for us, ranging in diameter from 3.7m to 7.3m. They are covering L-, S-, C-, X-, Ku- and Ka-bands, but a dedicated antenna also enables the analysis of signals between these commercial bands. This enabled the ASRMS to cover a range of signals from 80 MHz to 40GHz. Most of the monitoring is performed on geostationary satellites; however, three of them can also track MEO satellites since they are full-motion and driven by an advanced tracking controller.”

Following that, Kratos constructed a data centre, a control and monitoring centre, back-up power generation and inter-site connectivity to protect against outages and assure connectivity.

The data centre has several racks of equipment, including commercial

servers and switching equipment; the Monics Carrier Monitoring System (CMS) to scan and monitor satellite carriers; the satID product to geolocate transmitters of detected satellite signals; the Compass Monitor and Control (M&C) solution to centralise the management of all hardware, from antennas and servers to software and temperature sensors; the Geographical Monitoring Solution (GeoMon) to identify authorised and unauthorised satellite communication signals; and a signal recorder to enable recording and playback of signals for further analysis and trouble-shooting.

The overall ASRMS system is a fixed site, but this core system can also be networked with mobile units. These mobile subsystems include a 4WD truck that analyses both transmitting stations and satellite reception from anywhere in the country. This subsystem can be directly operated from the Muscat main operations centre as a local sensor.

Beyond fixed site monitoring, Kratos delivered mobile RF monitoring capabilities.

“This included using a vehicle designed with our partner Megahertz in the UK with antennas and monitoring equipment to track the satellite services in the uplink (Earth to space) and the downlink (space to Earth), to determine the location of authorised or unauthorised transmissions. In addition, in areas with rough terrain and high elevation, Kratos provided a remote-controlled RF monitoring drone named Moscito that performed last-mile geolocation to identify unlawful usage of the spectrum and interference in the uplink,” says Duboe.

This vehicle can receive signals at C-, X-, Ku- and Ka-bands in any polarisation. This special feature addresses the new technology of high-throughput satellites (HTS).



The site was very complicated, and required a lot of preparation to construct the building and the antenna site, says Jérôme Duboe, Director of Middle East Delivery, Kratos Oman

“Most of the monitoring is performed on geostationary satellites; however, three of them can also track MEO satellites since they are full-motion”

Jérôme Duboe, Director of Middle East Delivery, Kratos Oman

Kratos cites the example of how large antennas in Muscat can analyse the main beams while the vehicle is parked in the eastern part of the country, on a different spot beam not visible from Muscat.

The vehicle and drone each have their own sensors to analyse radio signals in surrounding areas, in order to pinpoint the exact location of satellite transmitters in any band. This enables the mobile unit and drone to go anywhere in the country to analyse radio signals.

From this phase on, it was a

matter of optimising regulatory missions. With GeoMon’s capabilities, the TRA’s operators were able to plan, schedule, execute and automate missions, as well as create reports for licence validation, interference resolution and ITU filings.

“In just a few clicks, we were able to do a number of things. We could generate results and reports that validate carriers or licences by automatically checking expected EIRP, centre frequency and bandwidth based on an RF



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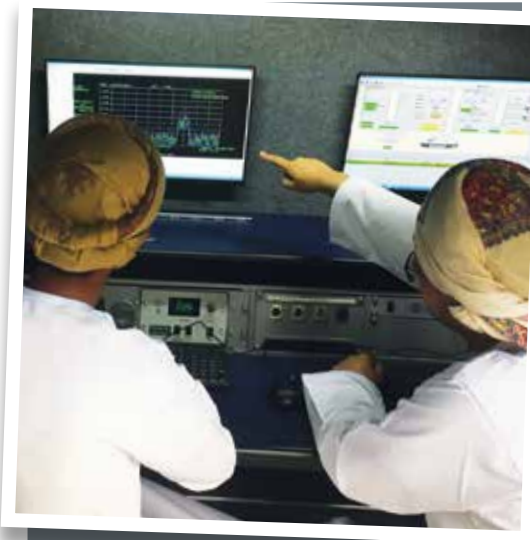
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Critical functions of the ASRMS

The ASRMS allows Oman's TRA to effectively safeguard the RF spectrum as a national resource, and to:

- Control the use of frequency spectrum and space resources by verifying that existing users are compatible with the radio licences granted by the TRA
- Monitor and measure satellite signals within the Sultanate, with the capability to verify cases of interference at regional, national and international level
- Detect and resolve accidental and intentional interference by identifying and then geolocating the source from within the country or from neighbouring nations
- Coordinate with the ITU and other regulators by providing monitoring services and satellite data to minimise cases of interference
- Support national projects and activities related to space services such as national satellite launches and allocations of orbital positions and frequencies, in accordance with the ITU

downlink measurement. We could locate interference events and booking antenna resources to perform a geolocation mission to pinpoint the source. Our operators could also undertake an ITU filing or scan orbital slots by automatically performing a blind scan and comparing the spectrum measurements with all known satellites in this specific space position to identify any issues," explains the TRA's Al-Balushi.

With state-of-the-art RF monitoring and geolocation in place, the final acceptance tests were completed by Kratos, and the station was officially opened last year under the auspices of HE Dr Ahmed Bin Mohammed Al-Futaisi, Minister of Transport and Communications, in the presence of Houlin Zhao, Secretary-General of the International Telecommunication Union (ITU).

One of the biggest challenges in this project was the civil works, explains Duboe. "With our partner Zajel Communications LLC (part of the IBD Group), we had to solve many issues related to local legislation. The second challenge was to integrate the overall system on-site, taking into account the civil works. What aided the process was that our core products were pre-integrated with the entire system."

A critical element of the success of the project was training, Duboe points out.

"Kratos provided some initial training during the early phases of the project, on the key products, so that the TRA project team could get a better understanding of the design. Then a large training package was provided to the TRA team along with the installation of the system. In addition, to service a contract for a long period of



TRA operators monitoring the spectrum and supporting regulatory missions in the control and monitoring centre.

The TRA on a regulatory mission with the RF monitoring vehicle.



"The ASRMS will enable us to better manage the satellite spectrum used in the Sultanate and enhance cooperation with other telecommunications regulatory agencies"

Yousuf Al-Balushi, Vice President for Spectrum Management Affairs, Oman TRA

maintenance, Kratos established a local office in Muscat providing a permanent presence to help the transfer of knowledge to Omani engineers. To support the Omanisation process, Kratos also collaborated with and relied on local Omani resources, a key priority for the Sultanate. This localised approach of a global services company was a key factor in the

success of this complex project."

Kratos continues to work closely with the TRA, sharing spectrum monitoring expertise and supporting the Sultanate in running the most advanced regulatory operation in the region.

In building the first monitoring station in the GCC, Oman's TRA has increased international cooperation. It now occupies an elite international position, and coordinates with the ITU and other regulatory authorities on satellite monitoring issues.

"With this launch, the Sultanate has been placed on the world map in the field of space radio monitoring. The ASRMS has exceeded all our expectations, and we are very pleased with Kratos' ability to deliver on time and within budget on such a large-scale effort. They were uniquely positioned in the industry to deliver on this project," concludes Al-Balushi. - Vijaya Cherian **PRO**

SHAPING THE FUTURE OF RF/MICROWAVE COMPONENTS

Increasing bandwidth and power handling as well as lower-cost manufacturing processes and components of further reduced size and weight are some of today's demands for communication payloads and IoS satellites of the future. Greater payload reconfigurability will become key to helping satellites adapt to changes in bandwidth, using resources efficiently or simply modifying the initial functionality. Dr. Miguel A. G. Laso looks at some of the key technologies that are shaping the future of the RF/microwave passive components onboard satellites



A number of new trends are shaping the future of satellite technology, and they are in the spotlight of research labs around the world. This article summarises some of these technologies, focusing on the future of RF/microwave passive components.

Satellite payloads have had fixed features until now, and a flexible allocation of resources is not usually easy or even possible. Future satellites demand this flexibility, in order to adapt to changes in bandwidth, use available resources efficiently or simply modify initial functionality.

In general, the remote

reconfiguration of a flexible payload will be a feature of next-gen satellites, seamlessly accommodating future (unknown) needs. Onboard traffic routing can be done using reconfigurable switch matrices based on mechanical, ferrite and semiconductor technologies.

In recent years, multiple studies have been performed to increase

the maturity level of RF-MEMS (microelectromechanical systems). RF-MEMS benefit from reduced size, low power consumption and linear operation at high frequencies. Reconfigurable microwave geometries can be implemented, using micromachining and integrated MEMS actuators.

However, RF-MEMS developers

have part reliability difficulties, a key parameter when considering hardware for space systems. New technologies such as Phase Change Materials (PCM) are providing promising results for broadband, low-loss, low-power and very compact RF switch solutions.

On the other hand, other approaches such as SIW (Substrate Integrated Waveguide) combine the advantages of waveguides (low-loss and medium-power operation) with those of planar circuits (low cost) and have also been proposed for reconfigurable circuits in space.

Although there have been great advances in this area of reconfigurable satellite circuits, flexible frequency-agile satellite front-ends require compact, high quality factor, tunable resonators and filters. Unfortunately, these are not easy to design and fabricate, as high quality factor, tunability and high compactness are not easily compatible within the same device.

Future large space-based satellite networks will deliver high data rate services for high-quality internet connections around the globe – at least, this is the plan. Companies intend to provide a network that connects sensors globally, enabling disruptive IoT applications even in the most remote locations.

In this new Internet of Space (IoS) era, data, sensors and space are interlaced more than ever. This network of interconnected satellites (with both ground stations on Earth and among each other, sometimes using optical links) may take the form of constellations of hundreds of low-cost LEO satellites, allowing resilient, reliable and secure communications, as well as a significant reduction of launch costs. You can check the latest news on SpaceX Starlink or Airbus OneWeb projects, among others.

Smaller technology demonstration constellations are also being launched or planned in

the area of Earth observation, most of the time in conjunction with universities. The common challenge is designing reliable payloads of small size and weight, low power consumption and low cost.

Additive Manufacturing (AM) applied to space appeared some years ago as an enabling technology for RF/microwave devices and IoS. AM actually comprises different techniques, each with pros and cons.

In the context of RF/microwave, some of the most promising technologies are fused deposition modelling (FDM) of polymers, polymer and ceramic stereolithography (SLA), and selective laser melting (SLM) of metals. SLM is very attractive in the sense that the printed part is already metallic (aluminium, for instance) and hence only needs to be silver-plated as a regular device machined out of an aluminium block.

On the other hand, polymer-based AM produces lighter components and very accurate dimensions, while ceramic-based parts benefit from low-loss/high-permittivity dielectric materials. However, metallisation of dielectric-based parts and their inner waveguides is not an easy task, and alternatives have been proposed based on sputtering or electroless plating.

Regardless of building material, there are some critical points in AM that have to be resolved in the coming years if AM is to become a realistic manufacturing method and traditional computer-controlled machining is to be put aside, not only for structural parts in the satellite where AM is already a reality, but for RF/microwave components too.

Geometric accuracy, surface roughness, high power, high temperature and mechanical behaviour, as well as general behaviour in space conditions, plating, etc, are just a few of the challenges that AM faces,

according to the RF/microwave community. This is an opportunity for electrical engineers to work closely with mechanical and material engineers and develop low-cost, low-weight, accurate procedures when thousands of small satellites are manufactured for big data/sensor IoT constellations.

Broader bandwidth communications and the integration of IoT sensor services over the same satellite network seem to demand increased operating frequency for increased capacity and functionality. For RF/microwave components, increasing the frequency comes at a price. Manufacturing devices at millimetre- and sub-millimetre-wave ranges becomes increasingly difficult using traditional methods. Design methods able to withstand fabrication errors when the component arrives at the workshop are being proposed. These resilient components could then be fabricated at high frequencies at the millimetre-wave range, using the manufacturing methods of lower frequencies.

At sub-millimetre-waves, a different fabrication strategy has to be used. Some laboratories have opted for Deep Reactive Ion Etching (DRIE) micromachining, which etches 3D geometries in bulk silicon. The device is divided into several parts that, after being etched, are coated with a thin metal layer (at least 10 times the electrical skin depth at the operating frequency) and mounted.

SU8 is an alternative technology, cheaper than DRIE. However, Si is superior to SU8 in every physical, electrical and thermal aspect. There are also developments using very accurate micromachining of intricate 3D shapes. Not only the price, but also the repeatability and/or compatibility of all these techniques with space conditions are nowadays sometimes questioned.

Increasing capacity means increasing bitrate and



“ New technologies such as phase change materials (PCM) are providing promising results for broadband, low-loss, low-power and very compact RF switch solutions”

Dr Miguel Laso, Associate Professor, UPNA

accommodating a larger number of channels – hence the need for the satellite to handle higher combined signal powers. New classes of high-power filters, for instance, have been in the spotlight of both academic institutions and industry, and some proposals have been developed for increasing output power handling.

Passive Inter-Modulation (PIM) and multipaction are the main high-power phenomena associated with high-power RF satellite payloads. Multi-frequency and multibeam satellites make things even more complicated to design, simulate and test. Heat and heat dissipation pose challenges that engineers of high-power payloads have to face. New aluminium alloys with lower coefficients of thermal expansion

would help, especially if parts can be additively manufactured and silver plated. The relationship between AM and high-power remains unexplored, with more research needed, as well as the development of specific space-oriented materials offering better heat dissipation.

Future satellite communications demand more flexibility, allocating resources when and where needed for global broadband access and integration with IoT. The technologies above are just some examples of what researchers in universities and research centres around the world are focusing on in terms of the RF/microwave passive components of future flexible payloads.

Some of these efforts are coordinated and it's worth mentioning initiatives such as the TESLA-ITN network in Europe, which brings RF/microwave research groups together to find solutions to the challenges mentioned above.

Undoubtedly, at the pace at which our business is evolving, with so many inspiring and technically difficult projects in the decades to come, universities will have to work closely with industry to quickly respond to its needs, as well as with space agencies, putting many decades of theoretical work at the service of tomorrow's challenges.

Our future space ecosystem seems to be characterised by the ubiquity of data and sensor information; low-cost development, testing and access to space; space as a marketplace; reconfigurability and flexibility; and immediate internet access to spacecraft data from every point of the planet. **PRO**

Dr Miguel A. G. Laso is Associate Professor at the Public University of Navarre (UPNA), in Spain. He is also Head of the Microwave Components Group at UPNA – Institute of Smart Cities, and a member of the TESLA-ITN network.

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SMART FARMING:
SATELLITE DATA
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Earth observation satellites play a significant role in satellite farming and are among the biggest enablers of the protection, security and sustainability of our planet, says Omkar Nikam

The inception of space science and technology has brought a revolution to different industrial sectors around the world. Satellite communications, Earth observation and satellite navigation are some of the applications of space technology.

As an enabler of the protection, security and sustainability of our planet, Earth observation (EO) is one of the important applications of space technology. It is a method to monitor, observe and measure biological, chemical and physical parameters on a global scale by using data collected by satellites in low-Earth orbit (LEO). This remotely sensed data produced

by EO satellites is relevant to climate change, agriculture, disaster management, weather forecasting and so on. Given the role of agriculture in the global economy and our welfare, EO's importance cannot be understated.

Smart farming

In layman's terms, smart farming is the ability to anticipate, analyse and react to natural and man-made threats through the use of highly advanced EO payloads embedded into drones, high-altitude platforms and small satellites. The spectral bands used by EO satellites benefit smart farming directly or indirectly, as a technique to help farmers record land productivity and improve

their decision-making power for cultivation and product marketing.

By using different types of spectral images, farmers can change techniques by knowing the crop pattern and fertility of the soil. Weather forecasting data from EO satellites is also helpful to find out the time and period of harvesting. This is useful in regions where the weather changes drastically and causes a large amount of damage to fields.

Current developments in smart farming

Several private endeavours are underway to cultivate an eco-system for the global EO markets by developing constellations across the spectrum of satellite

operators and data analytics platforms as service providers. Concurrently, civil government agencies are rolling up their sleeves to support this newfound momentum in terms of both policy and finance, and in both the developed and developing world.

The European Commission's Copernicus Programme is the world's largest EO programme, in partnership with the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), EU agencies, Mercator Ocean and the European member states, and highlights the role of government agencies within the EO landscape. ESA and EUMETSAT are responsible for developing and managing space solutions for the Copernicus Programme.

The information provided by this programme is available for free, giving IT communities wider scope for big data management in EO, allowing the downstream market to expand.

Private companies like Planet and Satellogic are developing smart farming solutions by launching small and nano satellites, while companies like Orbital Insight and SatSure are building foundations in machine learning and big data analytics.

In recent years, some space technology start-ups have been looking to use and manage EO data. Therefore, there are a lot of opportunities for storing, managing, analysing and providing services through EO data for smart farming. Moreover, ESA's Technology Transfer Programme Office has created Business Incubation Centres (BIC) in different parts of Europe to encourage entrepreneurs to develop business ideas based on space science and technology.



“Given the role of agriculture in the global economy and our welfare, EO's importance cannot be understated”

Omkar Nikam, Market Analyst, OGC

UN Sustainable Development Goals

With the rise in global population every year, there is an increase in demand for agricultural products. According to the FAO, the global population is expected to reach 9.6bn by 2025. This poses the challenge of feeding billions of people in the near future. With a rapid increase in population and no corresponding increase in productivity or GDP, there is cause for concern. In the most serious cases, population explosion, combined with factors such as desertification brought on by global warming, leads to increasingly precarious food security situations, particularly relevant in parts of North and West Africa. EO data and subsequent smart farming insights can alleviate these pressures by improving crop yields, providing better predictive analytics for drought risk and generally helping information

become more readily available.

For example, India is second most populous country in the world but the seventh largest in terms of agricultural output. There are several unanswered questions here. Is India using smart techniques in farming? Do Indian farmers get their deserved share of the gains from their work? Will India be able to feed billions of mouths without increasing farming efficiency?

To overcome these problems and put an end to poverty and hunger, the United Nations Development Programme (UNDP) has initiated 17 Sustainable Development Goals (SDGs). Many of these goals are connected to farming.

Smart farming is a promising way to increase efficiency in agriculture and will play a crucial role in protecting and creating sustainable solutions to transform the global agricultural system. As agriculture is by far the most important part of the global demand and supply chain, it is necessary to boost research and development activities to innovate new technologies.

Sustainable Future

The development of space technology for agriculture requires greater support from investors and entrepreneurs. The benefits leveraged by smart farming will be fruitful only if there is continued government support in terms of policy and finance. Although the idea behind the UNDP Sustainable Development Goals is impressive, it will take strong cooperation between government and private institutions to build a sustainable future. **PRO**

Omkar Nikam is a Market Analyst with Orbital Gateway Consulting (OGC). He has a master's degree in Space Studies from the International Space University in Strasbourg, France. At OGC, he works on Satellite Communication and New Space research.

FUELLING CONNECTIVITY

With the oil & gas industry operating in remote environments where telecommunication infrastructures are often unreliable, Nabil Soussia suggests alternatives that promise reliable and cost-effective connectivity



With oil prices recovering from the 2014 crash and investments in alternative renewable energy sources continuing to gain momentum, oil & gas companies need to innovate to stay competitive and keep the fuel flowing. The processes of locating, estimating and producing oil and gas are now driven by the real-time collection and analysis of data from the oilfield. Reliable and seamless communication on-site is absolutely critical to achieving the efficiencies organisations need to reap maximum profit.

A 2017 World Economic Forum whitepaper reported that digital transformation in the oil & gas industry could unlock approximately

\$1.6 trillion of value for the industry, its customers and wider society. Moreover, the digitisation could create benefits worth approximately \$640 billion. This includes approximately \$170bn of savings for customers, roughly \$10bn of productivity improvements, \$30bn from reducing water usage and \$430bn from lowering emissions.

Drilling into technology for efficiencies

Globally available and reliable connectivity, robotics and the Internet of Things (IoT) are making it possible for energy companies to extract oil and gas from locations that until only recently were deemed inhospitable.

Although robust and cost-

effective technologies are always the first preference for operators, creating robustness is not always easy. Energy companies will continue to struggle to derive the maximum value from IoT without access to radically improved reliable high-speed connectivity, according to independent research commissioned by Inmarsat.

Exchanging critical data when required

From the exploration phase to extraction or production, rigs or mining sites need to ensure a constant link with headquarters. In addition, access to operation-critical applications such as email and videoconference as well as the ability to reliably be connected at all times is critical.

Any solution deployed needs to seamlessly connect all hardware platforms and systems across various fields of operation, integrating exploration, drilling and production facilities, to deliver valuable data and video streams to a central location, allowing the operators to make better and quicker decisions.

Therefore, integrated solutions are becoming more popular, enabling organisations to combine controlled welfare and secure corporate links all in one solution. Such solutions can provide 360-degree support for corporate applications, equipped with 24/7 budget control tools and around-the-clock customer support. They can also provide advanced online reporting on network usage and help control allocations of staff credits.

In parallel, such solutions can provide personnel with high-quality on-demand data access via scratch cards. Scratch cards can be purchased individually as data bundles or provided by companies as a part of their social package, making access to messaging apps and social media easier and more affordable.

Boosting operational efficiency with remote maintenance

A significant cost to businesses extracting oil and gas is maintenance. Sending large numbers of staff to perform basic manual tasks can be both costly and inefficient. Wireless network standardisation efforts over the last decade have enabled remote monitoring and maintenance strategies that can help avoid costly shutdowns that may seem necessary in lower-priced markets.

The more efficient alternative is to employ remote monitoring technology that takes data readings at set intervals and transfers this data back to head offices. This approach significantly improves data visibility, allowing staff to constantly monitor machinery and other vital data and take action when necessary.



“Energy companies will continue to struggle to derive the maximum value from IoT without access to radically improved reliable high-speed connectivity”

Nabil Soussia, MD, IEC Telecom Middle East

This is particularly important on oil & gas rigs, where a fault with mission-critical machinery could halt production and cost a business millions of dollars. This approach also enables predictive maintenance. Rather than send staff out to remote locations every three months to inspect machinery, a company can optimise maintenance schedules and improve the efficiency of operations.

Optimising connectivity with the right technology

One of the challenges faced by the oil & gas industry is related to the fact that contractors and assets generally move from one location to another on a daily or weekly basis. This can be more challenging when faced with extreme temperatures and frequent sandstorms.

Satellite technology is capable of meeting the demand for effective, secure communications and overcoming these challenges. Providing uninterrupted service without the involvement of on-site technicians after the move of a rig or drilling platform, for example, is only achievable through the adoption of high-capacity platforms, which can auto-align and mitigate these challenges.

Providing telemedicine and e-health services

Reliable satellite links also allow applications such as telemedicine to deliver clinical health care in emergency situations, or e-training on safety and best practices for staff.

The facilitation of video conference with medical diagnosis equipment enables clinicians to provide remote consultations using state-of-the-art video communications, allowing accurate diagnosis.

Retaining and attracting the right talent

High-speed connectivity can help retain the right people and attract the best talent, and is increasingly becoming a deciding factor in whether young and talented individuals work in remote locations. With innovations in technology propelling a networked economy on land, it is becoming easier to ensure connectivity. Yet businesses are quite reluctant to provide open access to staff, on account of fear of increased and high running costs, large file downloads and overall work disruption.

Companies today acknowledge that connectivity is linked directly to staff welfare and business productivity. The challenge is to balance the two while maintaining budgetary control at all times. **PRO**

Nabil Ben Soussia is MD of IEC Telecom Middle East

CABSAT 2019

AT THE HEART OF SATCOMS INDUSTRY DIALOGUE

From exploring connectivity in maritime and aeronautical markets, to hosting discussions around regulation and spectrum, interference, sustainable space and the power of the cloud, to understanding new trends in the UHTS and VHTS segments, the low- and medium-Earth orbit HTS environment, smallsat markets, ground segment dynamics, and antenna design and engineering, Martin Jarold tells us what to expect at the GVF Satellite Hub Summit at CABSAT 2019



The GVF Satellite Hub Summit at CABSAT 2019 will be held on 12 and 13 March

at an open-access theatre-style structure in the satellite exhibition halls. It will also host a half-day workshop on 14 March.

The programme will commence on 12 March with keynote presentations from the UAE Telecommunications Regulatory Authority (TRA) and the International Telecommunication Union (ITU). The remainder of the day will be taken up by the first two of four moderator-led panel sessions, with speakers introducing the key issues pertinent to their topic followed by a panel discussion and audience interaction.

The 12 March programme features two sessions offering a broad and strategic overview of the satellite industry today. The first session encompasses everything from regulation, spectrum and interference, to cyber security, crisis connectivity, sustainable space, satellite and the cloud, M2M, IoT and 5G, grouped under the umbrella heading of *Global Satellite Focus – Big Ticket Issues*.

The afternoon session, *Global Satellite Business is Big Business – New Space Making It Bigger*, will explore themes including UHTS and VHTS, evolution in the low- and medium-Earth orbit high-throughput satellite environment, smallsat markets, ground segment dynamics, antenna design and engineering evolution, and the interfaces of satellite communications with Earth observation technology and applications.

The third and fourth sessions, on 13 March, will focus on important satellite communications solution user

vertical markets in the mobility environment. One session will focus on maritime, which has a long legacy relationship with solutions in mobile satellite service (MSS), operating in L-band and now established as a strongly developing VSAT market. The other will address the aeronautical connectivity and applications user vertical market, focusing on both the passenger experience of inflight entertainment and broadband connectivity and the essential contribution of satellite to ground and inflight operations.

The *Maritime Morning* theme, *To the Wider Market and Service Horizon*, will cover Maritime Mobility; Maritime Market Plurality; Key Facets of the User Experience; Bandwidth Inshore and on the High Seas; Satellite and Vessel Autonomy – Where? How? Why? and Satellite Cyber



“Mobility factors now permeate multiple facets of dialogue on satcoms”

Martin Jarrold, Chief of International Programme Development at GVF

Security @ Sea, and Radomes and Superstructure Footprints.

The *Aero Afternoon* theme, *It's Not Just About the IFE!*, will cover specific themes such as Understanding New Segment Evolving Demand Dynamics, Aero: Frequency Dedicated or Frequency Agnostic?, Never Mind the Orbit: It's all about the Price!, Hacking Aircraft Satcoms – Myth or Reality?, Always Online! Take-Up Rates by Captive Passengers or Demanding Customers?, How's the Hardware Doing?, and Antennas – Conformal or What?

While mobility focus is immediately apparent in its exploration of the connectivity issues in today's maritime and aeronautical markets, mobility factors now permeate multiple facets of dialogue on satcoms.

There are two principal, increasingly interconnected themes in today's communications environment.



In the MENA region, we see a major shortage of highly skilled technical manpower resources, whether for Earth station

operations (24x7) or simple field service support/OB van operations. This can be addressed when the service providers and users get highly focused and have a genuine desire to initiate capacity-building.

We strongly feel that if government regulatory authorities, telcos and users insist on capacity-building, as governments

and key users in other parts of the world do, there will be a paradigm shift and experience change with all the stakeholders in the region. The military would also play a key role and benefit by adopting and mandating capacity-building of resources for self-reliance and resilient satellite-based communications.

All stakeholders stand to gain in multiple ways. For instance, there will be a robust network and individual

links, reduced and mitigated interference, high reliability, lesser field support requirements, exposure to the latest innovations in technology and so on, which lead to happy end users. This in turn enhances the business by way of adding capacities and terminals, as well as higher profitability. Investment in up-sizing competencies of manpower has to be an ongoing process. We are doing

very focused programmes with the ITU, UN agencies and US DOD PACOM, but we see very few requests from MENA compared to Europe, the Americas, the Far East or even the Pacific islands. *Riaz Lamak is GVF Lead and International Director. He works with GVF towards capacity-building via mentored classroom trainings and certifications, network validation and benchmarking.*



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One is evolution towards an integrated and unified broadband communications ecosystem. The second is development of technology platforms and service arrays which meet user markets' demand for mobility, mobility and more mobility.

Exploration of key themes in technological development, as well as in service and market trends – on the path to a fully mobile broadband near-future founded on the complete integration of satellite and wireless – will reference the latest developments in the launch of more and more high-throughput (and very- and ultra-HTS) capacity to geosynchronous orbit, together with the expansion of HTS in MEO and LEO.

The Summit will also explore the strengths and weaknesses of current and developing satellite technologies in terms of providing access to the cloud. The cloud brings together different technologies – broadband networks, virtualisation, Web 2.0 interactivity, time sharing, browser interfaces – each a significant advance in its own right, but all the more powerful in combination.

In posing questions about satellite and the cloud, the Hub Summit objective is not to engage in a satellite-versus-terrestrial argument – particularly given the long-established trend of hybridised communications networks comprising satellite and terrestrial wireless technologies, and its immediate future. Rather, the objective is to identify where the unique nature of satellite communications can contribute to greater functionality, reliability, ubiquity and connectivity



The satcom industry has been on an innovative streak for a few years with promises that it now has to deliver. Cheap, flat antennas from any of the three dozen companies that have offered to churn them out by the wagon load – please bring the wagons over. Revolutionary satellites that can deliver 100 times more at a fraction of the price – we're ready for them. All those start-ups with hints of great things to come in 2019 – please make your way into the light and show the world that it's not all PR and vapourware.

All this energy makes satellite communications so much more exciting than the shoelace industry,

and the rest of the telecom industry isn't shy about promising the moon either. But a bit of scepticism about the continued relevance of satellites has crept in, and the mood among investors and regulators isn't

entirely favourable.

One of the biggest challenges of our time is feeding 10 billion people and keeping the lights on amid runaway climate change and a collapsing biosphere. Can this industry play its part? I think it can, at more than one level – and it better, because that, not whether plasma screens will go from 4K to 8K, is what a growing part of the population worries about right now. For an industry that operates on a truly global level and plans everything 15 years ahead, that should be in its field of view.

Stéphane Chenard is Senior Analyst at Euroconsult.

to the cloud, not only for the globe's most developed high-density markets, but also for the remote communities of the world's emerging and developing economies and societies, and in the mobility space.

Machine-to-machine (M2M) communications is another focus, and the interface and synergy of M2M communications and satellite communications will be part of the event dialogue. This notes the longer-term significance of transitioning to Internet Protocol version 6 (IPv6), which will bring on the full potential of the Internet of Things (IoT)/Internet of Everything Everywhere (IoEE). The IoT/IoEE will be the ultimate realisation of a future universal M2M environment which will far exceed the potential boundaries and limited scope of even the greatest reach of the present-day M2M environment.

Globally, this market is growing fast, and the aggregated target markets make its potential for the satellite industry very important.

Regulation, spectrum and interference are topics central to dialogue on satellite and mobile wireless integration and the use and allocation of radio frequency bands. VHTS and UHTS, and the evolution in the LEO and MEO high-throughput satellite environment, together with ground segment dynamics and antenna engineering evolution, are key in discussing essential technology and service delivery for a physically more in-transit human population. **PRO**

Martin Jarrold is Chief of International Programme Development at GVF and Chair of GVF Satellite Hub Summit at CABSAT 2019.

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Senior industry executives talk about their companies' achievements in 2018 and their plans for 2019 – as well as upcoming satellite trends, the future of satellite in a 5G/IoT world, and how relevant CABSAT and the MENA market are to their business

LeoSat Enterprises Ronald van der Breggen, Chief Commercial Officer

2018 achievements...

In 2018, LeoSat achieved a number of significant milestones for the company, including securing investment from a second strategic satellite operator – Hispasat, gaining approval from the FCC to operate our constellation in the US, getting commitments from customers and resellers totalling over \$1bn, and entering into an agreement with antenna company Phasor to develop the ground equipment for LeoSat.

2019 plans...

With the firm backing of the FCC, SKY Perfect JSAT and Hispasat, and over \$1bn in customer agreements, we expect to continue to make significant progress in 2019 on the journey to deliver the world's first business backbone in space, opening up new markets for data networking for enterprise, telecoms and government communications across the globe. Our focus will be on securing additional funding, continuing to optimise the technical parameters and performance of our constellation in conjunction with customer feedback, and working with our stakeholders to sign up new customers for LeoSat's data communications solution in our key target markets of enterprise, IT networking, telecoms, government and maritime.

Upcoming trends in satellite...

Big data is clearly driving the need for new communications infrastructure, and data volumes are exploding. Global networks are already carrying more than 1 zettabyte of traffic globally, and this is forecast

to grow exponentially. This is having a significant effect on the satellite market, with the need to invest in and deploy appropriate infrastructure, particularly as current satellite solutions remain sub-optimal for data and are generally seen as a last resort. So, with the ever increasing demand to move large quantities of data quickly and securely around the world and current GEO satellite solutions remaining sub-optimal for data, there is a growing interest in the major performance advantages of communications networks in LEO, particularly in terms of latency, speed and security.

Broadband and data applications benefit from low-latency communications, which is where LEO satellite constellations provide an advantage over geostationary satellites. And with cyber security and network resilience increasingly becoming a key focus for corporate and government networks, we are seeing a lot of interest in LeoSat's ultra-secure premise-to-premise network architecture. Essentially a VPN in space, data will travel end to end via optical lasers across a single encrypted network, bypassing terrestrial infrastructure.

Verticals that will see maximum innovation in the LEO context...

For all the sectors mentioned – telecommunications, multinational enterprise, government services, maritime and energy – LEO systems can solve essential communications and connectivity issues and meet the ever-growing demand to move large quantities of data quickly and securely around the world. For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than \$65m additional net income.

LEO systems, particularly ones which can combine high throughput with inter-satellite links to provide ubiquitous coverage, connectivity and security, can offer

communications capabilities with fibre-like characteristics in terms of costs and features, which will in turn allow a new series of options to connect within the Middle East and to the rest of the world. The key attributes of such systems can be used for several applications, for example, to provide 4G and 5G satellite backhaul to the cellular industry, give banks secured networks with their foreign offices, provide enormous uploading bandwidth required for oil & gas exploration, or allow internet access to passengers on cruise ships.

The MENA market...

We are already working with DCS Telecom, a leading telecoms provider of satellite and networking solutions in the Middle East, Africa and Asia. DCS Telecom will use LeoSat to upgrade its existing satellite solutions, enabling new opportunities through previously unavailable levels of performance combined with worldwide reach.

Expanding into new markets...

The traditional satcom market can grow into a much larger datacom market, which is said to be 200 to 250 times bigger with LEO. By choosing to launch MPLS routers in space, we are completely mimicking our terrestrial counterparts, while adding extra capabilities in terms of latency and security. This offers a compelling alternative for mission-critical data communication requirements, where data needs to arrive faster and more securely than any alternative option, be it terrestrial or satellite. We can thus offer features and functions beyond those of the terrestrial datacom industry and, better yet, compete and beat terrestrial infrastructure altogether.

So we see expansion in the context of the broader data communication market outside and beyond the traditional satcom market. Financial trading companies,



Broadband and data applications benefit from low-latency communications, which is where LEO satellite constellations provide an advantage over geostationary satellites, says Ronald van der Breggen, CCO at LeoSat Enterprises.

“For a typical Fortune 1000 company, just a 10% increase in data accessibility will result in more than \$65m additional net income”

Ronald van der Breggen, Chief Commercial Officer, LeoSat Enterprises

pharmaceutical research centres and online gaming companies are just a few of the new sectors showing interest in the LeoSat network, with key benefits of latency, speed, security and ubiquity.

5G and IoT – How are you addressing increasing demand in these two sectors?

5G: With data traffic predicted to

increase almost four-fold by 2020, to 4ZB per year, one of the key challenges for the enterprise sector is achieving scalable, flexible solutions for their expanding networks. 5G is promising ubiquity, high throughput, high density (where needed) and low latency. Not all aspects can be offered through existing infrastructure, and therefore a new network architecture is not merely an option to facilitate the roll-out of 5G, it will become a requirement. Satellite communications can support the roll-out of 5G in many ways. The one that has always been at the forefront is satellite’s ability to cover large territories and cover water, and thus expand the network footprint.

Without the next-generation LEO satellites, 5G networks will take longer to deploy, lack the necessary coverage and be more expensive to build. On the technical side, there

are a number of initiatives to bring players closer together in developing the satellite infrastructure aspect of 5G. LeoSat has joined the European Space Agency (ESA) satellite industry working group, to develop a stronger integration of 5G between terrestrial and satellite telecom operators.

Through the Satellite for 5G Initiative, ESA and the European space industry are joining forces to develop and showcase the added value that satellite brings in the context of 5G. They will collaborate on 5G service trials using satellite, with a focus on those vertical sectors for which 5G will be highly relevant, such as transport, media and entertainment and public safety. While focusing on these markets, there are activities in the areas of application development, standardisation, resource management, interoperability and other supporting technologies.

With regards to IoT, the rapidly advancing price/performance capability of computing, storage and bandwidth is contributing to an adoption rate for the digital infrastructure that is two to five times faster than previous infrastructures, such as electricity and telephone networks. By 2020, there will be 50bn internet-enabled devices. Those 50bn devices will become interconnected into a web of the IoT for the intelligent home and smart cities. As billions more devices become connected to each other, reliable and secure connections are required to support this new ecosystem. Satellite networks are playing an increasing role in the IoT segment, which permeates all industry verticals and processes (telecoms, enterprise, maritime and agriculture).

Ronald van der Breggen will be participating at the GVF Satellite Hub Summit at CABSAT 2019.



MENA represented around 20% of Integrasys' sales revenue in 2018, says Alvaro Sanchez.

Integrasys Alvaro Sanchez, CEO

2018 was a successful year for us, as we continue to grow with some good customer wins and partnerships. MENA represented about 20% of our sales revenue.

MENA is a growing market for us, as we have a number of clients in the region, such as STC, ITC, Detesad and Yahsat. We plan to further expand our presence, potentially in the mid-term investing in a new office and staff.

CABSAT will see the official worldwide launch of our link budget tool, called Beam Budget. Link budget calculations are extremely important for determining the best satellite for a given network, based on a number of parameters. However, the process

is extremely complex and requires a great deal of expertise. In most companies, there is a link budget expert. Nevertheless, with Beam Budget, anyone can do a link budget and understand the results for smart investing on the right network.

Our tool drastically reduces complexity surrounding link budget calculations, making it simple for anyone to use, in terms of both doing the calculations and viewing them in an easy-to-follow format. Other link budget tools require input of 50 parameters; however, with ours just 25 inputs gives you more than 75 results, providing a graphical and intuitive report designed for attracting customers.

With regards to trends, we see GEO, MEO and LEO remaining important for the future, and we have solutions that operate across all of those bands. LEO, however, is not without its challenges – and if we cannot properly monitor the networks, it will lead to a number of issues which have the potential to affect the entire satellite industry.

5G and IoT are important to the satellite industry, because satellite will be key to enabling both of these and the huge volume of capacity that will be demanded. In fact, our colleague Pedro Ruizis, is on the Steering Board of the 5G PPP.

Integrasys will be at Hall 7, Stand 708.

STN Mitja Lovsin, General Manager

2018 achievements...

2018 was another great year for STN and brought with it continued growth for the company. We strengthened our position in the African region and developed stronger partnerships in the Far East.

The main HQ facility underwent some major technical upgrades, which included the Crystal Control NMS (network management system), a robust multi-process architecture enhancing how we monitor and control all devices across our network. STN is entrusted with content from hundreds of channels around the world, as well as data delivery, so nothing less than a system that predicts, detects and reacts to problems would suffice.

The upgrade and redesign of our complete IT security infrastructure allowed us to further optimise the network perimeter as well as hosted/managed services. This was then reinforced with new-generation firewalls from Palo Alto Networks and Cisco's latest switching infrastructure. The upgrade enabled us to tighten our security policy and record big performance improvements.

Security on our restricted area access controls was also upgraded with SALTO Access security technology, to further protect high-performance technical equipment and client data stream. And finally, we received our long-awaited government approvals for further building development and extension plans, and we are now ready to power even further forward.

2019 objectives...

The company has already started strategic discussions and there is certainly new development planned for this year. One of the major next steps for 2019 is to get

“Our strengths with regard to ground infrastructure, design and cost budgeting could be considered a very prosperous partnership for all developing projects in the 5G/IoT sector”

Mitja Lovsin, General Manager, STN

the excavation of the additional 8,000sqm of land underway and prepare the ground with the concrete platforms to support an extended dish farm at our company HQ in Slovenia. The extent of STN's service portfolio is vast and the company keeps pace with constant technology updates, allowing our service capabilities to go far beyond satellite and fibre.

5G and IoT...

There are divided opinions within the satellite industry with regard to the impact of 5G and IoT.

However, one thing that everyone seems to agree on is that these new trends will, without doubt, bring new challenges for the satellite market and related businesses, including the ground segment.

I am very optimistic that these

new technologies will bring new opportunities for STN. A prime central European teleport such as STN with vast capabilities, available land, experience and virtually unlimited fibre capacity will have a major role to play in the future of this new business sector. STN has now opened the channels for discussion with existing and new satellite operators connected with this section of the business. Our strengths with regard to ground infrastructure, design and cost budgeting could be considered a very prosperous partnership for all developing projects in the 5G/IoT sector.

GEO? MEO? LEO? What is the future?

There is major focus on the LEO satellite launches and the need to create a global ground network of connectivity. This is indeed an area of interest for STN, and we could see many partner benefits for developing projects. Aside from a prime location in the centre of Europe, we also have the expertise, ground space and

“The extent of STN's service portfolio is vast and the company keeps pace with constant technology updates, allowing our service capabilities to go far beyond satellite and fibre”

Mitja Lovsin, General Manager, STN

excellent fibre connectivity to host or subcontract sections of this business market.

The MENA market and CABSAT...

This market is a very important part of STN's development history. In the very early stages of the company's business growth, we recognised the strong partner potential in the region. STN had the capability and technology to bring broadcast to and from the MENA market, and it quickly became the second biggest region for STN after Europe. We grew our relationships

with clients from the MENA region who wanted to be present on popular satellite coverage around the world, and the TV channels that beam from these positions have become increasingly popular with their viewers over the years.

What is interesting about the Middle East is that there is a huge amount of cultural, religious, documentary and news content. We are always interested to grow our business in the region, as we can deliver this programming to the large community of people from the Middle East living in Africa, Europe, Asia and North America.

Our team will be at CABSAT to meet with existing partners, customers and friends from the region. It is a great opportunity to meet under one roof to discuss current and future projects. The show has always been one of our favourites and I have no doubt it will continue to be, as each year we have experienced new interest and stronger connections.

Mitja Lovson and his team will be at CABSAT.

A major step in 2019 is to get the excavation of the additional 8,000sqm of land underway and prepare the ground for an extended dish farm at STN's HQ in Slovenia, says Mitja Lovsin.





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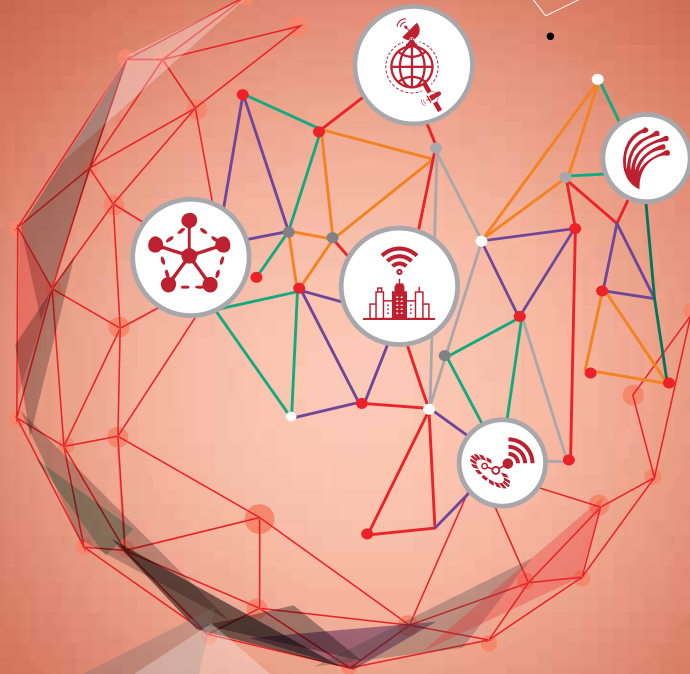
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Eutelsat Ghassan Murat, Managing Director

2018 achievements...

2018 was a particularly constructive year for consolidating video, our core vertical. In November, we announced the renewal of our Hotbird constellation, which distributes some 1,000 television channels throughout Europe and part of the Arab world. Hotbird broadcasts several FTA channels from leading broadcasters and telecom operators from MENA, including MBC, du and SNRT. In September, we also launched the Eutelsat CIRRUS platform, which will enable our clients to distribute their TV channels easily and at low cost, via satellite and also by internet, across all devices.

2019 launches...

Eutelsat has four satellites scheduled to be launched in the coming 12 months: EUTELSAT 5 West B, EUTELSAT 7C, KONNECT and EUTELSAT QUANTUM.

Hotly anticipated for the Middle East is EUTELSAT 7C, a high-power broadcast satellite destined for Africa, Europe, the Middle East and Turkey. Ordered from Space Systems Loral, the satellite will be located at Eutelsat's 7° East.

Verticals where you expect to see maximum innovation...

Customer needs in government, mobility and data markets are fast evolving. The EUTELSAT QUANTUM satellite offers unprecedented customisation and flexibility. The satellite's flexible behaviour enables it to adapt to its environment, giving customers in the government, mobility and data markets the ability to vary coverages based on their immediate needs and allocate resources



Eutelsat has four satellites scheduled to be launched in the next 12 months, says Ghassan Murat.

between beams and regions, optimising their capacity use.

Coverage, power, frequency and bandwidth: each of these features can be reconfigured in-orbit throughout the satellite's lifetime, to efficiently serve applications and ensure optimal use of resources at all times. Customers will no longer have to predict market requirements or anticipate changes in the future: with this new way of managing day-to-day operations, they will be able to tailor coverages to their immediate needs.

The MENA market...

MENA is the second largest region for Eutelsat after Western Europe. Two thirds of our entire fleet include MENA coverage. In 2017, Eutelsat acquired Noorsat, which provides services for over 300 TV channels almost exclusively from our leading MENA neighbourhoods at 7/8°

West and 25.5° East. In November 2017, Eutelsat was one of 20 French companies sponsoring Le Louvre Abu Dhabi, and an extension of the Eutelsat offices in Dubai was just completed in January 2019.

GEO? MEO? LEO? What is the future?

Eutelsat has chosen to operate geostationary satellites located 36,000km from Earth, as this model is particularly cost-effective for providing internet connectivity or video. This does not prevent us, however, from looking at satellite constellations, as it is a technology that can be interesting for IoT. In this respect, we are planning to launch a test satellite named ELO this year.

Ghassan Murat will be at the Eutelsat stand (Hall 6, Stand C6-10) with his team.

Newtec Eric Van Hoecke, Middle East Regional Sales Director

2018 achievements...

2018 was a record year for Newtec, where the company grew by 18%. Sales of our Newtec Dialog hubs went up by 15% in 2018. To date, we have deployed 170 hubs. The Newtec team has also grown to 420 personnel. We have opened a brand-new office in Sint-Niklaas, Belgium, to accommodate our growing number of colleagues. The last year also saw an unprecedented 50% growth of our manufacturing business in Erpe-Mere. We are expanding our factory as a result, and we are also expanding facilities for our Newtec Labs.

2019 objectives...

The main objective is to focus on maintaining our growth and making smart investments in our business to enable us to achieve this. We will particularly focus upon the government and defence market, which holds a huge amount of potential for us. In parallel, we will also work to become a market leader in cellular backhaul, and in the deployment of 4G and 5G. The mobility market, particularly maritime and aero, will also form an important part of our work in 2019.

The advent of LEO and MEO small HTS networks is on the horizon, and this is also a market that we are looking very closely at and preparing for. Newtec aims to put a great deal of work into this particular market. With the promise of the deployment of the first satellites in these networks later this year and into 2020, it is critical that the



The rise of LEO and MEO small satellite deployments will lead to a paradigm shift in the market going forward, says Eric Van Hoecke.

“Insatiable demand for data and therefore mobile broadband is driving satellite-based cellular backhaul, and Newtec is very active in this area”

Eric Van Hoecke, Middle East Regional Sales Director, Newtec

ground segment can accommodate these fast-moving satellites. Newtec Dialog will play a key role in their successful operation and we want to see Newtec leading the way in this field.

Upcoming trends in the satellite market?

The proliferation of the mobile device is incredibly significant. Insatiable demand for data and therefore mobile broadband is driving satellite-based cellular backhaul, and Newtec is very active in this area. Satellite is key to the expansion of mobile networks into rural areas. 5G will play a critical part in the future ultra-connected world – and the role satellite has to play here is already evident. Satellite will be integral to 5G's success and enable its deployment where terrestrial networks do not reach. The rise of LEO and MEO small satellite deployments will lead to a paradigm shift in the market going forward.

Verticals in which you expect to see maximum innovation...

Maritime is set to be an important

vertical for Newtec, and we will soon have some news to share with you on this. The demand for data and access to broadband at sea is huge, especially in terms of the cruise sector, but we also see growth in commercial shipping. As HTS constellations continue to grow, monetising these infrastructures is a priority for operators.

GEO? MEO? LEO? What is the future?

LEO will be very important in the future, even though the constellations are not yet deployed. We know that users want access to more data than ever before, and they want this everywhere, whether they are at home, at work, or mobile – at sea, on land or in the air. This demand for data has been the driving force for the development of new, small satellite mega constellations that will see a move away from the traditional geosynchronous orbit into low- and medium-Earth orbits. We are in uncharted territory and the industry itself is about to be tested as never before.

The satellites of the future are going to demand a lot from the ground equipment that is used to support them, and this is something that has been at the forefront of Newtec's work for some time now. Satellites in different orbits with varying payloads have different demands, so flexibility, agility and dynamism are essential in order to meet these different requirements.

Newtec has been watching LEO satellite development very closely. It is critical that our modem portfolio, combined with next-generation onboard technologies, is ideally suited to bring maximum efficiency and throughput.

Newtec's multi-service Newtec Dialog platform has recently performed successful over-the-

“The satellites of the future are going to demand a lot from the ground equipment that is used to support them, and this is something that has been at the forefront of Newtec's work for some time now”

Eric Van Hoecke, Middle East Regional Sales Director, Newtec

air tests on Telesat's inaugural LEO satellite. Launched in January 2018, the tests on the Ka-band payload are ongoing, and Newtec's technology is being used to demonstrate different service scenarios.

The latest trials saw test user traffic successfully passed over the satellite via Newtec modems, showing that flawless operation without packet loss can be achieved on LEO constellations. The tests have demonstrated that Newtec's equipment works seamlessly with LEO satellites and that our technology can deliver next-generation connectivity today.

5G and IoT? How are you addressing increasing demand in these two sectors?

5G promises to revolutionise our personal and work lives, and even whole cities, through new applications in health, transport, entertainment and security. This will require a huge shift towards a landscape dominated by wireless connectivity, and satellite has an important role to play in the mix of technologies required to meet 5G's full potential.

To ensure satellite is ready, major architectural

changes will be necessary, and these are already beginning. Virtualisation plays a key role at the core and edge of the network, bringing increased computing power, scalability and reduced operational costs. To achieve seamless terrestrial and satellite connectivity, a suite of orchestrators will be needed to dynamically steer traffic to the best transport option available, depending on bandwidth, latency, network conditions and other application-specific requirements. Newtec is part of the ESA Satellite for 5G Initiative that began in 2018.

The importance of MENA and CABSAT...

It's a very important market for Newtec and one where we look forward to doing more business in future. Our office in Dubai offers sales and support for the entire range of Newtec products. Newtec is very committed to connecting those who do not presently have access to connectivity, and MENA holds a great deal of potential for satellite. We can see the socio-economic impact that access to communications offers and we want to ensure that Newtec can reach these regions, delivering connectivity to even the most remote parts of the MENA region.

At CABSAT, we will be showcasing our capabilities across all our market segments, including broadcast, cellular backhaul, GovDef, consumer and enterprise VSAT, and mobility, and we will be highlighting the Newtec Dialog platform. Our Head of Mobility, Andrew Faiola, will also be participating at the GVF Summit on the *Maritime Morning* panel.

Eric Van Hoecke will be at the Newtec stand (Hall 7, Stand E7-20) with his team.

TOP 2019 TRENDS IN THE CONNECTIVITY ECOSYSTEM

Growing emphasis on smart cities, digitisation and automation is driving demand for last-mile satellite connectivity in the Middle East. Hussein Oteifa looks at the top trends in 2019 that will feed this demand



Here in the Middle East, development trends and shifts this year are creating new opportunities

for companies to do business in new territory and achieve a first-mover advantage, as well as in nearby areas where Middle East investors have recently been major foreign players, like Africa and South Asia.

In Q1 2018, Asia-Middle East container volumes spiked 26%, hinting at an enormous volume of trade that can be better supported by satellite solutions. Airlines saw passenger traffic rise 4.2% for the year. PwC called 2018 “the best in five years for Middle Eastern oil exporters” and noted that “stronger prices, combined with... reforms... put these economies on a more stable footing for 2019”.

Underpinning this growth is a steady rise in connectivity and technology upgrading. The industry is benefiting from heavy investment in FTTH and 4G LTE, with 5G just around the corner. Over 67% of the Middle East was connected to the internet by the end of Q3 2017, but broadband penetration is highly uneven.

Here are five key trends we expect to see in 2019:

Economic transformation drives use of satellite solutions

Oil leaders are diversifying their economies and satellite will play a pivotal role in this transformation through cloud connectivity and IoT.

The need for government services, which satellite is well-suited for, is also increasing, such as the UAE’s m-Government project. The benefits are not just enhanced connectivity: a leader at Smart Dubai notes that the government saves AED 5 for every AED 1 invested in the programme. Satellite is a key partner for governments in building secure and reliable connectivity.

5G-ready services will enable mobile network operators (MNOs) to expand their footprint with high capacity and low latency in remote and underserved areas”

Hussein Oteifa,
General Manager, SES Middle East

Industrial demand for satellite-enabled IoT to rise

According to IDC, global spending on IoT is forecast to hit \$1.2tn by 2022. Proof-of-concepts are now being transformed into integrated solutions offered by IoT technology vendors and satellite-enabled service providers, enabling companies to operate in remote locations to deploy IoT applications and services. This will open up the IoT opportunity for governments and vertical industries in areas where connectivity has traditionally been non-existent or poor – for example, industrial IoT services on oil rigs, mining sites and energy farms.

Satellite-based IoT with fibre-like performance will allow companies to send large amounts of data to the cloud or the edge, for real-time processing and analytics. This will present significant opportunities for cloud providers to tap into a wide range of organisations across governments and different market segments looking to use IoT.

Smart cities and digitisation spur 5G rollout

A GSMA Intelligence report released in late November predicts that all six GCC economies will roll out 5G services within the next five years.



In MENA alone, demand for HTS capacity is expected to increase from 40Gbps in 2019 to over 770Gbps in 2027, says Hussein Oteifa, citing NSR research.

Saudi Arabia, Jordan and the UAE are the highest ranked in MENA in terms of digital capability. As 5G news heats up around the world, the satellite industry’s investment in both space and ground assets will help accelerate 5G deployment. Using satellite’s global reach, new constellations delivering 5G-ready services will enable mobile network operators (MNOs) to expand their footprint with high capacity and low latency in remote and underserved areas.

Another driver for 5G is investment in new smart cities and future demonstration zones, such as Saudi Arabia’s Neom, Sharjah’s Aljada, Oman’s Madinat al Irfan and, of course, Dubai and Abu Dhabi.

Airline and cruise industry customers drive demand for seamless Wi-Fi connectivity

Despite missing its target of 90 million passengers in 2018, Dubai remains one of the world’s busiest

airports. The same demand comes at sea, particularly from cruise ships, superyachts and vessels plying the Gulf and major trade routes in the Red Sea and Indian Ocean. Advanced hybrid satellite technology consisting of GEO and MEO fleets is key to providing an unmatched guest experience, which increasingly depends on reliable high-capacity broadband connectivity.

The ‘home away from home’ super-high-speed connectivity experience ties in particularly well, as several Middle Eastern countries have been investing heavily in cruise port infrastructure and cruise operators are expanding regional route offerings rapidly. Operators see the region as a good home for European fleets in winter, while travellers see MENA itineraries as an easy way to check off several countries while enjoying a premium experience that necessitates a high-performance internet connection.

Network automation, virtualisation through use of hybrid satellite fleets

Telco operators are constantly seeking ways to drive new revenue streams and fulfil local government requirements to connect their citizens. As satellite network operations and service delivery become more automated and standards-driven, telco operators will benefit from faster service activation, more intelligent, efficient use of capacity, and easier integration into their broader network infrastructure.

In summary, in 2019 the satellite industry will be growing its cloud-scale data networking capabilities by launching satellites in multiple orbits. More MEO satellites will be launched and other non-GEO systems operators will be talking up future constellations. Traditional GEO satellite operators will continue reinventing themselves with high-throughput satellites (HTS). In MENA alone, demand for HTS capacity is expected to increase from 40Gbps in 2019 to over 770Gbps in 2027, mainly driven by non-geostationary HTS demand. This is almost 60% of the global HTS demand in 2027, according to NSR.

Integral to HTS, spot beam technology is designed to provide greater capacity and high data rates ideally suited to enterprise and consumer broadband applications that require data-intensive usage within a smaller vicinity. It is more cost-effective and allows telcos to remain price-competitive.

In a world defined by IoT and cloud-based connectivity, satellite will be the key complement to terrestrial infrastructure, with end users benefiting as we create new opportunities through satellite-enabled managed data services.

Hussein Oteifa is GM at SES Middle East (Hall 6, Stand E6-10).

ETL brings Enigma to CABSAT

HALL 2, STAND F2-32

ETL has a number of new launches planned for 2019, starting with the launch of three new versions of its Enigma Switch Matrix series, which will be demonstrated at CABSAT.

The Enigma Matrix provides signal distribution for up to 32 input and output feeds for downlinking and uplinking signal management and can be used across a number of applications including satellite communications, broadcasting, military and government communication systems. This new series features improved RF performance, optimising RF signal path performances, and an upgraded touch screen with enhanced control and monitoring functionality, which makes it easier to switch and control signal routing.

Also on display will be the Griffin Redundancy Switch, which provides signal redundancy for satellite modulators, downconverters or modems, and the 128 x 128 Harrier L-band Matrix by ETL Systems.

Rohde & Schwarz offers solid-state satellite amplifiers



HALL 2, STAND B2-22

Rohde & Schwarz will bring for the first time to the Middle East the R&S PKU100 Ku-band satellite uplink amplifier, which combines the strength of solid-state amplifiers and the compactness and low weight of tube amplifiers. Four models will be available, each in an indoor and an outdoor version. The R&S

PKU100 is available for the 12.75 GHz to 13.25 GHz and 13.75 GHz to 14.5 GHz bands with RF peak powers of 400 W and 750 W. The solid-state power amplifier is as light, compact and energy-efficient as conventional tube amplifiers and superior to comparable solid-state products. The new outdoor models are robust and weatherproof and comply

with IP65 ingress protection specifications, plus they offer numerous features required for outdoor applications. The R&S PKU100 can be mounted very close to the transmit antenna, saving RF power and minimising capital and operating expenses. Same as with the indoor model, the fans can be hot swapped in the event of a failure. If fitted with an optional redundant power supply, the R&S PKU100 will continue operating should one of the power supplies fail.

The R&S PKU100 uses solid-state output stages throughout and offers a genuine alternative to conventional tube technology.

ROKS introduces OMNI and BUC

HALL 4, STAND PD-06

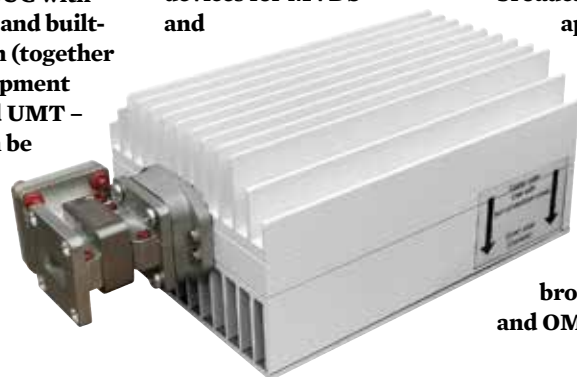
ROKS, with subsidiary company UMT, will present two new products: the new OMNI antenna (with a circular pattern in horizontal plane and not more than 1dB ripple, ideal for TV broadcasting or even monitoring); and the 20W Ku-band BUC with remote control and built-in AGC function (together with other equipment from ROKS and UMT – any request can be satisfied for MVDS system building).

“Our engineers worked last

year on developing these solutions, as well as other products, and will demonstrate them at CABSAT,” commented Ievgenii Kukhol, CEO of UMT. “In direct connection with our clients and their projects, we are able to bring new devices for MVDS and

telecom networks for each exhibition.”

The OMNI has low windage characteristics. The signal transmitted by the OMNI antenna can be received by typical Ku-band satellite dishes and LNB. The BUC is designed for MVDS TV broadcasting systems application in accordance with DVB-S/S2 or DVB-C standards, and can be used with regular radio-relay link (directional) or broadcast (sector and OMNI) antennas.



Singtel promises security with CyphreLink

HALL 6, STAND 602

Managed satellite solutions provider, Singtel Satellite will be at CABSAT to demonstrate the power of its hardware-based encryption service, CyphreLink, while seeking new business opportunities and networking with existing partners and customers in the MENA region.

CyphreLink is a site-to-site network encryption solution securing network connections between two



or more sites. Military grade, hardware-based encryption appliances are deployed at each protected site. It is an over-the-top network solution that

secures data as it traverses all points of the network connecting your trusted sites – routers, switches, firewalls, datacenters, hubs, teleports, and others. Unlike vulnerable software-based VPN solutions that pull heavily on network performance, CyphreLink offloads and accelerates encryption operations through a dedicated security engine.

“MENA is an important region for Singtel. We

have established a satellite footprint that covers Asia, Middle East and Africa, serving industries such as agriculture, banking, hospitality, maritime and mining. For secure satellite connectivity, CyphreLink delivers unassailable encryption for data-in-transit. Thus, enterprises can conduct businesses without limitations and without threats,” the company told *SatellitePro* in a statement.

YahClick to demonstrate latest solutions at CABSAT with partners ITG and Tech4Life

HALL 6, STAND D6-10

YahClick will bring its portfolio of satellite solutions to CABSAT this year including live demonstrations of its e-learning and e-health solutions for unserved and underserved communities across Africa, the Middle East, and central and southwest Asia.

YahClick uses the reusable Ka-band satellite frequency and is powered by HTS spot beam technology. By using the efficiencies of advanced satellite technologies, YahClick provides cost-effective, dependable and high-performance satellite broadband services across a growing footprint.



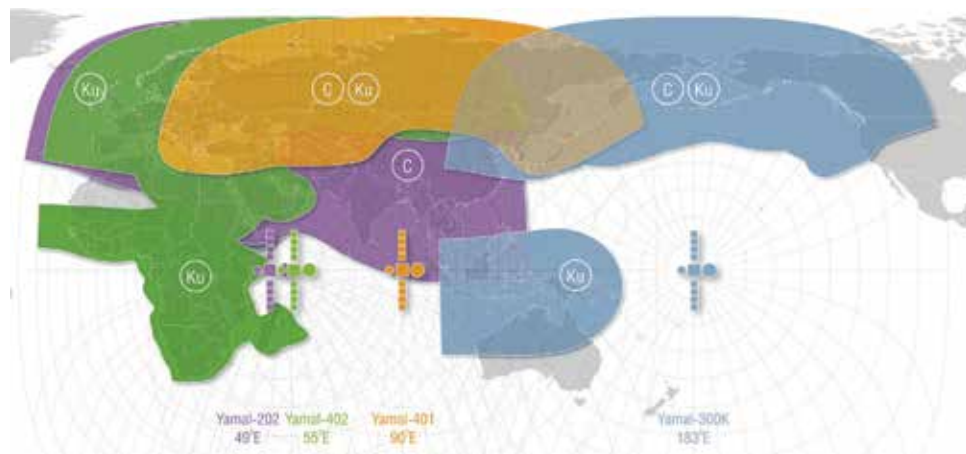
Joining YahClick at CABSAT will be two of its key partners: Integrated Technology Group (ITG) and Tech4Life. The partnership with ITG offers a full suite of digital learning tools and resources to schools and education ministries across YahClick's serviced markets.

Both ITG and YahClick will lead live demonstrations of the platform at CABSAT. Today, e-learning has the potential to be a powerful enabler of social and economic development within emerging markets. The ecosystem is helping to tackle the challenge of more than 57

million children lacking access to education in developing countries.

Tech4Life will also join YahClick to bring its e-health and telemedicine services to the event. The e-health provider's mission to improve access to crucial healthcare services in remote areas of the world perfectly reflects some of the event's key themes, as well as YahClick's own broader vision. By partnering with YahClick, Tech4Life is able to provide consistent, affordable and stable broadband links between major hospitals and remote villages that require professional consultation and diagnosis.

Gazprom Space Systems promotes Yamal



HALL 7, STAND J7-30

Gazprom Space Systems (GSS) will promote its Yamal satellites' capacity at CABSAT. The GSS fleet comprises four satellites positioned between 49E and 183E, as well as advanced ground telecommunications infrastructure.

The C-band payload of

Yamal-202 (49E) has wide coverage over the Eurasian continent, in particular over the MENA. The satellite supports a range of point-to-point connections and VSAT networks for corporate customers.

It is optimal for the arrangement of communication links and data

transmission in the interest of government authorities for TV distribution, as well as for arrangement of trunks between the centres of information resources concentration (mainly in Europe) and the centres of resources consumption (the Middle East and Asia). This year, Yamal-202 will be

replaced by new HTS satellite Yamal-601.

Yamal-402 (55E) provides Ku-band coverage over Russia, CIS countries, Europe, part of the Middle East and Sub-Saharan Africa. Customers can both operate within the African footprint (the Southern beam) and use the interbeam communication between Europe and Africa. Yamal-402 capacity is used more and more actively for occasional use.

Yamal-401 is located in one of the most popular positions in Russia, 90 degrees East, dedicated mainly to the Russian market. The satellite is equipped with C- and Ku-band payloads. The GSS customer base includes more than 250 companies. Yamal satellite capacity is used for services in more than 100 countries.

ViaLite set to impress in Dubai at CABSAT

HALL 5, STAND B5-22

Returning for its third year together, ViaLite will be sharing a stand with its distributor for the region, Symbolise, whose managing director Jeroen Husken will also be in attendance. The companies' successful presence at last year's show saw them secure a three-year agreement to supply a leading Emirates-based telecommunication services provider, through local system integrators.

This year, along

with exhibiting ViaLiteHD RF-over-fibre links for teleports and outdoor broadcast, ViaLite will showcase a number of new products, including its new C-band RF-over-fibre link. With a C-band uplink/downlink frequency range of 3.4-7.1GHz, the link is suitable for use in a wide range of satcom and broadcast applications, as well as some surveillance and weather radar systems.



The link's full frequency range is 500MHz to 7.5GHz.

By removing the requirement for an up/down converter to convert signals to an IF band, the module reduces deployment

costs and complexity.

The ViaLiteHD C-Band Link is available either as a rack chassis card or as a new purple OEM module, and comes with a five-year warranty as standard.

"The C-Band link has the highest frequency band of all our RF-over-fibre links, and we anticipate it generating a lot of interest," said Natasha Miller, Marketing Manager at ViaLite.

WORK Microwave announces AX-80 modem at CABSAT

HALL 5, STAND C5-13

WORK Microwave will demonstrate its latest satcom innovations for all frequencies, including UHF-, L-, S-, C-, X-, Ku-, K-, Ka-, Q- and V-band. A key highlight will be WORK Microwave's AX-80 modem, one of the only end-to-end solutions for wideband applications.

The AX-80 wideband modem is reportedly the world's first functional wideband modem that supports the DVB-S2X standard, with 500Mbps bi-directional throughput. During a live demo,



attendees can see the spectrum output and high-quality signal transmission enabled by the AX-80 modem. Integrated with 10G Ethernet interfaces, it supports full throughput with 256APSK and 3Gbps per direction, without any compromises or trade-offs.

Using this device, operators can optimise the

use of high-speed, IP-based broadcast and broadband access in future Ka-band or Q/V-band satellite systems with wideband transponders. WORK Microwave's AX-80 is fully functioning

and now shipping worldwide.

Also showcased will be the AX-60 modem, WORK Microwave's compact satellite up and downconverter for classic IF and Ku frequency bands, its quad-band ka block Upconverter with IF input at L-band, and its DVB-S2X satellite broadcast modulator.

Appear TV shows off X-series

HALL 4, STAND D4-21

Appear TV will showcase its new X-series at CABSAT 2019. This is a high-capacity, ultra-low latency platform designed to address the latest challenges facing the distribution and contribution market. The complete spectrum of encoding codecs is now available within its X10/X20 platform.

Appear TV's X10/X20 networking platform is modular and allows content producers and distributors to transition from an SDI infrastructure to an IP-based operation. Featuring core IP security

as a firewall, video monitoring, video routing and video re-multiplexing, the X10 and X20 operate as the key building blocks of an ultra-flexible, ultra-low delay, highly secure

broadcast network. The processing modules allow customisation to meet specific requirements: a high-speed IP card, a high-density SDI card and a scrambling card.



Turkmen Hemrasi to promote services in MENA

HALL 7, STAND J7-32

Turkmen Hemrasi, the commercial operator of the TurkmenAlem52.0E satellite, will promote its services at CABSAT, including TV and radio broadcasting, internet services, satellite telephone services, video conferencing services, distance learning and remote medicine. A second-time exhibitor, it sees the MENA market as "developing at a rapid pace".

"CABSAT is a very important exhibition for us because we see participation not just from the region but from across the world," commented Meylis Seyitgulyyev, Head of Marketing and Sales. "We offer a wide range of satellite services in the FSS and BSS ranges at a very competitive price, along with a high level of technical support that allows for quality, reliability and convenience for our customers."

The company specialises in providing satellite communications and broadcasting in the Ku-band in HD.



SMALL IS BIG IN SPACE

The rapid progress of commercial satellite IoT ventures is expected to account for over 25% of satellites launched over the next five years



As the small satellite sector continues to increase in popularity, operators are diversifying and

looking to new applications to open up opportunities for continued market growth. In this year's annual Nano/Microsatellite Market Forecast, published by Atlanta-based SpaceWorks Enterprises, analysts are predicting as many as 2,800 nano/microsatellites to launch over the next five years.

In line with expectations, 2018 saw a correction in the market after a record launch year in 2017, with 20% fewer nano/microsatellites (1-50kg) launched; however, potential for the sector remains high. A flurry of launches in Q4 2018 helped sustain overall market expectations and brought with it a number of industry success stories: the long-awaited flight of Spaceflight's SSO-A, Rocket Lab's first (and second) commercial launches, the takeover of CubeSat-based IoT, and much more.

Increasing global demand in down-stream data analytics and communications is driving much of the industry's growth, though it appears some segments are beginning to push the limits of the nanosatellite form-factor. Interestingly, microsatellites (10-50kg) defied the overall market trend in 2018, with a 25% increase

in launches. As customer demand pushes the market towards more capable payloads, we expect small satellite operators to begin adopting larger satellite form-factors.

Demand in the nano/microsatellite segment remains strong, and SpaceWorks analysts predict 294 launches in 2019. Compared to last year's forecast, projections for 2019 have been revised to reflect changes in both application and operator trends. Though still dominated primarily by commercial operators, the segment is seeing broader interest from government entities, including for expensive interplanetary science missions such as NASA JPL's MarCO mission. It appears, at least for the time being, that government interest is restricted to the civil operators' segment, with military operators showing little interest in this space, likely due to limited payload capabilities.

Even as operators begin to look to larger form-factors to accommodate more demanding payloads, nano/microsatellites are demonstrating enhanced capabilities that make them particularly attractive for certain applications. Of particular note, the rapid progress of commercial satellite IoT ventures is mostly restricted to this segment, and is expected to account for over 25% of satellites

launched over the next five years.

In contrast, Earth observation and remote sensing operators, historically the dominant players in the sector, are expecting a decrease in overall market share of more than 15% during the same time period. As sub-segments such as optical imagery begin to reach saturation, Earth observation and remote sensing operators are turning to applications such as GPS occultation, ADS-B and live video to diversify their revenue streams.

Increased launch consistency for small satellites, as well as new satellite applications, will enable future growth across the sector. Many operators launched their first satellites in 2018 and others began the initial roll-out of their larger constellations, creating confidence in industry investors for near-term growth. Maturing technology and enhanced capabilities of nano/microsatellites have given the industry the push it needed after a small decline in 2018; however, sustained sector performance will largely depend on the ability of firms to prove they can create consistent revenue streams and exit opportunities. **PRO**

Caleb Williams is Lead Economic Analyst and Stephanie DelPozzo is Economic Analyst at SpaceWorks Enterprises.

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