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KUWAIT'S SPACE PIONEER

Bassam Alfeeli reignites country's space ambitions with ground station and CubeSat projects

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WELCOME

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

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

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

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

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

VIJAYA CHERIAN
Editor
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Egypt launches first communications satellite

SATELLITE LAUNCH

Egypt's first-ever communications satellite, TIBA-1, launched last month, will provide communication services to the government and commercial sectors.

TIBA-1 weighed approximately 5,640kg at lift-off and is designed for a service life exceeding 15 years. It will provide communications infrastructure and broadband internet services to remote and marginalised areas, to support development projects. It will also provide internet and telecommunication services to some Nile Basin countries.


The TIBA-1 and Inmarsat's GX5 took the ride together to space on an Ariane 5.

TIBA-1 will contribute to the development of sectors including petrol, energy, mineral wealth, education and health. It will also support the state's efforts to combat crime and terrorism.

TIBA-1 is the first of the TIBA Sat series that Egypt plans to launch in the near future, and is expected to disrupt the communications industry in Egypt and Africa. The Egyptian government has taken over control and management of TIBA-1 after the launch.

Ethiopia to launch its first satellite

SATELLITE LAUNCH

Ethiopia will launch its first satellite this month. The satellite has been built in China. Ethiopia's Innovation and Technology Minister Getahun Mekuria told reporters that it will be used for agricultural, mining, environmental protection and Earth observation purposes. Mekuria added that Ethiopian engineers took part in its construction. A control centre has been set up on the outskirts of Addis Ababa.

Eutelsat to launch KONNECT in 2020

SATELLITE LAUNCH

KONNECT, built by Thales Alenia Space, is scheduled for launch in mid-January 2020. It will provide high-speed internet services for markets in Africa and Western Europe. Offering a total capacity of 75Gbps, it will allow the operator to provide internet services at up to 100Mbps speed. In Africa, it will also allow users to share an internet connection via public WiFi hotspots.

SpaceX launches second batch of 60 Starlink broadband satellites

SATELLITE LAUNCH

SpaceX has launched its second batch of 60 internet satellites, Starlink, to meet the internet needs of consumers across the globe. The first batch of 60 Starlink satellites was launched in May. The latest batch was launched from Cape Canaveral, Florida, which makes it the fourth mission for this SpaceX Falcon 9 rocket booster.

"The Falcon has landed for the fourth time," said SpaceX Starlink engineer Lauren Lyons during launch commentary. "These boosters are designed to be used 10 times. Let's turn it around for a fifth, guys."


Starlink is part of SpaceX's plan to create an interconnected network of 30,000 satellites.

Starlink is part of SpaceX's plan to create an interconnected network of as many as 30,000 satellites, to beam high-speed internet to consumers anywhere in the world. It aims to provide affordable, fast and reliable internet to people with little or no connectivity, including those in rural communities and places where existing services are too expensive or unreliable.

SpaceX estimates it needs at least six more Starlink launches to start offering internet access at high latitudes, such as Canada and the northern US. After 24 launches, SpaceX hopes to provide global internet coverage by 2020.

C-Band Alliance to clear 300MHz of spectrum for 5G, announces auction

SPECTRUM POLICY

The C-Band Alliance (CBA) will clear 300MHz of C-band spectrum to support fast 5G wireless deployment in the US. In an updated filing with the US Federal Communications Commission (FCC), the CBA detailed that the spectrum includes a 20MHz guard band to protect existing satellite services from 5G interference.

Further enhancing its plan to clear spectrum quickly, the first tranche – which clears spectrum within 18 months of an FCC order in 46 top metropolitan zones – has been increased to 120MHz, including the 20MHz guard band. The second tranche of the remaining spectrum will be made available within 36 months from a CBA-led auction, providing cleared spectrum throughout the entire continental US.

As it completed the work necessary to enhance its proposal, the CBA collaborated closely with US broadcasters that serve nearly 120m American homes via C-band. This included analysing the potential use by some customers of technologies such as advanced modulation, single format transport and advanced video compression, including high efficiency video coding (HEVC).

In its most recent filing, the CBA affirmed its commitment to covering all other costs of the transition, such as the required filtering of Earth stations throughout the US and the order of eight new satellites from US manufacturers.

Speaking on behalf of the C-Band Alliance, Intelsat CEO Stephen Spengler said: "Throughout this nearly two-year process, we have sought to work collaboratively as peers, to be responsive to the goals of US policy-makers seeking spectrum for 5G, and to work closely with our customers to protect their transmissions and understand their current and future network needs. Over this time, compression technology has continued to commercialise. We are confident that we can deliver a solution that not only maximises the clearing of mid-band spectrum to enable 5G in the US, but also fully funds a spectrally-efficient, next-generation compression infrastructure for programming distribution in the US.

"This solution represents unprecedented coordination among satellite operators, our customers and the FCC, and we look forward to delivering to the US an accelerated 5G deployment."

Eutelsat Communications also released a statement saying it welcomed FCC's decision.

Thales Alenia Space to build EUTELSAT 10B satellite for inflight and maritime connectivity services

SATELLITE BUILD

Thales Alenia Space has signed a letter of agreement with Eutelsat Communications for the procurement of a new all-electric satellite, EUTELSAT 10B. The satellite is based on the Spacebus NEO Thales Alenia Space product line and will particularly address HTS missions over Europe, the Mediterranean basin and the Middle East, as well as the Atlantic Ocean, Africa and the Indian Ocean.

Two of the satellite's payloads will be to provide timely continuity of service in C- and Ku-band on EUTELSAT 10A. The HTS missions will allow Eutelsat to access new customers and markets, delivering high-capacity Ku-band aviation and maritime mobility services. The missions will be supported by a digital 14kW multibeam digital payload allowing dynamic service allocation, essential to providing extensive flexibility and robustness with respect to market evolution. A fifth-generation Thales Alenia Space SpaceFlex VHTS processor will be integrated at the heart of the payload, achieving high flexibility and efficiency in throughput and bandwidth.

Scheduled to be launched in 2022, EUTELSAT 10B will be located at 10°E for a lifespan of at least 15 years.

YahClick partners with MorClick in South Africa

PARTNERSHIP

YahClick and Hughes Network Systems struck a strategic partnership with South African telecoms provider MorClick at AfricaCom last month. Under the agreement, MorClick is Master Distributor of YahClick's services, products and solutions in South Africa. MorClick will be responsible for targetting and acquiring new customers to benefit from YahClick's services, by capitalising on its expansive retail and distribution network.

YahClick has also announced the launch of YahClick Express WiFi, which is specifically designed to meet the connectivity requirements of multiple consumer segments. It will provide hotspots for consumers to access reliable VSAT (very-small-aperture terminal) internet connectivity at selected public touchpoints.

Farhad Khan is CEO of YahClick.

YahClick CEO Farhad Khan said: "When YahClick arrived in South Africa in 2012, we made a long-term commitment to help advance the country's ICT sector and bring trusted internet connectivity to more people. Our partnership with MorClick and the launch of YahClick Express WiFi services delivers on this commitment."

Focus on diversity in space at Airshow

SPACE NEWS

The UAE Space Agency brought together various experts and decision-makers from the global space sector to discuss the importance of gender diversity, capacity building and the use of advanced technologies for the evolution of the global space industry.

Speaking in one of the panels, Space Foundation COO Shelli Brunswick said: "Space has a place for everyone, and everyone is part of the space economy. If you're in the space business, you're in every business – the low-hanging fruit is health, telecoms and the EO. But there are others as well in almost every vertical."

The conference kicked off with a keynote by the Chairman, HE Dr Ahmad Belhoul Al Falasi, who highlighted the role of women in the development of the space sector. "We are incredibly proud of the fact that more than 45% of our national space sector is made up of women. While the fact remains that women are under-represented in STEM fields around the world, here in the UAE we have seen the role of women grow across the industry, which contributes to the rapid growth and incredible success of the UAE's space sector," Al Falasi remarked.

Shelli Brunswick is COO of Space Foundation.

HE Dr Eng Mohammed Nasser Al Ahbabi, DG of the UAE Space Agency, pointed out that MeznSat, a satellite due to be launched soon, has a number of women involved in its design and manufacture.

Naser Al Rashedi, Director of Space Policy and Regulations at the UAE Space Agency, stressed how space technologies can catalyse the development of different industries and help achieve sustainability.

"We came up with a space investment promotion plan and provided the legislative framework necessary to encourage innovation. Alongside creating space policy and regulation, we have also helped to create startups in the country, like CryptoLabs, which is Emirati-owned."

Dr Fatima Yahya Al Aydaroos, Space Science Expert at the UAE Space Agency, took part in a panel titled *Going Beyond Big Data with Earth Observation*, where she explained how developing space technologies and proper infrastructure are essential to tackling different environmental challenges.

During the conference, four aspiring young space explorers and one select educator were awarded an Astronaut Al Worden Endeavour Scholarship, following the signing of an MoU between the UAE Space Agency and Kallman Worldwide last month. The winners will spend a week at the US Space and Rocket Center's renowned Space Camp in Huntsville, Alabama.

WRC-19 resolutions on 5G, next-gen satellites and RF

POLICY

The International Telecommunication Union's (ITU) World Radiocommunication Conference (WRC-19) concluded last month in Sharm El Sheikh with more than 3,500 participants from 140 countries and over 50 ICT ministers from all over the world in attendance. Several agreements were made with regard to the use of radio-frequency spectrum and satellite orbits, including resolutions on 5G (IMT-2020); high-altitude platforms (HAPS); terrestrial wireless applications; radio local area networks (RLANs); intelligent transport systems (ITS); railway wireless technologies; satellite systems such as non-geostationary satellite orbits (non-GSO) FSS; and Earth stations in motion (ESIM).


Houlin Zhao is the Secretary General of the ITU.

Egypt's Dr Amr Badawi was elected Chairman of the conference. WRC-19 addressed requirements for some next-generation technologies set to play a pivotal role in the digital economy, with immense implications for the trillion-dollar telecommunication and ICT industries.

Agreements reached at the conference are expected to unlock great potential for human progress, advancing many of the United Nations Sustainable Development Goals (SDGs).

New milestones for NGSO systems

NGSO SYSTEMS

A new regulatory regime was agreed at WRC-19 for the deployment of non-geostationary satellite (NGSO) systems, including mega-constellations in LEO. These systems will have to deploy 10% of their constellation within two years of the end of the current regulatory period, 50% within five years, and complete deployment within seven years.

The milestone-based approach will provide a regulatory mechanism to help ensure that the Master International Frequency Register reasonably reflects the actual deployment of NGSO satellite systems in specific radio-frequency bands and services. It also seeks to strike a balance between the prevention of radio-frequency spectrum warehousing, the proper functioning of coordination mechanisms, and the operational requirements related to the deployment of NGSO systems.

"Advances in satellite design, manufacturing and launch service capabilities have created new possibilities for high-bandwidth connectivity around the world," said Mario Maniewicz, Director of the ITU Radiocommunication Bureau. "This landmark agreement at WRC-19 represents a technological milestone that will enable the deployment of next-generation communications while providing broadband internet access to the most remote regions."

The conference specifically called for further studies by ITU on tolerances for certain orbital characteristics of NGSO space stations for fixed satellite, mobile satellite and broadcasting satellite services, as well as for the possible development of post-milestone procedures.

Frequencies for HAPS systems agreed

HAPS SYSTEMS

ITU member states agreed to identify additional radio-frequency bands for HAPS systems. These easily deployable stations operating in the stratosphere are high enough to provide service to a large area or to augment the capacity of other broadband service providers.

The new resolution highlights that HAPS can provide broadband connectivity with minimal ground network infrastructure. This can potentially enable lower-cost connectivity and faster deployment.

Delegates at WRC-19 agreed that allocations to the fixed service in the frequency bands 31-31.3GHz and 38-39.5GHz will be identified for worldwide use by HAPS.

They also confirmed the existing worldwide identifications for HAPS in the 47.2-47.5GHz and 47.9-48.2GHz bands are available for worldwide use by administrations wishing to implement high-altitude platform stations. They agreed to the use of the 21.4-22GHz and 24.25-27.5GHz frequency bands by HAPS in the fixed service in Region 2.

Resolution on Earth stations in motion

ESIM RESOLUTION

A new resolution will boost the deployment of Earth stations in motion (ESIM). These address how to provide reliable and high-bandwidth internet services to what are – literally – moving targets. They provide broadband communications, including internet connectivity, on platforms in motion. Advances in satellite manufacturing and Earth station technology have made ESIM more readily available and practical.

To address the increasing need for radio-frequency spectrum for ESIM while protecting other services, delegates at WRC-19 decided on the regulatory and technical conditions under which the frequency bands 17.7-19.7GHz (space-to-Earth) and 27.5-29.5GHz (Earth-to-space) can be used by the three types of ESIM communicating with geostationary (GSO) space stations in the fixed-satellite service (FSS).

The WRC-19 meeting was held at Sharm El Sheikh, Egypt this year.

However, the new resolution cautions that the frequency bands mentioned above "are also allocated to terrestrial and space services used by a variety of different systems, and these existing services and their future development need to be protected, without the imposition of undue constraints, from the operation of ESIMs". It laid out technical and regulatory conditions for any ESIM communicating with a GSO FSS space station within the 17.7-19.7GHz and 27.5-29.5GHz frequency bands, or parts thereof.

5G agreements at WRC-19

5G RESOLUTIONS

Additional radio-frequency bands for International Mobile Telecommunications (IMT) were identified at WRC-19, to facilitate the development of 5G mobile networks.

New resolutions pointed out that ultra-low latency and very high bitrate applications of IMT will require larger contiguous blocks of spectrum than those available in the frequency bands previously identified for use by administrations wishing to implement IMT. They also pointed out that harmonised worldwide bands for IMT are desirable, in order to facilitate global roaming and the benefits of economies of scale.

17.25GHz of spectrum has been identified for IMT, in comparison with 1.9GHz of bandwidth available before WRC-19. Out of this, 14.75GHz of spectrum has been harmonised worldwide, reaching 85% of global harmonisation.

WRC-19 has also defined a plan of studies to identify frequencies for new components of 5G – for example, to facilitate mobile connectivity by high altitude IMT base stations (HIBS). HIBS may be used as part of terrestrial IMT networks, to provide mobile connectivity in underserved areas which are difficult to cover at a reasonable cost using ground-based IMT base stations.

IMT-2020, the name used in ITU for the 5G standards, is expected to continue to be developed from 2020 onwards, with 5G trials and commercial activities already underway to assist in evaluating the candidate technologies and frequency bands that may be used for this purpose. The first full-scale commercial deployments for 5G are expected sometime after IMT-2020 specifications are in force.

ITU will continue to work towards providing stable international regulations, sufficient spectrum and suitable standards for IMT-2020 and the core network, to enable successful 5G deployments at the regional and international levels. In parallel, the ITU group responsible for IMT-2020 or 5G is continuing the evaluation of the proposed technologies that will allow network operators to offer 5G performances to their users for the next decade. This evaluation will be completed in early February 2020.

EXPLORING A NEW SPACE OPPORTUNITY

Building a space project is not the stuff of dreams and does not necessarily have to have the backing of a government, or a lot of money behind it. It all starts with a dream, as CEO Bassam Alfeeli has proved with the launch of his start-up Orbital Space in Kuwait

Back in the 1960s, when the Soviet Union had recently launched Sputnik 1 (1957) and the US had just successfully launched its first communication satellite, Telstar 1 (1962), only one country in the region was carefully eyeing potential space opportunities, and that was Kuwait.

The Arab country eventually went on to build its own ground station – a regional first – in Um Alaish in 1968 (inaugurated in 1969, as severe dust storms delayed the project). The ground satellite station grew to a complex that housed three 30-metre satellite dishes by 1981 as part of Kuwait's efforts to support satellite communication services, space exploration and the like. In fact, the station will go down in history as one of the few that received signals from the Apollo 12 mission, which it broadcast to the world.

Unfortunately, that ground station was destroyed in the Iraqi invasion of Kuwait in 1990, and in 2009, the remaining dishes, wires and other equipment at the site were sold as scrap material. No further effort was made to revive that long-buried dream. Until now, thanks to a Kuwaiti engineer whose love for space has led him to single-handedly develop another ground station and engage science volunteers in a CubeSat project, in the hope of inspiring Kuwaitis to once again rise to the call of space.

Bassam Alfeeli is the founder and GM of Orbital Space, a start-up operational since 2018 in Kuwait. Today, he runs probably the only privately-owned Earth station for CubeSats in the region.

"Historically, Kuwait was one of the pioneers in the region with regard to space technologies. In fact, when the International Telecommunication Union (ITU) called its extraordinary administrative conference in 1963, also known as the Space Conference, to discuss satellite communication and how they will manage the frequency allocation, Kuwait was there. Five years later, Kuwait built the Um Alaish ground station. So we do have a history of space long before any other country in the GCC, and I think we must make every effort to revive it," says Alfeeli.

Kuwait University (KU) was also probably the first academic institution in the region to offer a remote sensing programme as part of its curriculum, but there were no further attempts to develop interest in space technology. There was no market demand for it.

Around 2010, Alfeeli began to talk to his then employer, the Kuwait Institute for Scientific Research (KISR), about developing and expanding its remote sensing unit into a space programme.

"They have had a remote sensing unit since 1995, which was just processing images purchased from vendors. They developed the atlas of Kuwait from satellite images, but didn't have the capability to acquire their own images – and here, I saw a fabulous opportunity."

The Kuwait Foundation for the Advancement of Science, the country's funding agency for science and technology initiatives,

Bassam Alfeeli receives the award for Space Initiative of the Year from Dr. Riyadh Najm at the ASBU *BroadcastPro Awards* on November 13 at Habtoor Grand, Dubai Marina.

did express interest in supporting the initiative, but it required an entity like KU or KISR to champion the effort. Unfortunately, there was almost no interest.

In 2017, Alfeeli was inspired by the UAE space programme. With some encouragement from the UAE Space Agency, he managed to get a Kuwaiti delegation from KU and KISR to visit the UAE to learn about their space initiatives and activities, hoping this would drive them to make efforts toward establishing a space programme. Those efforts did not yield any results, so he decided to take the journey without government support. In 2018, Orbital Space was born.

"Having failed to trigger the government to establish a space programme in Kuwait, I am hoping that if I show some success, I will perhaps be able to grab the attention of the decision-makers. I truly believe in this, and I'm using my personal funds to lead the establishment of the space programme. Some think I'm crazy, as I'm risking everything I have for this dream. I think the government will follow once they see success, and that's my strategy for now."

An electrical engineer with a degree from the Florida Institute of Technology and a minor in Space Transportation Systems, Alfeeli had the opportunity to visit the neighbouring Kennedy Space Centre often, learn from astronauts and space hardware engineers, and visit the launch pads and clean rooms where they assemble space hardware.

"I was 18 back then and when I got a scholarship to study abroad, I deliberately chose a university that was close to the Kennedy Space Center. Access wasn't so restricted in the 90s, and what I experienced there fuelled my passion for space. When I finished my degree, I returned to Kuwait to work for the Kuwait Institute for Scientific Research."

> "Having failed to trigger the government to establish a space programme in Kuwait, I am hoping that if I show some success, I will perhaps be able to grab the attention of the decision-makers"
>
> **Bassam Alfeeli, CEO, Orbital Space**

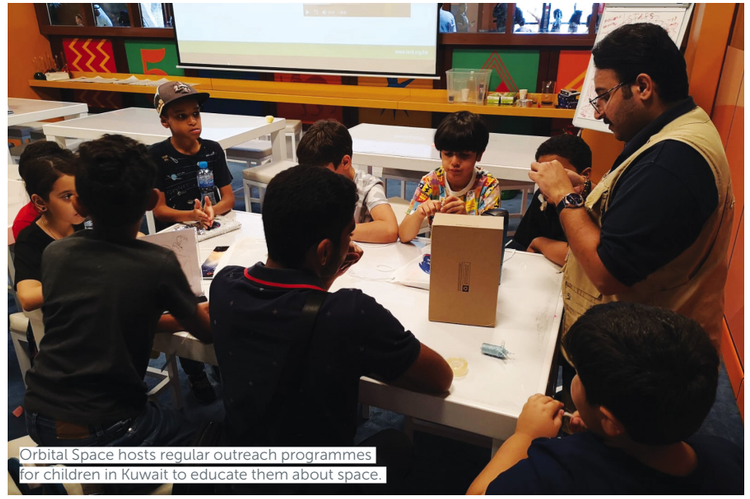
In 2013, Alfeeli moved to the Kuwait Foundation for the Advancement of Science, where he has worked ever since. Orbital Space takes up his evenings and weekends, as he manages several initiatives in parallel. He has set up a basic ground station called Um Alaish 4, after its predecessor, to receive signals from CubeSats. Orbital Space is also involved in building the country's first CubeSat, with a group of around 15 Kuwaiti volunteers. The Kuwaiti engineer initiated the CubeSat project as a tool to attract space enthusiasts.

"The idea is to create a platform to bring together a community of space enthusiasts in Kuwait. There is interest from the young generation, but there is no project that engages them to create that critical mass. I figured we needed a hub where people can come together and do that. So Orbital Space has now created that opportunity and is open to anyone who wants to join us to promote space in Kuwait," Alfeeli says.

By creating greater awareness through public talks on the history of the ground station in Kuwait and hands-on workshops on CubeSats for kids, he hopes to plant the seeds of a space programme in Kuwait. In addition to all the other initiatives, Orbital Space has also launched a competition for high-school students and undergraduate students in partnership with US-headquartered space commercialisation company Nanoracks, with the winning experiment to be sent to the International Space Station (ISS).

"We will send the first science experiment from Kuwait to space. We started a competition for students in high school and the undergraduate level. We have asked for submissions, and the winning experiment will go to space and one of the astronauts onboard ISS will conduct the experiment on behalf of the students."

Space projects require no small investment. A basic CubeSat could take anything upwards of $30,000 to build and a launch costs nothing less than $100,000. "At present, we are designing the bus for a 1U CubeSat and are in discussions with some Kuwaiti companies to fund the launch," says Alfeeli.



Orbital Space hosts regular outreach programmes for children in Kuwait to educate them about space.

> "At present, we are designing the bus for a 1U CubeSat and are in discussions with some Kuwaiti companies to fund the launch"
>
> **Bassam Alfeeli, CEO, Orbital Space**

A technical meeting to discuss the progress of the CubeSat design.

But is there revenue to be made from small space projects? Alfeeli says he is looking to monetise his projects and has identified a couple of revenue streams.

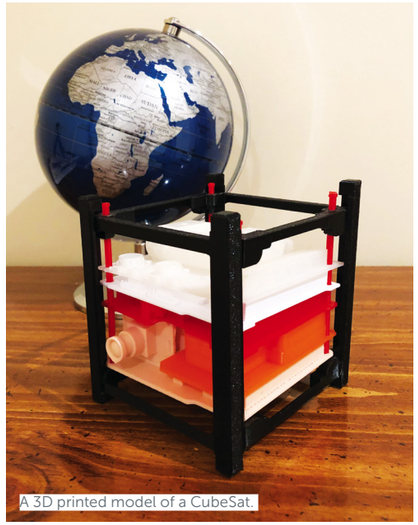
"At present, what we have is a very basic ground station, and the idea is to receive signals from existing CubeSats orbiting the Earth. This station is now linked into a global network of ground stations and is open source, so we are giving access to others to use this ground station as well. To explain, CubeSats by design use low Earth orbits (LEO), which means CubeSat owners have line-of-sight access to their CubeSats for a limited time period (three-four passes a day, 8-12 minutes per pass). Therefore, a network of ground stations can give greater access to CubeSats. What we can offer is access when the satellite passes over the region; CubeSat owners can have access to their spacecraft and receive signals

from it through the network."

Security issues are not a concern here, as CubeSats are mostly designed by academic institutions for education purposes and transmitted on amateur radio frequencies, he points out.

At present, Orbital Space is opening its ground station out to all global entities, allowing them to gather the data from the signals, but Alfeeli hopes to eventually start selling that access as a service.

"We need to build a track record first so customers can trust our services. We are building sophistication into the ground station gradually so it also becomes commercially viable. We would love to have the capability to create a sophisticated station that can allow anybody from all over the world to schedule a CubeSat pass, whether it is for weather information, measurement of solar activities, somebody's experiment in space, or event for entertainment (games and social interactions). If they are interested in getting their data from the CubeSat when it is far away from their location, they can access their satellite on orbit through this ground station. The aim is to charge per minute based on how much they want for access to their satellite," explains Alfeeli.


A 3D printed model of a CubeSat.

> "We aim to have the capabilities to offer services to design, build, test and operate CubeSats to students and amateurs"
>
> **Bassam Alfeeli, CEO, Orbital Space**

He adds that the team started with one antenna and one network, and has now expanded to two of each. Another level of service is to offer sophisticated data processing of raw data as well, if the customer is interested. Another revenue possibility could come from the excitement of working on CubeSat projects. Many university groups would be more encouraged to pursue CubeSat projects if there were local support and mentoring services.

"We aim to have the capabilities to offer services to design, build, test and operate CubeSats to students and amateurs, so they can gain the know-how to build a satellite as well. If they want to do a space-related experiment, they at least now have the ability to learn somewhere. We hope to monetise this opportunity. The idea is to develop a space industry in Kuwait. My vision is to provide access to space to all."

Orbital Space is aiming for a 2022 launch for its first CubeSat project. PRO


Around 15 engineers and scientists have enrolled as volunteers to be part of Orbital Space's CubeSat project.

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PAVING THE WAY FOR DISASTER PREPAREDNESS

Geeks Without Frontiers recently hosted a disaster-preparedness programme for an Afghani delegation in the UAE, to ensure they were familiar with the processes kickstarting communications operations in the country, should there be a natural disaster. *SatellitePro ME* reports on the project and what disaster preparedness entails

Geeks Without Frontiers (GEEKS), a non-profit with the goal of leveraging connectivity to improve and save lives throughout the world, has – with support from the US government and in coordination with leading international organisations – successfully provided a disaster preparedness programme for the government of Afghanistan.

The programme, which also received support from key industry members, is part of a GEEKS global initiative. It harnesses connectivity, technology and regulation, and combines them with stakeholder resilience strategies focussed on disaster preparedness, response and recovery, to help protect, save and restore lives.

"GEEKS is honoured to work alongside the Afghan government, in coordination with the US government, and with support from the United Nations and key communications companies," says GEEKS CEO David Hartshorn. "The outcome of this programme is not only strengthened disaster preparedness, but also an important step toward the development of a national emergency communications plan for Afghanistan."

Central to the GEEKS programme was an Emergency Communications Management symposium held recently in the UAE, delivered with support from the US Department of Commerce's Commercial Law Development Program (CLDP) and made possible through funding from the US Agency for International Development (USAID).

Industry sponsors were also instrumental to the programme's success, including Arabsat, Hughes and Intelsat. Knowledge and skills were imparted by subject-matter experts from throughout the GEEKS connectivity network to 25 Afghan delegates from multiple government agencies and local network operators.

GEEKS' capacity building draws upon connectivity best practices, shared with the delegates by representatives of organisations central to international and national resilience initiatives. For instance, the International Telecommunication Union (ITU), a UN agency, shares best practice in communications regulation, policy and spectrum management. During the programme, the ITU focussed on optimising these government functions for improved security and resilience.

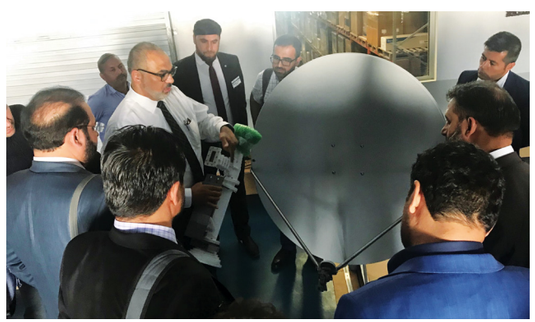
The United Nations Emergency Telecommunications Cluster (UN-ETC), which coordinates disaster preparedness and response for UN agencies in disaster-affected nations in every major region, advised delegates on technology tools, operational strategy and key considerations for coordinating with ETC before and during relief efforts.

The communications industry, represented by Arabsat, Hughes and Intelsat, shared updates on how state-of-the-art systems and services are being leveraged through resilience strategies for more effective preparedness, response and recovery. Hands-on skills building was provided by the GEEKS team, together with operators of the technology solutions used for disaster response.

> "The outcome of this programme is not only strengthened disaster preparedness, but also an important step toward the development of a national emergency communications plan for Afghanistan"
> **David Hartshorn, CEO, GEEKS**

The symposium concluded with an agreement to build upon the dialogue established during the programme, by collaborating on the development of a National Emergency Communications Plan for Afghanistan. A timeline for action was confirmed by all the stakeholders, whose contributions continue to be coordinated and supported by GEEKS.

The GEEKS capacity-building team was drawn from the organisation's global network of leading connectivity experts, including Riaz Lamak, GEEKS International Programme Lead, who manages capacity building and facilitates performance quality assurance of assets, human resources and processes; Mazen Nassar, GEEKS Master Instructor and CEO of Mena Nets, which manages system integration, training and consulting through a portfolio of seven technology lines; Joe Simmons, GEEKS Project Director, who has extensive experience addressing global connectivity challenges in the NGO sector; and Shafeeq Hamza, GEEKS Training Manager & MBC Trainer, as well as a GVF Certified Examiner. PRO



The symposium comprised various activities including assembling a VSAT terminal and participating in various workshops.

What does preparedness entail?

Preparedness for a natural disaster primarily addresses multiple areas, according to Riaz Lamak, Programme Lead at Geeks Without Frontiers (GEEKS). "In order to be able to offer on-ground support and communications to people impacted by a natural disaster, they should be aware of what kind of support they can potentially tap into," he explains.

Some of the key points addressed as part of preparedness were emergency licensing procedures; express customs clearance procedures for HADR; best suited technology; pre-positioning; quick installation deployments in terms of geographic vulnerability; spectrum availability; and cybersecurity threats.

"A country should be fully prepared when a big natural disaster hits," explains Lamak. "If it's a big disaster, external agencies like NGOs would like to come into the country and offer help. First, they will come with their comms equipment, such as mobile satellite phones (MSS terminal). They should ideally know beforehand what the emergency licensing procedure is, so that they are able to easily enter the country with their equipment.

"Normally, developed countries who plan their disaster response infrastructure consider a number of aspects. For instance, they earmark spectrum and keep aside some resources for their disaster management network. So it's important to know what procedures a country has, so that when a disaster hits, the agencies involved are able to kick in with processes immediately."

An unfortunate but common pattern in countries hit by natural disasters is cyber attacks. Lamak remarks that during a specific endeavour in Asia Pacific as part of a recent joint disaster preparedness exercise, he learned how cyber attacks are common during disasters, with hackers using the vulnerability of the area to cause further chaos. As part of the preparedness, therefore, awareness of this and alertness is required.

A third common issue during disasters is when NGOs try to come in with their equipment. Issues at customs can be extremely frustrating.

> "If you have people trained on how to deploy quickly, connecting and communicating is achievable"
>
> Riaz Lamak, Programme Lead at Geeks Without Frontiers (GEEKS)

"When everyone is coming in with equipment to support, how does one ensure easy access or get a waiver at customs so one can come and go during that period? Hence, the process and procedure should be pre-defined. All this cannot be done after disaster has already struck."

Lamak says countries typically earmark locations with pre-positioned terminals like satellite phones, VSATs, solar-powered radio sets, etc, such as in the Chief Minister's office, the Prime Minister's office, district-level offices and so on. While these comms terminals are normally used as redundant links, they can be activated for disaster mitigation. Once that challenge has been addressed, they are repurposed for business as usual.

"In normal circumstances, a country may use its network for social programmes like telemedicine, tele-education, office communication and so on. During a disaster, you can increase the bandwidth and use this same equipment for disaster relief and mitigation. We must remember that invariably mobility is down and fibre cut, so MSS & FSS satcom terminals are the best tools for first responder communications. Further, it should be remembered that with satellite imagery, we can identify where there has been maximum damage and send relief to those specific places."

Another element taught as part of preparedness is exploring which satellites have a footprint in a specific region. This is a very important step.

"We look at which satellite operators have their footprints and can put bandwidth on a specific geography. So we prepare them based on what bands each operator has, whether Ka-/Ku-/C-band, etc, and accordingly plan ground system hardware too. This is preparedness on satellite capacity and ground infrastructure."

The last element is trained personnel.

"If you have people trained on how to deploy quickly, connecting and communicating is achievable. This is why human capacity building is so important," explains Lamak.

GEEKS, as a technology neutral expert, works with satellite, fibre, copper, RF, mobile and every other technology available, offering a hybridised technical design for connectivity. It assists nations in preparedness and trains personnel.

Lamak explains that in this particular instance, the aim was to sensitise and train the Afghan team on all of the above preparedness levels. They went through emergency communication licensing and customs clearance procedures, and were offered hands-on experience with various technologies, systems and communication equipment.

SATELLITE IOT: THE RISE OF COMMERCIAL SATELLITE APPLICATIONS

The entry of satellite-based IoT promises to be a game changer for companies whose core operations are mainly based in remote locations, says Omkar Nikam

The satellite industry has been leveraging various commercial opportunities from a variety of industrial sectors. One of the emerging satellite applications, the Internet of Things (IoT), is set to grab a significant chunk of markets such as transportation, forestry and automobiles. According to government sources, there are currently more than 2.5bn people and approximately 20bn human-made objects connected to the internet. These objects include everything from cars to manufacturing plants.

The satellite IoT market has taken off on a downstream level, while the upstream level is about more innovative and commercial approaches for the downstream market.

This decade saw the entry of new upstream space companies such as Hiber, Astrocast, Kineis and OQ Technology, with satellite IoT as their core application, while traditional satellite companies like Iridium and Inmarsat are already using their current assets for satellite IoT applications, and Eutelsat recently decided to launch an IoT-dedicated constellation of four nanosatellites. According to Riot Research, the global satellite IoT market will grow to more than $5bn in 2025. This gives a broader picture of why many companies are investing in satellite IoT applications.

The satellite IoT market is still emerging. With respect to increasing demand for connectivity in market verticals such as oil & gas, agriculture and forestry, there is an appropriate space where satellite IoT will play a major role in the coming decade. For example, OQ Technology, a Luxembourg start-up, is developing satellite IoT solutions mainly focussed on the oil & gas industry. One of its unique approaches is to fill the gap in tracking issues related to pipeline leakages. This will increase the productivity of fossil fuel companies and help them reduce losses. There are numerous other applications, in various industrial segments, where satellite IoT can be of utmost importance to increasing productivity.

Commercial Applications

Demand for satellite IoT applications is set to increase, since terrestrial service providers are currently unable to maximise their coverage due to infrastructure constraints. With the scale of commercial satellite IoT applications, the satellite industry has the opportunity to direct its communication assets towards unexplored markets where satellite IoT will be in high demand.

The year 2019 showed how the satellite communication market has to evolve in the coming decade, especially with respect to declining satellite TV revenues. Both satellite operators and service providers had to bear a considerable amount of revenue loss due to the reduction in the number of satellite TV subscribers in various parts of the world. Though there is still a potential opportunity for satellite operators to explore the OTT and IPTV market, along with cloud services, satellite IoT is a huge incoming opportunity for the satellite industry as a whole.

> "The satellite IoT market has taken off on a downstream level, while the upstream level is about more innovative and commercial approaches for the downstream market"
>
> **Omkar Nikam, market analyst, Orbital Gateway Consulting**

The automobile, financial and energy sectors might be the markets where satellite IoT will play a key role in product/asset monitoring and delivering appropriate alerts to service providers. Vodafone has already deployed commercial satellite IoT services using Inmarsat's broadband global area network (BGAN). According to the company, there are currently more than 50m IoT connections, with approximately 250 types of devices, connected to Vodafone's IoT connectivity platform. Innovative products like flat-panel antennas (FPA) in the satellite communication market are also going to raise the commercial value of satellite IoT applications, especially in the automobile sector. Satixfy, Kymeta, Alcan Systems, Phasor and Isotropic Systems are some of the well-known FPA developers in the satellite communication market.

Future Outlook

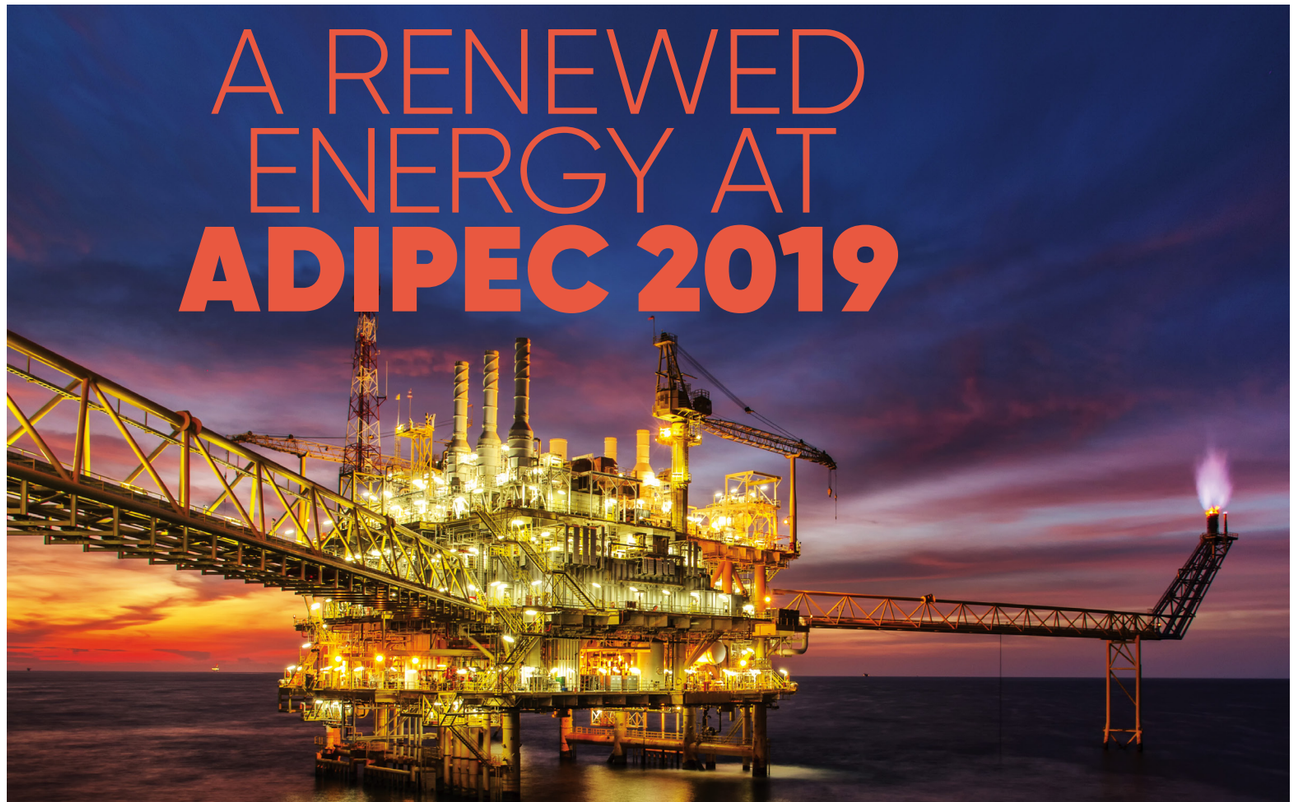
The future looks promising. This said, the satellite industry has to hit the right spot to make satellite IoT a sustainable asset for both operators and service providers. Though there are still many facts to be analysed with respect to market supply, such as the entry of numerous satellite IoT companies, overall market demand shows that satellite IoT applications will play a major role in multiple industrial segments.

The satellite communications market is the commercial core engine of the space industry. With satellite IoT, the communications market is expected to grow, as the satellite manufacturing and launch vertical are presenting low-cost opportunities for start-ups targetting the upstream market. The downstream market flow is also consistently evolving through innovative approaches to amplifying satellite services. M2M and 5G technologies are set to change traditional satellite services, with satellite IoT as the key application.

Satellite IoT is slowly shaping itself to fit into various market verticals. While it is still developing, the satellite industry has the opportunity to observe and analyse the future challenges and opportunities for the satellite IoT market. PRO

Omkar Nikam is a market analyst with Orbital Gateway Consulting (OGC) in Strasbourg, France. He works on satellite communication, Earth observation and satellite navigation consulting projects.

A RENEWED ENERGY AT ADIPEC 2019



A recent NSR report made the point that ongoing macro-economic challenges since 2018 have been putting a lot of pressure on satcom solution providers, and that 2020 may be the year for a turnaround. Based on this report and ADIPEC just having concluded, we asked Nabil Soussia, VP Maritime at IEC Telecom Group, about the future of the sector in this region

With oil prices having forced a lot of energy companies to optimise and retool their internal operations, is there less need for satcom services?

No, this is quite the opposite; there is an increased need for satcom services. The oil & gas industry is facing intense pressure to improve operational efficiencies as lower oil prices continue to crimp margins. One critical capability to accelerate operational efficiency and drive margins is digitisation. It has the potential to create around $1 trillion of value for oil & gas companies, and could create benefits worth about $640bn for the wider society.

Satellite solutions enable digitisation even in the most remote areas, and provide reliable back-up for GSM-connected inland sites. The digital oil field is no longer a concept but a reality, opening new horizons for businesses. As demand for data increases exponentially, satellite communication is the only realistic option for ship-to-shore and inter-ship communication.

What are the emerging trends in this market (also based on your visit to ADIPEC), and how do you propose to address them with new solutions?

Some of the emerging trends that we will continue to see in this market include the demand for digitisation, the need for comprehensive cybersecurity, staff welfare and back-up solutions.

The demand for digitisation and digital services is one. With renewable energy uptake accelerating and innovations like electric vehicles gaining mainstream attention, the oil & gas business will be compelled to change its operations to stay sustainable and competitive. Digitisation is the only way forward. New applications allow businesses to digitise, optimise and automate processes that save time and money, and increase safety.

Secondly, there is a need for comprehensive cybersecurity. The fragmented approach to digitisation may potentially leave companies exposed to a greater risk of cyber-attack. According to a 2018 survey conducted by Siemens and the Ponemon Institute, half of all cyber-attacks in the Middle East target the oil & gas sector. To mitigate this, companies need to align their digital and cyber strategies.

Staff welfare is also a priority. The new generation of specialists expect to have connectivity onboard when working in remote areas, and businesses are reporting having issues attracting new members when they do not provide connectivity. In terms of crew welfare, specialists are able to maintain social lives via video/audio calls, messenger programmes and social media. They can also continue to carry out routine activities such as keeping up with news and viewing bank statements.

Back-up solutions need to be made available for operations.

Facts and Figures: Oil & Gas

- 2020 will be an important year for Middle East and UAE-based energy companies to accelerate their digital transformation.
- According to McKinsey & Company, the effective use of digital technologies such as cloud, the IoT, mobility, artificial intelligence (AI), virtual reality (VR), big data and analytics could cut capital expenditure by up to 20%; it could cut upstream operating costs by 3-5%, about half that downstream. The firm also forecasts that total cash flows will improve by $11 per barrel across the offshore oil & gas value chain, adding $300bn a year by 2025.
- The demand for satellite Ka bandwidth is continuing to grow 10% year-on-year in the UAE.
- Spending on IT with digitisation is projected to reach $160bn in 2019, a 1.8% increase from 2018. Despite this, Deloitte's digital maturity index shows the oil & gas industry lagging behind all other sectors in digital uptake. EY estimates just 10-20% of the industry is digitised.
- Barriers to change include regulatory frameworks struggling to adapt to a new era of data sharing; the challenge of recruiting millennials to replace an ageing workforce; and digital is still considered at odds with deeply entrenched safety concerns.
- Recommendations for successful digital transformation: a) make digital a priority for senior executives (setting a clear vision, committing funding and resources); b) drive a culture of innovation and technology adoption; c) invest in human capital and development programmes that promote new, digital thinking; d) reform the company's data architecture; e) identify opportunities to deepen collaboration of sharing-economy platforms; f) create clear regulatory frameworks.
- Digital transformation does not require a 'rip and replace' approach.
- A fragmented approach to digitisation may potentially leave companies exposed to a greater risk of cyber-attack. To mitigate this, companies need to align their digital and cyber strategies.


Nabil Soussia with other industry professionals at ADIPEC.

> "With renewable energy uptake accelerating, the oil & gas business will be compelled to change its operations to stay sustainable and competitive"
>
> **Nabil Soussia, Vice President Maritime at IEC Telecom Group**

Unstable geopolitical situations may cause disruption of connectivity, which will have its consequences for the enterprise operations.

In this backdrop, and to meet changing customer needs at ADIPEC 2019, IEC Telcom demonstrated its latest OneGate Energy, designed as a land-deployed variation of its unique solution OneGate, to meet the requirements of remote units. OneGate provides access to a virtual platform to store critical applications. The solution also enables technical teams to maintain, update and upgrade on-site infrastructure remotely, saving time and money on logistics.

OneGate also separates the corporate environment from the staff network. Such segregation ensures that e-operations and classified data remain safe, eliminating cyber threats. OneGate addresses all major challenges of the oil & gas industry, including logistics, cybersecurity and optimising connectivity.

When do you see this market picking up, and what kind of new connectivity solutions will help it in the future?

The market will pick up pace when new projects launch and companies begin investing again. Connectivity solutions that will be critical to support this growth will include high-throughput satellites to handle big data and L-band for IoT.

Will it be GEO, LEO, MEO or a hybrid solution?

It can be anything, and more likely it will be a combination of everything. At the end of the day, consumers want to have a secure, reliable and sustainable internet connection. In some cases, the size of the antennas will matter, or the area coverage, but those are details that can be easily managed at our level, as we focus on bespoke solutions that help customers address their various business needs.

What about ground infrastructure? How can this be optimised to better address this market?

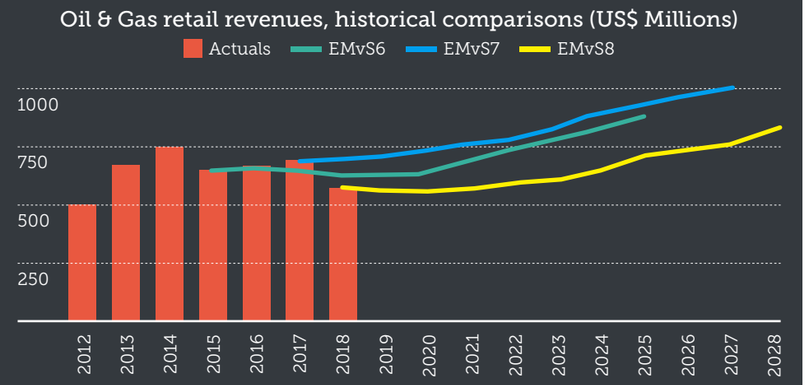
Ground infrastructure is an important part of the solution and can always be enhanced with better firewalls and comprehensive cybersecurity solutions. Optimisation and QoS are also key services that can always be enhanced by investing in ground infrastructure.

What challenges do you foresee in this market? Having just come out of ADIPEC, what are your thoughts on how to move forward?

When is the right time to invest? This is one of the most commonly asked questions. It is important to invest in the right technology and sustainable projects to continue to remain competitive and more sustainable. The MENA region, especially GCC countries, is at the forefront of nationwide digital transformation agendas, placing MENA seventh out of the 11 regions tracked by Gartner in 2019. The spending on IT is projected to reach $160bn in 2019, a 1.8% increase from 2018.

And yet the oil & gas sector still operates more in a traditional way, and more needs to be done, so all companies in the sector enjoy digitisation in full. Digital technologies are helping almost every industry rewrite its operating landscape, and the oil & gas industry can no longer remain behind. According to Wood Mackenzie, the industry can save up to $73bn within five years in exploration and production by adopting the latest technologies. PRO

THE NSR Report



A September 2019 report from analyst Northern Sky Research (NSR) describes 2018 as a hard year for satellite players with an interest in the energy markets. Although commodity pricing for energy products was weak or unstable, global economic activity shrank and energy customers had their own financial challenges, analyst Brad Grady from NSR comments that he was optimistic about a 2020 turnaround.

According to NSR's 'Energy SATCOM Markets, 8th Edition' report, the oil & gas markets are shaping up for 2019 into 2020 to be a "turnaround year" for onshore activities, offshore exploration and generally better levels of project expansion. Moreover, the two major energy SATCOM market service providers that publish financial data (SpeedCast and RigNet) have both given indications of positive revenue growth in their energy segments in the first half of 2019, and all indications of ongoing positive growth into the end of 2019 and 2020.

Grady says the oil & gas markets are driven predominantly by two factors – the price of crude and the backlog of extractable resources companies have – and have fairly straightforward metrics.

"In the run-up to the crash in 2014-2016, the price of crude fell dramatically, to the point where cost to extract oil & gas that made up the backlog of extractable resources vastly exceeded the market rate (and the projected market rate). As such, oil & gas end users faced a dilemma – wait out what could be a short-term dip in pricing, or start the long process of shutting down exploration and production sites, stacking rigs and retooling themselves to operate in an environment with lower crude prices," Brad Grady says in his report.

Practically, most end users waited it out as long as possible (some went bankrupt in the process), pushed off greenfield activities and stacked rigs or killed off new-build contracts.

"For SATCOM service providers, the impact meant fewer sites required connectivity, and new cash optimisation strategies from their customers meant that if you wanted to keep business, you had to cut a pretty significant deal. 2016 was largely a stabilising year due to the impact of the greenfield sites being shut off, and cash optimisation strategies were only beginning to roll out. By 2018, end users had retooled their operations, optimised their backlog against projected crude pricing and started to expand exploration and production activities. Yet service providers are still feeling the cash optimisation strategies in terms of their overall pricing abilities."

Looking into 2019 and beyond, Grady says the digitisation of rigs, platforms and vessels will continue to drive bandwidth demand to new heights, with the years of backlog neglect catching up with oil & gas end users. The process of retooling and optimising internal operations takes time, with most estimates saying 24-36 months.

"Beyond 2020, satcom market factors start to weigh in on the forecast: What's capacity pricing doing? Is LEO going to be a big thing? Do SPs need to pass along the savings?"

The report says we shouldn't expect the market to return to the "heyday" of 2014. "NSR expects that, with the combination of lower latency satcom services and end user demand for more automation, 2025 might be the year in which we see revenues exceed 2014 levels."

Grady comments that SATCOM service providers in the oil & gas markets aren't out of the woods just yet – return to growth doesn't mean a return to a 2014 market overnight.

He concludes: "End users are still looking for a good deal, and the path to the good old days remains challenging. New satcom services in LEO and MEO will be key to some of that growth, while GEO-HTS will serve as the new normal for network architectures. Overall, NSR has looked at 2020 as the year of improvement for a few years now, and all signs are shaping up that next year will be the year."

KEEPING CONNECTED

Inmarsat's GX5 satellite promises to revolutionise inflight connectivity and ensure that the company is part of the $33bn pie that awaits suppliers in this sector. Neale Faulkner, Regional VP at Inmarsat Aviation, talks to *SatellitePro ME* about the new launch, emerging consumer trends and the future of inflight connectivity

What is the current situation in the Middle East with regard to inflight broadband coverage?
Inmarsat already has four operational satellites providing global coverage, not only across the Middle East but across the whole globe. The GX5 satellite, which launched last month, will be a second layer covering the high-density route from the Middle East into Europe and South Asia, adding a huge amount of capacity and bandwidth, which will be available for our airlines and their passengers to enjoy faster broadband speed.

How will Inmarsat's next-generation broadband services revolutionise connectivity in aircraft, and who will benefit?
When it comes to next-generation connectivity, the good news is that GX, a truly broadband experience akin to that on the ground, is available in the region right now. It's being used on over 100 aircraft in the Middle East today, with a further couple of hundred due to be installed in the next 12-24 months.

GX is a step change to the services being providing with IFC in the last decade, where we're now going from slow speeds of only a couple of Mbps, up to 20, 30, 40 or more Mbps, and moving into the 100s of Mbps with our new satellites. It provides a similar experience that you would get on the ground, allowing you to stream movies and content, whether it be Amazon Prime, Netflix or perhaps Skype sessions with your family.

Inflight connectivity has really changed with GX, and passengers are benefiting right now. Of course, the airline also benefits, as it makes their onboard product significantly better, allowing them to grab the 450m 'floating' passengers who would be prepared to switch airlines if offered a fast and reliable inflight connectivity service.

How will the launch of Inmarsat's GX5 satellite enhance inflight broadband coverage in the Middle East?
GX5 is going to provide more capacity and more bandwidth into the region than the previous four satellites combined that have been launched thus far in the GX network. To put this in perspective, all of this capacity is going to be focussed into the specific area of the Middle East up into Europe over to the Indian subcontinent, which means that you're going to have huge amount of high throughput capacity in just a small region of the Earth.

But more importantly, it's where a huge amount of air traffic, commercial air traffic, is actually routed on a daily basis. Therefore, this satellite is so important to ensure we meet the demands of passengers not just for today, but for the next 15-20 years, the expected lifespan of GX5.

Could you take us through your roadmap, given you have a whole package planned with the last instalment due for launch in 2023?
Inmarsat has probably one of the most aggressive roadmaps of any satellite operator, especially when you consider that we're focussed on mobility connectivity services only. Commercial aviation is the key industry for this roadmap, as it's the one with the biggest potential for growth, and it's one where we've really focussed our innovations in products as a business, to be able to provide a sufficient network going forward. GX5 will be operational early next year. Every year for the next four years, we'll be launching a new satellite (in some cases more than one satellite per year) with more capacity and more bandwidth available for passengers. This means, in total, we will be bringing a total of 12 satellites onto our GX network by 2023, providing additional layers on top of our already global network.

GX 10a and 10b satellites will be special for a specific reason, as they are highly elliptical orbit satellites covering the polar region, an area that has never been lit up with inflight connectivity bandwidth before. This means that airlines that fly over the polar region, such as from the Middle East into the US, by 2022 will have uninterrupted connectivity throughout the whole flight, whether that be for internet connectivity or even live sports events, live TV channels, IPTV, etc.

As mentioned, every year there'll be a new satellite being launched, until we get to 12 in 2023. And when we get there, there'll be additional announcements for further satellites. I'm sure that we'll keep increasing and putting layers on top of the bandwidth we already have.

We hear recent research from the London School of Economics and Political Science (LSE), in association with Inmarsat, shows that airlines that have successfully installed connected cabins have an immediate opportunity to win $33bn in market value from competitors. How is Inmarsat looking to secure a part of this pie?

The GX5 satellite will be a second layer covering the high-density route from the Middle East into Europe and South Asia, offering a huge amount of capacity and bandwidth to passengers.

The key to achieving the $33bn piece of the pie for airlines is very much around understanding the demographics of the passengers in the next decade. We spoke a lot about 2028 being the pivotal year where there will be more passengers that were born post-1996 – Gen Z and NextGen passengers – than pre-1996. It will be understanding how those Gen Z and NextGen passengers think, where their loyalties are, and how they change their loyalties more than traditional demographics of the previous generations.

Inflight connectivity is able to facilitate their desire to make last-minute purchases while travelling, and allows airlines to monetise the experience of their captive audience for the duration of their flight with offers of hotels, tourist attractions or car hire at their destination. By doing this, airlines are able to grab the predicted $28 per Gen Z passenger, who has the tendency to delay a purchase decision to when they're onboard. That money is now available for the airline, and that's how airlines can start to take a piece of that $33bn pie.

What are some of your findings on connectivity in aviation?

I think the changing demographics of passengers is the key focus here, because really what you're seeing is that millennials onwards, those born from 1981, are digital natives that are used to being connected. When we first introduced our concept of inflight connectivity, we thought it would only be for business people. We were very wrong. The fact is that those that really want inflight connectivity are millennials, Gen Z and the NextGen passengers, who are used to being connected all of the time.

The fact remains that some of the older generations have a preference to use the time onboard to be disconnected, because they're used to being disconnected in the past. But that's not the same for millennials, Gen Z and the NextGen, and this is why we really do see a massive uptake in inflight connectivity as these passengers start to become the majority rather than the minority on flights. Airlines need to adapt and accommodate the needs of these digital natives, so as to ensure that they're being chosen as the airline of choice for these passengers.

As well as providing the right type of inflight connectivity, airlines need to also start thinking about pricing for this service. The debate of whether the inflight connectivity should be free of charge or chargeable is still raging on. But it is likely airlines will eventually be forced into a position which is likely to be a combination between the two, like a freemium model,

GX5's capacity will be focussed on the Middle East, parts of Europe and the Indian subcontinent, thereby providing a huge amount of high throughput capacity to those areas.

Inflight connectivity was initially designed for business people, but today it is primarily millennials, Gen Z and NextGen passengers, who want to be connected all the time and demand it, says Neale Faulkner.

by providing some element of connectivity for free (time limited, messaging only or specific data allowance), but then charging for a premium service on top of that.

What are the current pain points with regard to providing inflight connectivity, and how will new solutions in the market address them?

One of the most significant pain points in the industry right now is really about getting the equipment onboard the aircraft. It's very hard to ensure you have a line fit position on every type of aircraft available, or to be able to adapt an aircraft, especially when it's already in service. It needs a huge amount of time and effort to be able to retrofit an antenna on top of an aircraft. With this complexity comes costs and downtime for an aircraft during any retrofit programme. So one of the strategies we've seen from some of our partners is a tendency to support the airlines in getting the equipment onboard, whether financially or through some kind of subsidy for the equipment, in return for some of the potential revenues that can be made from paid service, sponsorship or advertising.

> "One of the most significant pain points in the industry right now is really about getting the equipment onboard the aircraft"
>
> **Neale Faulkner, Regional VP at Inmarsat Aviation**

Why has the Dubai Airshow been important for Inmarsat?

From the Middle East perspective, the Dubai Airshow is by far the biggest aviation event taking place in the region. It is one where the big deals are done by many of the Middle East airlines, and it's one where a lot of our partners and value-added resellers are present. And it is for that reason we need to be involved and be present. Meeting the airline at the same time they order aircraft and understanding what's happening in the market from competitors and partners alike are key factors for our presence. Even though we are a satellite owner and operator, we need to ensure we are integrated into the whole aviation ecosystem, and the Dubai Airshow is the biggest opportunity for us to do this when it comes to events. PRO

EXPANDING YAHSAT'S HORIZON

The biennial Dubai Airshow wrapped up last month with a total of $54.5bn in deals and a record 84,043 attendees, highlighting continuing airline investment in growing fleets. In conversation with Sulaiman Al Ali, Executive VP of Yahsat Government Solutions, we explore what the UAE satellite operator brought to the show

What did you bring to the Dubai Airshow this year?
We showcased the combined reach and capabilities of the Yahsat-Thuraya aero mobility portfolio that is powered by Ka-, Ku- and L-bands. We highlighted the airborne satcom heritage of Yahsat Government Solutions, enhanced through our acquisition of Thuraya. The Yahsat network is now capable of supporting aero mobility through Yahsat's fleet (AY1, AY2 and AY3) and Thuraya's satellites (T2 and T3).

Can you share some use cases of your integrated aero mobility solutions with us?
We recently conducted demos of Thuraya's aero mobility capabilities on fixed-wing aircraft for key government customers in Austria and Abu Dhabi. Both were very successful and well received.

The live airborne streaming sessions, organised in partnership with SCOTTY, an Austrian developer of BLOS satellite communications solutions, and Diamond Aircraft Industries, replicated real-time ISR (Intelligence, Surveillance and Reconnaissance) missions in which live surveillance imagery, flight tracking and duplex data were transmitted to mission control centres over Thuraya's L-band network. Consisting of a high-gain antenna and an aeronautical satellite modem, Thuraya Aero provides airborne access to secure IPs and VPNs, connecting mission-critical operations on land, sea and air simultaneously.

The technology demonstrations highlighted the reliability and effectiveness of Thuraya Aero for various ISR operations associated with border patrol, maritime and environmental protection, as well as disaster relief missions.

What progress has Yahsat made with regard to developing its inflight connectivity capability?
Mobility is a key pillar of our strategy and we have been in active discussions to engage with leading airlines in the country and across the region. Finding the right partners, developing the best solutions and implementing the optimal business model has taken time, but we have made significant progress in addressing our potential airline partner requirements to deliver their next-generation inflight connectivity solutions.

We have selected key technology partners to complement our network infrastructure and experience in delivering broadband connectivity solutions to meet the needs of our airline customers. We are working closely with the UAE and regional airlines as well as others to understand their demographic needs. We are also monitoring traffic demand patterns across our terrestrial markets served by our YahClick business, to get user insights on applications.

Tell us about your live transmission with Airbus in Germany.
After the successful demos of our capabilities from fixed-wing aircraft in Austria and Abu Dhabi, we wanted to highlight Thuraya Aero's compatibility with rotary-wing airborne platforms. We collaborated again with SCOTTY to conduct live screenings of a demonstrative aerial surveillance mission by an inflight Airbus H-145 helicopter in Germany for Dubai Air Show visitors, utilising Thuraya's L-band network. Airborne data consisting of ISR video, two-way cockpit audio and flight tracking data transmitted by Thuraya's aero mobility solution over L-band network were received by a deployable ground terminal developed by SCOTTY, connected to Yahsat's Ka-band satellite network. It was a perfect example of multi-band satellite network configuration similar to actual scenarios or concept of operations.

Thuraya aero enables demanding applications such as ISR, search and rescue (SAR), passenger and cockpit communications throughout a vast satellite footprint, covering more than 160 countries across the Middle East, Asia, Europe, Africa and Australia.

With operations in Abu Dhabi, Dubai and Sharjah, we are looking to consolidate our presence in the defence aviation market while expanding the scope of our partnerships with various governments in the region.

> "Demand from flyers to remain connected and consume their own content is driving the need for more bandwidth per aircraft"
>
> **Sulaiman Al Ali, Executive VP of Yahsat Government Solutions**

What are the challenges within the aircraft space, and how is Yahsat addressing them?
The challenges for airlines mainly derive from their need to keep up with changing market and customer demands. Inflight connectivity is a must-have now even for low-cost carriers. Demand from flyers to remain connected and consume their own content is driving the need for more bandwidth per aircraft. Airlines with first- and second-generation equipped connectivity systems need to upgrade technologies to better access and manage bandwidth. Similarly, service providers need to transition to HTS satellites to access greater capacity and achieve higher throughput and speeds.

What specific objectives did you hope to achieve from the Airshow?
This year, we turned the spotlight on Yahsat's capability to deliver high-speed inflight internet to government and commercial clients.

Our integrated, fixed-mobile aero platform targets a diverse range of aeronautical platforms including small, medium and heavy aircraft of fixed and rotary-wing classifications – encompassing UAVs, helicopters, government and civil jets, as well as commercial passenger aircraft. With this show, we have unlocked new business opportunities by forging a closer, stronger relationship with our national, regional and international customer and partners. PRO

SATELLITE INNOVATIONS IN DEFENCE & MILITARY

At Global MilSatCom, Koen Willems presented tech solutions that will help defence entities meet their operational objectives. We bring you the highlights

Global MilSatCom, held in London last month, provided a forum for the satellite industry and government and military users to come together to understand how space and the commercial satellite sector can help the military meet its operational objectives. Today, varying operational requirements call for satcom platforms that offer multi-service capabilities with the very highest reliability, efficiency, flexibility and security, and can accommodate applications across land, sea and air.

Increased Focus on Security

In mission-critical operations, security and resiliency are essential – but not all security threats are created equal, and defence organisations should have the flexibility to choose a platform that meets any operational requirement and combines the latest efficiencies with an extra security layer.

Anytime, Anywhere Connectivity

Market reports predict a big increase in OTM and OTP applications over satellite. Replacing traditional narrowband and legacy VSAT solutions, disruptive VSAT technologies are filling the gap, overcoming various challenges historically associated with OTM satellite communications while maximising efficiency, service availability and end-user experience.

Size, Weight and Power (SWaP)

To support the flexibility and mobility of these operations, SWaP requirements are becoming increasingly important; satellite terminals need to be transported and carried to conflict areas. This challenge is being addressed through SWaP-optimised modem boards and highly efficient return waveforms. Supporting small terminals that still deliver high throughput within a reduced amount of bandwidth is a great asset for government and defence network operators that seek to achieve an optimised total cost of ownership.

Next-Generation Waveforms

The design and development of a next-generation waveform is underway, involving a consortium of European companies. The European Protected Waveform (EPW) is being developed under the 2019 European Defence Industrial Development Programme (EDIDP). Built around efficiency, security, affordability and interoperability, the waveform will provide a new standard in satellite communications.

5G

Various consortia are undertaking extensive work and demonstrations, including the European Space Agency's SATis5 initiative, which provides a proof-of-concept test bed to demonstrate the successful integration of satellite ground segment with 5G infrastructure.

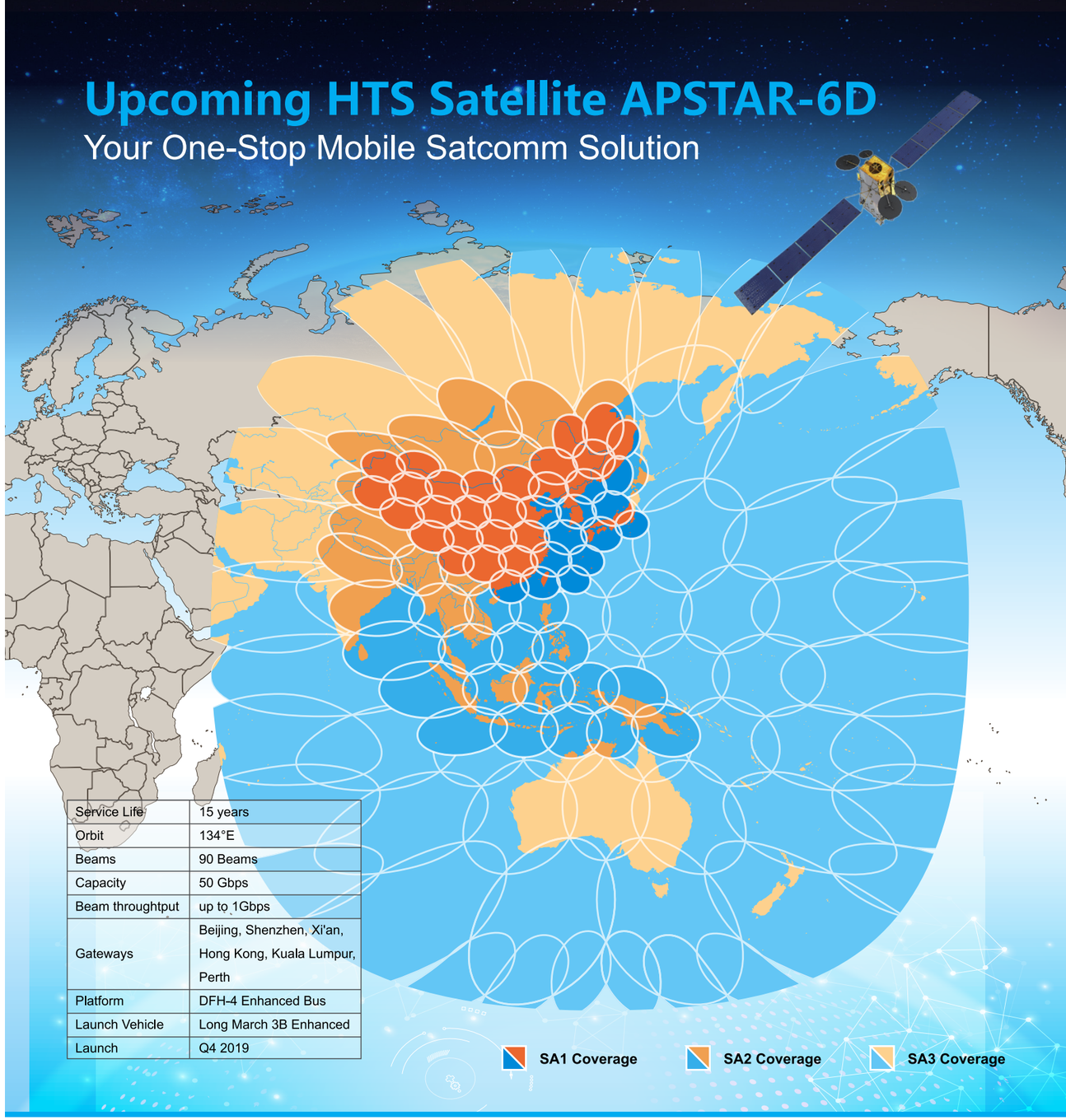
A number of 5G use cases over satellite, such as 'smart nation' and 'smart defence', require close interworking with terrestrial mobile networks. Satellite architecture must leverage network orchestration, virtualisation and slicing functions to offer seamless connectivity service anywhere in the world, as well as a lower-cost, highly flexible and scalable infrastructure.

Multi-Orbit Constellations

LEO, MEO, HEO, HAPS and GEO will cater to the bandwidth-hungry sensors and increased volume of mission-critical communications. These satellites and networks need to address operations on a global scale – and the ground segment technology, the space segment and the services they deliver must go hand in hand to provide seamless and agile communications. This can be achieved through a suite of technologies, such as efficient waveforms, adaptive coding and modulation, beam switching, roaming, beam forming and satellite hand-over technologies.

The satellite sector must work to build multi-orbit strategies and leverage the best of new constellations and very high throughput satellites, together with 5G technologies, to empower the satellite ecosystem to innovate at a rapid pace and enable new applications. PRO

Koen Willems is Head of International Government Satcoms at ST Engineering iDirect



Founded in 1992, APT Satellite currently owns five satellites, namely APSTAR-5C, APSTAR-6, APSTAR-6C, APSTAR-7, and APSTAR-9, covering Asia, Middle East, Europe, Africa, Australia and extensive areas in Pacific Ocean and Indian Ocean, and providing "turn-key"services of transponder leasing, satellite telecommunications, and satellite TV broadcasting services.

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