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Industry Trends, News Analysis, Market Intelligence and Opportunities

The Middle East Satellite Market Trends

by Elisabeth Tweedie

In common with the rest of the world, the market for traditional satellite services in the Middle East and Africa is facing challenges, from terrestrial competitors, new space competitors and shifting consumer taste. Nevertheless, all of the operators interviewed for this article, remain very upbeat about the prospects for their services in this region.

The broadcast market in the Middle East, has always been a challenging one for operators due to the dominance of free-to-air (FTA) TV. Over-the-Top (OTT) is an added and more recent challenge. Last year, Netflix produced its first Arabic original series. According to Price Waterhouse Coopers, while globally, by 2022 OTT will grow to 18% of consumer paid video revenues, in the MENA region, it will account for 24% of consumer paid video revenues. This fact has not escaped the notice of the satellite operators. Eutelsat for example has two products to support the rollout of OTT: SmartBEAM, launched in 2016, which delivers Internet Protocol Television (IPTV) via satellite, utilizing local WiFi networks for content distribution, and CIRRUS, a hybrid satellite-OTT platform, launched last year, offering content distributors the ability to simultaneously distribute content via satellite and OTT. For

The dominance of free-to-air satellite TV is one of the challenges facing the Middle East satellite market.

Traditional video, however retains its importance. Hamad

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EDITORIAL

The Middle East Market

This month we head out to Dubai, UAE for the CABSAT trade show which is the premier industry event for the Middle East and North Africa market. This year's edition of CABSAT will cover many of the key changes affecting the industry worldwide such as the fast-paced development of mobile and streaming technologies and how it is affecting consumer behavior, and more importantly, how it will impact service providers including satellite.

In this issue, our Associate Editor responsible for the EMEA region, Elisabeth Tweedie gives a good overview on the current trends in the Middle East Market in our cover story. We also have a preview of the GVF Satellite Hub Summit at CABSAT by Martin Jarrold which will be covering many of the burning issues in the satellite industry. I have the honor of once again moderating a panel discussion on the first day of the summit which will deal with the "Big Ticket Issue and the Industry Forward Agenda."

We look forward to seeing you in Dubai.

Virgil Labrador

Virgil Labrador
Editor-in-Chief

Satellite Executive BRIEFING
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EDITORIAL

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The Middle East Market

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AlMannai, Executive Director, Commercial, Es'hailsat commenting that the Direct-to-Home (DTH) will remain the most important segment in the near future, and the primary payload for the recently launched Es'hail-2. The main drivers of this video market are increasing demand for niche Arabic content and the conversion from standard definition (SD) to high definition (HD) and to a lesser extent ultra-high definition (UHD).

The operators are somewhat divided when it comes to 5G. Jacob Keret, Sr. VP Sales, Spacecom, stating: "We believe that 5G will take longer than pundits are currently reporting." Nevertheless, he is expecting Amos 17 (due to be launched later this year), which includes a high throughput system (HTS) payload to be able to provide elements for IoT. Masood M. Sharif Mahmood, CEO Yahsat, somewhat concurs, expecting large scale 5G deployments to take a few more years. However, he does see that ultimately, 5G will create new verticals and applications. "With the promise of high bandwidth and low latency, 5G is not only going to open up new verticals and use cases, but continue to support traditional use cases for satellite systems like backhauling with an increasing demand to support the high bandwidth requirements."

Having said that it will be a few years before 5G becomes a significant market, it cannot be denied that many 5G networks are being launched around the world, including several in the Middle East. SES' research leads them to expect that 30% of the region's population will have 5G networks by 2025. Hussein Oteifa, General Manager, Sales, Middle East, SES Networks commented: "Given the diverse geographical landscape of the region, and satellite's unique ability to connect remote areas, there is definitely huge potential to integrate high-performance satellite seamlessly into 5G networks and accelerate the rollout." SES has been, and continues to be, very active in leading various demonstrations to ensure the seamless integration of satellite into 5G. "As 5G starts to gain traction, we predict that the major cities – usually terrestrially well-connected – will be the first to deploy it. Once the trend has caught on, telcos will want to roll it out in across provinces and countries – and this is where high-performance satellite will shine," he added.

"...We believe that satellite will be part of the solution to address some of the challenges facing telcos in 5G and other new services..."

-Hamad AlMannai

Executive Dir., Commercial Es'hailSat

A similar opinion was ex-pressed by Es'hailsat's Hamad AlMannai: "We expect these new technologies to have some impact on our business, however, given the ubiquitous coverage of satellite, we also believe satellite will be part of the solution to address some of the challenges facing telcos in rolling out these services in all areas. We can still address 5G backhaul for services that are not latency dependent. Moving forward we are evaluating partnerships for HTS and low earth orbit (LEO) constellations that will address the latency issue and provide IoT and 5G services via satellite."

Possibly because IoT is essentially an extension to SCADA (Supervisory Control and Data Acquisition), a niche market that has always been open to satellite, the operators we spoke to, are all expecting IoT to be a viable market. Even Eutelsat, a strong video player, is launching a test LEO satellite as it views LEO constellations as highly suitable for IoT applications. SES is expecting its medium earth orbit (MEO) constellations O3b and the next generation mPower to be key in enabling the IoT market. O3b mPower, is a step change in capabilities, being ten times more powerful and more flexible than the current O3b satellites. First launches are scheduled for 2021.

Es'hailsat is evaluating part-

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nerships for HTS and LEO constellations that will address the latency issues inherent with geostationary satellites, thereby providing an entrée into the IoT and latency sensitive 5G applications.

Yahsat, following its acquisition of Thuraya last year, is uniquely positioned to address the IoT market, being able to offer both HTS in Ka-Band and Mobile Satellite Services (MSS) in L-Band. Following the launch of Al Yah 3 last year, Yahsat has extended broadband coverage to 19 additional African markets and Brazil. It's MSS satellites (formerly Thuraya's) cover two-thirds of the world. Masood M. Sharif Mahmood commented: "IoT, is enabling endless applications and uses, such as smart cities and efficient transportation, connecting billions of devices in the near future. This will require low bandwidth and various latencies, presenting us an enormous opportunity to capitalize on applications requiring seamless geographic access such as transportation and maritime."

No article about Africa would be complete without some mention of efforts being implemented to extend the reach of broadband to underserved communities. Towards the end of last year, Arabsat and Forsway joined together to deploy affordable satellite broadband services across Africa. Arabsat are providing capacity on BADR-7 and Forsway the customer premises equipment. Tobias Forsell, CEO, Forsway said: "We are excited to be working with Arabsat…. to create a new way of delivering highly cost-effective broadband services in Africa". Forsway's hybrid router, Odin, can be deployed at a cost of around US$100 per station, thereby enabling Arabsat to offer broadband for around US$5 per month. Thus, helping bridge the digital divide in remote rural communities, as well as providing new, more reliable, and lower-tariff services to urban users.

Eutelsat is also active in efforts to bridge the digital divide and is working with a variety of local partners in Africa to deliver internet services under the name of Konnect Africa. Service was recently launched in the Côte d'Ivoire. The basic package there, offers 5GB of data for a cost of 9,000 CFA (approx. US$ 16).

Meanwhile Yahsat and Hughes have entered into a joint venture to provide commercial Ka-Band broadband services across Africa, the Middle East and southwest Asia. Hughes will provide the Jupiter system and also the operating and business support system (OSS/BSS). Satellite connectivity will come from

The launch of Al Yah 3, the third in the Yahsat's fleet, in January 2018, extends the fleet's coverage in Africa and Latin America.

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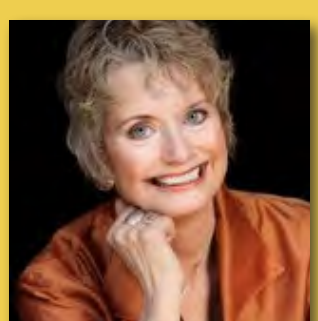
Eutelsat Communications and Yahsat signed a multi-year capacity agreement to provide broadband service for Africa using Yahsat 1B and Al Yah 3 satellites. Below, Yahsat launched its high-speed satellite broadband service in Ghana in September 2018.

Al Yah 2 and Al Yah 3. The venture will focus on both community hotspots and direct-to-premise service.

At the end of last year, the Society of Satellite Professionals International (SSPI) presented the Better Satellite World Award to Signatories of the Crisis Connectivity Charter. As we all know, satellites are essential in times of disaster when terrestrial communications are frequently destroyed or disabled. The linear nature of terrestrial communications frequently makes restoration a slow and difficult procedure. Satellite systems are often more resilient and can be restored more quickly. This award recognized the Charter as a key mechanism created between the satellite industry and the wider humanitarian community to make satellite-based communications more readily available to humanitarian and first responders and affected in times of disaster. Signatories to the charter include: Arabsat, Eutelsat, Thuraya, Yahsat and SES. The charter donation agreements provide three months bandwidth free-of-charge for humanitarian purposes.

September 25th this year will be a red-letter day for the UAE, and probably the region as a whole. On that day the first Emirati astronaut will travel to the International Space Station (ISS) for an eight day mission. He will travel there aboard a Soyuz-MS 15 spacecraft and return on a Soyuz-MS 12. Two Emiratis were selected for the UAE astronaut program, the second astronaut will continue training for future missions. The two astronauts are Hazzaa Al Mansoori and Sultan Al Neyadi, at the time of writing, it has not been disclosed which one will make the first journey.



Elisabeth Tweedie has over 20 years experience at the cutting edge of new commmunications entertainment technologies. She is the founder and President of Definitive Direction (www.definitivedirection.com), a consultancy that focuses on researching and evaluating the long-term potential for new ventures, initiating their development, and identifying and developing appropriate alliances. During her 10 years at Hughes Electronics, she worked on every acquisition and new business that the company considered during her time there. She can be reached at etweedie@definitivedirection.com

FEATURE

The Next Wave:
Low Earth Orbit Constellations

by Bernardo Schneiderman

Since 2016, the FCC had approved satellite constellations for new Non-geostationary Orbit (NGSO) Systems and the latest ones given green light were Spacex, Telesat, Keppler, and Leosat in November 2018 authorizing nearly 8,000 small telecom satellites to serve U.S. entities from Low Earth Orbit allowing global coverage.

The FCC approval for SpaceX (USA) and Telesat (Canada) to expand their constellations allow more satellites in the V-band spectrum. Kepler Communications (Canada) received approvals for 140 Ku-band satellites and LeoSat (Netherlands) for 78 Ka-band satellites. Among the four approvals, SpaceX got the largest with 7,518 satellites in a Very Low Earth Orbit or VLEO constellation that will operate below 350 kilometers.

OneWeb and a least 11 other entities are in various stages of consideration at the FCC for their operation. An FCC approval triggers a regulatory deadline whereby the companies must place at least half their constellations in orbit within six years, and the full systems in nine. At the end of nine years, the FCC freezes approval at the number of satellites in use.

Here's a quick status of some of the main satellite proposals that applied at FCC. However, this report is not exhaustive, as other ventures contemplate satellite constellations for a variety of applications starting from IOT to broadband for end users and enterprises are evaluating other solutions.

OneWeb. OneWeb has shifted the debut launch of its satellite mega constellation for 2019. OneWeb is building the first 900 satellites of its constellation through a joint venture with Airbus called OneWeb Satellites. Backed by SoftBank, Intelsat, Coca-Cola, and other investors, OneWeb is creating a constellation of small telecom satellites with the goal of making the internet accessible to everyone on Earth by 2027.

In March 2018, OneWeb asked FCC to expand its authorization from 720 to 1,980 Ku-band satellites. The company still expects to begin service in 2019, starting with the first few hundred spacecraft. "As long as we begin our production launches this year, we are still on schedule," remarked Greg Wyler, OneWeb CEO, in a recent press conference.

Since OneWeb's first launch will only have 10 satellites onboard, the rocket will travel

straight to their 1,200-kilometer Low Earth Orbit instead of the 500-kilometer drop off planned for subsequent flights, Wyler said. The near-direct insert cuts a few months of orbit raising time that would have relied on each satellite's internal propulsion.

Wyler estimated that there might be a two-month gap between the first launch and the rest of the launch campaign, which consists of a Soyuz launch every 21 days. After the first launch, each Soyuz will carry 36 satellites, with some occasionally carrying 34, he explained.

OneWeb also has a contract with Virgin Orbit for 39 Launcher One missions and a memorandum of understanding with Blue Origin for five New Glenn launches to supplement its primary Arianespace campaign. Neither of those vehicles are launching yet, however.

Wyler added OneWeb's first generation satellites have "actually beat our plans" on mass, weighing in at around 145 kilograms each, instead of the projected 150 kilograms. "We are at about 14.5 kilograms per Gbps. Each satellite is about the same performance as the satellites I designed for O3b, yet we are putting nine times as many on a rocket," he beamed.

SpaceX. SpaceX launched two prototype satellites last February and plans to use Ku- and Ka-band to begin evaluating how its service would fare and what the company would need to do to scale its operations. SpaceX is building its satellites in-house. So far, it has received FCC approval for more than 11,000 satellites in total.

OneWeb, backed partly by Richard Branson, plans to launch a constellation of 720 low-Earth orbit satellites using non-geostationary satellite orbit (NGSO) technology in order to provide global, high-speed broadband.

Elon Musk, CEO of SpaceX, is raising $500 million to fund a satellite-based internet service. SpaceX is looking to launch a massive network of satellites into orbit to provide internet service for devices on the ground, which would offer companies and consumers an alternative to cellular. And while SpaceX hasn't divulged which industries it would target with this service, it could potentially fill a need in the IoT that would provide the company with a sizable revenue stream.

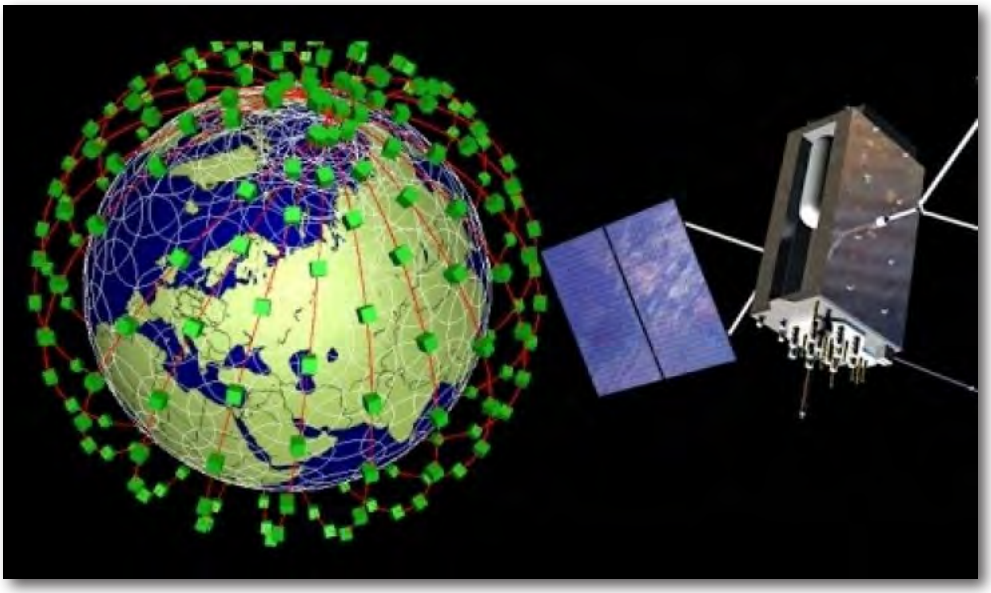
SpaceX is looking to get its Starlink internet service off the ground with the new-found capital. The company's planned satellite-based communication network would require a web of thousands of satellites to be able to blanket the planet in wireless coverage.

SpaceX is among those targeting the unconnected, with plans to bring high-speed, reliable and affordable broadband internet service to consumers in the U.S. and the world, including areas underserved or currently unserved by existing networks. The SpaceX system will initially consist of satellites using Ka- and Ku-Band spectrum to provide a wide range of broadband and communications services for residential, commercial, institutional, governmental, and professional users worldwide. SpaceX has separately filed for authority to operate in the V-Band, where it has proposed an additional constellation of 7,500 satellites operating even closer to Earth.

For the consumer, SpaceX says its end-user terminals, which will amount to a relatively small flat panel the size of a laptop, will use phased array technologies to allow for highly directive, steered antenna beams that track the system's LEO satellites. In space, satellites will communicate with each other using optical intersatellite links, which the company says will effectively create a mesh network flying overhead that will enable seamless network management and continuity of service.

The Starlink satellite-based internet service could be a huge boon for the IoT if SpaceX chooses to include low-power services in its network. A number of companies have announced plans to test and potentially deploy commercial satellite networks geared specifically toward IoT use cases, including Iridium, Astrocast, and Ligado. These companies are looking to the spacefaring networks to serve IoT devices because they are a viable alter-

native to cellular-based communications and typically operate on different wavelengths, due to the distances that signals have to travel. The Federal Communications Commission last year gave SpaceX permission to deploy 11,943 low-Earth orbit satellites for the planned Starlink system. A new application from SpaceX Services, a sister company, asks the FCC for "a blanket license authorizing operation of up to 1,000,000 Earth stations that end-user customers will utilize to communicate with SpaceX's NGSO [non-geostationary orbit] constellation."



In 2017, SpaceX submitted regulatory filings to launch a total of nearly 12,000 satellites to orbit by the mid-2020s. The internet communication satellites are expected to be in the smallsat-class of 100-to-500 kg (220-to-1,100 lb)-mass, which are intended to be orbiting at an altitude of approximately 1,100 kilometers (680 mi).

The Boeing Co. filed a proposal two years ago to FCC but in June 2018, an executive of Boeing admitted that the project is not moving forward at this time.

Boeing original project proposes to operate up to 2,956 satellites in LEO to provide internet access to government and commercial customers in the United States and globally. Boeing planned to deploy the first portion of the system -- 1,396 satellites -- operating at an altitude of 1,200 km within six years following license grant, and to subsequently increase the constellation to a total of 2,956 satellites. Boeing mentioned that the kind of V-band NGSO system that it proposes could go a long way toward meeting the Commission's desire to foster greater availability of affordable broadband, especially in rural or remote areas, where terrestrial providers cannot or won't build out.

O3b-SES. O3b already provides services to cruise ships and governments around the world, but it said that it wants market access to the V-band for up to 24 additional satellites that would operate in a circular equatorial orbit as a constellation called O3bN.

Earlier this year, O3b CEO Steve Collar told the media that he's optimistic that the solution that the company has for its follow-on architecture will be extremely competitive with anything else that is either in the market now or planned for the future. But for O3b, it's not about launching hundreds of satellites; it's more about developing the capability and efficiency of each satellite, he declared.

Kepler Communications. Canada-based Kepler is planning enabling intelligent shipping, smart agriculture, connected transportation, and remote telematics by deploying a satellite M2M backhaul service. At the core of each satellite is a novel Software Defined Radio, electronically steerable antenna array, and networking protocol that has the potential to become the standard for satellite communications with dynamic links and variable channel sizes.

The Kepler system will consist of up to 140 satellites, inclusive of in-orbit spares, with the capability to increase the number of satellites in operation to meet user demand. Kepler pledges that each spacecraft's cost will be low enough that they can be upgraded every three years with the latest advances in communication technology.

Kepler has launched two satellites that are already serving early customers with pilot trials for Global Data Service, a wideband store-and-forward service that allows moving bulk quantities of data over LEO constellation. This is the only wideband connectivity service available in remote and

polar regions delivering up to 400 GBs a month worth of data to customers around the world.

Kepler plans to launch the next satellite on the second half of 2019, which will be tasked with a different mission: to trial IoT connectivity solution (everywhere IoT) to early customers.

In 2020, Kepler will be launching GEN 1 constellation of up to 15 satellites. This GEN 1 will deliver Global Data Service to customers globally, and will incorporate the learnings from Sat 1 and 2, delivering wideband satellite connectivity.

GEN 2, of up to 50 satellites, is planned for 2021/22 and will be capable of both wideband and narrowband connectivity, delivering Global Data Service and everywhere IOT offerings globally.

During 2022/23, Kepler expect the full constellation to be deployed, adding to the total of 140 satellites that will provide global real-time coverage and real-time access to other satellites via data relay system with the use of ISL.

Canadian startup Kepler Communications plans to launch the next satellite on the second half of 2019, which will be tasked with a different mission: to trial IoT connectivity solution (everywhere IoT) to early customers.

TELESAT. Canada-based Telesat currently provides satellite-delivered communications solutions worldwide to broadcast, telecom, corporate and government customers. The company's fleet consists of 15 satellites, plus the Canadian payload on ViaSat-1 with two new satellites under construction.

Telesat is developing a state-of-the-art LEO constellation that will leverage the company's global spectrum rights in Ka band and proprietary LEO architecture to transform global communications. It will offer an unsurpassed combination of capacity, speed, security, resiliency, and low cost with latency that is equal to, or better than, the most advanced terrestrial networks. Able to serve the entire globe, Telesat LEO will become a core component in satisfying many of the world's most challenging communications requirements. It will accelerate 5G expansion, bridge the digital divide with fiber-like high speed services into rural and remote communities, and set new levels of performance for commercial and government connectivity on land and in key maritime and aeronautical broadband markets, which are among the fastest growing in today's satcom industry.

The proposed Telesat system, as listed by FCC, consists of a constellation of 117 satellites in 11 orbital planes. In 6 of the 11 planes (12 satellites per plane), which are inclined 99.5 degrees, satellites will be in a circular orbit at an approximate altitude of 1,000 kilometers. In the other 5 planes (9 satellites per plane), which are inclined 37.4 degrees, satellites will be in a circular orbit at an approximate altitude of 1,248 kilometers. Operation of the satellites is authorized by Canada and will be conducted in the 37.5-40.0 GHz (space-to-Earth), 40.0-42.0 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space), and 50.4-51.4 GHz (Earth-to-space) frequency bands. This is according to the company's FCC 18-163 filings on Nov 19, 2018.

Telesat's LEO Constellation Will Use 292 Satellites in a Proprietary Design of Polar and Inclined Orbits

ViaSat. ViaSat already offers broadband services, including to rural America, but it wants to augment its network with a constellation of 24 satellites at an altitude of 8,200 kilometers, according to the FCC.

ViaSat is still working on a Medium Earth Orbit satellite constellation idea revealed almost two years ago, but has not finalized what that system would look like. This is according to Mark Dankberg, CEO of Viasat, during a press conference in August 2018.

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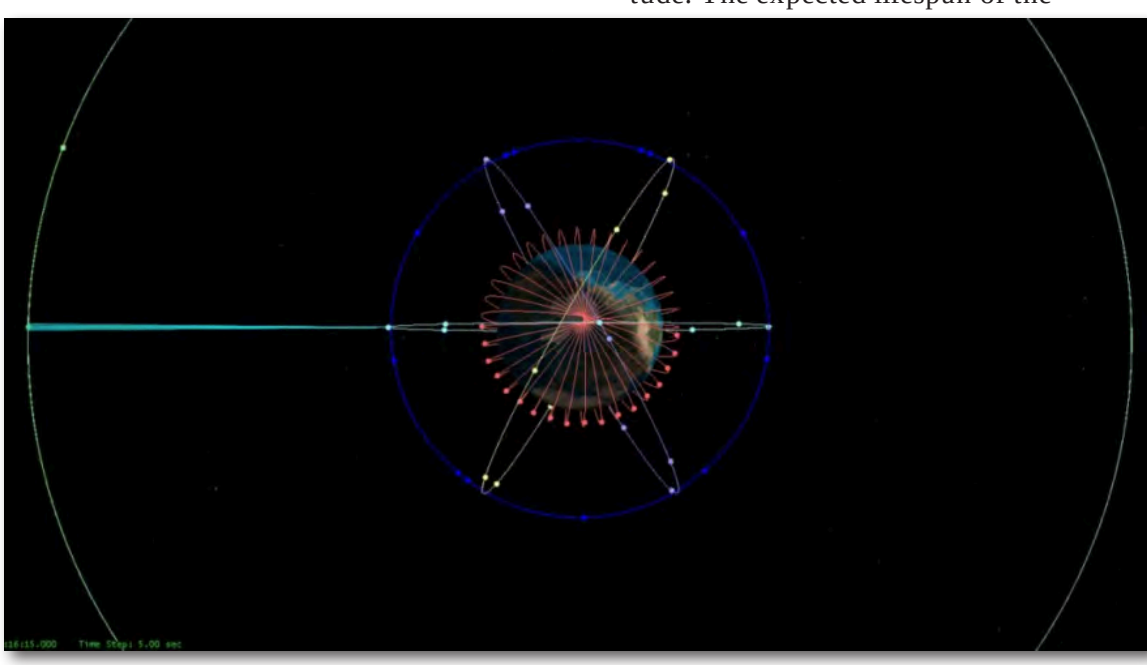
ViaSat is "putting a bunch of work" into optimizing a 24-satellite system disclosed in a 2016 application to FCC that would provide connectivity using Ka-band and the lesser used V-band spectrum.

The company's main focus has been spinning up telecommunications services on ViaSat-2, which launched last spring, and building a trio of large geostationary satellites to cover the globe, with each sporting a terabit or more of total capacity. A Viasat medium-Earth-orbit system, being closer to the Earth, would augment services from Viasat's geostationary fleet.

A hybrid system of GEO and MEO — something SES of Luxembourg is the only operator doing today — would provide "interesting opportunities to reinforce coverage in high-demand places and to get polar service," Dankberg said. "We think it's probably going to be a little more expensive on a per unit basis than what can be done with really good GEOs, but still could be a worthwhile addition to our fleet, and that's the direction we are going," he added.

Dankberg gave no timeline for fielding the MEO system. The FCC has yet to approve Viasat's application, which would trigger regulatory deadlines to bring at least half the system into service in six years, and the full constellation in nine.

Viasat is talking about the ability to offer 25, 50 or even 100 Mbps speeds to homes, rivaling terrestrial broadband offerings, while simultaneously serving thousands of passengers on cruise ships and in airplanes. If and when the system becomes operational, it will be able to move capacity to where the demand is, for example, where cruise ships need it. It would allow people flying from Los Angeles to Istanbul, for example, to stream movies and video at 35,000 feet over the Atlantic Ocean, regardless of how many people and devices are connected.



Digital rendering of Viasat's proposed MEO constellation communicating with ViaSat-2. (Viasat photo)

Space Norway. Norway-based Space Norway wants to be able to operate at least two satellites in what would be part of its Arctic Satellite Broadband Mission (ASBM) to access the U.S. market. As it implies, the company's main focus is to deliver high-speed broadband internet connectivity to end users in the Arctic region, which includes Alaska.

The company said its ASBM will be capable of providing broadband internet access to users in the Arctic region who have poor or no connection to GEO satellite systems or terrestrial networks.

Space Norway AS has been working to establish satellite-based broadband communications capacity in the High North since 2015. Space Norway's project is based on a system of two satellites providing coverage 24 hours a day in the area north of 65 degrees N latitude. The expected lifespan of the satellites is 15 years. If all goes according to plan, the satellites will be launched in 2022.

FCC released in November 2017 a grant to the Space Norway Petition to pursue its goal of providing broadband Internet access to currently unserved and underserved communities in the

Arctic region of the United States.

LeoSat. LeoSat initially planned to launch two prototype satellites in 2019, but having completed a meaningful amount of tech-validation on the ground with Thales Alenia Space and investor Sky Perfect JSAT of Japan, came to the conclusion it wasn't necessary, allowing for significant savings.

Mark Rigolle, CEO of LeoSat Enterprises, explains that LeoSat is attempting to build the world's first business backbone in space. As a dynamic young company, LeoSat believes that fast, reliable, and ubiquitous data connectivity will fuel growth for businesses worldwide. The company's solution is to take data networking into space, and in doing so, will set a new bar for ultra-secure, high-speed connectivity.

In 2018, LeoSat achieved a number of significant milestones, including -- securing investment from Hispasat, the Spanish national satellite operator, gaining approval from the FCC to operate the constellation in the U.S., and getting commitments from customers and resellers totaling over US$1 billion.

Hispasat, the Spanish national satellite operator, last year entered into an agreement to invest in LeoSat. Hispasat is one of the only satellite operator to have achieved continuous growth over the past years, thanks to a strong focus on innovation and smart long-term investments. With this investment, Hispasat has found a perfect complement for its geostationary fleet with the ability to expand its scope significantly towards new verticals that will define the data market over the coming years. The investment underlines Hispasat's firm belief in the unique attributes of LeoSat's new LEO network architecture to ensure further growth in the future.

Combining advanced on-board routers with inter-satellite laser links, LeoSat is creating an optical backbone in space, providing fiber-like low-latency and gigabit per second data delivery, which is ultra-secure and extremely resilient, thanks to its gateway independent meshed-network data-con-

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nectivity from transmitter to receiver. This solution will provide valuable new business opportunities in the growing data and mobility markets in sectors such as telecommunications, multinational enterprise, maritime and government services by ensuring previously unavailable levels of network performance combined with worldwide reach.

LeoSat was recently awarded the authority by FCC to provide NGSO services in the U.S. The FCC market access grant allows LeoSat to address currently unmet demand for high-bandwidth, low-latency, high-security data transmissions from large commercial and government customers in the United States.

Earlier in 2018, LeoSat entered into an agreement with Phasor, the developer of enterprise-grade electronically-steered antenna (ESA) systems, to develop a powerful Ka-band, NGSO-ready version of its breakthrough low-profile ESA, scalable to virtually any use-case requirement. This collaboration will provide high-speed, low-latency, ultra-secure, Ka connectivity infrastructure to corporate, government and commercial markets, offering speeds about 1.5 times faster than terrestrial fiber.

Phasor's very low profile, electronically steerable antenna enables the reliable, robust delivery of high-bandwidth services. The antenna is solid-state, with no moving parts, allowing satellite signals to be tracked electronically. The ESA can be flat or conformal in design and can be fitted seamlessly to moving vehicles, enabling a number of applications for maritime and mobility markets.

LeoSat said pre-launch agreements spanning a wide range of fast-growing data and mobility sectors including enterprise, telecoms, government and finance, have now taken the commitments the company has received from customers and resellers over the threshold of US$1 billion.

LeoSat is thus helping open-up new markets and deliver business growth for partner companies such as DCS Telecom, Globecomm, and Signalhorn, who are looking to provide innovative connectivity solutions.

LeoSat will focus on the following markets: Enterprise-to-Enterprise; Energy; Telecoms and Government. The company has high expectations from the enterprise and government markets, the companies that face the real challenges in connecting sites and locations in a high security and low-latency fashion. Filling an immediate need for organizations that have budgeted the money for that makes the proposition an attractive target for LeoSat. Mobility is certainly facing the same issues, but now more in the context of "simply get me connected." The company believes it can be successful by focusing on the right markets where requirements go beyond merely getting connected such as Online Gaming, Low-latency cloud applications, etc.

PointView Tech LLC. A filing with the FCC of a multi-million-dollar experimental satellite from Facebook was confirmed last July 2018. The satellite, named Athena, will deliver data 10 times faster than SpaceX's Starlink Internet satellites.

In early 2019, PointView's Athena will also head out to LEO, on an Arianespace Vega rocket. Athena is about the same size and weight (150 kg) as SpaceX and OneWeb's satellites, but Athena will use high-frequency millimeter-wave radio signals that promise much faster data rates. The company estimates its E-band system will deliver up to 10 gigabits per second. "PointView is aiming to understand whether a system using E-band spectrum can be used for the provision of fixed and mobile broadband access in unserved and underserved areas," it wrote in the FCC application.

PointView specifies three ground stations in its application that will send data to Athena in orbit and receive it in turn. One is a so-called satellite 'teleport' near Ventura, Calif., that is shared by a number of satellite companies. The second is Mount Wilson Observatory in the hills above Los Angeles, another popular location for communications hardware.

There are technical barriers to using E-band radio from orbit, however. High-frequency millimeter waves fade quickly and are easily absorbed by rain or other particles in the air. Part of Athena's two-year mission will be to test just how big of a problem that is. "PointView plans to publish many of its experimental findings, including atmospheric attenuation model validation data," says its application.

PointView expects to get download speeds of around 10 Gbps at its ground stations, with

Coming: Facebook's Athena low-Earth orbit (LEO) broadband satellite.

uplink speeds topping 30 Gbps. But because Athena is in LEO, it will only fly above the three ground stations a couple of times each day, and for less than eight minutes at a time.

The project, dubbed Athena, would eventually launch a fleet of small satellites into low-Earth orbit, somewhere between 100 and 1,250 miles above sea level, and beam Internet access down to rural areas. Athena would join competing projects from SpaceX and OneWeb, both of which are racing to put thousands of their own Internet satellites into orbit first.

The many LEO satellite constellation coming on-board in the next few years has also stimulated the ground equipment market with many companies providing innovative solutions for LEOs. One such company is LP Technologies which released LPT-LEO 1.0, an innovative spectrum monitoring software for LEO satellties. LPT-LEO has been in development for nearly 2 years, during that time the company has worked closely with many leaders in the satellite industry to to find a solution to monitor fast moving LEO satellites, and address the interference challenges the new generation of LEO satellites bring.

LPT-LEO is the only monitoring system to-date designed specifically for the LEO market. Its revolutionary approach to large data monitoring allows LPT-LEO to monitor large constellations of LEO satellites and record tens of thousands of passes per month. LEO touts the ability to automatically schedule spectrum analyzer changes to match LEO passes allowing for continually monitoring coverage and setting hand-offs between terrestrial sites. LPT-LEO is a network wide solution allowing for countless users to connect simultaneously, and the ability to connect every compatible analyzer into the system without any impacts on performance.

With FCC authorizing the majority of the players to implement NGSO satellite constellations in orbit during the next 5-10 years, new technologies and business competition will continue to rise, but the new generation of satellite players in the market will only succeed if their technology and economics will fit perfectly in the ever-changing market.

Bernardo Schniederman is the Principal of Telematics Business Consultants. He can be reached at: info@tbc-telematics.com.


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FEATURE

Mobility for the masses

by Andrew Faiola

Communications are undergoing a complete transition from what we know as the norm, towards a somewhat unknown reality, where anything and everything will eventually be connected. Of course, this is no easy feat for established networks built on fixed, tried and tested infrastructure and as new applications such as the Internet of Things (IoT), continues to advance and connected objects become commonplace, universal high-capacity, high-speed connectivity will become a necessity, anywhere and everywhere. Consequently, the role of satellite will play a growing role, delivering seamless, high-bandwidth broadband services to once unimaginable locations, including out at sea and in the sky.

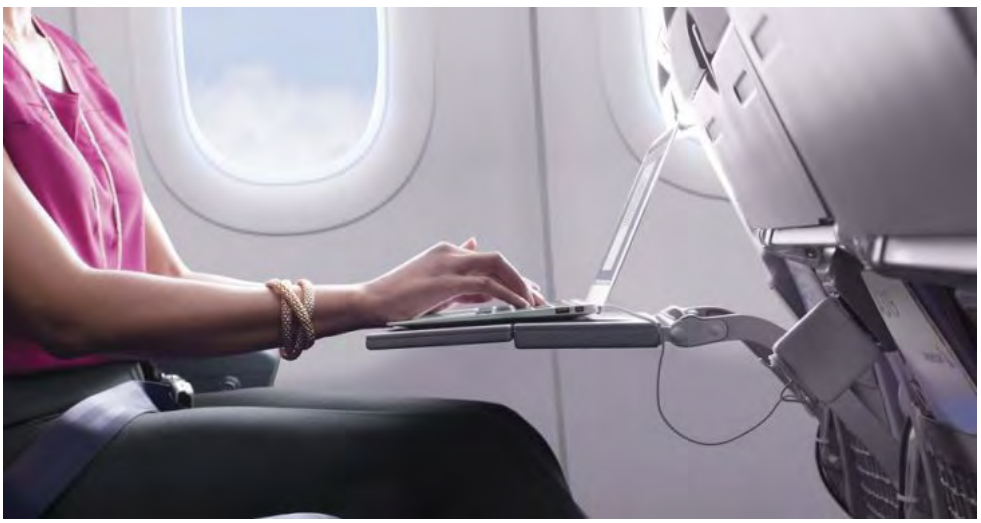
Digital Transformation

When it comes to the ways in which consumers demand data, their usage is now not only confined to a physical location. The huge draw to Over-the-top Services (OTT), has led to people demanding data for streaming, whenever and wherever they are. For example, more people in India than ever are consuming content on their phones as their primary means of viewing. This is just one example of how expectations for 'always on' connectivity has increased in recent years. This shift in expectations has also taken the hunger for services to new realms in the form of the rise in demand for Communications on the Move (COTM) services. As whole populations shift consumption habits, a strategic infrastructure of the right kind of connection and the most suitable equipment to carry the service is now required.

Satellite Evolution

In the past, VSAT networks were small and they were used solely to provide broadband connectivity to predominantly rural areas that were beyond the reach of traditional infrastructures. This has now changed and there has been a sizable shift in where satellite can deliver, due to the strategic and increased use of teleports to open up new services in new locations around the world.

Today's satellites are not only able to deliver connectivity but in fact revolutionise what was once possible, bringing significant new capabilities at the same time. One of the factors that has made this all possible is the different types of equipment now being deployed are of immense capabilities. From the smaller satellite footprints of the past, made of a limited number of beams and terminals, to the networks of today, where a much larger area is covered, using thousands of terminals with hundreds of beams. This, combined with the powers of High Throughput Satellite (HTS), creates a winning combination able to transform and shape those communications, positioning satellite as the key player in the field of COTM.



Passengers can get the best possible communications via satellite whether on land, out at sea or in the air.

When it comes to COTM, satellite communications are ideally positioned to achieve the best possible results for users – whether on land, out at sea or in the air. This is as true for an individual passenger on a cruise as it is for a military aeroplane seeking the best position to land in a warzone, using on-board communications as part of its navigation system. For the latter, it is not only a robust connection that is needed, but a completely secure, reliable one that can be relied upon at any critical moment, regardless of the path of the aircraft. For offshore and maritime markets, increased demand for higher data throughputs that can support bandwidth intensive services in those remote locations is rising at an unprecedented rate. The kinds of services that are now required include video conferencing, and media streaming – another example of the rapid spread of desire for OTT services, even out at sea.

In terms of COTM, land communications in these areas are crucial and satellite technologies are being deployed to this more and more, connecting vehicles reliably as they pass through any terrain either through a direct connection or by enabling cost-effective extension of the terrestrial network to remote areas that could not be connected otherwise.

Airborne Efficiencies

COTM spans several formats, on land, over sea and in the air, with applications including In-Flight Connectivity (IFC), connected vehicles and government operations in areas ranging from humanitarian aid missions to the powering of on-board IoT applications in rescue operations. Each application requires a unique and variable set of characteristics, such as the amount of bandwidth required, security, and selecting the right ground technology.

IFC, for example, is a huge area of interest and an area that will continue to grow substantially in the near future. For IFC to be successfully delivered, there are certain aspects that need to be carefully considered and specific requirements that need to be finely tuned. Panasonic Avionics is pioneering the journey towards seamless IFC in response to the increasing demand we are seeing. It has carried out a major upgrade of its satellite network to increase the data rates available to airplanes by at least 20 times. The new network also leverages the latest transmission standard DVB-S2X, unleashing the full power of HTS.

At the core of the upgrade is a new satellite modem which we developed in conjunction with Panasonic Avionics as part of the Newtec Dialog® VSAT platform. This modem dramatically improves data rates to unlock services such as faster Internet, Voice-over-IP (VoIP) applications, improved TV picture quality and a broader channel choice, 3G phone services, and additional bandwidth for crew applications. It is also extremely scalable and will continue to meet the evolving needs of airlines and their passengers for many years to come.

As well as fully supporting wideband DVB-S2X, the modem is also equipped with Newtec's latest Mx-DMA® return technology. This combines the efficiency of SCPC with the dynamic bandwidth allocation capabilities of TDMA to deliver up to 300 percent more data than legacy TDMA systems.

To reduce the interruption that occurs during satellite transitions, the modem also supports advanced beam switching capabilities, enabled by dual onboard receivers. This allows two separate satellite beams to be tracked, reducing beam switch times. A third receiver enables simultaneous reception of our live TV content and recently-launched "Zero-Touch" service, which aims to disrupt long media update cycles and simplify data transfer of passen-

Left, Newtec Dialog single-service and multiservice VSAT platform that allows operators and service providers to build and adapt their infrastructure and satellite networking according to business or missions at hand. Top, The Newtec MDM2210 IP Satellite Modem, a two-way, high throughput modem that is combined with a range of different antenna sizes and interactive LNBs (iLNBs) to create a cost-effective satellite terminal on the Newtec Dialog® platform.

ger-facing content.

Moving with the Times

These advancements in the air are matched by technology evolution at sea. As the maritime industry sees rising connectivity demands, solutions with very high data rates, both forward and return, and increased efficiency are vital. Milano Teleport, for example, saw this rise in demand first-hand. It opted for the Newtec Dialog multi-service platform, combined with two modems, to meet this demand and unlock the power of HTS. The solution included sophisticated mobility functionality including unique flexibility to manage beam switching in a global network, minimizing service downtime.

Companies such as Panasonic and Milano Teleport not only show the potential satellite has to deliver on the goal of ubiquitous connectivity but also how it is already fulfilling this requirement, satisfying rising customer demands in places where connectivity was not previously given a second thought.

As COTM advances further and demands increase, new possibilities for not only consumers to tap into new services will emerge, but also lucrative ways for operators to monetise services will be revealed. Although some markets are only scratching the surface of what's possible, it is only a matter of time before these new horizons become the norm and there really will be no boundaries to be crossed in terms of keeping people, and things connected on the move, however they travel.

Andrew Faiola is currently Head of Mobility at Newtec, where he is responsible for the company's strategy for aviation, maritime, and land mobile. Previously, Andrew spent 15 years at Intelsat, the world's leading satellite company, in a number of different direct account management and leadership positions, most recently leading the Mobility Solutions sales team for Europe, Middle East, and Asia. He also held various sales and marketing roles at NewSkies Satellites, and at an independent teleport in the USA called ESATEL Communications. Earlier in his career he performed research and project development work at the Center for Strategic & International Studies (CSIS), the Embassy of Mexico in Washington, DC, and at NASA, which involved the provision of Internet service and remote sensing for environmental purposes. He can be reached at: afai@newtec.eu

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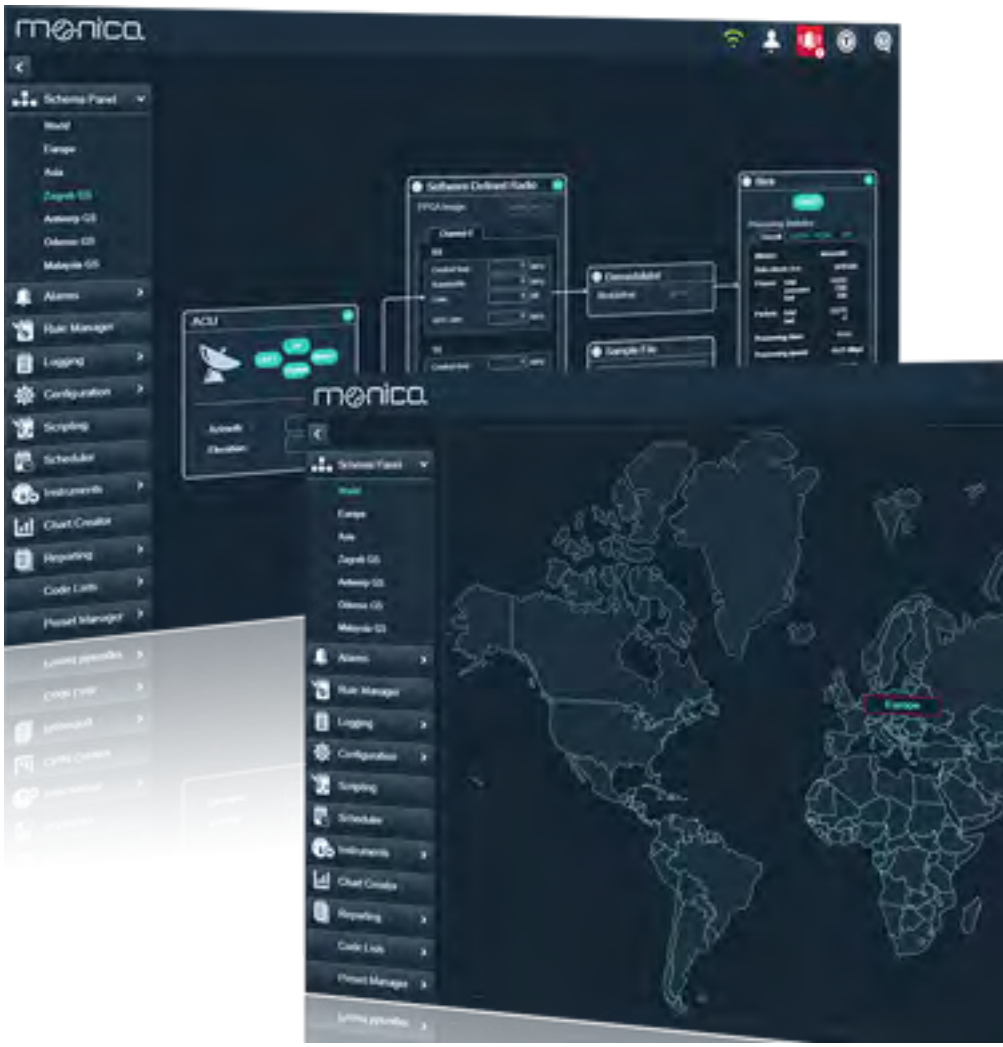
FEATURED COMPANY

Amphinicy Technologies: Innovative Satellite Software Solutions

by Virgil Labrador, Editor-in-Chief

Amphinicy Technologies based in Zagreb, Croatia is a provider of complex software solutions and all-round software support for the satellite and space industry.

After 20 years in the business Amphinicy has delivered over 100 projects to international space and humanitarian agencies, leading satellite operators and global satellite service providers, teleports and space mission operation centers, and satellite equipment manufacturers.



The innovative solutions provided by the company are based on their key product lines including:

- MONICA – a state-of-the-art ground segment monitor and control solution, built primarily for the satellite industry. It is robust, secure and reliable, demonstrates high performances and can scale from a single ground station to a network of hundreds of thousands VSATs
- Blink – a fully software based, ultra-fast satellite telemetry acquisition system for Earth observation
- SatScout – a powerful mobile application framework for commissioning and certification of VSAT terminals and antennas.

"In the last few years, we have put extreme focus on bringing these three products to a market-ready state. This year, we will present products at our booth at CABSAT in Dubai, with focus on MONICA, our new generation ground station monitor and control framework now supporting huge scalability up to 100.000+ VSAT terminals," said Frane Milos, Chief Executive Officer of

Amphinicy.

According to Amphinicy, MONICA exposes human and machine interfaces, with typical Monitoring & Control (M&C) features: a synoptic system status overview, alarming, logging, charting, reporting, powerful automation and scheduling capabilities, as is expected from an advanced M&C solution.

"However, its true power lies in our completely new architecture based on state-of-the-art technologies. MONICA demonstrates out-of-the-box scalability and speed of evolution. For example, the new SatCom networks like Yahsat, O3b and OneWeb, are expected to have hundreds of thousands of VSAT terminals. At the moment, there is no solution on the market that can support KPI monitoring of such networks! MONICA can, and it can do it in real-time, and we can prove it!" added Milos.

"MONICA is built with best of open-source frameworks, it benefits from the open-source community and evolves much faster than its traditional counterparts that struggle with reliance on obsolete and proprietary technologies. By using a community tested framework, we are able to provide a real-time monitoring of fascinating 2millions KPIs/sec, with layers of multitenancy, security and georedundancy on top of it," he added.

With configurability and connectivity embedded in every component, it can be used to build complex, tailored systems or used as an out-of-the-box solution, for a fraction of a price of competitors' solutions.

"...As the number of terminals continue to grow all over the world. Customers are demanding high performance, unlimited scalability and data redundancy..."

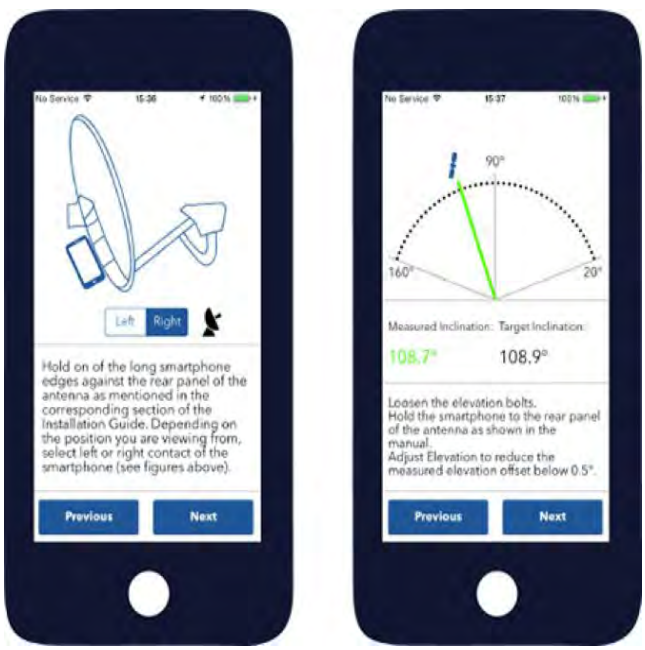
As the number of terminals continue to grow all over the world. Customers are demanding high performance, unlimited scalability and data redundancy.

According to Milos, MONICA could meet all of these means. Its key features include:

Power - its architecture built around the most powerful high throughput message bus existing today, as well as distributed services gives an unseen flow rate in monitor and control world. Millions of events per second can be handled by Monica's services. The key benefits of this product include:

Scalabilty-Monica can be one, two, or five and more interconnected and orchestrated services, fulfilling your needs. If you need more power, simply add another server. No matter how big or small your service is, Monica will adapt.

Reliabilty - Monica is resilient to failures. Every minute, every second, all the time, a message will end up in the storage, no matter what. The high-availability is in the core of our system's architecture. Just rely on it!



SatScout is a handy mobile application which helps end users or professional installers in commissioning satellite VSAT terminals, choosing appropriate antenna site, installing the antenna and lining up the terminal.

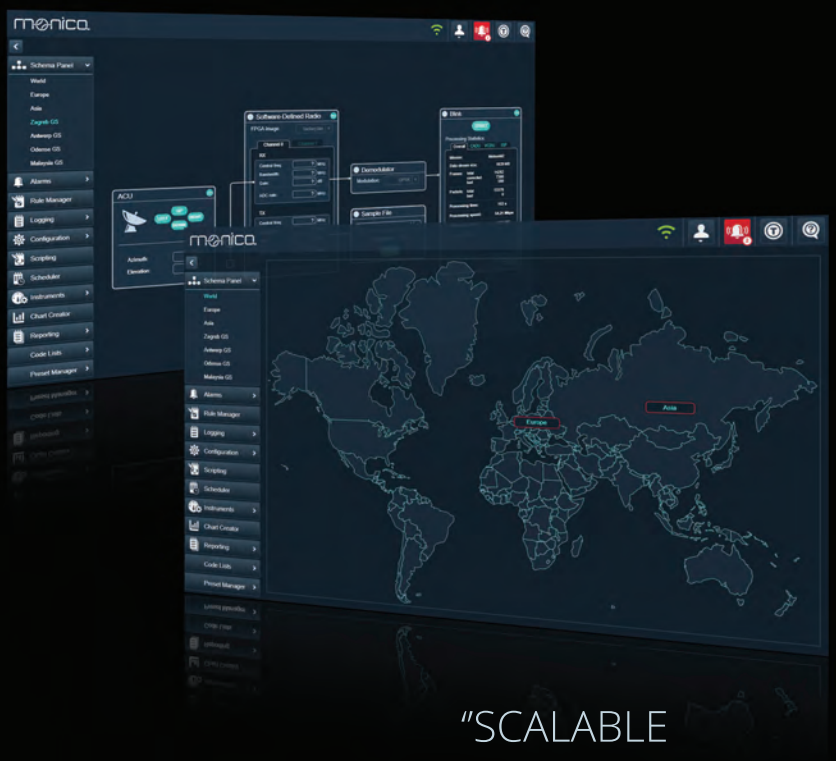
Security - Monica secures your data. Multitenancy up to the lowest level of data source allows fine tuning access per user, per organization or a group.

Amphinicy Technologies will be exhibiting at CABSAT 2019 in Dubai UAE from March 12-14. Visit their booth at Hall 7 #G7-33 to view a demo of their innovative products.

monica

Monitor and Control Solution

Next generation **monitor and control** software for the **satellite** industry with unique and **innovative architecture**.



"POWERFUL

Monica's architecture built around high throughput message bus and distributed services supports an unprecedented flow rate in monitor and control world. Millions of events per second can be handled by Monica's services.

"SCALABLE

Monica can be one, two, or five and more interconnected and orchestrated services, fulfilling your needs. No matter how big or small your service is, Monica will adapt.

"RELIABLE

Monica is resilient to failures. Every minute, every second, all the time, a message will end up in the storage, no matter what. Just rely on it!

"SECURE

Monica secures your data. Multitenancy support down to the lowest level of data source allows fine tuning access per user, per organisation or a group.

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monica.amphinicy.com

PRODUCTS & SERVICES MARKETPLACE

A guide to key products and services to be showcased at CABSAT 2019 in Dubai, UAE from March 12-14, 2019.

Amphinicy Technologies
Hall 7 #G7-33
www.amphinicy.com

Amphinicy Technologies is a provider of complex software solutions and all-round software support for the satellite and space industry. After 20 years in the business Amphinicy has delivered over 100 projects to international space and humanitarian agencies, leading satellite operators and global satellite service providers, teleports and space mission operation centers, and satellite equipment manufacturers. Our solutions are based around our products:

- MONICA – a state-of-the-art ground segment monitor and control solution, built primarily for the satellite industry. It is robust, secure and reliable, demonstrates high performances and can scale from a single ground station to a network of hundreds of thousands VSATs
- Blink – a fully software based, ultra-fast satellite telemetry acquisition system for Earth observation
- SatScout – a powerful mobile application framework for commissioning and certification of VSAT terminals and antennas

Amphinicy operates from offices in Zagreb, Croatia and Luxembourg.

ARABSAT
Hall 7 #B7-10
www.arabsat.com

Founded in 1976 by the 21 member-states of the Arab League, **Arabsat** has been serving the growing needs of the Arab world for over 40 years, operating from its headquarters in Riyadh-KSA and two Satellite control stations in Riyadh and Tunis. Now one of the world's top satellite operators and by far the leading satellite services provider in the Arab world, it carries over 500 TV channels, 200 radio stations, pay-tv networks and wide variety of HD channels reaching tens of millions of homes in more than 80 countries across the Middle East, Africa and Europe—including an audience of over 170 million viewers in the Middle East and North Africa (MENA) region alone tuned into Arabsat's video "hotspot" at 26°E.

AVCOM of VA
Hall 7 #709
www.avocmofva.com

AVCOM of Virginia is a vertically integrated technology company with 30 years of experience in the design and manufacture of commercial high quality, spectrum analyzers and signal monitoring products, in the USA. At CABSAT come seelive demonstrations of our products featuring the EVO Series 6-GHz spectrum analyzer.

C-COM Satellite Systems Inc.
Hall 7 # 711 (Canada Pavillion)
www.c-comsat.com

C-COM Satellite Systems Inc. is a pioneer and world leader in the design, development, and manufacture of mobile satellite-based antenna systems for the delivery of Broadband Internet to any location via Satellite. C-COM has developed a proprietary, one-button, auto-acquisition controller technology for rapid antenna pointing to a geostationary satellite with just the press of a button, enabling high-speed Internet connectivity where terrestrial markets are overloaded or simply don't exist. The company has sold approximately 8,000 systems to customers in over 100 countries providing service to a wide range of vertical markets such as Oil & Gas Exploration, Military Communications, Disaster Management, SNG, Emergency Communications, Cellular Backhaul, Telemedicine, Mobile Banking, and others. Come by our booth #711 to see a demo of our 98cm Flyaway antenna, the FLY-981 and the Ka-98JUP Driveaway Antenna system.

COMTECH EF Data
Hall 6 E6-21
www.comtechefdata.com

Comtech EF Data Corp. is a leading supplier of communications

equipment with a focus on satellite bandwidth efficiency and link optimization. Our high-performance satellite communications ground equipment is deployed globally to support mission-critical and demanding applications for government, mobile backhaul, premium enterprise and mobility. Service providers, satellite operators, governments and commercial users wanting to optimize communications, increase throughput and delight customers leverage the performance and flexibility of the Comtech brand. The solutions are facilitating fixed and mobile networks in 160+ countries and across every ocean.

COMTECH Xicom Technologies
Hall 6 E6-21
www.xicomtech.com

Comtech Xicom Technology provides a broad product line of KPAs, TWTAs, SSPAs and BUCs for worldwide satellite uplink covering C-, X-, Ku-, DBS-, Ka-, Q-band, Tri- and Multiband with power levels from 8 to 3,550 watts and available in rack-mount and antenna-mount ODU packages.

Comtech Xicom has led in the design and production of millimeter wave TWTAs. Xicom has been shipping high power Ka-band amplifiers since 1997. We have shipped more than 2000 Ka-band amplifiers to military and commercial customers around the globe. We can offer CW amplifiers for TT&C as well as peak amplifiers for multi-channel communications. We offer both outdoor mounted and indoor products to meet our customers' needs.

Comtech Xicom is the world leader in Q-band HPAs. We have 50, 120, 140 and 200W products. As well as a dual-band Ka/Q band amplifier. We have full mil qualification. V-Band is an emerging frequency of interest due to the vast available bandwidth and the availability of V-band hardware. Comtech Xicom offers a 250W V-Band amplifier for gateway service.

Gazprom Space Systems
Hall 7J7-30
www.gazprom-spacesystems.ru

Gazprom Space Systems (GSS) is a Russian non-governmental satellite operator providing high quality Yamal capacity all over the world. Yamal satellite fleet consists of four satellites positioned between 49E˚ and 183E˚.

Yamal-202 (49°E) has a wide coverage over the Eurasian continent, in particular over Middle East and North Africa. Soon it will be replaced by Yamal-601.

Yamal-402 (55°E) satellite provides Ku-band coverage over Russia, CIS countries, Europe, Middle East and Sub-Saharan Africa.

Yamal-401 (90°E) is dedicated mainly for the Russian market. The satellite is equipped with C- and Ku-band payloads.

Yamal-300K (183°E) has a wide contour fixed Ku-band beam covering the Far East, Pacific Ocean waterways and western coast of North America. The satellite is popular for aeronautic and maritime connectivity.

Thanks to high performance and wide coverage areas, Yamal satellite capacity is perfect for Backhaul, Trunking, Broadband, mobility and SNG services.

Integrasys S.A.
Hall 7 # 708
www.integrasys-space.com

Integrasys is a privately owned company specialized on engineering and manufacturing Satellite Spectrum Monitoring systems and VSAT tools in the telecommunication and broadcasting markets. Integrasys was founded in 1990 by a group of Hewlett-Packard engineers experts on Automated RF & Microwaves Test Systems and Software. Since then Integrasys has evolved towards today's company, offering a wide range of signal monitoring products for different telecom services.

At Integrasys our mission is to provide the industry the best quality and fastest technology available in carrier mon-itoring systems, with the customer service and care that our customer's deserve. We want to add value to our customers in quality of service, technology, speed and cost efficiency, by innovating; therefore satellite industry recogniz-es Integrasys as the leader for innovation in satellite signal carrier monitoring systems and VSAT tools.

Mission Microwave Technologies
Hall 7 #709
www.missionmicrowave.com

Mission Microwave Technologies is developing revolutionary Solid State Power Amplifier BUCs to support ground-based, airborne, and space-based applications. Utilizing the latest in semiconductor technology, we

have optimized the size, weight, and power (SWaP) for these critical applications while delivering the best possible reliability. Mission Microwave currently offers advanced GaN BUC products at X-Band, Ku-Band, and Ka-Band from 12W to 400W, and sets the "new standard" for performance and reliability.

ND SatCom
Hall 5 #C5-10
www.ndsatcom.com

At CABSAT 2019, **ND SatCom** will be highlighting its SKYWAN **5G product which features:**

- One compact device for all applications and network roles
- Smallest hub on the market
- Supports all kinds of topologies

The SKYWAN **5G** satellite router is a reliable, flexible and versatile satellite communication platform for customer centric networks. It is a bi-directional MF-TDMA plus DVB-S2X system that supports voice, video and data applications in the most bandwidth efficient manner combined with unrivalled real-time performance.

SKYWAN 5G unlocks new business opportunities for service providers e.g.in enterprise networks. Total cost of ownership is significantly reduced thanks to the fact that only one type of device is needed for all roles in the network. Each SKYWAN **5G** has the full functionality on board and specific features are unlocked by a license key. One small hardware for all network roles simplifies logistics and unprecedented scalability enables the growth of your network in a very cost efficient manner. This saves costs in terms of logistics, certifications, network configuration and maintenance. Measuring in at only 1 RU the SKYWAN **5G** is the smallest hub device on the market.

SKYWAN **5G** enables star, mesh, multi-star and hybrid topologies. Each unit can act either as a hub or master station, therefore adding agility in terms of its network role. Geographical redundancy of the master station is already built-in and a DVB-S2X outbound can be added easily at every station. Network virtualization allows seamless integration into all IT infrastructures.

The device is so flexible: the customer can change the topology anytime, or cascade units to increase traffic volume per site according to business growth.

Newtec
Hall 7 #E7-20
www.newtec.eu

Newtec is specialized in designing, developing and manufacturing equipment and technologies for satellite communications. As a pioneer in the industry, Newtec is dedicated to creating new possibilities for the broadcast, consumer and enterprise VSAT, government and defense, cellular backhaul and trunking and mobility, offshore and maritime markets.

Our products and technologies can be applied in a wide range of single and multiservice applications from DTH broadcasting, video contribution and distribution and disaster recovery and backbones for cellular backhauling, to small and medium enterprises, SCADA and oil and gas networks, aircrafts and vessels.

RF Design
email: o.vogel@rf-design-online.de to book a meeting
www.rf-design-online.de

RF-Design specializes in developing, manufacturing, and marketing high-quality RF equipment, RF distribution and RF-over-Fiber solutions for the international Satellite-, Broadcasting- and Broadband communications market. Our product portfolio includes a wide-range of Switch Matrix systems, RF-over-Fiber solutions, Splitters/Combiners, Switches/Redundancy Switches, Line Amplifiers, RF/DVB Signal Quality Analyzers and LNB-supply/control systems...perfectly suited for applications in Teleports, Satellite Earth Stations as well as for Broadcast- and Broadband RF distribution infrastructures. We also have strong capabilities to design and to manufacture custom-made products and solutions for your individual needs. All our products are

developed, manufactured, tested, and approved in our own facilities in Lorsch, Germany and characterized by high quality, reliability and superior RF performance.

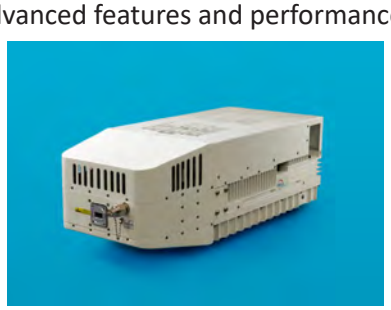
Oliver Vogel, Director Sales and Marketing, will be present at CABSAT 2019 from 12-14 March and would be pleased to meet you during the show. Please send him an email to o.vogel@rf-design-online.de to arrange a meeting.

Russian Satellite Communications Company
Hall 7 #K7-30
www.rscc.ru

Russian Satellite Communication Company (RSCC) is the Russian GEO satellite operator with global coverage. RSCC provides a full range of communications and broadcasting services via its own terrestrial telecom facilities and satellite constellation, which consist of modern Express-AM, Express-AT, Express-A type satellites; e.g. video distribution and contribution, DTH, DSNG, broadband Internet access, IP trunking and cellular backhaul, maritime mobility, SCADA, enterprise networks connectivity and other. The company operates various regional satellite TV distribution networks and corporate VSAT networks for fixed and mobility customers.

Terrasat Communications
Hall 6 #604
www.terrasatinc.com

Terrasat Communications designs and manufactures innovative RF solutions for Satellite Communications systems. Our ground-breaking IBUC – the Intelligent Block Up-converter – brings advanced features and performance to C-band, X-band, Ku-band, & Ka-band satellite earth terminals and VSAT's.



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UHP Networks
Hall 7 # F7-32
www.uhp.net

UHP Networks is a leading global manufacturer of advanced VSAT networks and systems. Headquartered in Montreal, Canada, the company has over 370 networks and over 40,000 remote terminals installed in 50 countries. Among its customers are Fortune 500 corporations, major broadcast networks, top-tier US Mobile Network Operators and government agencies. UHP has the industry's first software-defined VSAT router, offering unparalleled processing capability (packets per second, Mbps, TCP sessions) per W of consumed power and superior bandwidth efficiency owing to the industry's most sophisticated TDMA protocol and DVB-S2X signalling. The company won the 2018 VSAT Stellar Award for Best Ground Segment Technology.

XMW Inc.
Hall 7 # H7-32
www.xmwinc.com

Since its foundation in 2010, **XMW** has been exploring new markets that require unprecedented products such as Ka-band BUC, multi-band BUC, multi/simul-band LNB and multi-band antenna systems. XMW has invested heavily and continuously in research and development to launch state-of-the-art SATCOM products that enable the innovative service providers and users to create greater value and lead the industry.

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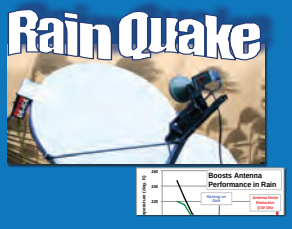

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It's the Weak Link that Breaks the Chain

by Robert Bell

Once upon a time, a large teleport operator was hit by a major power outage. Uninterruptible power supplies immediately kicked in and the NOC staff waited for the generator to start. Nothing happened. So, they switched to the backup generator. Still nothing. Work crews rushed to trouble-shoot the generator failures while the countdown timer on the UPS batteries ticked downward…and downward…and still downward. Just minutes from total loss of power, the work crews got one of the generators started and customers suffered no loss of service.

That did not stop the operator for buying two more generators to serve as triple and quadruple backups.

Service continuity is the core deliverable to customers. Most other aspects of service can be managed, explained or finessed, but not whether the service is off instead of on, severely degraded rather than healthy. Not surprisingly, it is the issue to which teleport engineers and managers devote most of their time, energy and money.

And yet, as the story shows, it is always the hidden issue, the weak link left unnoticed, that threatens the continuity of service, even at well-run facilities with proper procedures in place. In 2015, WTA introduced its Teleport Certification program to help operators find the strengths and weaknesses in their facilities, technology and procedures and to receive independent, standards-based certification at one of four Tiers, from Tier 4 at the top to Tier 1. To date, WTA has certified 46 teleports operating in the US, the UK, France, Germany, Italy, Norway, Cyprus, Switzerland, the UAE, Australia, Hong Kong, Singapore, Mexico, Bulgaria, Colombia and Brazil.

Teleport Certification has also generated substantial data on teleport operators from its 270-question survey instrument. In a recent report, we looked at what the data reveals about the most common under-appreciated issues that can have an impact on service continuity, and how teleport operators can best resolve them.

Why Service Continuity?

It is fundamental, for one thing: the most basic value delivered by a telecommunications service provider. Of the 270 questions in the survey instrument, nearly 20% are about service continuity and many more cover topics with

an impact on it. But it is also an area, particularly where operating procedures are concerned, where our sample of teleport operators showed some subtle but meaningful weaknesses.

Finding the Weak Links

Much of it comes down to the procedures that govern management of service continuity. The best operators make sure that their approach is based on accepted international standards, so that they get the advantage of the best thinking on the planet. They take a hard look at the continuity scenarios in their planning and make sure they align with the real risks. And they test relentlessly: the continuity scenarios and the automated failure and recovery systems that are supposed to prevent loss of service.

They also keep a sharp eye on redundancy. Deciding how much redundancy is needed in every part of the operation is a judgment call that balances probability and expense. The research showed that combiners, LNBs and site diversity are areas where even well-managed facilities come up short. Redundancy becomes especially important as more teleports are controlled by remote NOCS. Communication between the NOC and teleport can be a critical point of failure. While saving money through centralization, the best operators make sure they have enough redundancy that they will not regret the decision to centralize.

Every service provider must make decisions about how bullet-proof to make their facilities, infrastructure and facilities. The Teleport Certification program (www.worldteleport.org/certification) helps to make these decisions visible, so that operators can make better-informed decisions and deliver the price-performance that their customers expect.

Robert Bell is Executive Director of the World Teleport Association, which represents the world's most innovative teleport operators, carriers and technology providers in 46 nations. He can be reached at rbell@worldteleport.org. High-Performance: Service Continuity is available free to members and for sale to non-members at https://www.worldteleport.org/store/default.aspx?.

CABSAT 2019 Briefing:

The GVF Satellite Hub Summit

by Martin Jarrold

In my previous column I recounted the genesis of the GVF Satellite Hub Summit @ CABSAT, a progress which has led us, in 2019, to the 5th event in this successful series, which takes place over 12 to 14 March at Dubai International Convention & Exhibition Centre/Dubai World Trade Centre.

The essential value-added feature of the annual CABSAT exhibition, the 2019 program will not disappoint, with almost 30 contributors from 27 different organizations "taking the stage" at some point across the two main days of the Hub Summit and the final half-day Workshop.

Free-to-attend, presentation-based, panel discussion-focused, with wide-ranging content, and presented within a physical "Hub" – an open-access theatre-style structure situated within the satellite exhibition hall – this is what characterizes the Satellite Hub Summit.

Our aim is to provide a continuing major focus for the discussion of satellite communication industry themes applicable to the Middle East, North Africa and South Asia regions, in the context of the wider industry and world, serving to create a powerful and prominent platform for addressing and analyzing evolutionary and revolutionary transitions in satellite technologies, services, applications, and markets.

Key 'Knowledge Partners' for the Satellite Hub Summit include Euroconsult, Northern Sky Research (NSR), and SpaceWatch Global. Stéphane Chenard of Euroconsult, Chris Baugh of NSR, Torsten Kriening of SpaceWatch Global, Riaz Lamak of GVF, as well as Virgil Labrador, Editor-in-Chief of this publication, will comprise the moderating team.

The program for the Dubai Hub Summit will begin on CABSAT Day One, 12 March, with keynotes from Khalid Al Awadi, Manager, Broadcasting & Space Services, Spectrum Management Affairs Department, United Arab Emirates Telecommunications Regulatory Authority, and from Xiuqi "Ellie" Wang, Head, Data Treatment Section, Space Publication & Registration Division, Space Services Department, Radiocommunication Bureau, International Telecommunication Union.

Four following main program sessions over two days will feature the following key themes for discussion:

Global Satellite Focus… "Big Ticket" Issues on the Industry Forward Agenda

- Regulation, Spectrum & WRC-19
- The Interference Agenda – A Problem Gone Away?
- Satellite & the Cloud/Network Virtualization, M2M, IoT, 5G
- Cyber Security Developments & Initiatives
- Disaster Response – Satcoms Innovations & Strategies
- Sustainable Space Initiatives & Best Practices
- Satellites & Space – Expanding Access, Emerging Technologies, Globalising Aspirations

Global Satellite Business is Big Business. New Space Making It Bigger

- UHTS/VHTS/HTS 2.0
- HTS Evolving: The LEO & MEO Mega-Constellation Terrabit Factor
- Smallsat Markets – Applications in Revolution
- Accelerating Ground Segment Dynamics
- Antenna Evolution: Parabolas to FPAs
- Satcoms & Earth Observation – Application & Market Interfaces
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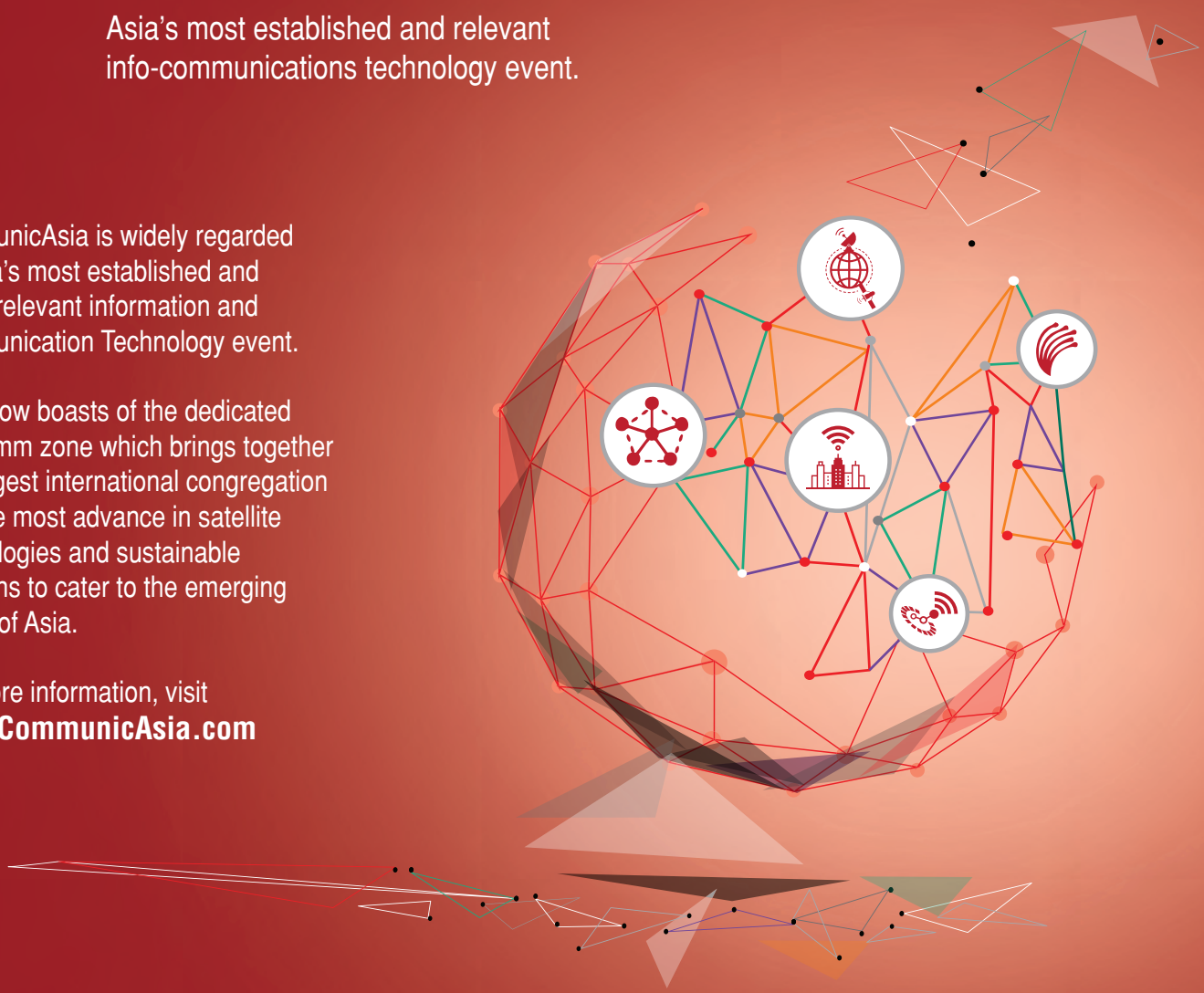

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MARKET INTELLIGENCE

Mobility: 'Maritime Morning' – "To the Wider Market and Service Horizon"

- Maritime Mobility – Growth Steaming Ahead?
- Maritime Market Plurality– Addressing Segment Differences
- Key Facets of the User Experience
- Bandwidth Inshore & on the High Seas
- Satellite & Vessel Autonomy – Where? How? Why?
- Satellite Cyber Security @ Sea
- Radomes & Superstructure Footprints

Mobility: 'Aero Afternoon' – "It's Not Just About the IFEC!"

- Understanding New Segment Evolving Demand Dynamics
- Aero – Frequency Dedicated or Frequency Agnostic?
- Never Mind the Orbit – It's all about the Price!
- Hacking & Interfering in Aircraft Systems – Myth or Reality?
- Always Online! Take-Up Rates by Captive Passengers or Demanding Customers?
- How's the Hardware Doing?
- Antennas – Conformal, or What?

Details of the developing program with timings on a session-by-session basis can be seen on the GVF Satellite Hub Summit web pages at https://www.cabsat.com/features/gvf-satellite-hub-summit.

The format of the four main sessions provides for each speaker/panelist to have a maximum of 15 minutes to deliver a presentation detailing his/her opening remarks relating to their selected topic within the overall session theme to which they are a contributor. At the conclusion of all presentations/opening remarks the speaker/panelists will form a panel. The following 45-50 minutes will be comprised of a moderator-led interactive discussion amongst the panel members and the Hub Summit audience.

Martin Jarrold is the Chief of International Program Development of GVF. He can be reached at: martin.jarrold@gvf.org.

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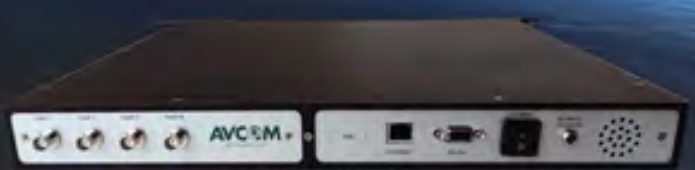

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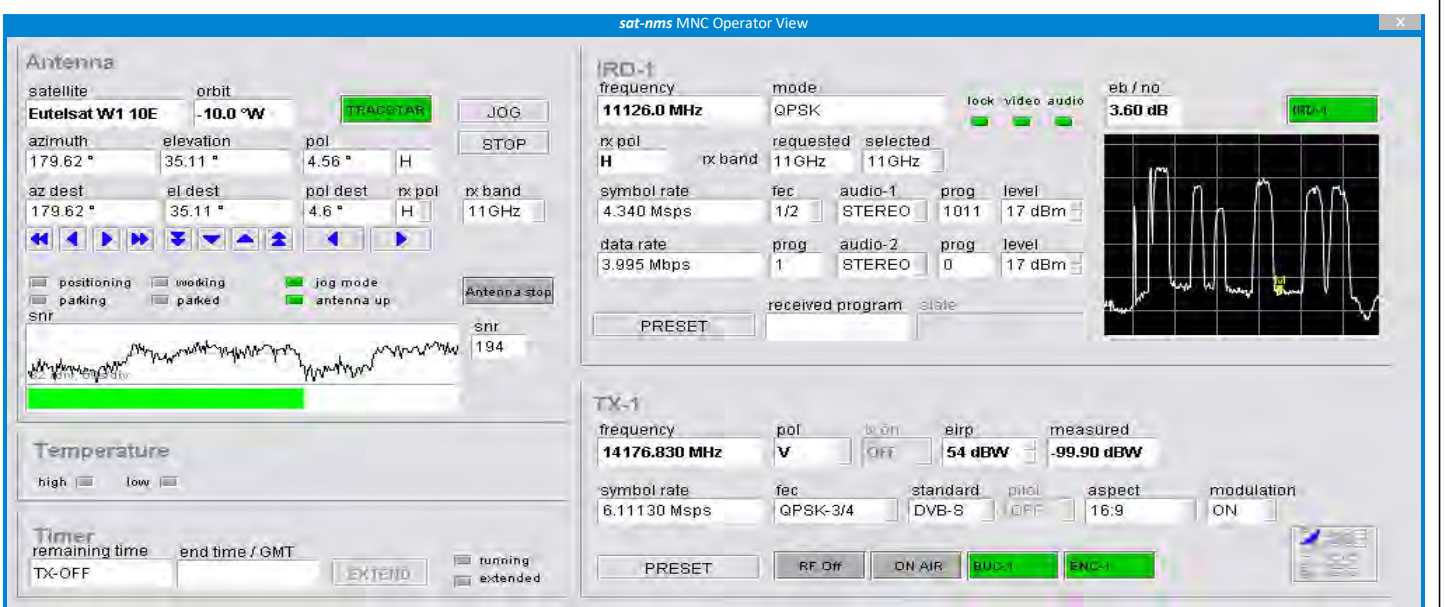

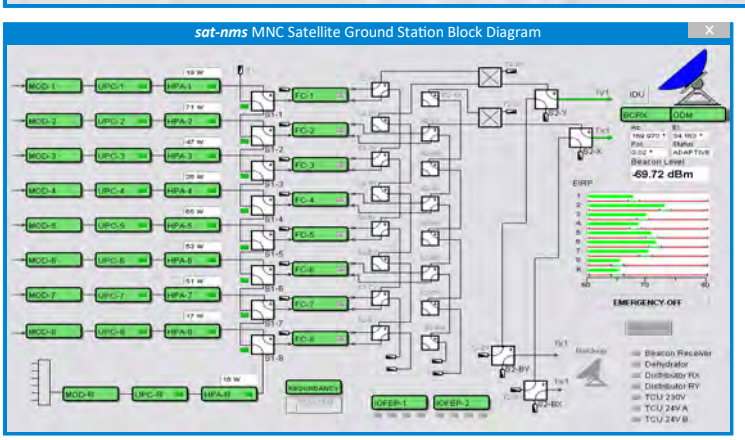

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EXEC MOVES

Sky Perfect JSAT Appoints New Chair and President

Tokyo, Japan, Feb. 13, 2019 — SKY Perfect JSAT Holdings Inc. board of directors has appointed a new chairman and new president effective April 1, 2019. Named new chairman is Shinji Takada whose previous title was president, and Eiichi Yonekura, formerly senior executive vice president, as new president.


Shinzi Takada

The company said it made the decision to promptly respond to changes in the business environment, and to achieve further growth through the new management structure.

Shinji Takada will also become chairman of SKY Perfect JSAT Corporation while Eiichi Yonekura will become president and CEO. SKY Perfect JSAT Corp. is a wholly owned subsidiary of SKY Perfect JSAT Holdings Inc.

Sixty-two year old president Eiichi Yonekura finished his economics degree at the Keio University in 1981. He joined ITOCHU Corp. in 1981 as executive officer, rising from the ranks to become an advisory member in 2018.

Terrasat Names Gorton as New EMEA Director

Morgan Hill, CA, Feb. 7, 2019 — To jump-start the 2019 year, Terrasat has recently surpassed shipping out 20K IBUCs worldwide, and it continues to charge forward by expanding its sales team. Terrasat welcomes Paul Gorton to the team as Director of Sales, EMEA, who will be combining forces with Ron Merritt, Regional VP of EMEA.


Paul Gorton

Paul Gorton arrives primed from Comtech Xicom Technology and brings with him over 20+ years of combined experience in both application engineering & sales. Paul's extensive knowledge will enable Terrasat Communications to be even more responsive to the needs of the ever-diversifying Satcom market. Bob Hansen, Global Sales & Marketing, said "What has endeared customers to Paul is his broad reaching knowledge and empathy towards their requirements, this matches perfectly with Terrasat Communications' customer focused approach".

Gorton, commenting on his role said, "It is an exciting time to be working in the industry with Satellite Communications playing such a huge role in Aero, Maritime, Government & Military as well as the more traditional VSAT and Broadcast verticals."

Iridium Welcomes Back Suzi McBride as New COO

McLean, VA, Feb. 8, 2019 — Iridium Communications announced that COO Scott Smith has decided to retire effective March 15th and the company is welcoming back to Iridium new chief operations officer Suzi McBride. McBride will assume this position effective as of February 11, 2019. Smith led Iridium's technology and operations, including Iridium NEXT, which recently completed its final launch. Smith will continue to work with Iridium in a consulting role as the handoff to his successor is completed, with the company wishing him well in his greatly earned retirement.


Suzi McBride

Smith first joined Iridium in April of 2010 with a primary goal of helping lead the company into the Iridium NEXT era. This included the design, development, launch and implementation of the new satellite network, including its ability to seamlessly maintain service for existing customers through the transition.

Making a return to Iridium as COO, McBride will lead operations of the Iridium network, including the satellite constellation and associated ground gateways and terminals. This also encompasses all technology innovation on Iridium's new network, including the development and manufacturing of subscriber equipment, new services and applications. Prior to rejoining Iridium, McBride spent the past two-and-a-half years at OneWeb, where she served as COO and Senior Vice President. In that role, McBride built up OneWeb's team of engineers and oversaw the system design, production and testing of the ground and space

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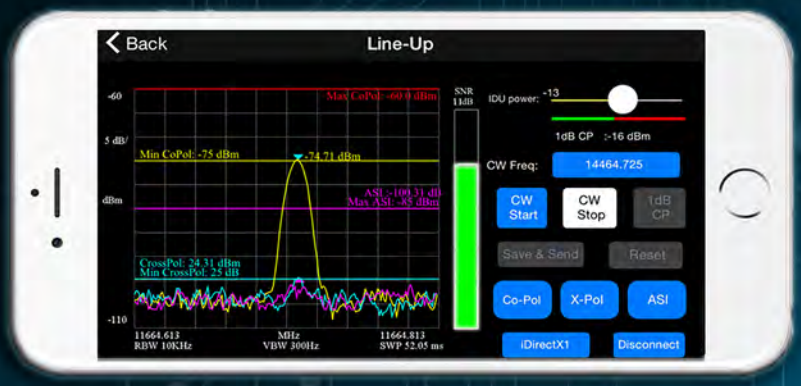

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During her first tenure at Iridium, lasting over nine years, McBride served as Vice President of Program Management and Launch Services, playing a key leadership role in developing the Iridium NEXT system, leading launch strategy, engineering and hosted payload programs.

SES Appoints Baughn to New CSO Position

Betzdorf, Luxembourg, Feb. 6, 2019 — SES is streamlining customer support and services by forming a global services delivery team under the leadership of a Chief Services Officer (CSO). John Baughn, formerly executive vice president global services at SES Networks, is appointed to this newly created position.

John Baughn

SES said this move underscores the company's commitment to place customers at the heart of its business and deliver exceptional customer experience following the successful implementation of two market-facing business units in 2017, SES Video and SES Networks.

The newly created CSO position consolidates all customer support and operational delivery, logistics and services related resources across the video and data businesses. It unifies functions across the organisation into a single team charged with delivering exceptional services to its customers.

SES also announced Ruy Pinto as the successor to Martin Halliwell as chief technology officer (CTO). Ruy Pinto, formerly deputy chief technology officer and chief information officer of SES will lead SES's global technology organization including all technology functions currently within the business units and will also retain the leadership of SES's IT and digital transformation activities. Martin Halliwell will remain part of the senior leadership team and serve as a strategic advisor to the CEO until his planned retirement in May 2019.

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Brightcove Signs Definitive Agreement to Acquire Ooyala's Online Video Platform Business

Boston, Mass., Feb. 14, 2019 — Brightcove Inc. (NASDAQ: BCOV), a provider of cloud services for video, has announced it has entered into a definitive agreement to acquire the online video platform (OVP) business of Ooyala, a provider of cloud video technology.

Brightcove is acquiring Ooyala's OVP technology, including video content management and publishing platform Backlot, Analytics, Live, and its underlying IP and associated patents. As part of the transaction, Brightcove will acquire substantial portions of Ooyala's engineering, support, and sales staff, including the company's Guadalajara, Mexico operations. Brightcove intends to take on all customer, reseller, and partner relationships utilized by Ooyala's OVP business globally.

"Ooyala has tremendous global customers who understand the power of video and its ability to transform business and reach new customers," said Jeff Ray, CEO of Brightcove. "This transaction, which includes immediately growing our highly skilled and committed global workforce, accelerates our ability to deliver faster innovation and deeper support for all customers. We also will increase our market reach and further strengthen our ability to secure new business in key target markets. We look forward to welcoming Ooyala's OVP customers and ensuring a smooth transition and a world-class experience for them."

Over the past 15 years, Brightcove has developed the most sophisticated online video platform in the market with solutions supporting media, entertainment, marketing, and enterprise spaces. Aspects of Ooyala's technology will be integrated into the Brightcove platform to provide a more robust global offering for all customers. The transaction is expected to close in the first half of 2019.

Italian Infrastructure Group Atlantia Purchases Majority Stake in Hispasat

Milan, Italy, February 13, 2019 — Italian infrastructure group Atlantia announced that Spanish toll road operator Abertis had agreed to sell its 89.7 percent stake in Spanish satellite operator Hispasat to Red Electrica for €949 million (approximately US$1.1 Billion).

In October, Atlantia and Spain's ACS completed a €16.5 billion acquisition of Abertis.

Hispasat recorded €235 million in revenues last year, with profits of €80.5 million. The purchase will leave the Spanish state (via its Sociedad Estatal de Participaciones Industriales) holding 7.4 percent and Spain's Center for the Development of Industrial Technology with the remaining 2.9 percent.

Red Eléctrica's existing telco-related business has revenues of some €330 million and manages Spain's second-largest fiber system.

Hispasat is the leading provider of satellite infrastructure in Spain and Portugal, the fourth largest operator in Latin America and the eighth operator worldwide, with revenues of 204 million euros in 2018.

Hispasat currently has a fleet of 7 satellites providing coverage to Europe and the American continent, distributing more than 1,250 television and radio channels.

CommScope to Acquire ARRIS in US$ 7.4 Billion Deal

Hickory, NC, Feb. 1, 2019 — CommScope (NASDAQ: COMM), a global leader in infrastructure solutions for communications networks, has agreed to acquire ARRIS International plc (NASDAQ: ARRS), a global leader in entertainment and communications solutions, in an all-cash transaction for $31.75 per share, or a total purchase price of approximately US$ 7.4 billion, including the repayment of debt.

In addition, The Carlyle Group, a global alternative asset manager, has reestablished an ownership position in CommScope through a US$ 1 billion minority equity investment as part of CommScope's financing of the transaction.The combination of CommScope and ARRIS, on a pro forma basis, would create a company with approximately US$ 11.3 billion in revenue and adjusted EBITDA (earnings before interest, taxes, depreciation and amortization) of approximately US$ 1.8 billion, based on results for the two companies for the 12 months ended September 30, 2018.


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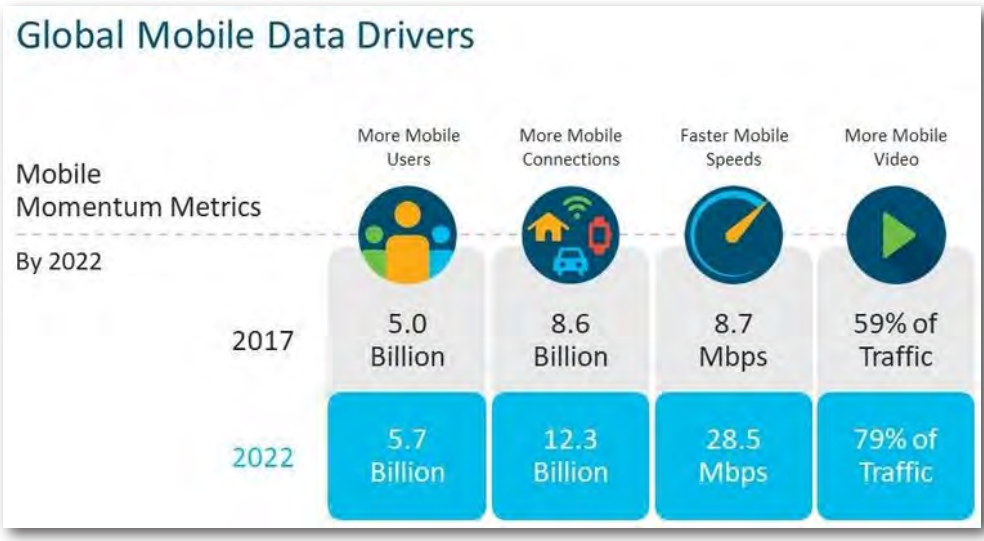
Cisco: Global Mobile Networks Will Support More Than 12-B Mobile Devices, IoT Connections by 2022



San Jose, Calif., Feb. 20, 2019 — At the inception of Cisco's Mobile Visual Networking Index (VNI) Forecast more than a decade ago, mobile (or cellular) traffic represented less than five percent of total IP traffic crossing global networks. Today, the role and reliance placed on mobile networking has dramatically increased.

There has been worldwide rise in mobile access for consumers and business users. The expanded reach and quality of mobile broadband has fostered a seemingly insatiable demand for mobile communications, media and a wide range of mobile IoT applications.

According to this year's forecast update (2017 – 2022), mobile traffic will be on the verge of reaching an annual run rate of a zettabyte by the end of the forecast period. By 2022, mobile traffic will represent nearly 20 percent of global IP traffic and will reach 930 exabytes annually. That's nearly 113 times more than all global mobile traffic generated just ten years prior, in 2012.

Mobile technologies continue to connect more people and things than ever before. In 2017, there were five billion mobile users worldwide, but over the next five years, that number will increase by half a billion to 5.7 billion users, which represents about 71 percent of the global population. By 2022, there will be more than 12 billion mobile-ready devices and IoT connections (up from about nine billion mobile-ready devices and IoT connections in 2017). By 2022, mobile networks will support more than eight billion personal mobile devices and four billion IoT connections.

The forecast update also anticipates ongoing efforts by mobile carriers around the world to enhance mobile network performance. The average global mobile network speeds will increase more than three-fold from 8.7 Mbps in 2017 to 28.5 Mbps by 2022. Average mobile speeds vary significantly by geographic locations as 5G adoption begins to ramp up in some regions.

Key Predictions

2G, 3G, 4G, 5G and LPWA Connection Share:

In 2017, Low-Power, Wide-area (LPWA) networks supported 1.5 percentof mobile devices/M2M connections, 2G supported 34 percentof global mobile devices/M2M connections; 3G supported 30 percent of global mobile devices/M2M connections; and 4G supported 35percentof global mobile devices/M2M connections.

By 2022, LPWA networks will support 14percentof mobile devices/M2M connections, 2G will support eight percentof global mobile devices/M2M connections; 3G will support 20percentof global mobile devices/M2M connections; 4G will support 54percentof global mobile devices/M2M connections; 5G will support threepercentof global mobile devices/M2M connections (about 422m 5G connections globally).

5G:

By 2022, 5G connections will represent over three percent of total mobile connections (more than 422 million global 5G devices and M2M connections) and will account for nearly 12 percent of global mobile data traffic.

By 2022, the average 5G connection (22 GB/month) will generate about 3X more traffic than

the average 4G connection (8 GB/month).

WiFi:

Traffic Offload from Mobile Networks (Cellular) to Fixed Networks (WiFi)

In 2017, monthly offload traffic (13 EB) exceeded monthly mobile/cellular traffic (12 EB).

In 2017, 54 percent of total mobile data traffic was offloaded; by 2022, 59 percent of total mobile data traffic will be offloaded.

2017 Total IP Traffic (fixed & mobile): 48 percent Wired, 43 percent WiFi, nine percent Mobile.

2022 Total IP Traffic (fixed & mobile): 29 percent Wired, 51 percent WiFi, 20 percent Mobile.

Globally, total WiFi hotspots (including home spots) will grow 4X from 2017 (124 million) to 2022 (549 million).

Rethink TV Says the Rise in SVoD Viewing Will Swamp Traditional TV by 2023

Bristol, UK, February 13, 2019 — Rethink TV service has forecast that SVoD uptake is accelerating and in terms of hours viewing per day it will shortly draw level with broadcast TV globally by 2023. This is according to its new Report "The rise in SVoD viewing to swamp traditional TV by 2023," released today. This is a global forecast by region of all SVoD usage to 2023, and shows the stark contrast between the heavily AVoD Asia compared to the SVoD frenzy going on in the US and Europe.

Rethink TV sees 478 million SVoD subscribers today growing to 743 million by 2023, with China having the most SVoD subscribers by 2023, but North America still driving the largest dollar volume. The report anticipates the US market rising from a combined paid SVoD (including vMVPD) reaching 236.6 million subscriptions by the end of 2023, from a base today of some 146.5 million.

Netflix will continue to lead in SVoD in both subscribers numbers (outside of China), but will make up 194 million SVoD customers out of 743 million globally by 2023, some 26% of total global subscribers. In the US Netflix today represents 44% of subscriptions, but will only be 31% of the increased US subscription levels by 2023.

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The Satellite Markets 20 Index™

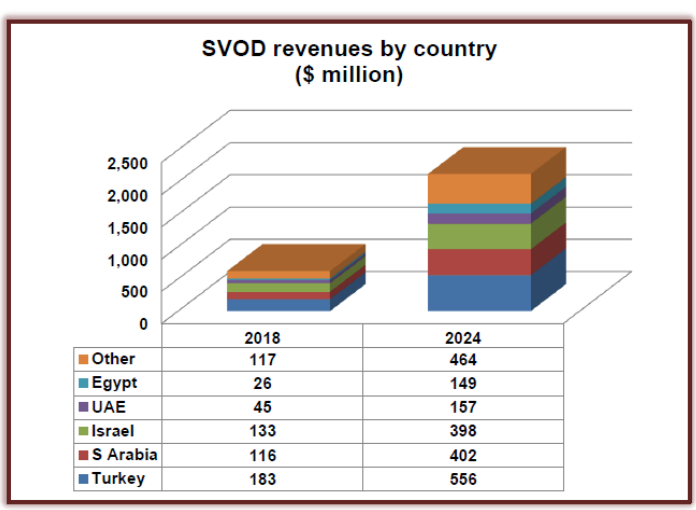
Company Name	Symbol	Price Mar. 3	52-wk Range	
Satellite Operators				
Asia Satellite Telecommunications Holdings Li	1135.HK	6.00	4.62	7.20
Eutelsat Communications S.A.	ETL.PA	17.42	15.28	23.11
APT Satellite Holdings Limited	1045.HK	3.64	2.47	3.75
Inmarsat Plc	ISAT.L	408.50	334.30	646.00
SES S.A.	SES.F	17.72	10.81	20.81
Satellite Manufacturers				
The Boeing Company	BA	440.62	292.47	446.01
Maxar Technologies	MAXR	5.83	4.77	55.28
Lockheed Martin Corporation	LMT	309.47	241.18	361.99
OHB SE	OHB.DE	32.5	27.55	40.25
Honeywell International Inc.	HON	155.72	123.48	162.52
Equipment Manufacturers				
C-Com Satellite Systems Inc.	CMI.V	1.26	0.98	1.28
Comtech Telecommunications Corp.	CMTL	26.86	22.80	36.94
Harris Corporation	HRS	164.79	123.24	175.50
ViaSat Inc.	VSAT	75.93	55.93	76.41
Gilat Satellite Networks Ltd.	GILT	9.18	7.54	10.74
Service Providers				
DISH Network Corporation	DISH	32.23	23.22	41.90
Globalstar Inc.	GSAT	0.46	0.29	0.99
Orbcomm Inc.	ORBC	7.25	6.89	11.25
Sirius XM Holdings Inc.	SIRI	5.99	5.48	7.70
Sky plc	SKY.L	1727.50	17260.00	1728.00

The Satellite Markets 20 Index™ is a composite of 20 publicly-traded satellite companies worldwide with five companies representing each major market segment of the industry: satellite operators; satellite manufacturers; equipment manufacturers; and service providers. The base data for the Satellite Markets Index is January 2, 2008 - the first day of operation for Satellite Markets and Research. The Index equals 1,000. The Satellite Markets Index™ provides an investment benchmark to gauge the overall health of the satellite industry.

INDEX	Index Value **March 3, 2019**
Satellite Markets 20 Index™	3,448.87
S & P 500	2,901.52

ADVERTISERS' INDEX

VITAL STATS



	2018	2024
Other	117	464
Egypt	26	149
UAE	45	157
Israel	133	398
S Arabia	116	402
Turkey	183	556

Source: Digital TV Research

MENA SVOD revenues will reach US$ 2.13 billion by 2024; or US $1.51 billion more than the 2018 total. SVOD revenues will more than triple between 2018 and 2024, according to the latest edition of the Middle East and North Africa OTT TV and Video Forecasts report by Digital TV Research.

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