

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

Whither the Satcom Mobility Market?

by Virgil Labrador

The Satellite Mobility market consists of three key verticals: the aeronautical/in-flight; maritime and land mobile communications on the move (COTM) markets. Of those three markets that cover the air, sea and land, two of those verticals are probably the hardest hit sectors of the satellite industry by the ongoing global COVID-19 pandemic.

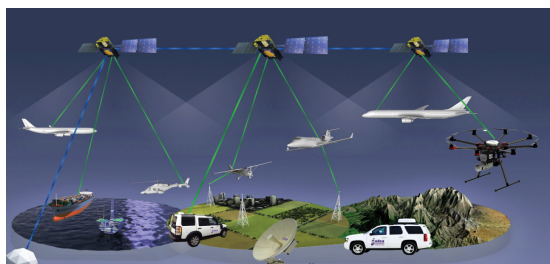


Image courtesy of Jabasat

In the last few years, the aeronautical and maritime markets, where satellites have little or no competition from terrestrial networks, was touted as the next wave driving demand for satellite services and equipment. The restrictions to movement and the steep decline in air travel and the complete shutdown of the cruise industry has severely

impacted the bottom line of satellite service providers and ground equipment manufacturers who invested heavily in the aero and maritime markets.

The global pandemic hit the aero and maritime markets hard with a number of high-profile bankruptcies such as GogoAir and Speedcast, among others. However, while the short-term prospects in the aero and maritime markets may look dim, the outlook for the aero and maritime markets are actually quite promising according to research findings by key consulting firms.

The Aeronautical Market

The recovery of the airline

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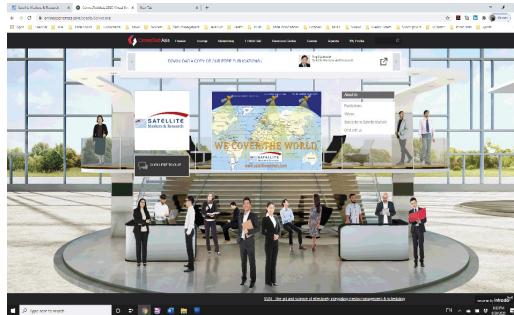
Virtual Shows



I attended my first virtual exhibition during the ConneCTechAsia last month where we had a virtual booth. It's definitely a different experience from a live event, but given the conditions we all face, we simply have no other alternative. A virtual booth actually can accomplish many of the things that a live booth does--like chat with visitors, set-

up meetings and distribute literature. I like the fact I don't have to travel a long distance and carry all the paraphernalia for a live booth. I was able to say hi to old friends and have some productive meetings. But it's not the same as meeting them face to face. Also, in a virtual set-up, it might be easy to reconnect with old friends but harder to make new ones.

With no end in sight for the global pandemic, we would have to do with virtual shows for now. Our next one is CABSAT in November. See you all there!



Virgil Labrador

Virgil Labrador
Editor-in-Chief



Virgil Labrador
Editor-in-Chief
virgil@satellitemarkets.com

Peter I. Galace,
Elisabeth Tweedie
Associate Editors

Contributing Editors:

North America:

Robert Bell,
Bruce Elbert, Dan Freyer,
Lou Zacharilla

Latin America:

Bernardo Schneiderman

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Bruce Elbert, President
Application Technology Strategy, L.L.C.

Office: +1 512 9430454
Mobile: +1 310 9181728
Fax: +1 512 9430455
Web: www.applicationstrategy.com
E-mail: bruce@applicationstrategy.com

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SYNTHESIS PUBLICATIONS LLC
1418 South Azusa Ave.
Suite # 4174
West Covina CA 91791 USA
Phone: +1-626-931-6395
Fax +1-425-969-2654
E-mail:
info@satellitemarkets.com
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market is already underway according to a survey for an event called “FlightPlan: Charting a Course into the Future” conducted by Inmarsat and the Airline Passenger Experience Association (APEX). The poll – completed by more than 500 professionals from across the global aviation industry between April and June 2020 – shows that more than half of respondents (60%) expect a recovery period between 18 months to three years. Despite bracing for a slow recovery, the poll reveals a sense of optimism for the industry’s future, with digitization expected to drive the return to profitable growth.

Philip Balaam, President of Inmarsat Aviation, said: “The immediate priority for airlines and the wider aviation industry is clearly surviving the unprecedented impact of COVID-19. Aviation is taking its first steps towards a recovery and it is encouraging that many in this industry have been proactive in adapting and planning for the future. These survey results, together with the numerous discussions and debates during FlightPlan, indicate that the COVID-19 crisis may prove a decisive moment for digital transformation in an industry that’s historically been behind the curve, with the vast majority of aviation professionals expecting digital technologies to help drive a stronger return towards profitable growth.”

Research and Markets projected that the the Global Airborne Satcom market accounted for US\$5.51 billion in

“...Despite bracing for a slow recovery, the poll reveals a sense of optimism for the industry’s future...”

2018 and is expected to reach US \$9.80 billion by 2027 growing at a CAGR of 6.6% during the forecast period according to Research and Markets. Rise in long-haul flights and traveller traffic and raise in the number of high-throughput satellites are the major factors propelling the market growth.

As the APEX survey revealed, it might take 18 months to three years for the aviation industry to recover, but in the meantime satellite executives I’ve interviewed see opportunities in aero applications for defense, government and the Unmanned Aerial Vehicles (UAV) markets.

The Maritime Market

In its latest research titled, “Prospects for Maritime Satellite Communications,” Euroconsult projects that the previously growing maritime connectivity market will experience a significant setback due to the Covid-19 pandemic. Maritime VSAT connectivity reached an all-time high of 28,200 connected vessels at the end of 2019 but because of the current health crisis, the previous projection of 49,300 terminals by 2023 has been reduced to 40,600 units.

In 2019, the Maritime satellite VSAT communications market experienced high growth with the total number of terminals increasing by 17.5 percent year over year, and VSAT services revenue growing by 11 percent to approach \$1.3 billion. Increasing demand from passengers, as well as regulatory pressure on communications and crew

welfare were major factors pushing maritime operators to install new generation satellite systems on their vessels.

“Despite the current setback, the fundamentals of maritime connectivity should continue to apply, with strong demand from the shipping industry as well as for leisure and business connectivity and operational applications,” said Pacôme Révillon, CEO of Euroconsult. “In light of technology advances and the appetite for applications and bandwidth we expect the industry to return to growth in two years’ time.”

The research provides detailed analysis of five market segments including merchant shipping, the cruise industry, offshore energy production, fishing, and private yachting, all of which are expected to reflect some slowing in the current environment. Merchant shipping is the largest market segment for VSAT with 17,700 connected vessels and revenues of US\$ 565 million in 2019.

“Because of the current limits on international trade and the economic downturn resulting from the pandemic, new ship deliveries and the subsequent VSAT installations they entail are forecast to slow,” said Xavier Lancel, Senior Consultant at Euroconsult. “Despite the presence of fixed contracts, docked vessels will likely result in a lower average revenue per user for connectivity services.

The cruise industry was also a major demand driver for maritime satellite connectivity.

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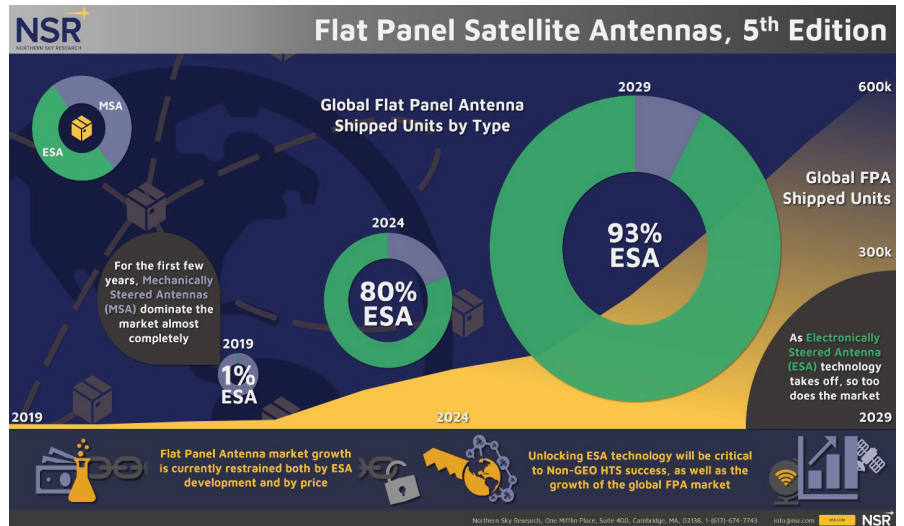
In some cases, service provider revenues reached US\$ 110,000 per month for the largest cruise ships. This is expected to be the market segment most impacted by the current health environment, with most ships temporarily docked.

Euroconsult forecasts that the cruise industry slowdown will continue for several years prompting cost-reductions and delaying demand for new vessels. Even as fast internet connectivity has become a requirement for cruise ship passengers there will be a sharp decrease in VSAT services revenue in 2020, and projections are that it will take until 2025 for revenues to reach 2019 levels again.

Land Mobile Satcom

The bright spot in the mobility market is the land sector. NSR's Land Mobile via Satellite, 8th Edition, released in July, finds that satcom land mobile markets continue to have a strong future, with over 750,000 new in-service units coming over the next decade, across nine distinct applications. Many of these units will trend towards higher ARPU levels with enhanced revenue prospects, despite a near-term COVID-19 revenue dip. Connected vehicles play a major role in long term growth, as broadband overtakes narrowband demand across all land mobile applications.

In the near-term, COVID-19 is having, and will have, a more muted impact on land mobile revenues with enterprise users, especially when compared with aeronautical and maritime mobility markets. Nonetheless, the greater uptake of satellite service by consumers in the last



few years, especially for ecotourism purposes, has resulted in a greater revenue decline in 2020 and 2021. However, the upside is that device deactivations remained at similar levels to 2019, so there will not be a "COVID-19 plunge" across land mobile, providing much-needed near-term optimism for the market according to the report.

While the past has been dominated by lower ARPU L-band devices, flat panel antennas (FPAs) will soon hit the market and longer-term will begin generating outsized revenues for mobility applications, especially for first responders type vehicles. A high-growth scenario for connected cars is also forecasted for a set of conditions, where satellite capacity and FPAs can proliferate in the consumer

vehicle space according to NSR.

"The emergence of LEO constellations is driving a wave of investment and innovation in FPAs," said World Teleport Association executive director Robert Bell. FPAs which can be used for all mobile applications are considered the one of the most innovative advances in satellite technology in recent years. However, it full commercial deployment is facing some technical and financial challenges. Among the issues FPAs have to surmount include coming up with a product that is competitive in price.

The big takeaway from all the recent research on the prospects of the satcom mobility market is that the fundamentals of the sector are sound and that recovery is inevitable.



Virgil Labrador is the Editor-in-Chief of Los Angeles, California-based Satellite Markets and Research which publishes a web portal on the satellite industry www.satellitemarkets.com, the monthly Satellite Executive Briefing magazine and occasional industry reports called MarketBriefs. Virgil is one of the few trade journalists who has a proven track record working in the commercial satellite industry. He worked as a senior executive for a teleport in

Singapore, the Asia Broadcast Center, then-owned by the US broadcasting company CBS. He has co-authored two books on the history of satellite communications and satellite technology. He holds a Master's in Communications Management from the University of Southern California (USC). E-mail: virgil@satellitemarkets.com



New Realities of Network Traffic

Internet traffic is increasing globally based on the new realities of remote connectivity – teleworking, distance learning, telemedicine, webinars and video conferencing. It's likely we'll see long-lasting changes to the way we live and work. Given the higher traffic volumes and network complexities, it is imperative for operators and service providers to have satellite infrastructure solutions that provide performance, reliability and quality of experience. At Comtech EF Data, we have the solutions for the new realities of network traffic!

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Managing an Outside Broadcast Fleet

The South African Broadcasting Corporation (SABC) is South Africa's public media provider, operating five national television and nineteen radio channels, as well as a comprehensive range of websites. SABC's main headquarters and studios are located in Johannesburg.

They now operate a fleet of 10 satellite communication vehicles which are able to transmit HD video streams while driving. Based on the statement of one of the senior technicians of SABC, the main advantage of the vehicles is not the ability of transmitting videos while driving; it is the always on capability of the vans which makes the difference.

It's not just a connection . . .

The system which SABC is operating is not just a connection it is a fully integrated solution where all parts are tailored to perfectly fit to each other.

Whenever a van leaves its home base it joins the SABC network. The people in the van can login to the SABC internal network, check their mails or make phone calls to the internal telephone network. Whereas other systems provide this functionality by routing all traffic through the internet, with all drawbacks in terms of security, the NDSATCOM SKYWAN system delivers all data packages directly to the rooftop of SABC and therewith into the internal network.

SABC not only decided to use modern satellite communication technology they also decided to use the NDSATCOM Media Fleet Manager System to let their fleet of traditional on the pause SNGs use the same bandwidth as the SOTM vehicles. This decision saves money for satellite bandwidth and increases efficiency in terms of internal processes what also saves money.



SABC's fleet of OB vans

. . . it's a system

The NDSATCOM Bandwidth and Fleet Management System introduced some major enhancements to daily work of the "TV Outside Broadcast" division of SABC.

Khutso Matlala who works with TV Outside Broadcasts-SABC said: "As soon as you start the van and switch on the circuit at the back the van is on. While its leaving SABC and driving to a story. Traditional vans had to get to the venue, find the satellite, setup; that took about 30 minutes. This is connected all the time, you just get of switch on your camera and you can start shooting. Communication as well, they are on, as soon as the van is on. So you have got connectivity to the studio while you are driving so there is not setup time."

Bandwidth Management

The MFM with its easy to use bandwidth scheduling client makes it easy to setup transmissions. By clicking source SNG and destination equipment the MFM can automatically select which capacity shall be used to setup the transmission. This avoids handling hundreds of bits of paper where capacity requests are normally tracked.

Equipment Setup

At the point in time where the transmission is short before going live all equipment needed will be configured automatically by the MFM controller environment. If a van is not connected in time, due to whatever reason, everything will be setup whenever the van connects to the network. The operators at the MCR or the van can concentrate on their daily business activities, all standard configuration topics are handled by the system automatically.




Monitoring & Control

The MFM systems not only provides helpful features for scheduling and configuration tasks it also enhances monitoring & control of the system by at the same time reducing bandwidth for these tasks dramatically. The concept of local MFM controllers talking to a central controller at the main site reduces bandwidth for M&C by up to 80%. The local

controller can ask for changes every second, but will only transmit data packets over satellite if changes appear or alarms occur.

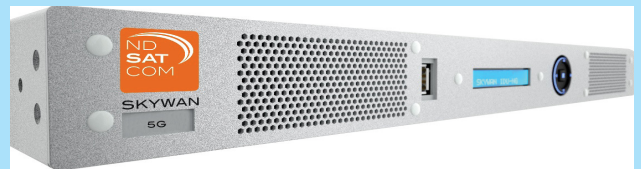
Always on Connectivity


Because of the always on capability of the vans it was the perfect choice for the SNG demand of SABCs South African regions. With this system there is no need to send a technician out to the story. A cameraman and a reporter are enough to run the vehicle. This enhances flexibility and reduces costs for hotels and accommodation on site. The technicians can stay at the central site doing their daily business only coming into play if something special needs to be prepared. And most of these things can now be setup remotely using the always on capacity. 

ND SatCom's SKYWAN 5G

SKYWAN 5G is one compact device for all applications and network roles. It's the smallest hub on the market and 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. For more information go to: https://www.ndsatcom.com/en/s_c1056i/SKYWAN_Satellite_Router/SKYWAN_5G/ 

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Interview with Hans Massart, Head of Media and Broadcast, ST Engineering iDirect

To get insights on the evolving broadcast market, Satellite Executive Briefing spoke with Hans Massart, Head of Media and Broadcast of ST Engineering iDirect. He has more than 20 years of experience in the broadcast industry. He was previously the Head of Media and Broadcast for Newtec, which merged with ST Engineering iDirect last year. Before joining Newtec in 2012, he served for fourteen years in various sales and business development positions on a European scale at Cisco, Scientific-Atlanta and BarcoNet.

How has the recent merger of ST Engineering iDirect and Newtec strengthened your position in the broadcast markets?

The merger has brought together two companies with their own strengths. Newtec has always had a strong presence in the broadcast market and iDirect has a strong foothold in convergence and innovation. The merger allows us to leverage and combine into strengthening the focus, widening it beyond traditional broadcast with an importance across all the vertical markets that we serve.

By bringing the two companies together, we have widened both our portfolio and our reach. The combination means that we now have much more resources open to us and more representation across the world so that our customers benefit on a local level. We have a great team of people that can support our work in the broadcast sector and enable us to do more. Looking to the future and the use of VSAT platforms for broadcast purposes such as All-IP for contribution and distribution, or OTT video delivery in general, we now suddenly have a very large installed base of both iDirect legacy VSAT systems on top of the Newtec systems already out there. We are looking forward to building on our very strong market position and continuing the innovation that the broadcast sector recognizes us for.



Hans Massart

How is ST Engineering iDirect continuing to innovate in the broadcast market?

We keep on pioneering. There are many innovations we propose for the broadcast market, especially in terms of the move to IP. We are constantly asking ourselves how we can more efficiently and effectively transport OTT signals over satellite. We are contributing, as we have always done, to designing new standards with DVB. We are also participating in different forums on distribution of video over 5G networks and investigating how we move forward to build a successful 5G ecosystem and facilitate efficient video transportation over such networks.

It's not just the broadcast market, though. We are looking into how video is being used in so much of what we do on a daily basis. We are very aware that video is used across many different verticals such as enterprise, IFC, mobility, government, etc. It's not necessarily just the broadcast market that utilizes video – it's a plethora of markets, and we need to find the best way to deliver to these users as well.

As most of the world faces the impact of the COVID-19 pandemic and beyond, what do you see as the key trends for broadcast satellite delivery?

During the pandemic, especially in the first months, all sports were put on hold. This definitely had a negative impact because no Outside Broadcasts were taking place from sporting events. But, on the other hand, as journalists have also remained at home, they have had to adapt to delivering their stories from home studios. In some cases, flyaway broadcast kits were used and small SNGs could even be parked outside journalist's homes so that they could continue to work effectively.

The other key trend is OTT and we are heavily engaged in its delivery over satellite. This is especially important for OTT transmission across a very large footprint, yet with the capability to offer a very high Quality of Experience. Satellite can be hugely beneficial for delivery of this kind of solution. In the context of COVID-19, there has been exponential growth in the use of OTT services for video streaming. However, OTT is also finding its place in the delivery of educational content and lessons to pupils in remote areas where they have not been able to get to school. This is an example of the importance of OTT access in isolated communities that would otherwise be cut off completely.

What specific products and services are you offering that address these key trends?


If we first look at contribution, our Newtec Dialog VSAT platform is perfectly positioned for contribution for IP Newsgathering. The advantage here is that it is compatible with the new ways in which newsgathering crews do their job, focusing on the story without having many technical people around. The beauty of Dialog is that it automates the newsgathering process and therefore can be operated extremely simply with no requirement for additional technical personnel. It sets up a bi-directional IP pipe towards the studio. In some cases, these stories are breaking in the middle of nowhere, or where infrastructure has been destroyed and only satellite is available. In some cases, terrestrial IP media cannot provide enough reliable bandwidth, and here satellite provided IP bandwidth can be blended in flexibly so all applications required can be run.

For distribution, we have our modulator range such as the MCX7000, which enables us to facilitate unidirectional OTT video over an entire footprint. In terms of traditional DTH, it offers the opportunity to transport multicast Adaptive

Bit Rate (ABR) streams. Our modulators can also be utilized for distance learning and educational content can be made available to children over tablets or other smart devices. If there is no internet available, an intermediate connection can be made in the form of a set top box or gateway.

For interactive distance learning we have our VSAT platforms, Evolution, Dialog and Velocity that can be used and facilitate interactivity, enabling classes over this IP pipe and an overall more immersive classroom experience. It also offers pupils the opportunity to have an Internet connection if it's not possible using terrestrial means - so we open a door to the world.

What differentiates ST Engineering iDirect's products from the competition?

Over the past 30 years, we have built both a video and IP DNA which is unique in the industry. This allows us to handle video over IP over satellite. All of our data products are built with video transport in mind and we have developed some unique features to ensure that video is transported in an efficient way whilst guaranteeing Quality of Experience. IP video is a data application, but it is a data application that deserves special attention in terms of Quality of Service and Experience. It is that attention to detail and our constant innovation that sets us apart. 

"...We are looking into how video is being used in so much of what we do on a daily basis. We are very aware that video is used across many different verticals such as enterprise, IFC, mobility, government, etc. It's not necessarily just the broadcast market that utilizes video – it's a plethora of markets, and we need to find the best way to deliver to these users as well."

To read or download a pdf of the Market-Brief report on Satellite in an OTT World go to:

www.satellitemarkets.com/pdf/pdf2020/satellite-ott-marketbrief.pdf

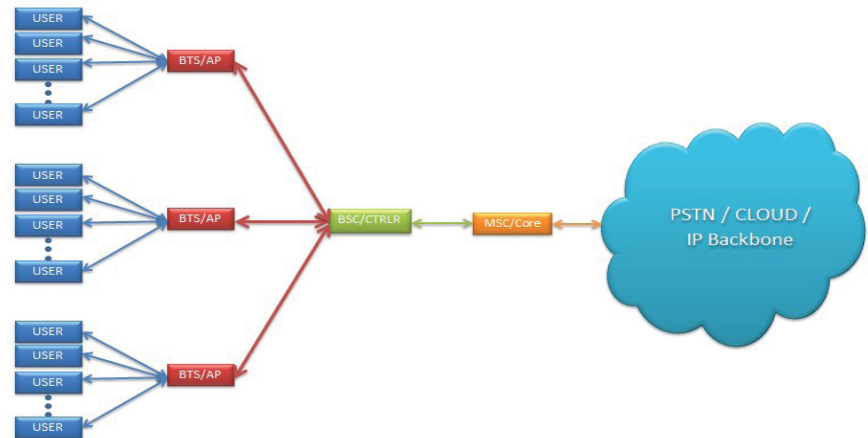


Satellite in an OTT World

Challenges for LEO HTS Constellations: Terrestrial Networks Integration

by Muhamad Furqan and Waheeb Butt

By now, we all are aware of the magnitude of the 1st generation of NGSO (Non-Geo Stationary Orbit) mega constellation and their capabilities for provision of high throughput, low latency, global broadband to everyone, everywhere. Let us move forward and analyse the integration of the networks established by these constellations with already existing and upcoming terrestrial networks.



Network Architecture for a Typical MNO/ISP Network

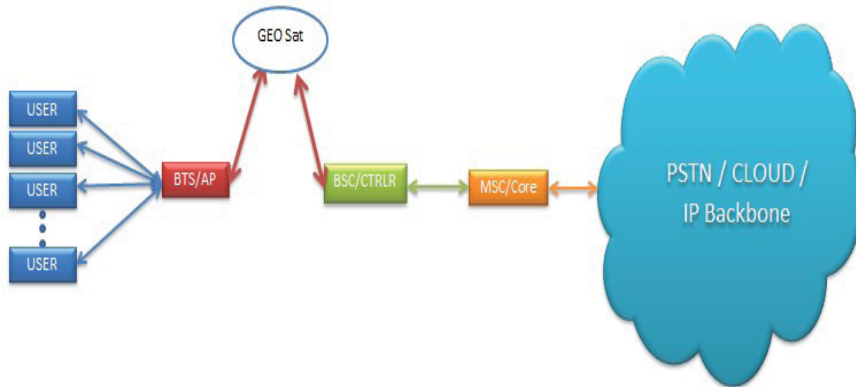
Satellite communication has been serving the terrestrial network as a complementor rather than a competitor for a considerable time. The best use-case scenario is the cellular backhaul over VSAT (Very Small Aperture Terminal) to connect remotely installed BTS (Base Transceiver Station) of a cellular network through a geostationary satellite to the respective BSC (Base Station Controller) and ultimately the core network. This technology enabled MNOs (Mobile Network Operators) to increase their subscribers base in remote communities which could not be connected to their network grid through Microwave or Fibre transmission. Similar network architecture, commonly known as bent-pipe and FSS (Fixed Satellite Service), has been used by other networks requirements of ISP (Internet Service Providers),

Government, Corporate, Oil & Gas, Mining sectors, where the DCE (Data Communication Equipment) and DTE (Data Terminal Equipment) are replaced from BTS and BSC to networking switches and routers.

However, all these communications are struggling to keep at par with development at terrestrial networks, and the main reason is staggering latency of around 530 milliseconds for a roundtrip of a message through the satellites at an altitude of around 37,000 kilometres, which is a big challenge for Industry 4.0 technologies. The arrival of the planned NGSO mega constellation appears to address the problem through claimed significantly lower latency of around 4 milliseconds, which is at par with fibre optics.

The integration of the networks of mega constellations with those on the ground is a complicated situation with multiple dynamics to analyse. Let us have a brief look at 4G LTE and 5G NR technology and analyse the integration for both backhaul and fronthaul interfaces through NGSO satellites with the core networks.

The development of cellular communication system has changed its course from being a national or regional concern to becoming an increasingly complex task undertaken by global standards-developing organizations such as the 3GPP (Third Generation partnership Project) and ITU (International Telecommunication Union). The constituent mobile communication technologies of the cellular communication system have evolved



VSAT Network Architecture

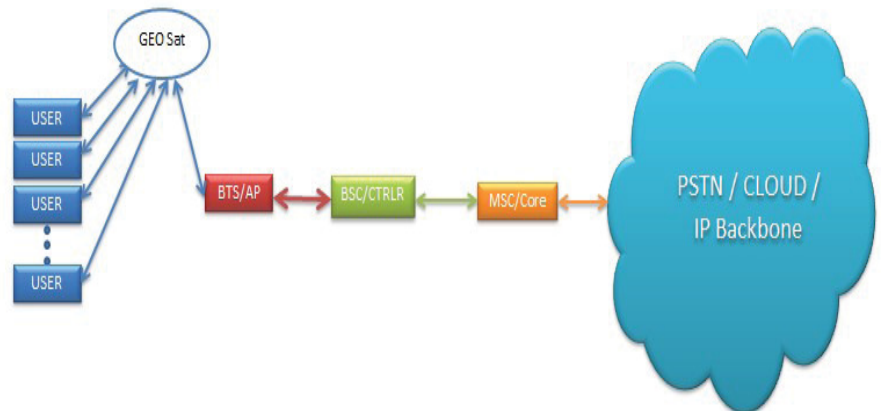
through different generations (G). Earlier during the 2G era and the initial deployment of 3G systems, the data traffic was at a notably low level even the introduction of packet data solutions, such as GPRS (General Packet Radio Service) and EDGE (Enhanced Data Rates for Global Evolution), was not able to increase the data services considerably. However, higher data rates, increased throughput and lower latency has significantly increased the use of packet data. LTE/LTE-A (Long Term Evolution/ Long Term Evolution-Advanced) guarantees the combined user and signalling data for the provision of a sufficiently smooth user experience especially in delay-critical applications like video conferencing and real-time gaming etc. LTE-A extends the 20 MHz bandwidth of basic LTE up to 100 MHz which in turn increases the theoretical data rate 200 Mb/s of LTE up to 1 – 3 Gb/s based on the set of functionalities.[1].

According to 3GPP, the key features associated with LTE/LTE-A are:

- High spectral efficiency. OFDM (Orthogonal Frequency

Division Multiplexing) is used in the downlink transmission to make the system more robust against multipath interference with the help of frequency domain channel-dependent scheduling and MIMO (Multiple Input Multiple Output) systems whereas DFTS-OFDM (Discrete Fourier Transform Spread-OFDM) and SC-FDMA (Single-Carrier Frequency Division Multiple Access) are used in the uplink along with the multi-antenna approach transmission in order to provide a low PAPR (Peak-to-Average Power ratio).

- Very Low Latency. In addition to keeping the TTI (Trans-



MSS Network Architecture

mission Time Interval) and RRC (Radio Resource Control) procedure short, handover latency, transfer delay and interruption time are kept considerably short as well for the desired low latency rate.

- Simple Architecture. The introduction of eNodeB as the only node in E-UTRAN (Evolved-UMTS Radio Access Network) lead to smaller number of RAN (Radio Access Network) interfaces, X2 and S1.

The connection between different eNodeB elements is established by the X2 interface which is meant for eNodeB handover procedures, data forwarding as well as interference management of the RRM (Radio Resource Management). The S1 interface is used to establish the connection between the eNodeB and the EPC (Evolved Packet Core), it is further divided into S1-MME and S1-U. S1-MME connects the eNodeB to the MME (Mobility Management Entity) and S1-U connects the eNodeB to the S-GW (Serving Gateway).

The core network of LTE-A is designed on the same principles

as that of LTE in order to avoid any bottlenecks due to the increased data rates. Furthermore, the backhaul portions are to be dimensioned in such a way that they do not create bottlenecks as well. Considering the maximum and average data rate of the radio interface, the core dimensioning is balanced in such a way that the core network is neither over-dimensioned (increased operational cost) nor under-dimensioned (loss of revenue and customer dissatisfaction). The infrastructure of 2G and 3G TDM (Time Division Multiplexing) backhauling still needs to be supported, therefore, in order to support both the lower data rate systems and the high data rates of LTE/LTE-A, it requires high scalability from the

IP (Internet Protocol) core and backhaul networks. Preferably, backhauling is performed via fibre optics or microwave radio links between the base station and the radio controller whereas the traditional solution has been the circuit-switched TDM, nevertheless the transition to the all-IP concept in supporting stages of the core network is obvious.

The deployment of LTE/LTE-A along with the re-usage of existing physical sites requires sufficient scalability of the backhaul network in order to meet all the system capacity demands of the site. Thus, the backhaul needs to support the traffic of multiple technologies such as TDM and Ethernet/IP while maintaining control for the QoS (Quality of

Service), therefore the dimensioning of the core network should be based on the probable distribution of the services; ensuring that the QoS meets expectations for the most demanding services, such as real-time video.

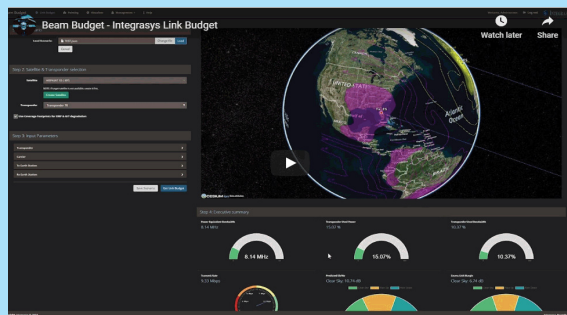
The evolution of RAN topologies and the concept of hybrid architecture are mainly driven by new LTE-A features, such as eICIC (Enhanced Inter-Cell Interference Coordination) and CoMP (Coordinated Multipoint) over ideal and non-ideal backhaul. Ideal backhaul provides less than 2.5 μ sec latency whereas non-ideal backhaul's latency is in the range of 5-30 msec which can be even more in case of DSL (Digital Subscriber Line) or cable access. The backhaul networks are

Integrasys' Beam Budget is Ready for LEOs and Flat Panel Antennas

Integrasys's Beam Budget is ready for Low Earth Orbit (LEO) constellations and Flat Panel Antennas (FPAs). Integrasys created Beam Budget, the unique and only technology solution that enables us to accurately calculate Link Budgets supporting LEO constellation and flat panel antennas.

Beam Budget has the availability for any frequency band, including Q and V whose high frequencies are more affected by atmospheric events. Thanks to Beam Budget small satellites constellations can design better, easier, and more effectively their networks for their constellations, and service providers can compare constellations and services before they choose the right partner.

Flat panel antennas are designed to fit in more types of platforms with its low profile and its flat surface, installations can become easier and faster. The greatest advantage of flat panel antennas is the ability to create Multibeams, which are able to point different constellations. At this part is where LEO satellites come on stage, the complexity of this communication system lies in their orbital movements which enables them to reduce the latency between devices. Therefore, flat panel antennas would be ideal to make this connection happen, as they can point to multiple satellites simultaneously. For example, the Connected Car is an application that will drive demand for the flat panel antennas. Beam Budget is the best satellite simulation tool, able to accurately model spacecraft transponders, beams and footprints; as well as ground equipment to assess the global performance of wide area satellite networks on multiple time-scales. For more information go to: <https://www.integrasys-space.com/link-budget-calculation-tool>



designed to support a multi-RAT (Radio Access Technology) macro layer and LTE-based small-cell layer. Practically speaking, hybrid backhaul/fronthaul architecture offers RAN capacity and/or performance benefits with the likelihood of a multi-RAT cell site having legacy services on the backhaul while migrating the LTE on C-RAN (Centralized-RAN) architecture which leads to hybrid transport mechanism such as CWDM (Coarse Wave Division Multiplexing), or hybrid wireless.

The requirement of minimum received power levels for certain data rates leads to

the adoption of different access methods in the uplink and downlink transmissions. The received power level is dependent on the presence of useful and interfering signals compared to the noise level; SINR (Signal to Interference Noise Ratio) values indicating the QoS level. The fast fading environments (dense urban areas) with a high number of multipath propagation components, makes OFDMA as the most suitable choice for LTE downlink transmission but the associated drawbacks such as PAPR along with

non-optimal power efficiency compels the UE (User Equipment) to use energy efficient SC-FDMA. The combination of OFDMA and SC-FDMA provides coverage areas comparable to HSPA (High Speed Packet Access) networks but offering high data rates. The functionality of the handovers plays an important role to ensure the QoS in all cases where LTE/LTE-A coverage area is sufficiently good. The X2 interface between the eNodeB elements optimizes

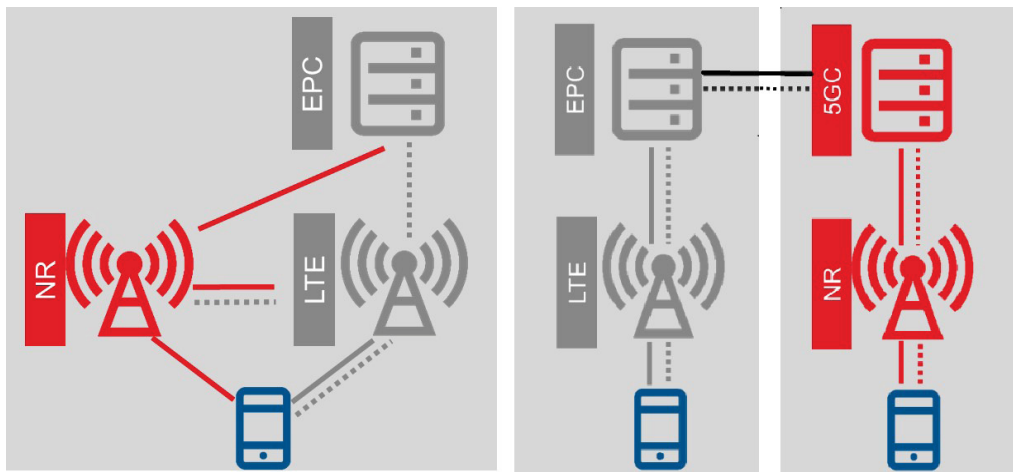
vice is more important even with reduced throughput rather than complete breakdown of the service.

ITU-defined 5G applications include eMBB (Enhanced Mobile Broadband), mMTC (massive Machine Type Communication) and uRLLC (Ultra Reliable Low Latency Communication). In all these deployment options, FWA (Fixed Wireless Access) is employed as a competitive substitute

to FTTx (Fibre-to-the-x) owing to its superior radio capabilities and reduced operational cost, leading to an economically feasible broadband connectivity. FWA enables the mobile operators to meet the rising broadband demand with

cheaper connectivity solutions rendering additional broadband revenue streams. Furthermore, FWA can provide a broadband upgrade in areas where xDSL or copper lines are hard to replace or if there is a time-limited demand.

Mainly, the deployment of 5G is either SA (Standalone) or NSA (Non-Standalone). SA option consists of only one generation of RAT whereas NSA consists of two generations of RAT (4G LTE and 5G). The NSA option leverages existing 4G deployment as the RAN is composed of eNodeBs



High Level architecture of NSA (left) and SA (right) deployment options

the success rate of the handovers in LTE as compared to the previous techniques. In a probable situation of service outage, the LTE connection is changed automatically to 2G/3G networks affecting the QoS level as the overall data throughput will be lower in this case. This fall-back procedure could seriously impact some of the applications involving real time data streaming but it wouldn't have the same effect for VoIP (Voice over IP) connection. Nevertheless, from the user point of view, the continuum of the ser-

as master node and gNodeBs as secondary node with a connection to EPC. In the SA deployment, RAN is composed of only gNodeBs and connects to 5GC (5G core). It does not have any impact on LTE radio and is capable of supporting all 5G use cases with network slicing via cloud native service-based architecture unlike NSA which may not be optimized for new 5G use cases beyond mobile broadband. The left and right side of the figure on the previous page represents the NSA and SA deployment options respectively [2].

In order to support NSA, the 4G core network needs only software upgrade without any modifications in the hardware since the handover procedure in 5G is not different from 4G network whereas EPC upgrade may be done under two scenarios. In the first scenario, the physical EPC is upgraded to support NSA and the capacity expansion is based on the physical EPC whereas in the second scenario, a new virtualized EPC is built to support NSA, with interoperability with the physical EPC and the capacity expansion is based on the virtualized EPC. The evolution to 5G SA would be carried out swiftly in the second scenario unlike the first scenario where the physical EPC based on a dedicated hardware cannot be used in a virtualized environment

C-Band is the primary band for 5G network, having a large bandwidth makes it perfectly suitable for 5G eMBB services. Due to the large downlink transmit power of the gNodeB, downlink coverage is better than uplink. The coverage of the C-Band downlink is

similar to that of LTE 1800 MHz but when it comes to uplink, the user experience is affected due to limitation in the coverage causing bottlenecks in 5G deployment. So in order to address the issue of this limited uplink coverage, 3GPP Rel. 15 introduced two mechanisms namely NR-CA (New Radio-Carrier Aggregation) and SUL (Supplementary Uplink). The synchronization of 5G network is also an important aspect to avoid interference ensuring an efficient usage of the spectrum and a reduced network equipment cost. If 5G macro-cells networks are not synchronized, more than 25 MHz additional guard-band together with additional transceiver filters would be required.

Fronthaul implementation plays a significant role to attain low latency level required by 5G use cases, manage mobile data growth, provision of scalability in terms of RAN densification and future evolution towards cloud RAN. As for the interfaces, eCPRI (Enhanced Common Public Radio Interface) and O-RAN (Open Radio Access Network) seem to be the main candidate for RRU (Remote Radio Unit) and CU/DU (Centralized Unit/ Distributed Unit) with a bandwidth granularity of 25Gbits/s. So the main aim is to adopt a single interface, eCPRI, with defined jitter/latency requirements for both 4G and 5G networks.

The idea of sharing the network infrastructure in 4G is expected to retain its popularity and continue in the 5G era, where the networks will be densified even more as compared to

4G networks. Network sharing comes in many forms but mainly classified as Passive and Active infrastructure sharing. In passive infrastructure sharing non-electronic components such as power supply-management system, and backhaul transport networks are shared. Active infrastructure sharing involves the sharing of electronic infrastructure of the network including RAN (consists of antennas/transceivers, base stations, backhaul networks and controllers) and core network (Server and core network functionalities). Some of the listed benefits of network infrastructure sharing are cost reduction, environmental benefits, improved customer experience and coverage expansion. Apart from these advantages, there are some disadvantages associated with the network infrastructure sharing approach as it may lead to hindrance in competition among the MNOs (Mobile Network Operators), since it is inherently difficult to differentiate own network infrastructure against the sharing partners. Furthermore, sharing of an existing network architecture is challenging because an existing network has already been planned and designed based on specific operator requirements, so consolidating it further is likely to be difficult if any of the requirements are conflicted. Keeping this in mind, the network infrastructure sharing may be difficult to implement in NSA but it may be more feasible with SA where both radio access and core networks would be newly deployed considering that the operators will collaborate from the planning phase.

It is worth observing the



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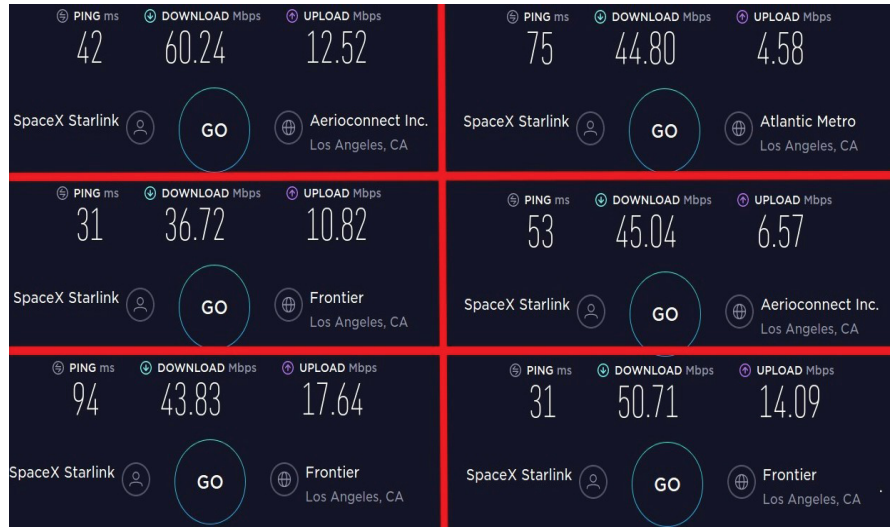
FEATURE

leaked performance results of SpaceX Starlink broadband services [3] during the compilation of this article and results, thus far, can help us better understand the application of LEO-HTS Mega-Constellation services for fronthaul or backhaul connectivity of given 4G or 5G cellular communications.

- Latency: 21 ms.
- Download: 45.9 Mbits/s. (5.7 MB/s.)
- Download: 10.1 Mbits/s. (1.3 MB/s.)

For the results given above, LEO-HTS satellites can be easily adopted to fronthaul of a 4G LTE network as well as 5G NR, with exception of mission-critical services where uRLLC is not the primary requirement. For the best-case scenario of Starlink VLEO (Very Low Earth Orbit) ~ 350km altitude, the latency for a roundtrip can be around 2.34 ms, which is remarkable and significant improvement to that of a traditional GEO satellite.

However, these are just the analysis of provision of fronthaul and backhaul services to cellular networks from the space, a thorough research is still needed to make a business case where lots of other considerations have to be studied for such technology. The satellites of the constellations, with inclusion on-board processing must be made to serve the purpose as a cellular Access Point through software defined technologies like SDN (Software Defined Network), SDR (Software Defined Radio), NFV (Network Function Virtualization), O-RAN etc. to connect directly to the user



Starlink Performance Results

equipment via OTA (Over-The-Air) interface, as well as frequency spectrum adoptability of user equipment, doppler effect (estimated velocity of these satellites is 9km/s), link-budget analysis etc., for a complete network architecture.

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[2] 5G Implementation guidelines; <https://www.gsma.com/futurenetworks/wp-content/uploads/2019/03/5G-Implementation-Guideline-v2.0-July-2019.pdf>

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[1] The LTE-Advanced Deployment Handbook; <https://www.wiley.com/en-us/The+LTE+Advanced+Deployment+Handbook+%3A+The+Plan->

[3] <https://freenews.live/first-starlink-internet-speed-tests-published/?fbclid=IwAR2wCx8E8EJPBVWS3xt2JncYIzzcvYxn5TCgIBpKyrxk-22D0wRQTVxleKzws>



With around a decade of experience in the satellite communications industry, **Muhammad Furqan** is a renowned writer and analyst with multiple publications and keynote appearances at different international platforms. Currently based in Australia, he is working in research related to Radio Frequency Electromagnetic Spectrum for mobile and satellite communications at Queensland University of Technology. He can be reached at: info@muhammadfurqan.com



Waheeb Butt received the B.S. degree in Electronics from IIU Pakistan in 2007 and M.Sc. degree in Communication and signal processing from Newcastle University, UK in 2009. Since then, he has been involved in teaching and research activities related to the field of telecommunication. He is currently doing PhD at RWTH Aachen University Germany, in the area of wireless communications.

He can be reached at: waheeb.butt@ice.rwth-aachen.de

The Biggest RF Company You May Never Have Heard Of

by Virgil Labrador

RevGo Global maybe the biggest RF company that you've never heard of. You may not know their company name but if you have been working in the satellite ground segment sector in the last 20 years chances are you have most likely have come across the products that they have made.

RevGo Global has delivered over one million units since 2002 including satellite Block Upconverters (BUCs), Low Noise Blocks (LNBs), transceivers and point-to-point Outdoor Units (ODUs). However, most of the products they have delivered has been under other private labels and not until recently under the RevGo brand. The reason is RevGo spun off from Wavelab Inc, which produced RF and microwave equipment under Original Equipment Manufacturing (OEM) agreements with other companies, some of which are well known brands in the industry.

Wavelab was founded by senior satellite engineers from the US and Canada in 2002 and initially focused on point-to-point microwave products. In 2012, the company expanded into the satellite market with its first products of BUCs and LNBs for the Asian market and for private label of two of the five leading BUC and LNB manufacturers. Since 2016, Wavelab decided to launch its own brand of

satellite RF systems under the Revgo Global name, while Wavelab continued to focus on point-to-point microwave communications. Today RevGo designs and manufactures RF systems with well over 50,000 transceivers, BUCs and LNBs deployed in the Ku-, Ka-, C-, and DBS-Bands for satellite earth stations, VSAT networks and mobile applications.

New Generation GaN Technology

With headquarters and main R&D facility located in Reston, Virginia, USA and other facilities in Houston, Texas and Guangzhou, China, RevGo has created a broad product series of highly reliable BUCs, low noise block LNBs, and full transceivers with the most efficient size, weight, power and quality (SWPaQ) with the following features: Output powers from 2 to 200 Watts with standalone (1+0) and redundant (1+1) operation. The company

combines new generation GaN technology, unique power combining technology and a high-volume production-oriented system design with strict quality control to create more efficient, compact, cost competitive and field proven reliable products.

All RevGo products are manufactured to the stringent quality standards of ISO9001:2015 and is available within the shortest lead times.

“RevGo RF solutions are compact, require no



Revgo Global's headquarters and main R&D facility in Reston, Virginia, USA. Revgo Global also has facilities in Houston, Texas and in Guangzhou, China.

tuning, and are fully synthesized and designed using the latest RF technology. RevGo continually focuses on quality and ease of the manufacturing process, which allows large-scale production volume as well as a reliable product that is very competitively priced,” said Mike Engle, President and CEO of RevGo Global.

Key Differentiator

Engle points out the key differentiator from the many other BUCs and LNB manufacturers in the market is that RevGo is a high-volume manufacturer. “We design products specifically for high volume production. This is a key differentiator for us because we design things that have no manual tuning. We design products with automatic testing so flatness gets automatically adjusted. Therefore, we have a low labor component to our production process. We are also the largest supplier of Ka-Band transceivers in the world today,” said Engle.



“We design our own GaNs and package our own GaNs. We do not rely on outsourced parts. This improves quality control and shortens delivery times. This enables us to quickly deliver to our customers unlike our competitors who rely on outsourced GaNs. The GaN is one of the hardest to and longest lead items to procure. We’ve streamlined the production process so you can get your product in less than four weeks,” said Engle.

David Seeman, an experienced satellite industry executive who recently joined RevGo Global as Director of Sales, said that “what attracted me to the company is the passion for RF. They basically don’t say no. They have engineers from all over the world who provide unique input and they just like build-

RevGo Global BUCs, LNBs and Transceivers

Founded by Satcom senior executives from US and Canada with more than 100 years of combined experience at Satcom RF systems, RevGo Global Inc combines the new generation GaN transistors, unique power combining technology, volume production oriented system design and strict reliability control to create the most compact, cost effective, field proven reliable BUCs LNBs and transceivers from C-band, Ku-band, DBS-band to Ka-band.

Revgo Global combines the new generation GaN technology with unique power combining capabilities, designed for high volume production with strict reliability and quality control to create the most compact, cost-effective, field-proven, reliable BUCs, LNBs and Transceivers. Manufactured to the stringent quality standards of ISO9001:2015. All at the highest value available and the shortest lead times.


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- BUC, LNB, Transceiver – Tx/Rx/OMT/Filters

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ing good, reliable products.”

A Company Easy to Do Business With

The company is proud not only of the quality and reliability of its products but also of the ease of doing business with them. “We are big enough a company to meet any requirements under the most exacting standards but also small enough to work very closely and develop relationships with our customers. We make it very easy to deal with us and not make the process too complicated. It’s either we can make it to fit your requirements or we don’t and our prices are very competitive. The relationships we have with our customers have lasted for multiple years because of the trust they have in us.” said Engle. 

“...RevGo RF solutions are compact, require no tuning, and are fully synthesized and designed using the latest RF technology. RevGo continually focuses on quality and ease of the manufacturing process, which allows large-scale production volume as well as a reliable product that is very competitively priced...”

**--Mike Engle, President and CEO
RevGo Global**



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Satellite Executive Briefing highlights key products and services now available in the market.

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For more information go to: www.advantechwireless.com/summit-II

AvL Technologies's 2.4m axi-symmetric antenna

AvL's new 2.4m axi-symmetric antenna is ultra-lightweight and has a breakthrough three-case pack-up.



The 14-piece carbon fiber reflector operates in X-, Ku- or Ka-band with new bayonet-style feeds and quick-change RF kits, and a C-band capability is in the planning as an upgrade. The antenna is modular, flexible and operates on an aluminum space frame, which enables set-up or pack-up by one person in minutes. Once the antenna is set-up and anchored, the manually operated antenna is easily repositioned using simple, ergonomic pointing assist features – no anchor adjustments needed – for fine tuning to one satellite or pointing to a different satellite.

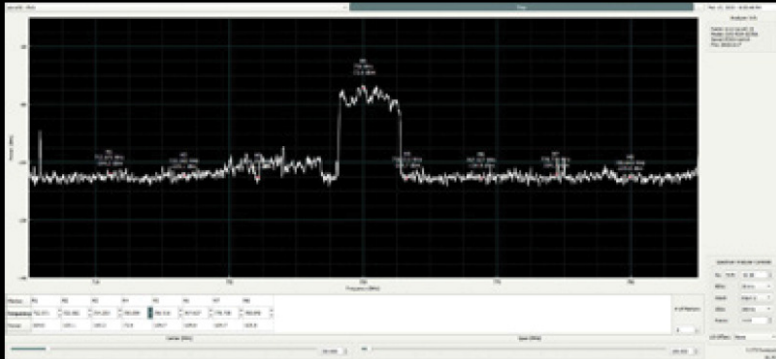
AvL antennas are the industry benchmark of excellence for GEO & MEO ground systems, Oil & Gas Data Backhaul, Disaster Relief, mobile broadband Internet access, Defense & Homeland Security, and Satellite News Gathering solutions.

For more information go to: www.avltech.com

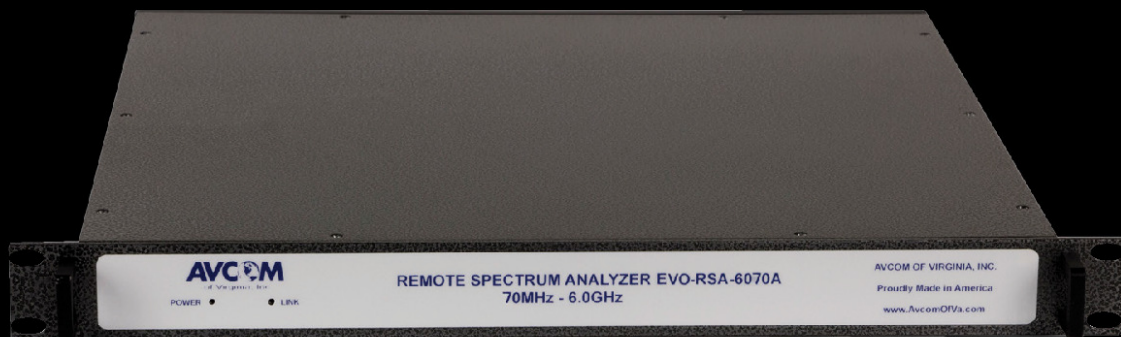
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0.6M/0.9M Auto or Manual Flyaway antenna — Flyaway applies to the war zone for military communications and broadcast media, and it is extremely portable and supports manual, auto and one button capture satellite within 3 minutes.

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For more information, please visit www.jonsa.com.tw or email. saccount@jonsa.com.tw



A large advertisement for JONSA VSAT Antennas. The background is a dark blue world map with glowing blue lines and dots representing satellite connections. In the center, the word "JONSA" is written in large, white, bold letters with a registered trademark symbol. To the left of the text is a large, gold-colored satellite dish on a tripod stand. To the right is a smaller white satellite antenna with a radome, similar to the one in the top image. In the bottom left corner, there is a JONSA logo with three stars above it, followed by the website "www.jonsa.com.tw" and email "saccount@jonsa.com.tw". In the bottom center, the text "Link Jonsa VSAT Antenna Cover Your Life" is written in white. In the bottom right corner, there is a QR code.

Mission Microwave SSPAs for TWTA Replacement in Ka-Band Satellite Gateways

Mission Microwave has produced a family of wide-band Ka-band SSPAs to support LEO, MEO or GEO constellations from a single gateway station. Offered in commercial models within the range of 27 GHz to 30 GHz, these GaN based SSPAs are designed to be form, fit and function drop in replacements for Travelling Wave Tube Amplifiers (TWTAs) commonly used on gateway ground stations. These new products take advantage of the knowledge and experience gained from deployment of Mission’s existing product lines, which already lead the industry in mobile Ku and Ka-Band BUC deployments for commercial and Government SATCOM terminals.



**Mission Microwave’s
MOAB 400 Watt Ka-Band SSPA**

“Customers have long been demanding high power SSPAs to replace TWT Amplifiers,” said Mission Microwave’s President and CEO, Fran Auricchio. “Our latest amplifier is the most advance GaN SSPA on the market and can provide up to 166 watts of linear power in a multi-carrier environment and over 200 watts of linear power for a single carrier; effectively replacing a 500 watt TWTA. The amplifier is design for outdoor mounting and sustained operation at 60°C. Our team and the initial customers for this product have been very excited by the prospect of replacing their TWTA amplifier fleets with more reliable and efficient SSPAs,” he added.



X, Ku and Ka-Band BUCs from 10 to 400 Watts



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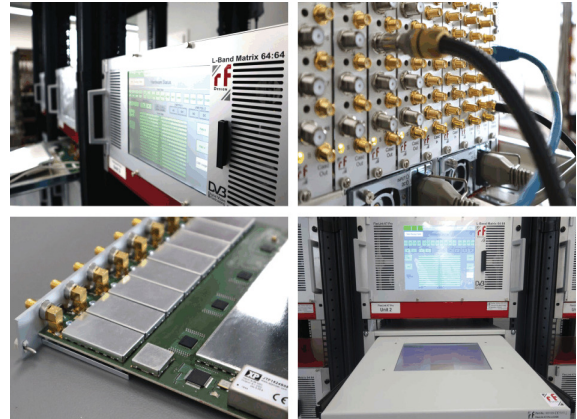
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The FlexLink K7-Pro is the flagship of RF-Design's Switch Matrix product range. It represents an expandable Switch Matrix system that operates at the extended L-Band frequency range 850 – 2450MHz. The FlexLink K7-Pro can be populated from 8:8 to up to 256:256 I/O's and is a perfect fit for signal routing applications especially at Satellite Ground Stations and Teleports.

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XMW Inc. is very pleased to officially announce its roll out of SES mPower series. These series fully cover complete line of products from LNB and BUC ranging 5W up to 40W required by SES mPower service expected to be launched in 2021. New series of BUCs have the smallest and lightest form factors to meet new mobile applications for airborne, maritime, vehicle, and portable antenna systems as well as fixed antenna systems. Redundancy systems for both of LNB and BUC are also available for the sites that need more reliable service.



Ka Tri-band 20W BUC for mPower

Ka Tri-band LNB for mPower

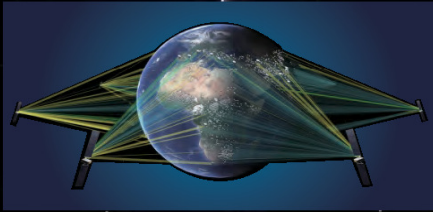
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XMW facilitates communication in the Earth and Space
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“Air-series™ for Airborne Applications”



AirBUC™
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AirLNB™
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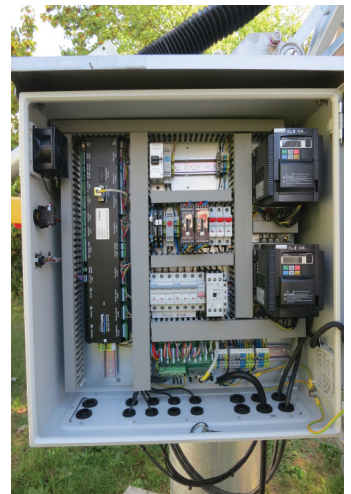


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Satservice ACU2-ODM Step-Track Antenna Controller

SatService is proud to announce that it's well known step-track antenna controller module sat-nms ACU-ODM has now got a successor ACU2-ODM. It is based on a new and more powerful hardware platform and provides the following new key features:

- TLE (NORAD-NASA), Intelsat 11 Parameters Tracking
- Polarization Prediction
- Jackscrew protection mode
- Beacon Receiver direct control
- Target Editor
- NTP time synchronization



The new DIN Rail module sat-nms ACU2-ODM is fully compatible with the recent version and will therefore be used for all existing indoor and outdoor ACU systems and related upgrade kits. SatService ACUs can be used for all types of satellite communication ground station antennas.

SatService is a German manufacturer, system house and reseller for professional equipment and services for satellite ground stations.

For more information go to: www.satservicegmbh.de

ST Engineering iDirect's iQ LTE Series Satellite Modem

ST Engineering iDirect's iQ LTE Series combines next-generation DVB-S2/DVB-S2X satellite connectivity with 4G-LTE creating a converged solution able to deliver reliable and persistent communications across a wide range of on-the-move and on-the-pause land mobility use cases. Featuring an integrated Cradlepoint LTE cellular router, the solution offers fully automated VSAT/LTE failover and failback, WAN link affinity steering, advanced VPN connectivity, and an available SD-WAN option for robust communications.

The iQ LTE series is ideal for emergency response and government applications reaching throughputs over 1000 Mbps on a cellular network and over 300 Mbps on a VSAT network, when being used in L2oS mode. Licensable features allow for easy scaling. The satellite modem will reach high return throughputs due to high Msps rate (up to 15 Msps) on the inbound while it also supports high power BUCs and OpenAMIP mobility.



This hybrid cellular and satellite solution offers always-on connectivity and the reach needed for on-the-move communications.

For more information on the iQ LTE Series go to: www.idirect.net/products/iq-lte-satellite-modem

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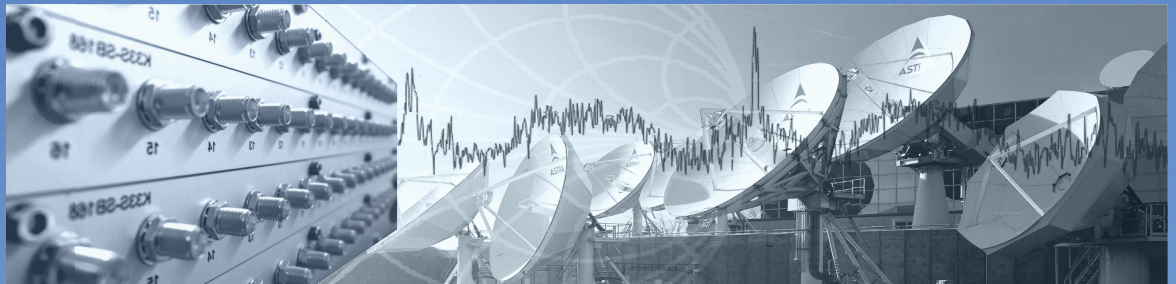
FURTHER UPGRADES

Retrofit of existing Andrew tracking controller with *sat-nms* ACS3000 upgrade kit

Further ACU replacement units on request

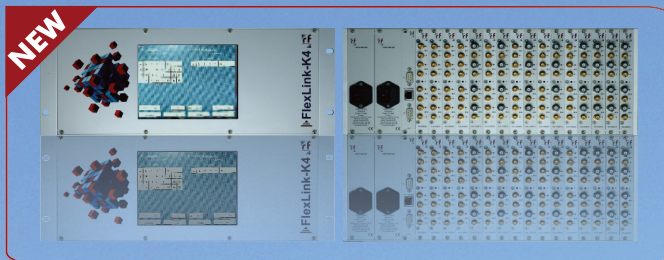
More high performance solutions e.g. optical links, frontend processor, M&C software are available

**IF YOU HAVE ANY QUESTIONS OR NEED A DEMO -
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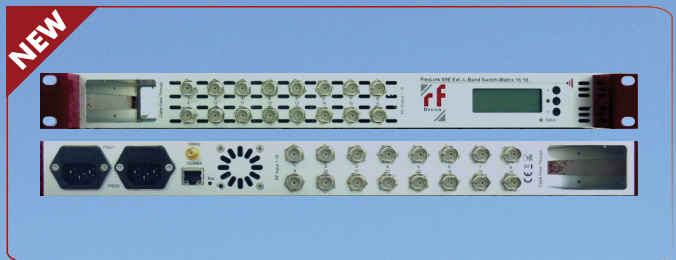


EXCELLENCE IN RF EQUIPMENT

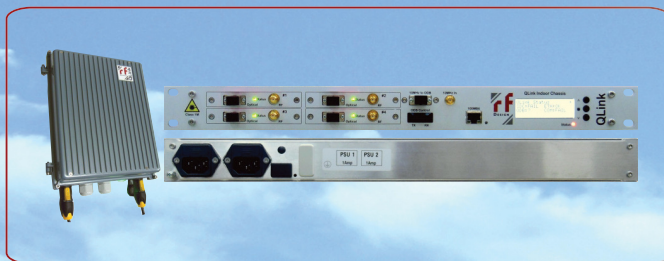
„FlexLink K4“ 32:32 Switch Matrix



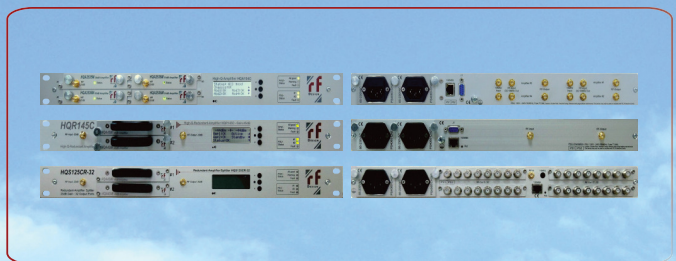
„FlexLink S9E“ 8:8 or 16:16 Matrix



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Leaning Into Risk

by Lou Zacharilla

The best advice I ever got for dealing with things that terrified me was from a teacher in New York 30 years ago. She said, “Try leaning into your fears.”

It is a human tendency to back away from fear and risk, or to let someone else take it on for you. You can still count me among those with that tendency in mega doses. I have no genuine physical courage. But when I push myself to go through something hard and scary, like a medical procedure or a new business venture, I feel much better for having leaned in. It has been my experience that dread and risk are like everything else. The thing you dread is never as bad as you imagine it will be - or as good. And all things are transient. That is the really good news. Better to take a risk and overcome it because it may be, in the end, what defines you. And that is the path to a joyful experience, where work and resistance are replaced by effortlessness.

Because more people are in a state of dread and fear than ever, we started wondering, “What does this have to do with the space and satellite business?” After all, few industries normalize and overcome more risk than the satellite industry. We are not known to be risk adverse because it is how we earn our pay. There are few things riskier than a launch, or deploying a US\$ 400 million satellite or riding one of these Roman candles into the sky. The potential downside of these risks don’t need no ‘splainin’.

But there are all types of risks that we do not consider. SSPI decided to look at as many as we could name.

<https://www.sspi.org/cpages/better-satellite-world-risk>

We asked, “What are other risks inherent that

may not be considered as such? (And I am not talking about being a Mets fan or buying Intelsat stock....) As we started to jot them down in our production meetings the list kept growing.

There is the risk of starting a business. This one is most familiar to most people. But how about starting one in a place that you visited only once but fell in love with? A place like Asheville, North Carolina, say? Jim Oliver, the founder of AvL did just that. He took a risk starting his company in a place where there was no industry cluster. But because he took that risk, he eliminated a far more deadly risk. His antennas impacted the safety of the military. Whenever a young private went out in the field and needed supplies, they would “burn” a supply list onto a CD and drive a Humvee across the line of fire to deliver it. An average of 30 soldiers were killed each year doing it. But thanks to Jim taking a risk in hilly Asheville, that awful risk was eliminated.

“...few industries normalize and overcome more risk than the satellite industry. We are not known to be risk adverse because it is how we earn our pay....”

How about the risk of being ethical in a commercial environment? Will Griffin is the Chief Ethics Officers at Austin, Texas-based Hypergiant.

He was hired to fulfill a promise made by his CEO, Ben Lamm, to “deliver the future we are promised.” In the world of AI that can mean stopping a product from being produced because it does not pass the company’s rigorous ethical criteria, which includes “the law of humanity.” This is basically the Golden Rule. If the Hypergiant product does not help humanity, it does not go to market.


There is the risk of being wrong about climate change, which some of us will be. To ensure that fewer of us are not wrong there are business models like BlueField Technologies’, which effectively challenges energy companies and governments on their claims about meeting the standards for methane

emissions.

The risk of putting your money where your vision is was also listed. How about a vision that includes figuring out a way for EVERYONE to have a financial piece of the New Space economy? That is a refreshingly bold one for a “money guy” to make. But when that “money guy” is Voyager Space Holding’s Dylan Taylor and you spend 25 minutes with him, the question I asked after was, “Why are people afraid of taking risks this BIG?”

What we have learned is that risk can be tough and end a person’s security for awhile. That is tough stuff. Ask any person who has experienced this “dark night of the soul” and you get a glimpse of what goes on inside them. I wanted to ask. I am amazed that almost to a person their real agenda turned out to be to make a better industry and a better world.

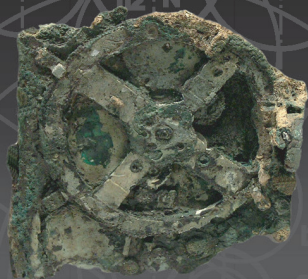
So SSPI, with the support of its sponsors, has started rolling out a special series of The Better Satellite World podcast called, “Risk.” Each Monday we drop a new episode. You can find it on Apple Podcasts, Spotify as well as www.sspi.org.

Let me know if you have a risk you think should be explored. 

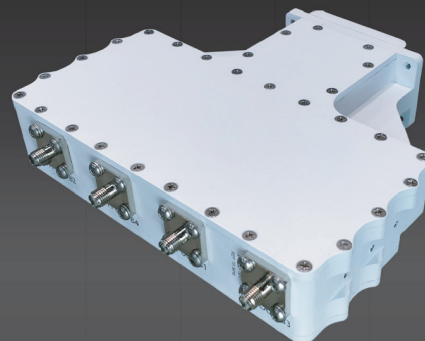


Lou Zacharilla is the Director of Innovation and Development of the Space and Satellite Professionals International (SSPI). He can be reached at: LZacharilla@sspi.org

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Digitization, ‘Actionable Intelligence’ and a Global Digital Ecosystem

by **Martin Jarrold**

The GVF Webinar Series has been an innovative response to the dictates of a variously locked down world and its various themes have been well received by a global audience. Whilst, as noted in my previous column, 69 has been the least number of countries dialing-in to any one individual Zoom event, the total number of nations reached across the series to date has now exceeded 120.

Last time, I referenced our ninth webinar which, to put it succinctly, was all about the money. Our tenth event will already have taken place by the time you read these words but, like the many hundreds of others who will already have done so, you can access the video recording of this event, and all previous webinars in the series, at <https://gvf.org/webinars/>.

Global Transitions: Digital Economy, Digital Infrastructure, Connected Communities, Digital Planet was broadcast live at 3:00pm London time on 24 September, a good time for the moderator and panelists located in the UK, Switzerland and the USA, but somewhat more challenging for the contributor speaking from Australia, representing GVF member, Telstra. From the UK the webinar’s moderator represented the Satellite Applications Catapult; from Switzerland the speaker represented the United

Nations Environment Program (UNEP) Digital Transformation Task Force; and from the USA we featured another GVF member, Isotropic Networks.

The train of thoughts which originally led to formulating the theme of this webinar originated out of the social distancing, working from home and travel restriction imperatives of the pandemic lockdown. Over time the initial thoughts greatly expanded to the concept of “Digital Planet”, heavily influenced by ideas emanating from the UNEP.

The importance of the enabling communications technologies behind our now having been forced to realize the full potential of “virtual” business meetings/events – greater inclusiveness, fewer international travel frustrations, lower greenhouse gas emissions, more efficient utilization of working time and associated improved work-life balance – has been boldly underscored. This change in the human experience, seemingly only an incidental consequence of a (hopefully) limited phenomenon – in the form of the SARS-Cov2 virus – is an illustration of something which has a deeply rooted strategic significance. It illustrates that we have the potential to increasingly and more accurately understand the complexities of the world around us – natural disaster causes and consequences, manifestations

and effects of climate change, monitoring environmental degradation throughout the biosphere, human action and inaction with consequences including refugee population migrations – because of our ability to gather, analyze and disseminate that which can be digitized.

“Lockdown” necessitated new (digitized) ways of working to enable many people still to do their jobs; there is also a profoundly deeper focus on extending digitization to facilitate recovery from the economic recession engendered by pandemic. Notions about, and gearing-up for, ‘Digital Economy’ and ‘Digital Infrastructure’, are not new, but a global socio-economic crisis has most certainly energized debate about the necessity, and the advantages, of far greater changes than were previously conceived.

The fact that economies and communities will all be more deeply and widely enabled by the growing digital infrastructure that will be built on the integration of 5G and satellite technologies into a single network of networks has now assumed a greater significance. Industries, businesses, people and governments worldwide, facing unprecedented challenge, will accelerate in their adoption of digitization to both adjust to the new normal and to improve preparedness to minimize the impact of the next crisis – an impact

that may again be equally as serious for, and equally intertwining of, people's economic well-being and their health.

Digitization is not an end in itself. Whilst data gathered from a massively expanded – 5G + satellite enabled – communications infrastructure will be the vital raw material of a digitized economy and society, what matters is the mechanism and processes by which it is turned into what is today commonly called “Actionable Intelligence”, often represented in the form of “dashboards”.

Data in the Zettabyte Age will flow in vast volumes from the tap of the Internet of Things (IoT), of course including the Industrial Internet of Things (IIoT), but also encompassing so many more devices from our own personal wireless communications (i.e., smartphones with social media, plus increasing biometrics-based data generation) to our Wi-Fi-enabled domestic appliances. However, all this data will really only be of use when it is determined exactly what it is for. Data may be just measurement, quanta, of things, but when data is analyzed it becomes information, and information is the building block of the knowledge that facilitates effective decisions and enables positive and productive action.

Data maintains financial liquidity in markets, improves creativity in maintaining and evolving supply chains, makes production of “things” more efficient using latest manufacturing technology advances, takes ideas and develops them, and builds more robust cyber security to sit alongside machine learning and

artificial intelligence (AI).

A digital infrastructure comprising, in 5G terminology, Enhanced Mobile Broadband (eMBB), Ultra Reliable Low Latency Communications (URLLC), and Massive Machine Type Communications (mMTC), may be expanded into not just a global digital ecosystem, but a global digital ecosystem, as suggested in dialogues within the United Nations Development and Environment Programs. In this we will potentially see a world wherein data is gathered from all conceivable sources by all available technologies and processed by all available tools:

- satellites, drones & sensors
- artificial & virtual reality
- smartphone apps
- open source software
- blockchain & distributed databases
- social media feeds
- IoT
- AI & machine learning
- cloud & edge computing
- and, others!

The “product” of this global digital ecosystem will enable more than just the formulation of Actionable Intelligence, but foster a culture of Sustainable Decision-Making that, in the context of trying to meet the Sustainable Development Goals (SDGs) and of trying to stem climate change, will be the indispensable currency of the future Digital Planet.

This webinar dialog between the Satellite Applications Catalyst, Isotropic Networks, Telstra,

and the UNEP initially examined what it really means to be digitally connected in an urban center in an industrial region as well as in a remote community in a developing region. Moderator questions covered the implications for manufacturing and transport of AI and IoT; societal trends engendered by wireless devices; media consumption; digital payment systems; and national & regional policies affecting ways in which services will be delivered to citizens.

This video recording of this discussion is not to be missed if you want to grow your understanding of what the future of the digital Earth may be, how satellites might be contributing to it 10 years from now, and understanding the steps needed now to create a pathway to this future.

Don't forget to note the next three webinars in this series, with more information available at: <https://gvf.org/webinars/>:

- 8 October 2020

A Regional Perspective on C-Band – The Next Battleground?

- 22 October 2020

The Regional Satellite Operators' Voice

- 5 November 2020

Humanitarian Assistance & Disaster Response: The Evolving Role of Satellites in Disaster Response

These, and later online events, are GVF's continuing contribution to the Webinar Epoch! 🗺️



Martin Jarrold is Vice-President of International Program Development of GVF. He can be reached at:

martin.jarrold@gvf.org

Comtech and Gilat Terminate Merger Agreement

Comtech Telecommunications Corp. (Nasdaq: CMTL) and Gilat Satellite Networks Ltd. (Nasdaq: GILT; TASE: GILT) announced today that the companies have agreed to terminate the merger agreement first announced on January 29, 2020 and have settled all pending litigation in the Delaware Court of Chancery. In connection with the termination and settlement agreement, Comtech has agreed to make a payment of US\$ 70.0 million to Gilat.

The merger termination and the settlement agreement have been ap-

proved by each company's board of directors and are effective immedi-

ately. The settlement calls for dismissal of the litigation, with prejudice. The trial of the litigation which was scheduled to begin today in Delaware Chancery Court was accordingly cancelled.



In a joint statement, Fred Kornberg, Comtech's Chairman and Chief Executive Officer, and Dov Baharav, Chairman of the Board of Gilat, said "While we both believed from the outset that the merger of these two great companies was a perfect marriage, the COVID-19 pandemic made the timing of the combination particularly challenging.

We concluded, that under current conditions, the settlement is the best path forward for both companies and their respective stakeholders."

We concluded, that under current conditions, the settlement is the best path forward for both companies and their respective stakeholders."

GMV Merges its UK Company with NSL

London, UK, September 7, 2020 - GMV Innovating Solutions, the UK aerospace company belonging to GMV, has signed a merger agreement with Nottingham Scientific Limited (NSL). GMV trades in the aerospace, defense, ICT and intelligent-transportation-systems markets while NSL is UK leader in satellite navigation and critical applications. After the agreement GMV becomes sole shareholder of NSL and sets up the company GMV NSL, to be integrated seamlessly into GMV's set of companies.

Back in 2013, as part of its international expansion, GMV rolled out a business development strategy in the UK. This involved setting up a new company, which came on stream in late 2014 to join the suite of companies and offices in Spain, USA, Germany, France, Poland, Portugal, Romania, The Netherlands, Malaysia and Colombia. Working from its Harwell innovation center in Oxfordshire, GMV's main UK business is earth observation, space debris tracking, mission planning, flight dynamics, navigation, autonomy and robotics. Its principal clients include the European Space Agency (ESA) and the European Commission (EC), as well as UK's space agency (UKSA), the Defence Science and Technology Laboratory (DSTL), Innovate UK, ASUK, Satellite applications Cata-

pult and the Science Technology Facility Council (STFC).

Set up in 1998 and boasting a solid and acknowledged track record in hi-tech projects, NSL is a UK-based SME specializing in satellite navigation and critical applications. From its Nottingham head office in the East Midlands, NSL offers GNSS-based services, systems, solutions and intellectual property, helping to ensure that navigation and positioning are precise and reliable, secure and protected, resistant and robust. NSL's major clients include UK Space Agency, ESA, UK Government departments, QinetiQ, Inmarsat, and the European Commission.

GMV NSL, 80-strong, will be integrated into GMV's set of companies, which closed 2019 with a staff of 2,176 and a turnover of more than £236 million. GMV NSL will be able to rise to even greater challenges and tap into the opportunities offered by the UK market, especially the space market, not only in satellite navigation and in critical applications, but also in earth observation, telecommunications and new technologies, with the overarching aim of winning pole position in Britain's space sector, according to GMV.

WALTON DE-ICE

Portable Radome



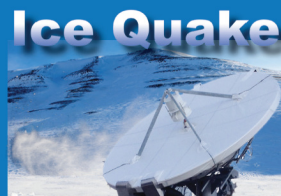
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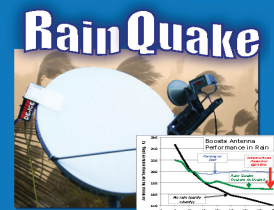
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Globecast Appoints Antoine Guilbaud as CFO

Paris, France, September 23, 2020-- Globecast has announced the appointment of Antoine



Antoine Guilbaud

Guilbaud as Chief Financial Officer, effective September 1st. He replaces Nathalie Krick, who is taking

up a new role in Globecast's sister company Orange Cyberdefense.

Guilbaud's duties include providing the CEO and management board with financial and management information to ensure proper driving of the business and to oversee the implementation of the company's financial goals and ambitions. He's also responsible for finance, budget and strategic planning, and global purchase activities.

Guilbaud brings to his new position over 20 years of experience in the telecom industry. As former CFO and General Secretary at BuyIn – the joint venture between Orange and DT providing strategic procurement – Guilbaud was in charge of finance, IT, legal and compliance, as well as procurement engineering. Prior to this, he was the CFO/Deputy CEO at Orange Slovakia, where he was a member of the company's Executive Management and Board of Directors. He also worked as Finance Director at Orange Belgium.

XTAR Appoints Michael Assid VP-Sales & Marketing

Asburn, Va., October 1, 2020-- XTAR, LLC announced the appointment of Michael A. Assid as its new Vice President of Sales and Marketing. Prior to joining the XTAR team, Assid served in numerous leadership roles at Headquarters, Air Force Space Command (AFSPC) and Headquarters, U.S. Space Force.



Michael Assid

He continues to serve as a Colonel in the U.S. Air Force Reserve, currently assigned as the Senior Individual Mobilization Augmentee to the Commander, Space Training and Readiness Command (STARCOM) at Headquarters, U.S. Space Force. In his new role at XTAR, Assid will set strategy for all domestic and international sales, business development and marketing activities within the organization.

Assid is a 31-year military space veteran with extensive operational experience in Space Electronic Warfare, Offensive and Defensive Space Control, Satellite Communications, Space Situational Awareness, Command and Control, Test and Evaluation, and Adversary Space Operations. He holds a Bachelor of Business Administration from the University of Texas at Arlington, and Master of Information Systems Management from Lesley University. Mike is a founder of the Air Force's Space Aggressor Program and

its two Space Aggressor squadrons, founder and former commander of the Air Force's only Reserve Space Control Squadron, and former commander of the 310th Operations Group.

XTAR, LLC is a commercial satellite operator providing MILSATCOM-compatible communications exclusively for government and military users.

Momentum Appoints President

Santa Clara, Calif., September 16, 2020-- Momentum Inc., a commercial space company providing in-space satellite transportation and infrastructure services, today announced the appointment of Dr. Fred Kennedy as President of the company, effective September 14, 2020.

Dr. Kennedy most recently served as the inaugural Director of the Space Development Agency (SDA), a U.S. Department of Defense agency responsible for developing threat-driven space architectures to sustain the U.S.'s technological advantage in space. Prior to that, he led the Tactical Technology Office (TTO) of the



Fred Kennedy

Defense Advanced Research Projects Agency (DARPA). Before joining DARPA, Dr. Kennedy served

as the senior policy advisor for the White House Office of Science and Technology Policy


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(OSTP), advising the President of the United States on space and aviation policy. Dr. Kennedy retired as a colonel from the U.S. Air Force after 23 years of service, filling multiple senior roles related to spacecraft technology demonstration and satellite system production.

Globecast Americas Hires Lou DiMauro as VP-Sales

Los Angeles, Calif., September 8, 2020 — Globecast, the global solutions provider for media, has announced the appointment of industry veteran Lou DiMauro as Vice President of Sales, East Coast, effective immediately. In his new role, DiMauro will be

responsible for selling Globecast media management, contribution, distribution and IP services to customers based in the US and Canada.

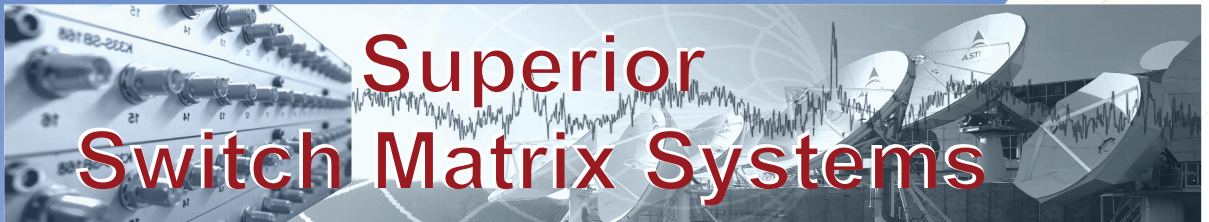


Lou DiMauro

DiMauro will be responsible for Globecast’s advanced media services including cloud-based playout and media management services and OTT platforms. He will report to Tim Jackson, Senior VP, Sales & Marketing, the Americas, Globecast.

DiMauro most recently held the

position of Vice President of Sales, North America, for Encompass Digital Media (including predecessor companies Group W and Ascent Media) as part of his more than 30 years with the company. During that time he oversaw sales of current and new services, managed an annual sales budget of US\$ 75 million and with large-scale accounts including A&E Television Networks, CBS, and ABC, among others. Prior to working for Encompass Digital Media, DiMauro was Broadcast Operations Coordinator at ESPN Media.



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„FlexLink K4“ 32:32 Switch Matrix



„FlexLink K7-Pro“ 64:64 Switch Matrix



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Early Confirmed Speakers



Lee Choong Kay
VP, Chief of Sports
Astro



Lakshanti Fernand
Partner
CMS Singapore



Angeline Poh
Chief Corporate
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Ivy Wong
CEO
VS Media



Clément Schwebig
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Highlights for 2020

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- Streaming Ahead
- Premium Advertising
- Sporting Times
- Talking Tech

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NSR Report Shows that Satellite-Based Earth Observation not Slowed by COVID-19

Cambridge, Mass., Septmeber 28, 2020-- NSR's Satellite-Based Earth Observation, 12th Edition (EO12), released today, finds a limited impact from COVID-19 on the EO market, with the sale of EO data and derived products to reach

\$8.1 billion annually by 2029. Revenues will be driven by government, military, and financial service-based customers, owing to strong demand and diversity need. Constellations of satellites featuring optical, radar,

and new non-imagery datatypes - such as radio frequency monitoring - are expected to dramatically increase the industry's access to supply and encourage new business models.

Investment and announcements strongly support the development of satellite constellations for Earth Observation. NSR estimates that over 1,000 EO satellites, as part of constellations, are expected to launch by 2029, with 78% of those featuring optical payloads. In addition, NSR notes that investment

has not slowed down, even as other sectors face a reduction due to COVID-19.


"There is a lot of excitement in the EO market for large volumes of data and services", notes

ground, with investment continuing strongly through 2020.

Despite all the excitement and planned launches, NSR's EO12 report warns of challenges in the industry. Competition and a lack of standardization are expected to slow market uptake, leaving many players facing high CAPEX and hesitant customers. "Constellations are bringing volume, and subscription services are increasing access to EO data. However, every product and service is priced, and structured, differently. This makes purchasing a rather lengthy process, expecting to keep market growth more moderate than hoped for," Kasaboski states.



Dallas Kasaboski, NSR Senior Analyst and report author. "The industry is trying to change from traditional, one-off purchasing, toward providing EO data, information, monitoring, and insights-as-a-service. As such, satellite constellations are a major part, but so too are other technologies such as cloud computing, artificial intelligence, and machine learning", Kasaboski added. For the past decade, NSR has noted investment's strong focus on satellite infrastructure, but downstream services seem to be gaining

NSR's latest report details the growth of the EO industry from data & imagery to big data analytics. Improvements on the distribution of data and services are expected to catch up with volumes of supply coming via dozens of constellations. New capabilities such as persistent monitoring, greenhouse gas, radio frequency observation, and cloud computing are expected to drive the market toward becoming a more consumer-friendly sector over the next decade. 

The Satellite Markets 20 Index™

Company Name	Symbol	Price			Price Change	
		October 8	52-wk Range		Last Month	Jan. 2
Satellite Operators						
Thaicom Public Company Limited	THCOM.BK	6.10	2.14	6.20	-2%	53%
Eutelsat Communications S.A.	ETL.PA	8.21	7.98	18.67	-8%	-43%
APT Satellite Holdings Limited	1045.HK	2.01	1.97	3.94	-7%	-32%
Echostar	SATS	28.64	23.93	45.15	1%	-34%
SES S.A.	SES.F	6.11	4.88	18.03	-2%	-51%
Satellite Manufacturers						
The Boeing Company	BA	163.22	89.00	378.70	-5%	-48%
Maxar Technologies	MAXR	27.80	6.80	30.13	17%	34%
Lockheed Martin Corporation	LMT	380.02	266.11	442.53	-1%	-11%
OHB SE	OHB.DE	39.6	25.65	48.65	4%	-7%
Honeywell International Inc.	HON	170.05	101.08	184.06	2%	-6%
Equipment Manufacturers						
C-Corn Satellite Systems Inc.	CMLV	2.87	1.50	3.39	7%	59%
Comtech Telecommunications Corp.	CMTL	15.52	11.48	38.00	-2%	-57%
KVH Industries Inc.	KVHI	9.47	6.36	11.64	12%	-13%
ViaSat Inc.	VSAT	34.25	25.10	77.80	-8%	-52%
Gilat Satellite Networks Ltd.	GILT	5.44	4.70	10.76	3%	-32%
Service Providers						
DISH Network Corporation	DISH	27.39	17.09	42.62	-19%	-25%
Globalstar Inc.	GSAT	0.31	0.23	0.60	0%	-35%
Orbcomm Inc.	ORBC	3.74	1.24	4.84	-3%	-8%
Sirius XM Holdings Inc.	SIRI	5.82	4.11	7.40	2%	-19%
RigNet Inc.	RNET	4.50	0.77	7.48	-8%	-25%

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 September 4, 2020	Percentage Change 4-Sep-20	Percentage Change Jan. 2, 2020
Satellite Markets 20 Index™	2,227.75	-2%	-23%
S & P 500	3,406.41	-1%	5%

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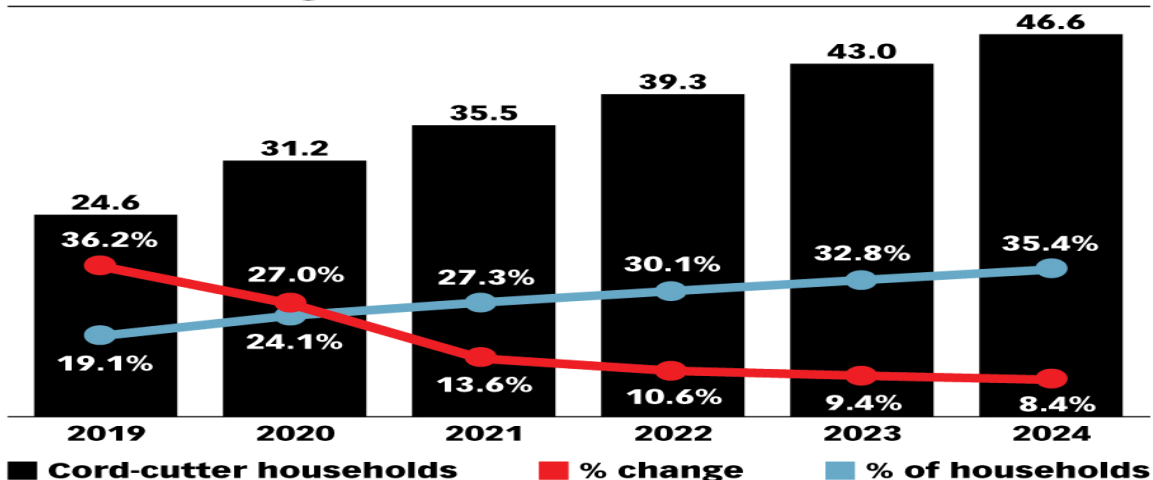
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VITAL STATS

US Cord-Cutter Households, 2019-2024 millions, % change and % of households



Note: pay TV households are those with a subscription to traditional pay TV services; excludes IPTV and pure-play online video services (e.g. Hulu, Netflix, YouTube, Sling TV, etc.); non-pay-TV households are those that have cancelled their subscription or have never had traditional pay TV services
Source: eMarketer, Sep 2020

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