

# Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

## The Indian Satellite Market

by Omkar Nikam

For decades, satellite technology has played a pivotal role in various industries, namely, media & entertainment, military segment, disaster management, etc. India being a home to several such industrial verticals, is about to boost its global satellite technology reach with the government's creation of Indian Space Promotion and Authorisation Centre (IN-SPACE), a



new entity under the Department of Space, that seeks to streamline and promote the country's utilization of private sector resources, know-how, and technology.

The country has been a long-standing powerhouse of media & entertainment, where satellite broadcasting has been playing a crucial role for decades for Indi-

an consumers. While the USA, Japan, China, Israel, and a few of the European countries have already locked their target on several industrial verticals to integrate commercial satellite communication (satcom) applications. India is levelling up its capabilities to boost domestic and international opportunities for the satellite market with several changes in

the space policy and law.

### Prospects in the Indian Satcom Market

The Direct-To-Home (DTH) services are still holding a firm ground in Asia and prominently in India. Currently, there are more than five DTH companies

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## Challenges Ahead



As summer end in the Northern Hemisphere, the month of September usually features key industry events such as the IBC in Amsterdam, the World Satellite Business Week organized by Euroconsult in Paris and the Global VSAT event in London..

These shows are traditionally the jumping off point for the next year, giving a glimpse of what to expect next. Due to the global pandemic, these shows have gone virtual or in the case of World Satellite Business Week postponed to November.

We still have IBC as a virtual event as well as ConnectTechAsia (formerly CommunicAsia) and the AVIA Satellite Industry Summit this month. So we will still be having some shows in virtual form. Moreover, there has been a upsurge of virtual events over the summer that we are able to discern what's to come.

What is evident is that there will be many challenges ahead. The summer has shown several bankruptcies but also a lot of Mergers and Acquisition activity, which we report in our website, [www.satellitemarkets.com](http://www.satellitemarkets.com). The next few months would give us a better picture of the impact of the global pandemic on the industry as a whole and the road to recovery. So stay tuned. We will continue to report events, whether they be virtual or not.

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## Indian Satcom Market

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providing broadcasting services across India. The prominent ones are DishTV, Tata Sky, and Airtel Digital TV. Being one of the biggest satellite service consumers, India still has a lot to explore in terms of connecting the threads of business opportunities in content distribution through Over-The-Top (OTT) via Satellite, military satcom and satellite-based Internet of Things (IoT). Following are some of the opportunities that will help Indian satellite companies to boost its domestic and international presence:

- **Advantage of India's Defence Partnerships:** Military satcom is one of the crucial assets for any defence forces. Though India has recently started boosting its space capabilities for the military, there are several upcoming opportunities which will benefit the private sector. The United States is one of the important partners of India in the defence sector. Leveraging the resilience of the U.S.-India defence relationship provides opportunities to leapfrog, such as access to secure, ubiquitous military communications. The private contracting of the military satcom is yet to see the light in India, but the future looks promising with countries like the United States playing a key role in uplifting the commercial satcom capabilities for military purposes in India.
- **Developing OTT via Satellite Capabilities:** The high video content production, distribution, and consumption rates

***“...India is one the world's next big market for satellite technology applications. ..”***

in India can be taken as an opportunity to develop in-house backend technology by collaborating with several production houses, distributors and broadcasters. With foreign players like Netflix, Amazon Prime, Disney+ Hotstar, etc. focusing primarily on local video content development, there lies an opportunity for downstream satellite companies to set-up an in-house distribution capacity. Currently, companies like Eutelsat, Quadrille, and Broadpeak, have already entered the global OTT via satellite market segments. Therefore, private Indian satellite companies too have a chance to leverage the country's massive consumer base to accelerate the OTT via satellite market.

- **A Push for Satellite-based IoT:** Communications market is rapidly evolving with satellite being at the front of new technologies such as autonomous vehicles, unmanned aerial vehicles (UAV), etc. Though India still has to organize and structure its foundation for advanced satcom systems, the automobile sector has the potential to boost the satellite-based IoT market. IoT is an entangled nexus of satcom and satellite navigation. With India's very own Indian Regional Navigation Satellite System (IRNSS), which is yet to unlock its full potential, the country's pri-

mate sector has a chance to explore several opportunities in the satellite-based IoT market.

### Satellite Launchers

#### Landscape

Considering the implementation period of private satcom policies in India, the satellite launch and remote sensing verticals are the crucial verticals to explore, especially for Start-Ups and Small Medium Enterprises (SMEs). India's Polar Satellite Launch Vehicle (PSLV) has one of the highest success rates in the world, that is 94%. Indian Space Research Organisation's (ISRO) high-quality but low-cost services are the trends that should be followed up by the emerging private Indian space companies. The private launch service scenario in India has to incorporate the New Space trend but also align with the market supply and demand. Several questions related to manufacturing cost, launch site, policy and regulations are to be addressed before the private launch service provider makes an entry into this competitive market. Recently, Skyroot, India's first private satellite launch service provider, achieved success in an upper-stage engine fire test. This also showcases that the Indian private sector has the potential to compete and welcome the investors to boost private space finances. Although the future remains uncertain, it is by far safe to say that Indian launch market has a lot of offer in terms

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of low-cost and high-quality services as the country is revamping its in-house production capabilities with the government's Made in India initiative.

### Boosting Employment Opportunities

Every industry has primary, secondary, tertiary categories, and so on at various levels of the organization through which it collectively hires people from different educational backgrounds. Though from past one decade, India has become Asia's one of the most prominent Information Technology (IT) hubs, there is still a considerable gap between the skilled individuals and the requirement of the new/emerging industries. For other countries, space may be a long-time engaging domain, but for the Indian citizens, the sphere of space technology has recently started opening-up due to the increasing push towards privatization. Therefore, once the Indian space industry being a small government holding branch, it has now started building a nexus of young individuals through educational policy changes, various conferences, start-up boot camps, and various competitions organized by the ISRO.

Considering the employment opportunities, every space mission inculcates a cluster of people from economics, law, commerce, science, engineering, business, and many other branches. But the question remains of how non-engineering backgrounds will be playing a pivotal role in the space sector? There are various iterations involved in a space mission, especially before the



India's Polar Satellite Launch Vehicle (PSLV) has one of the highest success rates in the world. (image courtesy of Indian Express)

launch of a satellite/orbiter/rover. It takes a lawyer to look after the regulatory framework, a commerce person to carry out an auditing process, an economist to provide essential statistical data on the return on investment, and science scholars to look after the new technology research and development activities. This is just a tip of the iceberg, but various other educational backgrounds will be playing a pivotal role as India aligns itself with the space power nations in the coming decade.

### Conclusion

India is one the world's next big market for satellite technology applications. But when it comes to investing a considerable amount of taxpayer's money in space, the government has to think twice before allocating

higher amounts of budget, mainly due to the country's other earthly issues. On the other hand, a partnership or an agreement with foreign nations as the United States will help the country to accelerate its private satellite technology presence on a global scale. Though currently, India has to take a bottom-to-top approach in scaling up the upstream private satellite sector capabilities, the downstream market already has a significant amount of rolling satellite applications in broadcasting, remote sensing, disaster management, etc. Therefore, taking thorough advantage of the existing downstream capabilities and accordingly iterating the future market supply and demand, will result in healthy growth of the private Indian satellite companies.

**Omkar Nikam** is a correspondent of the Satellite Executive Briefing magazine based in Strasbourg, France. He completed his Master in Space Studies from the International Space University and had over three years of experience in the Indian media and marketing industry. He can be reached at: [omkar@satellitemarkets.com](mailto:omkar@satellitemarkets.com)



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# Interview with Jay Gullish, US-India Business Council

To get insights on the business prospects in the Indian Space market from an external perspective, Satellite Executive Briefing spoke with Jay Gullish, who leads the U.S.-India Business Council's Digital Economy Committee, Media and Entertainment Committee and Privacy Working Group. Gullish has passionately promoted digital development in more than 20 countries over his 25 years of experience in government, industry, and civil society across the telecoms, information technology, sat-com, and cyber sectors.

Most recently, Gullish served as a digital policy officer at the U.S. Embassy in New Delhi covering cyber policy, telecommunications, information technology, digital inclusion, and commercial space. While at the Embassy, he aligned U.S. cyber policy toward India across multiple in-country USG agencies and consulates on behalf of the State Department's Coordinator for Cyber Issues (S/CCI). Gullish was also the in-country lead for the U.S.-India ICT Working Group and the U.S.-India Cyber Consultations. Gullish previously worked in India's outsourcing industry, and lived and worked in India for over five years. He has international technology experience in southern Africa, Israel, and Vietnam.

**The United States (US) and India have strengthened the defense partnerships for technology transfer programs. And as India has taken a step to privatize the space sector, so is there a possible opportunity for private companies to play a key role in the defense satellite programs?**

The recent strife along India's northern border underscores the potential value of military space, and the stark reality that India's military space capabilities lags considerable vis-à-vis the country's civilian, and global commercial capabilities used by militaries worldwide. Here, leveraging the resilience of the U.S.-India defense relationship provides opportunities to leapfrog, such as access to secure, ubiquitous military communications, centimeter and hyperspectral imaging, precision navigation, and other technologies available to the U.S. military.

To date, however, there has not been significant government interactions with respect to military space assets, technology, or systems. The recent conclusion of the COMCASA agreement is a starting point but the technology is highly sensitive so the process will not be quick. India must also commit financially, along with ensuring the intellectual property, export controls and non-proliferation obligations. But the ground reality on the northern border is likely to drive the slow and steady expansion of talks around MILSATCOM hardware, ser-



**Jay Gullish**

vices, and technology.

Interestingly, these same technologies have massive commercial benefit, and the U.S. military has a clear strategy to leverage commercial industry – including non-U.S.-companies – in support of the warfighter. So outside the mil-mil engagement, there is also opportunities for the Indian military to use commercial services. Here, greater understanding



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of how the U.S. military procures, uses and utilizes commercial services is critical.

**As of 2020, there are several satellite service providers in the Indian downstream market, but very few are capable of providing backend satellite architecture. Therefore, will India's space privatization policy create a competitive circle for US-based companies like ST Engineering iDirect and Hughes Networks?**

Hughes is the largest VSAT operator in India, and for years has proposed a Jupiter satellite to provide two-way broadband internet. So obviously any movement in the satcom segment or approval of its satellite would represent a sea change, and would move the entire ecosystem to reassess India.

Currently, India's use of commercial satcom is limited structurally by regulation and the dominance of the government as the key provider of space segment. As a result, India is more than a decade behind in commercial satcom markets that have migrated rapidly to Ka-band – which India lacks. So there is a mismatch of capacity and demand; VSAT licensing is a pain point; mobility services illustrates the slow pace of rolling out applications pervasive elsewhere. While there continues to be a lot of interest in the India satcom opportunity, and in particular the recently Indian Government space sector reforms, there remains a sentiment that we have seen this all before without, ultimately, any substantial reform or market liberalization.

Yet the focus by the PM Minister, who has publicly highlighted multiple times by the Prime Minister – most recently during India's Independence Day speech, there is once again a sense of opportunity. But industry needs details, details, and details to understand the nature of the reforms on the satcom segment. But one initial observation is clear: the liberalization discussion appears focused on the “space” side of the industry rather than the “satcoms” side.

In the area of satcoms, there is a long-founded understanding that significant reform is needed: an open skies policy across all bands, permission for Ka-band satellites and LEO constellations, streamlining of the VSAT licensing regime, and a light-touch conformity testing environment. In the United States, for example, The U.S. Federal Communica-

tions Commission oversees most, if not all, of commercial satellite regulations. In, no less that three ministries and a regulatory oversee the same.

The Telecom Regulatory Authority of India (TRAI) has long led the need for reform, and in an August 20 statement in an open, public broadband consultation states it best:

“A key concern in the deployment of broadband services through satellite in India is the restrictions imposed on providing satellite bandwidth competitively. An effective exploitation of this resource will facilitate expeditious proliferation of broadband, especially in regions that are technically non feasible through other means. In addition, satellite communication technology is experiencing various changes such as the use of Ka band satellites, which can provide large capacity and higher speeds. To address these issues various action points as follows have been suggested in the Authority's recommendations dated 17th April 2015 on “Delivering Broadband Quickly: What do we need to do?”

i. ‘Open Sky’ policy should be adopted for VSAT operators similar to what is available to ISPs and broadcasters. VSAT service providers should be allowed to work directly with any international satellite operators.

ii. Separation of Licensor, Regulator and Operator functions in the satellite space domain to conform to best international practices of free markets.

iii. The issue of coordination of additional spectrum in the 2500– 2690 MHz band with Department of Space (DoS) needs to be addressed urgently, so that this band can be optimally utilized for commercial as well as strategic purposes.

iv. Time-bound award of licenses for operating satellite services and Regulating/Opening of Ka band.

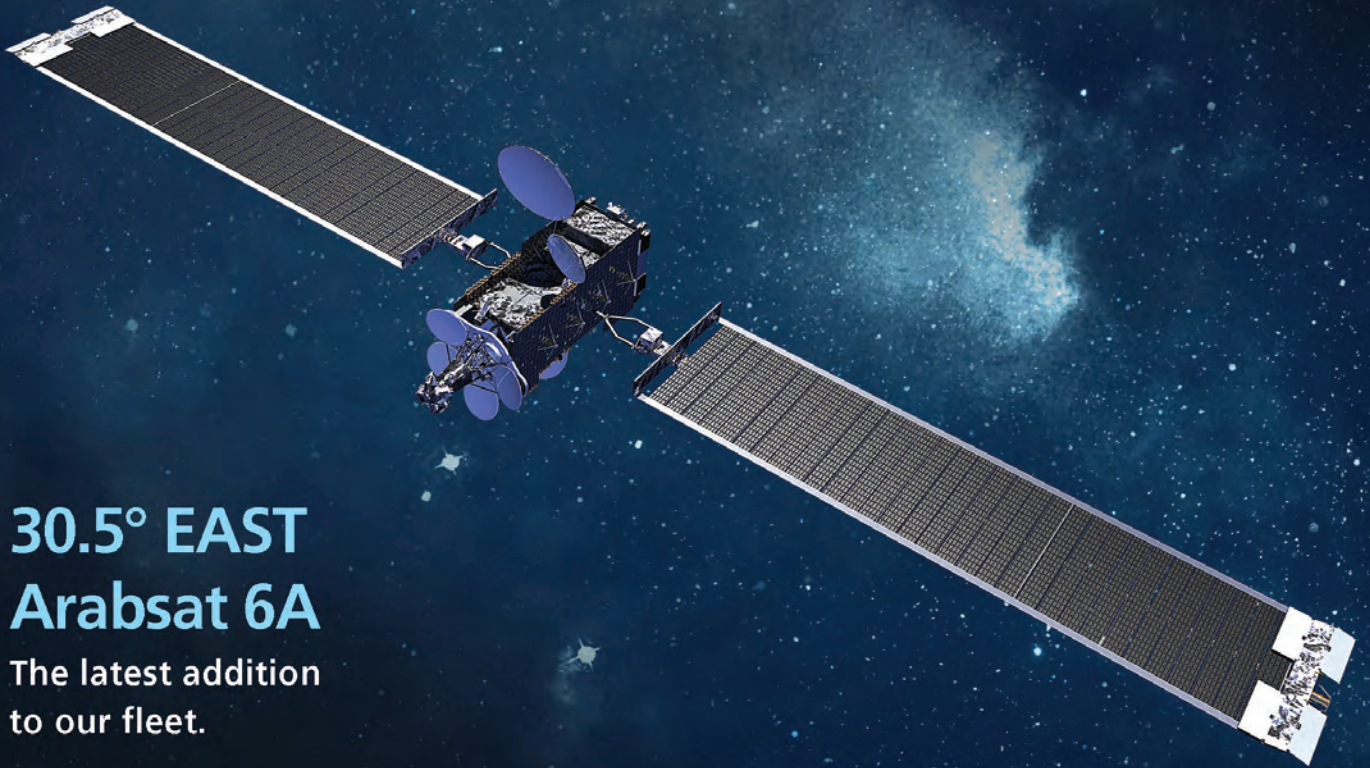
Furthermore, India's National Digital Communications Policy (NDCP), issued in 2018 by the Department of Telecommunications, calls for similar reforms in the space segment and outlines need steps to make the ground segment more efficient. The NDCP called for a “new a “SATCOM Policy” which hasn't been drafted yet. But perhaps with push to open the “space” by the Department of Space could align with DOT, TRAI, and PMO sup-



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port for reforms. There is a huge business opportunity, but most importantly change would benefit India industry and society via enhanced broadband, network resilience, disaster management and business continuity.

**With respect to the satellite communication value chain mapping, will US companies have an opportunity to invest in rural satellite broadband programs which will be the part of India's National Broadband Plan?**

All roads lead back to the foundational reforms needed to allow private operators to compete, and the policy environment to allow for operators, supported by the Universal Service to roll out these services. The government is currently focused on fiber, and the role of satellite in in broadband plan is underrepresented. These efforts need to be synced to satcom reforms as well. The current broadband consultation could shift this balance.

**ISRO's public private partnership (PPP) policies is definitely an encouraging move for the Indian Entrepreneurs but the country has to achieve a certain mark at global scale to build private capabilities. With respect to this, will US investors be interested to invest in private satellite capability building – manufacturing, assembly, and integration?**

The centrepiece of the GOI's commercial space reforms is the creation of the Indian Space Promotion and Authorisation Centre (IN-SPACE), a new entity under the Department of Space, that seeks to streamline and promote the country's utilization of private sector resources, know-how, and technology. ISRO and IN-SPACE recently held a multi-stakeholder consultations – virtually of course – with Indian industry, the applications community, and academia to share their ideas and concerns with the opening process. Many of the speakers referenced U.S. models for commercial space activity. The IN-SPACE representatives emphasized that it seeks to directly link industry to the users and customers, bypassing the current route via ISRO. IN-SPACE will also take up technical matters that inhibit commercial activity. But as I mentioned, so far the discourse has focused on the “space” side of the sector. USIBC is keen to promote the U.S.-India commercial space sector by linking U.S. experience in the private sector to the potential of the Indian ecosystem, and


**“...Currently, India's use of commercial satcom is limited structurally by regulation and the dominance of the government as the key provider of space segment. As a result, India is more than a decade behind in commercial satcom markets that have migrated rapidly to Ka-band—which India lacks...”**

support Indian industry's efforts to integrate with the U.S. space supply chain.

**Will US-India relations open a new satellite business gateway with allied nations like Australia (as their space agency is young are also looking to scale up capabilities in the satellite communication arena)?**

India is a highly success space faring nation, but to date has correspondingly few joint programs or trade with other space powers such as the United States, Europe, and Japan – coincidentally these nations are broadly speaking India's largest trading partners. I suspect these countries will be the primary focus as the country moves through its current reform process. The U.S. and India are particularly well suited due to the large and success Indian-American community and the size and scale of the bilateral digital ecosystem. Australia has a few best practices – namely a focus on access to capabilities rather than ownership – but would I focus on the larger relationships first.

**The satellite-based Internet of Things (IoT) is still waiting to unlock its full potential in the Indian market. Therefore, what are your thoughts on the private Indian satellite companies partnering with US-based automobile companies for providing satellite-based IoT hardware and software integration?**

Let's take baby steps, first. The U.S. is a great market and testbed for advanced cars that include increased intelligence, autonomy, satellite navigation, and satellite communications and entertainment services. Yet the infrastructure in American supports these pilots and service roll outs. India is farther behind, and doesn't yet have the policy environment or mature commercial ecosystem that can develop the equipment, services, and solutions to utilize satellite-based IoT. India needs to focus on the foundational issues which will permit the long-term capture of more advance satcom segments. 

# Challenges for LEO HTS Constellations

by Muhammad Furqan and Zoe Shahid

Exponentially increasing numbers of announced ambitious NGSO (Non-Geo Stationary Orbit) or LEO-HTS (Lower Earth Orbit – High Throughput Satellites) Mega Constellations have been creating waves in the world of technology. Their success will not be a mere disruption to the existing system, it will be a whole new system altogether.

With regular revisions in numbers of satellites from existing players and entrance of new players, these mega constellations will redefine the dynamics of Space Race 2.0, Industry 4.0, 4th, and 5th Dimension Warfare. With the rollout of a complete extra-terrestrial network there will be multiple challenges faced by the new ecosystem. With multiple revisions of filings with FCC (Federal Communication Commission) OneWeb (Qualcomm, Virgin, Airbus) leads the race with 48,000 satellites followed StarLink of SpaceX with 42,000 and Project Kuiper of Amazon with 3300 (1st numbers, may revise with the trend of the competitors) odd and other multiple constellations of smaller numbers. Recently, Huawei also announced its arrival with China Unicom with numbers of satellites not yet publicly announced.

## Security Challenges

One of the biggest challenges faced by these mega constellations is 'Cyber Security'. Satellite Communications has been serving the world for different services for more than half a century. In this article, we will focus

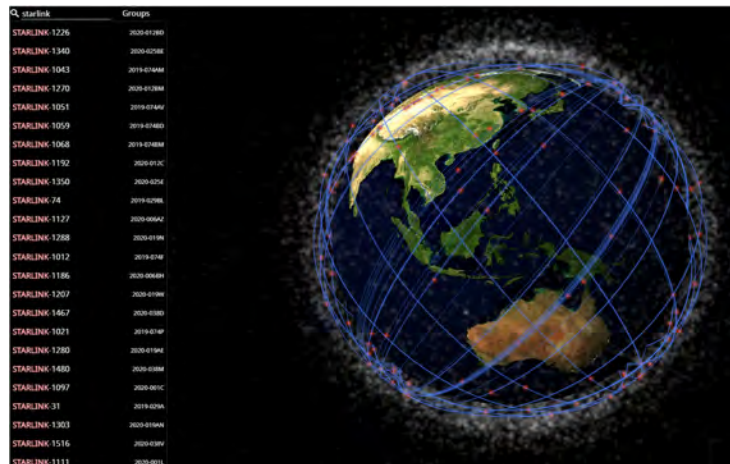
connections or eavesdropping.

Moreover, traditional satellite communications links were only receive-amplify-transmit kind of connections working only on the physical layer of the OSI, TCP/IP, UDP architectures. Except for MSS services, Customer networks

are not usually directly connected to the satellite but through specialised interfaces of satellite communication equipment. Customers network interface with the public ground networks, PSTN/Cloud/Cellular/Fibre, are more vulnerable to intrusion as compared to their satellite communication interface.

This uniqueness along with global coverage made satellite communication primary choice of strategic organizations.

However, the arrival of the first generation of NGSO mega constellations will change the outlook of the satellite communication horizons. With focus on provision of low latency, high throughput, global footprint broadband services, end user will be directly connected to the satellites. With easy to deploy and use terminals customers and their personal network of devices (IoT – Internet of Things) will be able to enjoy the luxury at par with at least 4G LTE (4th Generation of Mobile Communication – Long



on the security challenges faced by the LEO constellations and will deal with other challenges in subsequent articles.

Traditional GEO Satellite Communication Networks have remained secure so far due to limited integration with the ground networks. These networks rely on not easily available specialized communication equipment, specific frequencies, and some additional technical skills to establish a successful connection. The sophistication of the equipment, technical parameters, skills altogether with costs involved have made commissioning of even a legal link a perplexing task, making it even more difficult for illegal

## NGSO Constellations

Term Evolution), and will serve their purpose to complement the future terrestrial networks like 5G (5th Generation of Mobile Communication). With the ever-increasing demand of the data traffic with requirements of lower latency for services to perform at their optimum scale, organizations currently using traditional GEO satellite communication services will also review their connectivity priorities.

### Potential Threats

Change in the dynamics of the communication technologies will result in increase of potential possibilities of network, cyber a data security related risk. With end user direct connectivity with the satellites with lower cost easy to use and deploy terminals, no requirement of additional technical skillset, and satellites having on board processing to accommodate software-based networking technologies like SDN, SDR, NFV etc. can result in security breaches for the end-users, organizations, the network and even the satellites. It can be apprehended that the whole ecosystem of these mega constellations; customers, network, data traffic, communication interfaces, satellites, as all the layers of the OSI, TCP/IP or UDP models will be exposed, can at least expect similar threat level of any given terrestrial communication network. We can do the comparative and predictive analysis of the terrestrial network related security issues to map on the upcoming networks of the mega constellations.

COMPANY	NO. OF SATELLITES	BANDS	SERVICES
StarLink (SpaceX)	42,000	Ka, Ku, V	Global broadband
Boeing	3,300	V	Advanced communications, Internet-based services
Kuiper Systems (Amazon)	3,236	Ka, Ku	Global broadband
OneWeb (Virgin, Qualcomm, Airbus)	48,000	Ku	Global broadband (Recovered from Chapter 11 Bankruptcy)
LinkSure	272		One Belt One Road
Kepler Communications	140	Ku	Machine-to-machine communications (Internet of Things)
Telesat Canada	117	Ka	Wideband and narrowband communications services
Theia Holdings A, Inc.	112	Ka	Integrated Earth observation and communications network
Spire Global	100	Ka	Maritime and meteorological monitoring, and earth imaging
LeoSat MA (Sky Perfect JSAT)	108	Ka	Broadband services (shut down due to unavailability of investment)
Boeing	60	Ka	Very high-speed connectivity for end-user earth stations
O3b	60	Ka	Broadband services
ViaSat	24	Ka, V	Broadband services
Karousel LLC	12	Ka	Communications
Audacy Communications	3	K, V	Data relay constellation
Space Norway AS	2	Ka, Ku	Arctic broadband

In this era where internet is the focal backend technology being used by the latest technological deployments and upcoming solutions in the form of IoT where the modern devices are connected with each other and communicate through the pool of wireless communications, with the help of embedded sensors which makes them smart enough to collect and analyse data and transmit over the internet. This data, hence, needs to be protected and secured.

However, the nature of wireless media being shared and easily prone to interceptions, makes it more exposed towards security threats. Let us have a look at the common security threats and the areas where the wireless communications are making its application a challenge to be implemented on most of the crucial industries. Key areas which can be under threat are:

- Critical Information which is shared over the network.



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- Nodes attached to the network; that can be servers or clients which have private information stored on them.
- Most importantly the network itself.

The elimination of threats to the information transmitted over the network is the major challenge in terrestrial communications systems. A few types of threats which can cause major damage to the vital areas described above are discussed briefly below:

**Interception-** this is the major challenge in shared network communications these days. Here the attacker intrudes the ongoing transmission through wiretapping or sniffing. This can cause the attacker to get access to authorized information and even credentials for the accounts transmitting the information.

**Replay Attack-** A replay attack which is commonly known and playback attack where the transmission packets are replayed with a delay to access certain information from the network. The picture below can be seen to understand the serious hazards of this issue.

**Spoofing-** It is the action of camouflaging a message that can be in form of an email, text message, weblinks or a phone call, from a malicious sender and manipulated as being from a identified and reliable source. Spoofing can be done to an extent of masking the IP addresses to an allocated IP pool from the private network.

**Manipulation of Data-** This threat can cause to change the original information into something which is not the actual and authentic fact. Data alteration and access to the key resources

is the most common risk when it comes to secure transmission and handling of critical information.

Most Authentication and Confidentiality protocols are implemented to mitigate the risk of security breaches in terrestrial communications but with the advancement in technology and shared network infrastructural approach in form of cloud networking, the risk and dangers are becoming more worse and a new challenge encountered by the industry.


### Protocols

Another challenge in Communications Systems is that the security protocols for wireless and wired networks are different. Wireless communication and easily deployed but the security and bandwidth limitations are way more in number than in wired networks.

Now, these mega constellations and their users will be exposed to these threats and will require continuously evolving

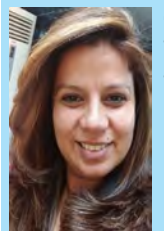
mitigation techniques to counter the threats. The security concerns do not end up here, but the physical security is another challenge. The 4th Dimension Warfare (Space Warfare) needs to be addressed as well, these satellites, although commercial entities, should be considered as critical strategic assets. In last few years we have experienced a growing trend of space warfare development, may it be the anti-satellite missiles testing by different countries or establishment of dedicated space force commands.

### Conclusion

In conclusion the LEO HTS Mega Constellations are the centrepieces of the combined complex matrices of Industry 4.0, Space Race 2.0, 4th Dimension Warfare, and 5th Dimension Warfare (Cyber Warfare). These constellations will not only change the outlook of a night sky as we know it but will also play a considerable part in the change of life we are used to live. 



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](mailto:info@muhammadfurqan.com)



**Zoe Shahid** is an expert in Transmission Planning, Optimization and Operations with an experience of 12 years in maintaining and troubleshooting Fixed Line Fibre Optic Networks, providing seamless services. Currently based in Australia, she is gaining experience on network and cyber security along with providing her services for product and solution designs for Telecommunication Services providers. She can be reached at: [.zoe\\_shahid@hotmail.com](mailto:.zoe_shahid@hotmail.com)

**Watch out for the next issue where we delve on the Challenges of Terrestrial Network Integration**



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# Proactive Mitigation of Satellite Interference

by Alvaro Sanchez

It is a sad fact that although interference mitigation has come a long way over recent years, it remains a thorn in the side of the satellite industry. In the past, it was enough of an achievement to detect the source of interference within hours or days, and even solving it at all was another. In the long run, prevention is a better cure, but when it comes to interference, operators and users can be as diligent as they like, putting measures in place to avoid interference and doing their best to solve it when it occurs.

However, not everyone is doing the same. Whether it's by error, poor knowledge or intentional, interference continues to occur, costing valuable time and resources to resolve. So, what can we do about it?

## Cancellation Technology

Whether it's mis-pointing during setup or degradation of signal mid-service, the repercussions of satellite interference can be huge because of the loss of quality of service for users and the potential for

affecting other services. But what if it was possible to detect errors before they caused a service issue, and as soon as it happens? Furthermore, what if we could 'cancel' that interference in-house, using auto-

ated technology, so that consumers at home never even knew there was a problem to begin with?

What we need to look at investing in next is cancellation technology, i.e. a way of putting a stop to interference as soon as it's detected in real time. Identifying the source of

radio-frequency interference (RFI) sooner and resolving the cause means that a service is not offline, and customers remain unaffected.

Technology, in particular automated technology like this is important because many satellite customers are understandably not specialists in the use of spectrum and satellite tech. The people operating equipment on the ground are not satellite engineers, and therefore errors often remain undetected for significant periods of time, disrupting vital services. Often, these issues then require a long chain of hu-



**Integrasys Vectorsat Carrier Under Carrier Interference Detection System enables detecting, recording and solving any possible signal interferences. Moreover, it enables locating with Carrier ID standard.**

man contact to find someone able to solve the issue, putting satellite operators under even more pressure.

But even in specialist satellite setups, errors can easily occur. In VSAT deployments for example, we know that operators and most users are putting as many mitigation measures in place as possible, but it's still incredibly challenging to set up with no errors at all. With technology in place to detect, alert and better still, solve the RFI issue, this not only improves the efficiency of that particular VSAT operation, but it also means that users are aware of what exactly caused the error, and are able to put measures in place to avoid the same RFI-causing errors again in future.

### Future of RFI Interference Mitigation

Automation and technology are the key to preventing satellite interference and maintaining good quality of service for all satellite users. Integrasys has been at the forefront of network monitoring and automation systems for 30 years, and excitingly is very near to bringing to market a product which will be able to cost-effectively cancel interference in real time. The more we automate operations with new technology such as this, the less room there is for error. Not only does this save operators time and money solving errors, but users are also guaranteed consistent error-free services, which is so key during this period of huge change for the satellite and communications industry on the whole.

There are big opportunities on the horizon for satellite with the coming wave of 5G, as well as LEO satellites and connected devices. If satellite



**Mobile VSAT truck where interference mitigation measures are crucial.**

doesn't resolve its bugging issue with interference and work to maximise efficiency, it could be under threat from other services, or at the very least miss out on huge opportunities to grow.



**Alvaro Sanchez** is Integrasys CEO and Marquess of Antella (Noble Title from 17th century in Spain). Alvaro is a Software and Industrial engineer by European University and holds a Master Degree in Management, Sales & Marketing by ESIC Business School. Alvaro during the last 10 years has worked at Integrasys as Management, Sales Director and Executive roles where he was very successful growing the sales, revenue, profit and responsibilities within the company; and previous to that he was working at CERN European Organization for Nuclear Research as a RF Engineer measuring timing in a Nanosecond Synchronization for measuring the Neutrino Speed. The Noble Title that he hosts, is coming in his heritage from 1649 from his ancestor Nicolo Palavicino, given by Phillip IV in Sicily for the Antella region near Florence. He can be reached at: [alvaro.sanchez@integrasys-sa.com](mailto:alvaro.sanchez@integrasys-sa.com)



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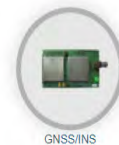
SATCOM Modules



Transceivers



TLTS

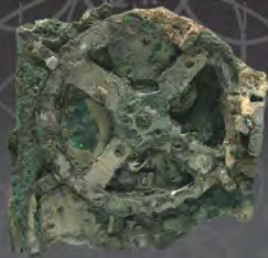


GNSS/INS

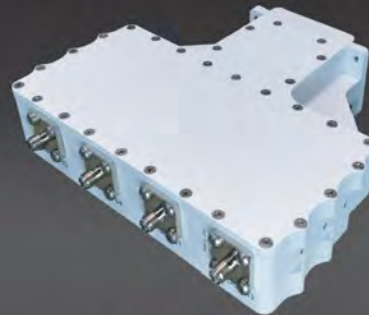


Other Systems

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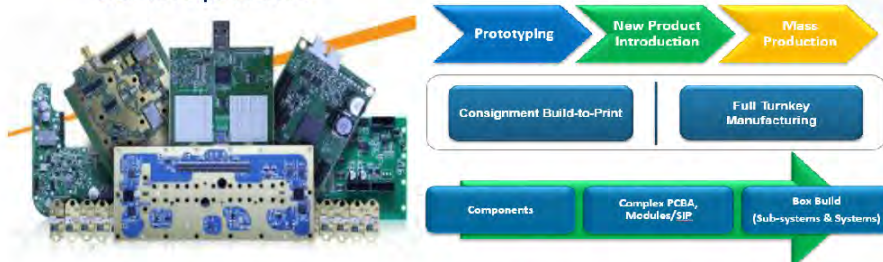


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Flat panel antennas are designed to fit in more types of platforms with its low profile and its flat surface, installations can become easier and faster. The greatest advantage of flat panel antennas is the ability to create Multibeams, which are able 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>



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For more information on the MCX7000 visit [www.idirect.net/products/mcx7000-multi-carrier-satellite-gateway](http://www.idirect.net/products/mcx7000-multi-carrier-satellite-gateway).

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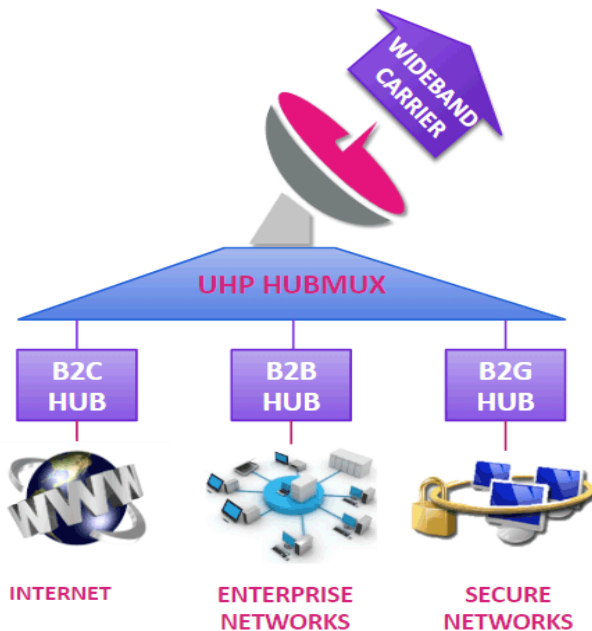
Terrasat Communications presents the latest state-of-the-art IBUC for Fly-Aways & COTMs; the IBUC 3. The latest in Terrasat tech is now ultra-lightweight, super compact, available up to 40W & comes with a 3-year warranty. All IBUCs allow the operator to customize configurations & manage alarms & sensors for real-time network management and control. IBUC reliability is baked into the IBUC 3 design and verified through intensive individual unit testing. For more information go to:

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## UHP Product Release 3.6



The newest software Release 3.6 from UHP Networks provides major improvements in the performance and functionality of the award-winning UHP line of VSAT equipment. First there is an up to 3 times increase in data throughput. The Forward carrier from the Hub can now operate up to 200 Msps (or 650 Mbps) DVB-S2X with Time Slicing. The Return TDMA carrier runs up to 11 Msps (or 35 Mbps). Second, the UHP Hub has innovative Hub-Mux feature which multiplexes multiple services and supports virtualization of the Hub. Third is a slew of new design features to support On the Move connectivity. This includes enhanced Automatic Beam Switching mechanism which utilizes satellite coverage maps, stored locally in each remote. Sophisticated algorithm for fast assignment and release of bandwidth to the

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# The Roots of Quality of Service in Teleport Operations

by Robert Bell

Where does high quality of service come from in a satellite services operation that runs 24x7? There are obvious factors like the reliability of power and connectivity, provision against disaster like fire suppression and adequate attention to maintenance. But quality of service is ultimately a product of human ingenuity, and its roots reach into the culture of the organization.

For a recent report on quality of service, the World Teleport Association turned to the consultants and engineers who serve as on-site auditors for its Teleport Certification program. Certification is based on hundreds of objective, measurable factors – but we thought that it would be illuminating to ask the auditors about the less tangible issues that contribute to the quality customers receive. Their comments fell into three areas:

- Excellence runs in themes.
- Achieving quality is hard if you fail to address the soft issues.
- Don't skip the paperwork.

## Excellence Runs in Themes

One might expect a well-run teleport to have a consistent degree of excellence in facilities, technology and procedures. Being run by human beings, however, teleports very rarely achieve operational excellence in every area of an audit. It's much more common to find themes of excellence across specific areas. Even in areas of strength, there are underlying weaknesses that can be improved upon.

For example, the facility may have fully redundant baseband platforms, but configuration control is poor, so any data loss causes an outage on both primary and secondary transmission chains. Some teleports install excellent network infrastructure but have inadequate cybersecurity. Often, teleports install secondary backup generators that will withstand a double failure. But they may create a hidden weakness by installing it in an enclosure with no automatic fire suppressant. Finally, business continuity can be an area of weakness, even for strong

performing teleports. Covid-19 has reminded us that teleports ignore business continuity at their peril. So, it is useful to think of quality as thematic – based on the likes, dislikes, expertise and experience of staff – and look for aspects that fall outside the favored themes.



## Addressing the “Soft Issues”

“Soft” issues are the core problem of every business. Experience shows there is a strong correlation between employee engagement and quality of service. In other words, motivated teams provide better service. When ordering new services, for example, customers generally want a teleport to respond promptly and deliver a fault-free service. That requires close collaboration among sales, technical support, engineering and operations. In a communications business, that can be hindered by remote locations and technical challenges, so strong collaboration between teams is essential to overcoming these barriers to quality.

Lack of a strong culture of collaboration will show itself most often in the time it takes to resolve issues. If the different teams at the teleport are used to working together, they can move fast, identify the right team or department to own the problem and ensure it is solved. If communication between teams is not habitual, no set of procedures will provide a smooth resolution.

Management culture is the ultimate success factor. If management does not provide teams with



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the right tools – for example, effective monitoring equipment – the quality of teleport operations will suffer. Effective leadership is essential for providing support, direction and guidance to the teams who are delivering for customers.

In the best performing teleports, people are happy and willing to go the extra mile, to keep persevering with a tricky customer issue or technical problem. Often employees freely give this discretionary effort because they feel valued as part of a high-performing team devoted to helping customers. This is what creates a culture of continuous improvement, which leads to a virtuous circle of better performance, leading to higher motivation, leading to highly engaged customers.

### Don't Skip the Paperwork

Quality of service requires a commitment to continuous improvement: finding the root cause of issues so they can be permanently fixed. When a service outage occurs due to inadequate project controls, for example, improving the project process should be a priority.

Highly rated teleports have mature and documented processes in place that define how equipment and systems should be operated and maintained. Processes also define how teams should work together to successfully deliver services. Just as important as having these processes is reviewing and updating them regularly.

If processes are in a poor state, equipment may not be effectively managed or maintained properly and teams' actions may not be coordinated. For example, the teleport may introduce a new service without allowing time for adequate testing before startup. This could mean that equipment is not properly configured, which results in a failure and an extended service outage.

The best-performing teleports have documentation covering key activities to ensure repeatability and reliability. They follow a regular schedule in reviewing and updating them as required. They are diligent about maintaining records of system configurations to avoid the risk of configuration data being lost. High performers also stay informed about changing technologies that can improve operations or customer service. They have a proactive technology planning process that keeps them from being

**“...Quality of service requires a commitment to continuous improvement: finding the root cause of issues so they can be permanently fixed...”**

left behind.

In weaker operations, you find a laissez faire attitude to change management and root cause analysis. Outages might be ‘explained away’ without solid measures being put in place to avoid a recurrence. Things are taken for granted, such as fire safety and first aid, because “that’s the way we have been doing it for years.”

### Fixing a Bad Dog

When the family dog behaves in ways that cause grief, smart owners turn to expert trainers to guide their pets' behavior into a better path. What they seldom realize is that the trainer's expertise is less about making a better dog than it is about making a better owner. The trainer works to equip the owner with new and better habits, and these gradually transform Fido's behavior.

The same principal applies to quality of service at a teleport. Hundreds of specific bits of infrastructure, hardware and software contribute to it. Painstakingly documented procedures support it and make possible its continuous improvement. But ultimately, QOS is the product of the entire organization, from management to the person who answers the customer calls in the NOC. WTA's Certification program measures and evaluates the details – more than 170 in all – that contribute to quality of service, but the experience of the onsite auditors reveals the power of company culture to drive high performance.



**Robert Bell** is Executive Director of the World Teleport Association, which conducts research into the teleport and satellite industry and offers a Teleport Certification program to service providers. “High Performance: Insights That Improve Quality of Service” is available for free to members and for sale to non-members at <https://www.worldteleport.org/store/ViewProduct.aspx?id=16584423>. He can be reached at: [rbell@worldteleport.org](mailto:rbell@worldteleport.org)

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# Overcoming the Digital Drought

**F**or all of history, water has been the stuff of life, flowing in rivers nearby or drawn up from the hidden streams that flow underground.

Today, the place we call home is part of an on-line world, and the water of the digital age is the internet, bringing knowledge, entertainment, commerce and connection.

But in too much of the world, the digital river never reaches rural towns and villages. Instead of digital streams, they face a digital drought.

Yet in Mexico today, more than 1.8 million people in rural communities can go online, thanks to satellite operator Viasat.

In each town or village, Viasat and its local partners install a central Wi-Fi hotspot connected to a Viasat spacecraft. Viasat's next-generation satellite network delivers high-speed, high-quality service at affordable prices. People connect on their own devices – and their lives are transformed.

Email, messaging, phone and video calls, social media and web-browsing bring new services, education, news and entertainment. They can reach distant relatives, take classes, apply for jobs and learn market prices for their products.

The digital revolution via satellite is just getting started. Viasat is working with companies like Facebook to make the internet accessible to people in more rural areas. It is helping Telebras in Brazil connect thousands of schools, hospitals and other government institutions, and recently announced

expansion of service to homes and rural villages.

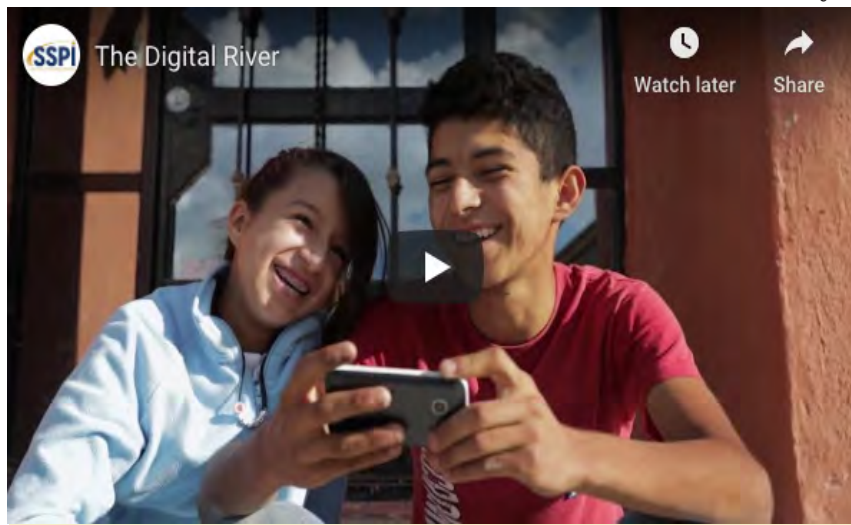
Hughes Network Systems has similar rural installations going on all over the world. The coming generation of LEO spacecraft – once they develop revenue streams serving the traditional satellite markets – will vastly



expand the connectivity pool. It is happening now because Viasat was the first company to market with satellite broadband offering high speeds at competitive costs. Having proven the viability of the business model, it opened doors for a growing range of companies to enter the business and achieve fast growth.

More than a half-million Americans and US businesses already subscribe to the company's broadband service. With the Community Wi-Fi program, the company has found a way to deliver service at a price that rural Latin Americans can afford.

The flow of the digital river no longer has to bypass rural villages and towns. Thanks to satellite, the digital drought is coming to an end. 🇺🇸



**Click here to view a video on overcoming the digital drought:**

[www.youtube.com/embed/NUPkKDzGHYE](http://www.youtube.com/embed/NUPkKDzGHYE)

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# 69 Countries and Counting...

by **Martin Jarrold**

**A**n enigmatic title deserves explanation. The 69 countries referred to is the least number of nations we have had consistently dialing-in to recent webinars in the GVF's Webinar Series, organized in association with Satellite Evolution Group. In my previous column I over-viewed the series, which is broadcast over Zoom on alternate Thursdays, starting at 1500 hours/3.00pm (London). An overview is also available on the GVF website at <https://gvf.org/webinars>. There you can access video recordings of past webinars, find out what is next on the program agenda, and see each webinar panelists' responses to a body of questions which the 60-minutes of each webinar did not cover.

Next on our program, the ninth webinar in the series, is GEO/MEO/LEO – Satellite in the Finance Markets. This will take place on Thursday 10 September

2020 at 1500, London/1400, UTC and will be moderated by Dara Panahy, Partner, Milbank LLP. Accompanying Dara for the webinar dialog will be Chris Quilty, President, Quilty Analytics; John Apostolides, Investment

Partner, Melody Investment Advisors LP; and, Mark Boggett, CEO, Seraphim Space Fund. The discussion of satellite's relationship with the finance markets. However, the reality is that the financing of space-related business ventures is different from that of most non-space businesses, particularly when involving the space segment. The economics and financing of satellites is a very large and complex topic. Not only does it require the traditional business planning exercise

roads, or if the several instances of industry organizations seeking to restructure are isolated examples of an industry otherwise in good health. While most everyone has an opinion, key will be the people who have to make the case for investment and those who have to decide if the case is persuasive.

Creating the investment story, and deciding whether to make the investment, might be the typical business development chronology. It is certainly a starting point for

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**GEO / MEO / LEO - Satellite in the Finance Markets**

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**Thursday**  
10 September 2020  
3pm UK time

**Moderator**  
Dara Panahy  
Partner  
Milbank

**Panelists**

Chris Quilty  
President  
Quilty Analytics

John Apostolides  
Investment Partner  
Melody Investment Advisors

Mark Boggett  
CEO  
Seraphim Space Fund

Supported by  
**Milbank**  
Space Smart

Partner, Melody Investment Advisors LP; and, Mark Boggett, CEO, Seraphim Space Fund.

Alongside virtually every industry, COVID-19 has created financial headwinds for the satellite industry with some companies seeking re-organization due to the pandemic and other factors. The question is whether the industry – or specific subsectors of the industry -- is at a financial cross-

discussion of satellite's relationship with the finance markets. However, the reality is that the financing of space-related business ventures is different from that of most non-space businesses, particularly when involving the space segment. The economics and financing of satellites is a very large and complex topic. Not only does it require the traditional business planning exercise

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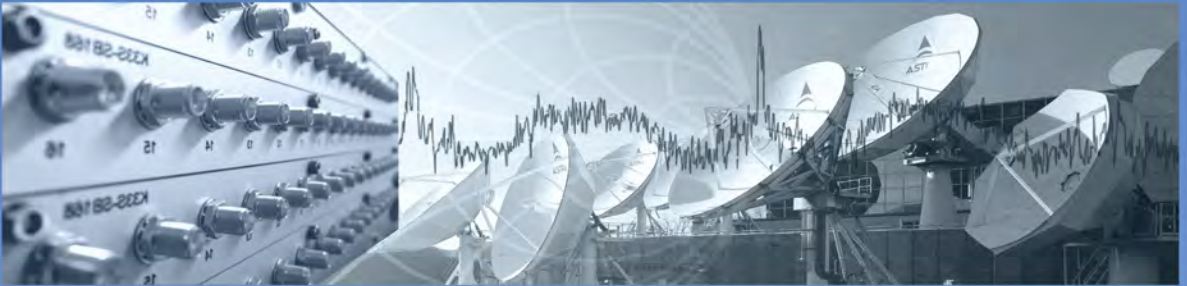
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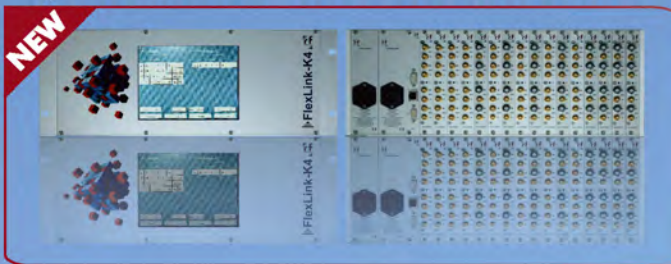


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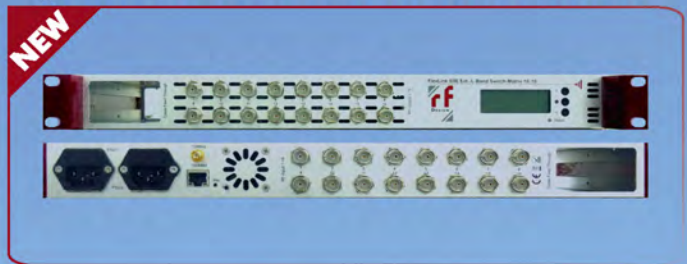


# EXCELLENCE IN RF EQUIPMENT

„FlexLink K4“ 32:32 Switch Matrix



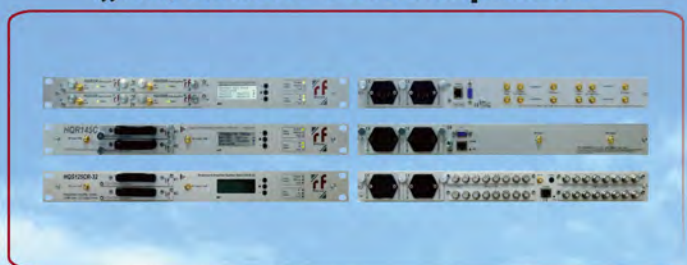
„FlexLink S9E“ 8:8 or 16:16 Matrix



„QLink“ QUAD RF-over-Fiber



„HQ Series“ Line Amplifiers



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plus a very large up-front investment before revenues can be realized, financing satellites involves government policy issues (e.g., on spectrum usage and regulation), insurance, dual-use technologies, national security & defense, and increasingly, responsibilities for maintaining space sustainability through the disposal of satellites at end-of-life. It therefore requires dedicated know-how and structuring.

To explore satellite's relationship with the finance markets – and the extent to which changes within the industry arising out of the evolution and growth in GEO, MEO and LEO is impacting this relationship – it is necessary to understand: (1) the economic characteristics of, and major trends in, the satellite industry; (2) changes in the structures of a financial sector which attracts a variety of investors ranging from institutional investors to venture capital firms and even individuals; (3) the elements of business plans for satellite communications (and other satellite applications); and (4) key issues in the markets for satellite-based applications, i.e., growth within current user markets, expansion into new existing markets, and catalyzing the emergence of entirely new areas of economic activity.

This webinar discussion, bringing together these key and leading individuals in the field, will help to clearly define a large number of questions and aim to provide some answers, and you can join-in by registering at <https://gvf.org/webinar/geo-meoleo-satellite-in-the-finance-markets/>.

***“...Alongside virtually every industry, COVID-19 has created financial headwinds for the satellite industry with some companies seeking re-organization due to the pandemic and other factors...”***

On 27 August, GVF's previous webinar, the eighth, featured panelists who spanned the globe as much as did the audience. For Kacific Broadband Satellites (Singapore), Gilat Satellite Networks (Israel), ViaSat (US West Coast), and SES (US East Coast) the core topic was Serving Underserved Communities, and the starting point/premise was “The Digital Divide remains despite years of debate about solutions to bridge it.” So, the fundamental question is ‘How exactly is satellite now fulfilling the urgent need to bridge the digital divide?’ You can tune-in to the recording (at <https://gvf.org/webinar/serving-underserved-communities/>) to find out how this dialog developed, with consideration also turning to:

- Is the biggest barrier to serving the underserved connectivity or affordability?
- Will there be a role for satellites in connecting underserved communities in five years? Ten years?
- Is community Wi-Fi the best way to bring the internet to remote communities in low-income countries?
- Are universal service funds a significant source of support to bring satellite delivered


internet services?

- What advantages do GEO have over NGSO systems in bringing services to underserved communities? Conversely, what advantages do NGSO systems have over GEO systems?

- What is the role of satellite in emergency response and business continuity?

GVF's deeper dive into the realm of the virtual gathering has worked very well and we plan to continue to end-2020, with the calendar through to early November looking like this:

- 24 September 2020  
Global Transitions: Digital Economy, Digital Infrastructure, Connected Communities, Digital Planet
- 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

As I wrote last time – Welcome to the Webinar Epoch! 



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

[martin.jarrold@gvf.org](mailto:martin.jarrold@gvf.org)

## Calian Group Acquires Tallysman Wireless

Ottawa, Canada, September 3, 2020--Calian Group has acquired Tallysman Wireless, a manufacturer of precision Global Navigation Satellite Systems (GNSS) antennas, and related components. The definitive agreement is valued at up to \$24.5 million. Amount paid on closing is \$15.7 million (net of cash received) and contains two earnout periods of \$4M and \$4.8M based on the achievement of a certain level of EBITDA performance over the next 30 months. Tallysman's results will be consolidated and reported with Calian's Advanced Technology segment.

Tallysman designs, manufactures and sells a very wide range of GNSS, Iridium and Globalstar antennas and related products into a market with a broad range of vertical applications that include precision reference systems, survey, timing, precision agriculture, unmanned and autonomous vehicles, marine and many more. The company also produces cloud based wireless tracking systems over two-way radio systems and 4G category M cellular systems, for applications ranging from school buses to municipal public works.

Tallysman has substantially invested in R&D to produce the widest range of GNSS antenna available, and that includes several antenna types that lay claim to being among the most accurate GNSS antennas in

world. The company is widely recognized as a technology leader and is the supplier of high precision antennas to a number of leading precision GNSS systems providers.

"Calian welcomes Tallysman to our team. The Tallysman product line and services add a complemen-

also look forward to leveraging additional resources, new technologies and markets deriving from Calian's deep expertise in satellite communications"

"Tallysman has shown consistent profitable revenue growth as they have expanded their network across the globe" said Patrick Houston. "With a growing product portfolio of class leading precision and custom GNSS antennas, they are poised to maintain their growth momentum as part of Calian."

"This important acquisition supports both customer diversification

and service line innovation, two key pillars within our four-pillar growth strategy," stated Kevin Ford, President and Chief Executive Officer, Calian. "The Tallysman acquisition demonstrates Calian continued our focus on innovation and growth. The wide range of products and applications Tallysman brings to Calian expands our product line and entry into new markets. We are excited with the opportunity to support innovation in exciting growth industries such as autonomous vehicles, precision agriculture and wearables. We could not be more pleased to welcome Tallysman to the Calian team." 🇨🇦



tary component to our ground-based satellite communications business. It expands Calian's reach in the satcom industry to markets requiring smaller antenna used in end-user devices that need a different range of fidelities." said Patrick Thera, President, Advanced Technologies, Calian. "GNSS is one of the fastest growing markets for satellite ground systems and we are excited to join forces with a leader in this field."

"We are extremely pleased to join the Calian team." said Gyles Panther, President and CTO, Tallysman. "we look forward to continuing, profitable growth of our core GNSS businesses with market leading products that we sell to a broad customer base. As a member of the Calian family we



# Intelsat Acquires Gogo Commercial Aviation

McLean, VA, August 31, 2020—Despite being in bankruptcy proceedings, Intelsat (OTC: INTEQ), today announced that it has entered into a definitive agreement to acquire the commercial aviation business of Gogo (NASDAQ: GOGO), the largest global provider of in-flight broadband connectivity, for US\$ 400 million in cash, subject to customary adjustments.

The transaction further propels Intelsat's efforts in the growing commercial in-flight connectivity market, pairing its high-capacity global satellite and ground network with Gogo's installed base of more than 3,000 commercial aircraft to redefine the connectivity experience, according to a company statement.

Gogo's leading commercial aviation business provides Intelsat with key airline relationships and customer-facing capabilities, including a leading software platform, ISP and


network management infrastructure. It currently serves 21 commercial airlines, including 9 of the top 20 global carriers. This transaction will combine Intelsat's next-generation high throughput space assets with Gogo's



best-in class 2Ku antenna to uniquely position Intelsat to deliver more cost-effective and advanced commercial aviation broadband connectivity services. Passengers will benefit from an enhanced in-flight connectivity experience that delivers fast and reliable video streaming, browsing and cloud-based applications from gate to gate.

“Consumer demand for in-flight

connectivity is expected to grow at a double-digit rate over the next decade, notwithstanding the impact of COVID-19. The addition of Gogo's commercial aviation business provides compelling strategic value for our stakeholders and makes strong commercial sense,” said Intelsat's Chief Executive Officer, Stephen Spengler. “Gogo's business is a perfect fit with Intelsat's expansive satellite network and infrastructure due to the breadth of Gogo's technological solutions, global reach and operational excellence.”

Spengler continued: “A priority growth objective for Intelsat is to extend our reach closer to the millions of customers who use our satellite capabilities to stay connected around the world. The addition of Gogo's commercial aviation business is a significant step toward this goal. We are growing beyond satellite connectivity to expand into consumer-optimized managed services.” 

## Kymeta Acquires Lepton Global Solutions

Redmond, Wash., August 18, 2020—Kymeta Corporation acquired Lepton Global Solutions LLC which will become a wholly owned direct subsidiary of Kymeta Corporation. Established in 2013, Lepton Global Solutions is a provider of satellite-based customized turnkey communications solutions and services with expertise in the Intelligence Community (IC), Special Operations Command (SOC) and other government sectors.

Acquiring Lepton combines critical capabilities and strengthens Kymeta's ability to pursue key opportunities with U.S. defense and government customers in locations around the world according to a company statement. As a rapidly growing satellite communication services provider with a global and scalable network infrastructure, the company provides customized end-to-end connectivity solutions that can be deployed quickly and efficiently to meet the needs of customers wherever they are located.

Lepton currently hosts Kymeta's satellite connectivity

solutions. As a combined entity, the new offerings and capabilities bring unique, complete, bundled solutions to the market based on best-in-class technologies and tailored customer-centric services that meet and exceed customer mission requirements.

“Having a turnkey satellite service provider like Lepton accelerates Kymeta's ability to successfully penetrate U.S. Military and Government customers in partnership with a well-established brand, deep channel experience, and network support for those verticals. The combination of Kymeta's revolutionary hardware, together with Lepton's service offerings, will be a winning combination that will be hard to beat. We are excited to bring Rob Weitendorf, Isabel LeBoutillier, and their team into the Kymeta family and thus expand and accelerate our ability to go to market,” said Walter Berger, President and COO of Kymeta. 

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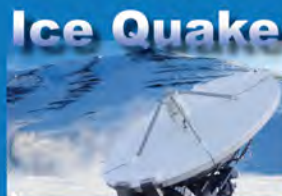
## New LEO / MEO Design

The **Portable Radome** makes satellite networks more survivable and deployable into extreme and harsh environments. Protect transportable antennas and equipment from, snow, ice, burning sun, sandstorms, torrential rains, up to 85 mile-per-hour winds, and more.

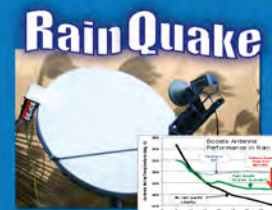
- Single-person setup in less than an hour — conventional radomes can take days.
- New LEO/MEO design for full-arc / elevation angle performance. L, C, Ku, X, & Ka Bands.



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**Cobham Advanced Electronics Appoints Kahn CEO**

Arlington, Va., September 1, 2020- Cobham Advanced Electronic Solutions (CAES), a provider of mission critical electronic solutions, appointed Mike Kahn as Chief Executive Officer (CEO) effective September 1, 2020. Kahn takes over from Shawn Black, who is leaving the business to pursue other opportunities.



**Mike Kahn**

Kahn has held a number of senior positions within the aerospace and defense industry, and most recently served as the Sector VP and General Manager for Weapon Systems at Northrop Grumman, following the acquisition of Orbital ATK where he was President of Defense Systems.

During his nearly 40 years in aerospace and defense, Kahn has been the recipient of numerous awards and is widely recognized as a leader within the sector.

Kahn has extensive experience supporting the Department of Defense, NASA and major commercial customers in successfully delivering significant programs across manned and unmanned launch vehicles, spacecraft and satellites, strategic and tactical missiles, advanced munitions and precision weapon systems.

**Speedcast Government Appoints David Myers CEO**

Washington, D.C. August 19,

2020--Speedcast Government (SCG) announced today the appointment of David Myers as incoming President and presumptive Chief Executive Officer (CEO), succeeding Moe Abutaleb, its long-standing CEO.

Abutaleb has served as CEO since the founding of UltiSat in 2003, through its growth and success and sale to Speedcast International in 2017. He guided the formation of a Proxy company at that time, and then led the integration of Globecom Systems and its Government-related entities after that acquisition was made by Speedcast in 2018.

Myers is a recognized leader in government telecommunications with a track record of driving growth in public and private companies. He joins SCG from Peraton, a prominent national security company, where he served as President of the Communications sector, focused on advanced networks for defense, intelligence and civil customers. Myers previously served as President and CEO of Datapath, a leading provider of military-grade satellite ground systems and field services. He has held a number of senior executive roles at ITC Global, Harris CapRock, and Spacenet. Myers also served as Chairman and President of the Space and Satellite Professionals International (SSPI) industry association. He holds an MBA



**David Myers**

from Rice University, an MS in computer information systems from Madison University, and dual bachelor degrees in business and international relations from Southern Methodist University.

**RUAG International Names André Wall CEO**

Zurich, Switzerland, August 25, 2020--The RUAG International Board of Directors has appointed André Wall as the new CEO. The 55 year old engineer is currently CTO of the Spanish airline Iberia and will take over the management of RUAG International by 1 January 2021 at the latest. CFO Urs Kiener will continue to lead the company until the new CEO takes over. Wall was born in 1964 and is a German citizen. He previously served as CEO at SR Technics and Jet Aviation in Switzerland as well as MTU Aero Engines in Germany. Prior to that, he held various management positions at Rolls Royce Aero Engines and Toyota. "With André Wall, we are gaining an internationally experienced expert in the industry. He has a proven track record of breathing new life into companies and steering them towards success. R U A G International will benefit from his expertise during its ongoing transformation. André Wall will ensure that RUAG In-

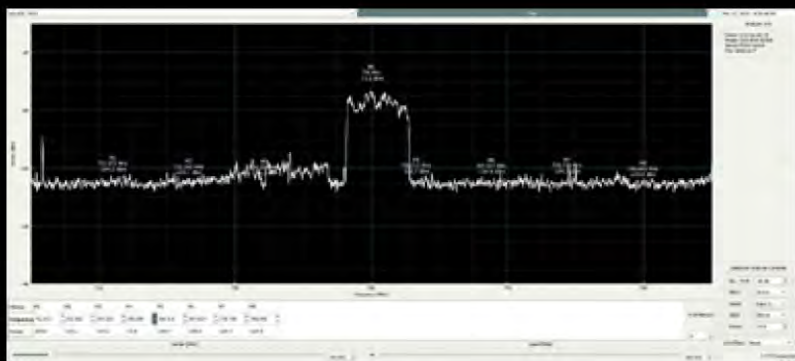


**André Wall**

# New Spectrum Analyzer Series



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ternational continues its post-unbundling course, copes with the effects of the COVID-19 crisis and is ultimately privatised as planned”, says Dr Remo Lütolf, Chairman of the Board of Directors of RUAG International. Since January 1, 2020, RUAG International has been unbundled as a civilian technology company from RUAG MRO Schweiz, a company closely linked to the Swiss Armed Forces. RUAG International is thus implementing the Federal Council’s decision to develop further as an aerospace group focusing on space and aerostructures.

### Jay Wray Joins Encompass North America

Atlanta, GA, September 1, 2020—Encompass Digital Media, a global technology services company that delivers end-to-end video solutions to television networks, broadcasters, sports leagues and OTT service providers, appoints Jaz Wray to Sales Director covering Western USA and Canada. He brings more than 20 years combined experience in broadcast, media & entertainment and wireless telecom industries. Based in Southern California, Wray will manage existing clients as well as lead new business activities in his region.

“We are thrilled to add Jaz to the North America Encompass sales team,” states Peter Ostapiuk, Encompass Senior Vice President, Sales – North America. “He will be instrumental in assisting our clients in migrating their workflows to cloud-based solutions while exploring verti-

cal markets we have not addressed in the past.”

“Encompass provides the rare opportunity to capitalize on both my telecommunications infrastructure background as well as my experience across the broadcast, live events and media & entertainment markets,” explains Wray. “I am delighted to be an integral part of the North America team and look forward to introducing our recently launched, state-of-the-art Altitude Media Cloud platform to new and existing clients.”

Prior to Encompass, Wray worked for Barco in the live events market. He also managed sales in the Western USA for Ross Video and Clear-Com. Wray has a Bachelor of Science in Business Administration and earned his MBA in International Management from Thunderbird School of Global Management. He is also an FAA certified private pilot.

### Krasimir Terziev Joins Orbital Connect

Sofia, Bulgaria, August 4, 2020--Orbital Connect, a global VSAT service provider announced that Krasimir Terziev joined the company. Terziev will become a Managing Partner responsible for executing sales strategies for the development of the satellite services and distribution of products of the



Jay Wray



Krasimir Terziev

leading hardware manufacturers.

In addition, he will help the overall market expansion establishing stronger brand awareness across USA and Europe.

With more than 15 years in the Telecommunication sector, his valuable contribution will be significant for the deployment of Orbital Connect’s growth strategy according

to the company. Terziev worked for two of the leading Telecom providers in Europe, Teletor and Vivacom, managing successfully sales teams.

His last role was a Head of International Sales, Satellite Solutions for Vivacom. He was actively involved in numerous Broadcasting, VSAT, and Teleport projects. He is a member of the board at one of the leading Universities in Europe – Trakia University.

“We’re happy for having Krasimir in our team. His solid experience in the Satellite & Telecom Sector will allow us to strengthen Orbital Connect’s market presence. This is a milestone for our company following our deployment plans for 2020,” said Violeta Kircheva a Managing Member for Orbital Connect.



# The Global Commercial Satellite Imaging Market is Expected to reach US \$6.6 Billion

Dublin, Ireland, August 18, 2020-- The Global Commercial Satellite Imaging market accounted for US \$2,528.96 million in 2019 and is expected to reach US \$6,675.65 million by 2027 growing at a CAGR of 12.9% during the forecast period according to a report by Research and Markets entitled The “Commercial Satellite Imaging - Global Market Outlook (2019-2027).”

Increase in security concerns and introduction of new technologies such as GPS satellites, advanced remote sensing technology, the high-resolution cameras, light detection & ranging (LIDAR) technology and electric propulsion technology are some of the factors propelling the growth of the market. However, the availability of aerial imaging services is hindering the growth of the market.

Satellite images are majorly collected by special imaging satellites operated by commercial businesses and governments across the globe. Companies operating in the commercial satellite imaging market sell images to businesses such as Google Maps and Apple Maps and governments through licensing agreements. The usage of satellite imagery for commercial purposes such as agriculture, defense, energy and insurance is known as commercial satellite imaging. The amalgamation of high-end technologies in commercial satellite imaging has encouraged various industries to deploy the technology to increase their reach. The rise in demand for high resolution and advanced satellite

imagery in the field of national development administration, emergency services, national defense organizations, homeland security agencies and environmental protection has augmented the adoption of commercial satellite imaging.

Based on the end-user, the military & defense segment is going to have a lucrative growth during the forecast period owing to the security and surveillance applications, which are the core functionalities of any defense organization. In most cases, governments have their satellites orbiting the Earth, performing several operations. Growing defense and military budgets in most of the countries, to develop security programs, are expected to contribute to the growth of the market.

By geography, North America is anticipated to hold considerable market share during the forecast period due to growth in funding in different space programs and an increase in research to achieve a strong base of the technology. The market in the region is expected to expand significantly led by advancements in research and development projects. Due to strong support from the federal government regarding grants to academic institutions and companies, to develop highly advanced satellite imaging devices, the market studied is estimated to expand further in the region.

For more information on the report go to: “Commercial Satellite Imaging - Global Market Outlook (2019-2027).”



# Tech Innovation to Improve Resiliency and Agility Will Be Critical Post-COVID-19

New York, NY, August 20, 2020 – COVID-19 has drastically changed the landscape for businesses across all industries, forcing immediate changes – but ones that will have long-term consequences. In the latest report by Lux Research, “The Impact of COVID-19 on Tech Innovation,” Lux outlines five key trends that will define how the world beyond the pandemic will be different.

The five trends that are shaping the post-COVID-19 future are infection prevention, remote commerce, improving resiliency, greater agility,

and macroeconomic impacts. Each of these trends can have a positive or negative influence on an emerging technology. By considering the effects of these trends on technology, we can see how industries are being transformed.

“The methodology focuses on three primary parts: identifying the major trends shaping the future after the pandemic, assessing the impact on technology, and prioritizing the actions that need to be taken based on trends and tech impacts,” explains Michael Holman, Ph.D., Vice President of Research at Lux Research and

co-author of the report. “While things are changing too rapidly to have 100% certainty, this methodology helps executives take a systematic approach to rebalancing their portfolio.”

Lux predicts that increased agility and resilience will drive long-term positive change for materials innovation. “Materials informatics will also see a medium-term positive impact thanks to increased efficiency and agility in R&D. We expect a positive ef-

fect on plastic waste recycling and synthetic biology, as more people are gravitating to single-use plastics to stay safe, and synbio can allow more agile and flexible production,” says Holman.

The energy industry will see a number of key changes. Lux predicts that increased resilience and agility will drive further investments in clean energy, spurring on the energy transition. Bio-based and synthetic fuels, however, will be hard-hit by macroeconomic funding constraints and low oil prices. With increased energy use out of the home thanks in part to remote working conditions, home

energy management is predicted to have a positive medium-term impact, led by remote commerce and improved resiliency.

“Digital transformation will rapidly accelerate adoption of emerging technologies like telemedicine, thanks to a dramatic increase in remote commerce and the need for infection prevention,” notes Kevin See, Ph.D., Vice President of Research at Lux Research and co-author of the report. “Wearables will also see

a positive near-term lift as they aid in infection prevention and reopening efforts. There will be an up-

ward trend in robotics due to the need for infection prevention and improving resiliency. COVID-19 will push major manufacturing and logistics operations to assess the potential of robotics moving forward.”

The agrifood and health ecosystems will see positive growth in omics, which are a powerful suite of technologies for fighting COVID-19. In food, ingredient informatics and plant-based proteins will benefit, as they allow for increased resilience and agility in the food value chain.

The future of the mobility industry is more varied. Autono-



## MARKET TRENDS

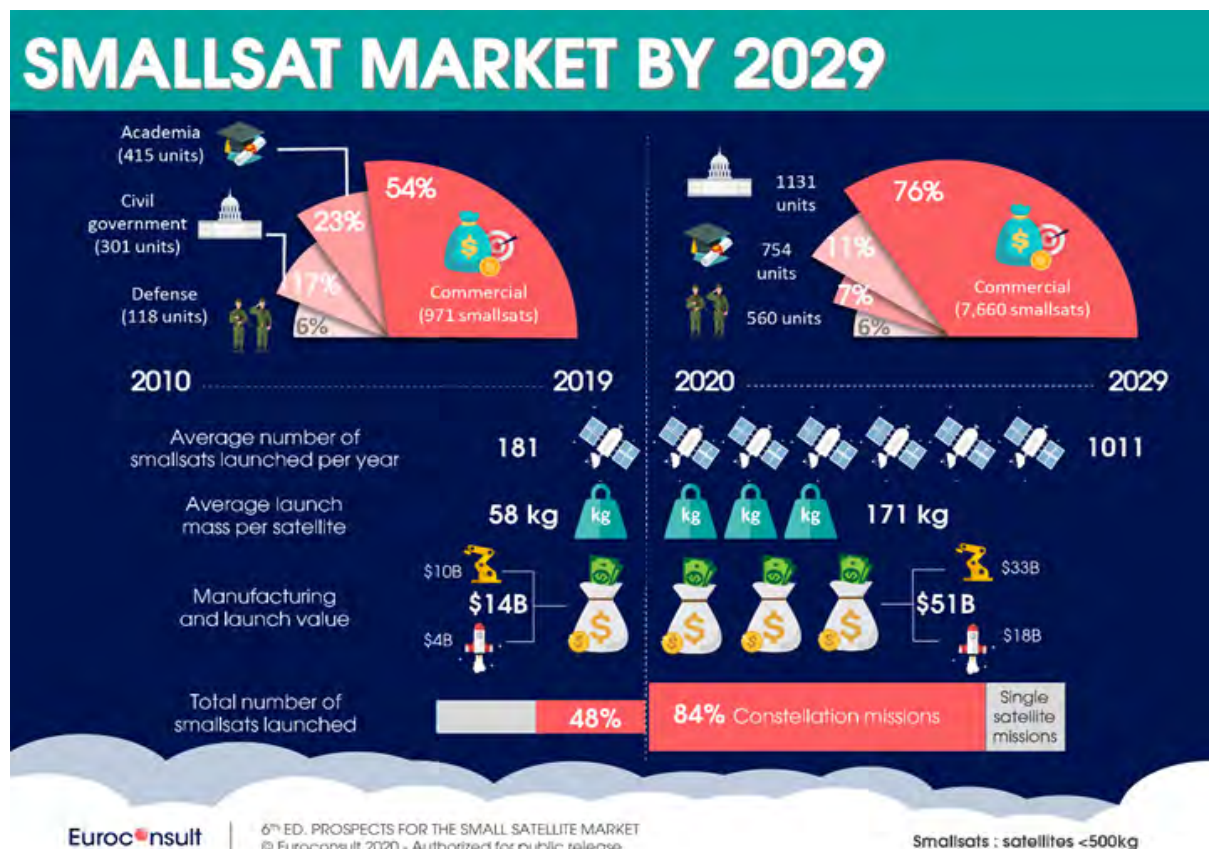
mous vehicles will experience a long-term positive impact due to social distancing preferences but near-term are delayed due to disruption of development and pilots. Shared mobility is a mixed bag, as ride-hailing is severely negatively affected in the near term, while micromobility solutions provide an alternative that better suits social distancing measures. The long-term consequences for electric vehicles will be minimal, as adoption will continue to be driven by regulations that for now have not drastically changed.

By using this framework, innovation leaders can identify the trajectory of technologies they are either invested in or considering investing in, and the implications for their industry. Some technology outlooks will see persistent effects from COVID-19, while others will experience a more dynamic shock

that changes over time. Understanding the effects of the underlying trends on that trajectory will aid in making better decisions with more confidence.

Lux Research is a leading provider of tech-enabled research and advisory services, helping clients drive growth through technology innovation. A pioneer in the research industry, Lux uniquely combines technical expertise and business insights with a proprietary intelligence platform, using advanced analytics and data science to surface true leading indicators. With quality data derived from primary research, fact-based analysis, and opinions that challenge traditional thinking, Lux empowers clients to make more informed decisions today to ensure future success. For more information, visit [www.luxresearchinc.com](http://www.luxresearchinc.com)

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## The Satellite Markets 20 Index™

Company Name	Symbol	Price		
		September 4	52-wk Range	
<b>Satellite Operators</b>				
Thaicom Public Company Limited	THCOM.BK	6.20	2.14	6.20
Eutelsat Communications S.A.	ETLPA	8.95	7.98	18.67
APT Satellite Holdings Limited	1045.HK	2.17	1.97	3.94
Echostar	SATS	28.44	25.23	45.15
SES S.A.	SES.F	6.26	4.88	18.03
<b>Satellite Manufacturers</b>				
The Boeing Company	BA	171.05	89.00	391.00
Maxar Technologies	MAXR	23.66	6.06	21.45
Lockheed Martin Corporation	LMT	385.02	266.11	442.53
OHB SE	OHB.DE	38.25	25.65	48.65
Honeywell International Inc.	HON	166.69	101.08	184.06
<b>Equipment Manufacturers</b>				
C-Com Satellite Systems Inc.	CMLV	2.68	1.44	2.73
Comtech Telecommunications Corp.	CMTL	15.85	11.48	38.00
KVH Industries Inc.	KVHI	8.44	6.36	11.64
ViaSat Inc.	VSAT	37.19	25.10	84.62
Gilat Satellite Networks Ltd.	GILT	5.30	4.70	10.76
<b>Service Providers</b>				
DISH Network Corporation	DISH	33.78	17.09	44.66
Globalstar Inc.	GSAT	0.31	0.23	0.60
Orbcomm Inc.	ORBC	3.86	1.24	8.21
Sirius XM Holdings Inc.	SIRI	5.72	4.11	7.40
RigNet Inc.	RNET	4.87	0.77	10.97

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 1-Jul-20
Satellite Markets 20 Index™	2,267.82	-4%
S & P 500	3,426.96	12%

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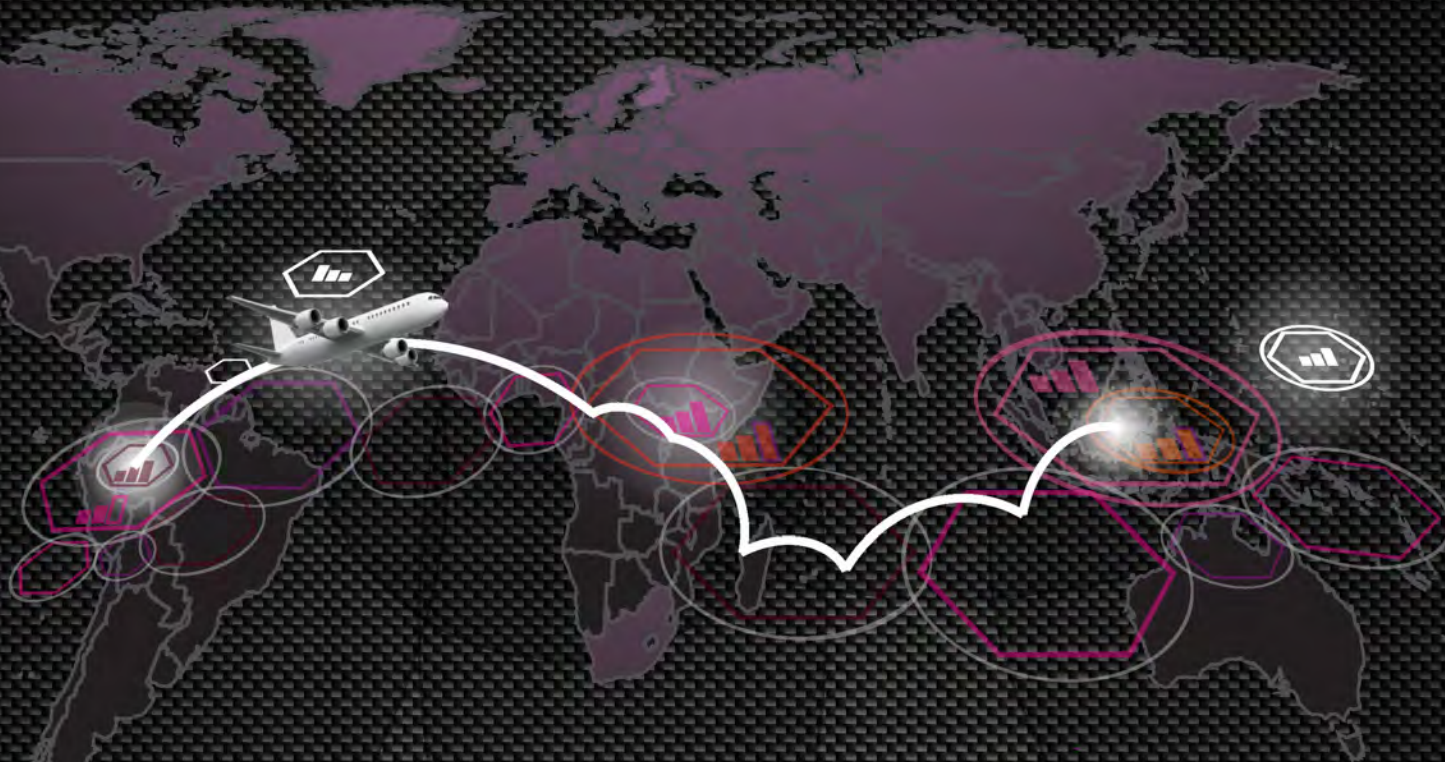
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