

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

The Satellite Industry in a Post-Pandemic World

by Virgil Labrador

As with many industries, the satellite industry has not been spared the effects of the global COVID-19 pandemic which hit the world over a year and a half ago. The pandemic has drastically disrupted supply chains and practically shut down key market segments for satellite such as in-flight connectivity and some key segments of the maritime sector such as the cruise ship business. Some key installations



and contracts were delayed due to travel restrictions. However, the satellite industry has fared better than most industries during the pandemic due to several factors inherent in the key markets that the industry serve and the prospects post-pandemic are encouraging.

At the beginning of the pandemic in the first quarter of 2020, the satellite industry was hit by some high profile bankruptcies which involved the second largest satellite operator Intelsat and Low Earth

Orbit (LEO) operator OneWeb. OneWeb have since received fresh capital investment and emerged from bankruptcy while Intelsat is on track to exit bankruptcy by the end of the year. In the case of Intelsat, it has since started to acquire companies such as Gogo Aviation, betting on the swift recovery of the aviation market. If anything, the high profile bankruptcies of satellite companies during the initial stages of the pandemic was not directly a result of the pandemic but for causes that pre-existed the pandemic.

Increased Financial Activity

Since last year there has been no other major bankruptcies in the satellite industry and it has actually been seeing increased Mergers and Acquisitions (M&As) and investment activities.

A key development since the pandemic has been the rise of Special Purpose Acquisition Companies

Continued on page 4

What's Inside

From the Editor.....3



The Military Satellite Market
by Omkar Nikam.....8

TechBrief:

Battlefield Network Automation
by Juan Manuel Martinez..... 14



Executive Spotlight:

Cynthia Harty
ST Engineering iDirect..... 18

Satellite Data Services Market
by Lalit Katare..... 20

SATELLITE 2021
Products Spotlight:.....24

Company Spotlight: AVEALTO...33

National Harbor Your Way!
by Martin Jarrold.....36

Mergers and Acquisitions.....39

Executive Moves.....41

Show Report:

Space Symposium 2021.....46

Stock Index.....49

Ad Index.....51



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Live Events are Back



After a year and a half hiatus from business travel, I finally left the friendly confines of Southern California for my first plane ride since the pandemic to Colorado Springs to attend the Space Symposium 2021. It was every bit like the old trade shows before the pandemic, with the exception of everyone wearing face coverings indoors. The organizers estimated 7-8,000 participants from 25 countries and 200 exhibition booths. Every one I met at the show were relieved to be able to meet again face-to-face and do business in the trade show floor, the lobby of the elegant Broadmoor Hotel or anywhere they can manage to conduct business.

The mood was very upbeat in the show. A lot excitement over the new US Space Force and new projects in the pipeline for military market as well as for the new LEO constellations. I think the positive mood at the show is reflective of the promising prospects in the space industry post-pandemic as we reported in the cover story of this issue.

We've got a full schedule of live events to attend in the next few months. These include the SATELLITE show in National Harbor, Maryland in September, the NAB in Las Vegas and CABSAT in October and the IBC in Amsterdam in December, among others. We look forward to meeting you at these and other shows.

Meanwhile, everyone stay safe and happy travels!

Virgil Labrador
Editor-in-Chief



EDITORIAL

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

Europe:

Martin Jarrold (London)

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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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Post-COVID...

from page 1

(SPAC) which made it easier for startup companies with limited financial or operational track records to raise capital by Initial Public Offering (IPO). In 2020, over US\$ 3 Billion were raised by SPACs for space-related companies. While SPAC activity has slowed a little since last year due to tighter regulations, some analysts view the increased interest in space companies in the investment community will result in the influx more private equity investment in the industry.

Short- and Long-Term Industry Prospects

The latest figures from the Satellite Industry Association (SIA), which tracks the health of the industry through its annual "State of the Satellite Industry" report reveals continued strength and growth in the global space economy in 2020, despite the pandemic. "The industry's investment in technology and innovation led to improved affordability and productivity, enabling new capabilities, and opening up new markets. The commercial satellite industry in particular saw record-setting growth in the number of satellites launched," according to the report.

Among the highlights of the SIA report include:

- The global space economy grew 1.4% to US\$ 371 Billion from 2019 to 2020. Satellite industry accounts for 73% of space economy revenues worldwide.
- Ground equipment segment grew to US\$135.3 Bil. in total revenue for the year—reflecting the rise in consumer broad-



Despite the pandemic, the global space economy grew 1.4% to US\$ 371 Billion from 2019 to 2020, according to the SIA. The satellite industry accounts for 73% of space revenues worldwide.

band, on-the-move connectivity, and satellite-enabled smartphones and other devices.

- Satellite broadband revenue grew by 10 percent during 2020 to US\$ 2.8 Billion due to technology innovations that increased data capacity and number of subscribers.

The growth of the satellite industry during the pandemic continues in the first half of 2021. The industry has already launched 1,200 satellites in the first half of 2021, matching the total number launched during all of 2020.

The prospects are very good for the industry in the long-term as well. Numerous studies are projecting continuous growth for the industry across all segments through the end of the decade.

Just to highlight some of the key studies, NSR is projecting that 24,700 new satellites will be launched through the end of 2030. A great majority of those satel-

lites are in the non-GEO orbits.

By all indicators, the Low-Earth Orbit (LEO) satellite constellations will be dominating the industry though this decade. LEO constellations will be fuelling growth in various satellite vertical markets such as Broadband Access, Enterprise, Internet of Things (IoT), Cellular Backhaul, among others.

The key factors that served the satellite industry well during the pandemic and in the post-pandemic economy are inherent in the types of services that satellite provides. Satellite technology is a key enabler in provide connectivity and in the post-pandemic world--most of the key economic drivers will require connectivity and lots of it. In fact, of the 10 Technology trends to watch post-pandemic according to the World Economic Forum, seven of them presents unique opportunities for the satellite industry. These include increased demand for bandwidth to facilitate the following:

- Online shopping



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All of the above will require broadband connections which can involve satellite technology. So, the post-pandemic prospects for the industry are looking very good indeed.

Conclusion

Without a doubt, life as we know it has been drastically changed by the global COVID-19 pandemic. With increased rates of vaccinations, signs are very encouraging that the worse will be over by 2022. But there is a lesson to be learned from all the pandemics that have seen in the last two decades alone: pandemics may be here to stay.

The important thing is how to mitigate the devastating effects of pandemics. As in any crucial challenge that we face in the past, it's important to learn the lessons well and prepare for the next set of challenges. A lot of the satellite companies that I have interviewed recently have made very good use of their time during the pandemic by streamlining their operations and supply chains to make them "pandemic-proof." Some

have ramped up their Research and Development (R&D) efforts and developed innovative new products. Those companies that have made good use of their time during the pandemic doing forward-looking things are well-poised to face the future, which from most indicators seem quite positive for the satellite industry.



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). He can be reached at virgil@satellitemarkets.com

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The Military Satellite Market

by Omkar Nikam



Military operations have integrated satellite technology as a crucial part of their operations on land, air, and sea for over half a century. And the United States is one of the leading countries followed by Russia and several European nations in boosting space applications for military. But the world is slowly shifting from a US centric sphere, primarily due to ease in accessibility of resources, increased cooperation between non-allied nations, and rapid innovation the technological sector. The inception of the United States Space Force (USSF) in December 2019 has proved to be a turning in the global military satellite segment. With an annual budget of more than US\$17bn USSF is slowly becoming a central engine of enhancing military assets in space. While developed countries like France already have a Space Force established before the USA, the space fairing nations like India and China are also trying to amplify their space applications for military. While considering the global acceleration of satellite applications in the military domain, the New Space has been one of the crucial sectors to reduce the cost and make space more accessible to both commercial and military agencies. As the world progresses towards a nexus of challenges thrown up from variety of issues, the development of satellite applications will be crucial for military agencies. To dissect this major shift of govern-

ment agencies towards integrating satellite applications in the military domain, we will tap on some of the critical points that will set a new course for the satellite industry

Enhancing Communications, Surveillance, and Reconnaissance with New Space Technologies

Satellites are the backbone of communication, reconnaissance, and surveillance in the modern warfare and according to GlobalData, the intelligence, surveillance, and reconnaissance (ISR) market segment is expected to reach US\$ 7 Billion by 2031, growing at a compound annual growth rate (CAGR) of 3.67% during 2021-2031. The New Space technologies have proven that commercial companies can reduced the high defense budgets by enhancing security capabilities using new space applications. Companies like SpaceX are the result of National Aeronautics and Space Administration's (NASA) commercial space initiatives which has proven over time that the entry of private and commercial entities can significantly reduce the cost of accessing space applications.

Similarly, in Europe, the European Union Agency for the Space Programme's (EUSPA) Government Satellite Communications (GOVSATCOM) initia-



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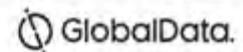
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Market attractiveness by military satellites segment, 2021–2031



Source: GlobalData, Aerospace, Defense and Security Intelligence Center



tive will accelerate the research and innovation in the EU's Common Security and Defence Policy (CSDP). Considering these efforts of developed nations, New Space technologies will help government and military agencies counter hybrid threats in the coming years.

On the other hand, advancement of space technology and low-cost services are some of the crucial factors that have urged many developing nations to equip their defense forces with space applications. Though dropping prices of satellite services is one of the reasons for increasing the demand for military space applications, the fast-track need for upgrading the defense technology is the most important factors for many developing nations. Especially considering the military intelligence operations, Geospatial intelligence (GEOINT) plays a central role in the intelligence nexus. And as companies like Planet Labs, Digital Globe have paved the way for innovative and low-cost satellite imagery services, the road to space applications for military will encourage numerous public-private partnerships (PPPs) in the near future.

Privatization and International Cooperation: Rise of New Allies

Though the defense industry's commercial outlook has made space a peaceful resource; many developing countries are still struggling to provide appropriate op-

portunities for the private sector in the defense segment. So, what is the end solution to accelerate the research and development process for military space applications? Encourage more private engagements by targeting technology niche is one of way to expedite this process. For example, in 2015, China became of the countries that opened its door for private players to engage in military space developments. Similarly, the USA displays an excellent example of how encouraging PPPs can lead to the overall socio-economic growth of the country. Therefore, privatization is one of the ways to bring-in innovation and harness the right talent for the nation.

Following the global trend of privatization in the space industry, the international affairs might create a series of barriers when deploying or initiating a satellite application of military interest. The international relations between nation have by far impacted every commercial industry, as it heavily relies on shifting gears with respect to geopolitics. And as satellite industry is racing towards serving the government and military needs, it will potentially change the future landscape of international cooperation in the industry. For example, India and USA are slowly becoming strong partners and this international cooperation will prove beneficial for both the nations to enhance their existing partnerships in the satellite sector; but will also push away some of their partners to initiate cooperation with new allies.



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Emerging Technologies

Numerous things are rapidly changing the technological landscape of the military satellite applications, but the recent success of Chinese Quantum Communication satellite lies at the forefront of the defense industry. With this success, China will be able to change the face of Signal Intelligence (SIGINT). In SIGINT, there is a high probability of third-party penetration by using various hacking techniques. And Considering the cyber-attacks, the satellite industry is progressing to counter the cyber threats via strengthening the end-to-end encryption techniques. But this scenario is about to change with the inception of Quantum Communication satellites. China is not the only country looking beyond skies to deploy Quantum Communication network; India, South Korea, Singapore, and Japan are also the upcoming players who are looking forward or have already made some amounts of investments in Quantum Communication network via satellite. Arqit, a UK-based startup, is one of the emerging companies pioneering secure communication technique by utilizing quantum key distribution (QKD). The company has recently raised US\$400mn through Special Purpose Acquisition Company (SPAC). Such startups can prove to be beneficial partners for government and military agencies, as the world is entering an era hybrid threats.

Similarly, multi-domain war operations will also require cutting technologies to ensure smooth operation on the field. SES is one of the pioneers in the ISR segment, the company has been one of the strong partners of several agencies. And with the GovSat (a public-private joint venture company between the Luxembourg Government and SES), the company will create a strong foundation to enhance Europe's ambitious plans for secure communications in space. The cyber-attacks have paved way for hybrid threats and satellite industry can fill this gap by serving the needs of government and military agencies.

Conclusion

As the military demand continues push the boundaries of innovation, satellite industry should tap into emerging technologies like quantum satellite communications and keep a close eye on enhancing cyber security. Considering the changing climate of international affairs and current landscape of conflicts around, it is by far safe to say that satellite industry will have the op-

“...As the military demand continues push the boundaries of innovation, satellite industry should tap into emerging technologies like quantum satellite communications and keep a close eye on enhancing cyber security...”



image courtesy of ND SatCom

portunity to present new technologies to help government and military agencies to counter hybrid threats.

Every technology upgrade brings more comfort to society, but its very strength also invites challenge. This is one of the reasons why space is a point attraction for many nations around the world. But, tracking the global footprints of the space applications for the defense industry, both developing and developed nations have started looking towards space as a valuable asset for national security as well as to ensure the economic growth of the country.

Omkar Nikam is an independent space and satellite consultant based in Strasbourg, France. He has eight years of experience in technology and business consulting. He is also the EMEA correspondent for Satellite Markets & Research, USA. Omkar specializes in market research, analysis, and consulting services for several space and satellite market verticals. He can be reached at: www.oknikam.eu



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A Reliable Battlefield Network Automation for Robust Connectivity

by **Juan Manuel Martinez**

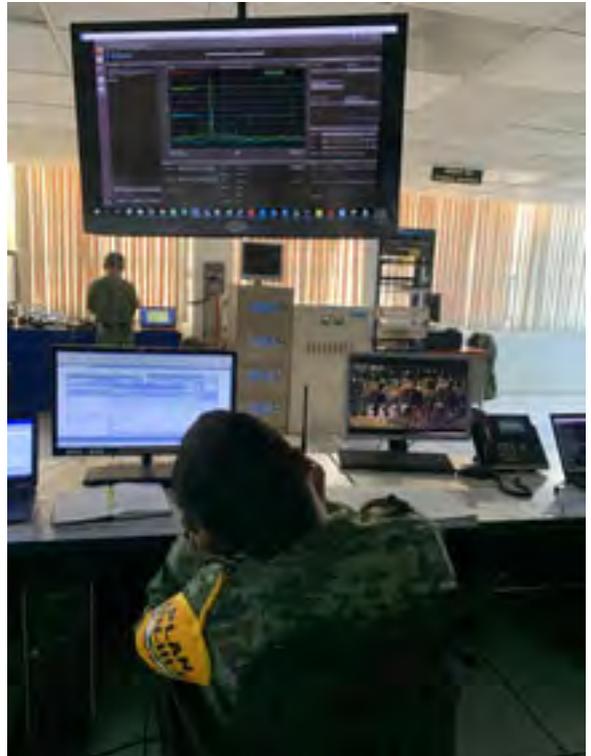
According to NSR the Satellite Communication Government and Military market will be reaching an overall revenue of US\$ 93 billion by 2029. The increasing need for resilient and real-time connectivity from the Government and Military Sector for Intelligence, Surveillance, and Reconnaissance (ISR) and Command and Control (CC) functionalities, lead to robust ground infrastructure, to enable new applications to enhance operations.

The Ground segment will have a key role, as it will be critical to unlocking the full potential of the Satellite connectivity and data exchange. The main requirements for Government and Military Markets regarding the ground infrastructure are clear, lightweight systems that are able to provide multi-band, multi-orbit and multi-network connections seamlessly and accurately, for providing connectivity to the troops, tracking the enemy positions and triggering any action to prevent or mitigate threats. Lightweight antennas are being the main characters of this new paradigm, as they can be managed electronically, automating some tedious processes, such as deployment or configurations, as well as predictive maintenance. Being able to adapt to the complex network architecture is key as it is required in military operations. SatCom on the move is

critical for maintaining the communication on moving troops and acquire the necessary data in real-time to make the right decisions. The driver for these new is the new constellations, which demand technologies that enable a No Touch Commissioning solution, being totally automated without the need of any human interaction with Artificial Intelligence.

Electronically steered antennas integrated with the appropriate auto commissioning technology provides a new way of remote service commissioning and installation, which is a great advantage for Military services, for example in a conflict location with extreme conditions where surveillance might be totally dependent on external forces, the field troops will need to gather all efforts and resources in maintaining the data exchange and tracking secure, having room for emergency manoeuvres. Ground technologies are the key driver to succeed in a fast and reliable network deployment which is essential when troops are in a position of jeopardy.

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current Military and Government needs is Satmotion API by Integrasys, a No Touch Auto Commissioning system supported by the latest antennas in the market, from VSAT to FPAs and electronically steered antennas. The technology developed by Integrasys enables to configure and obtain the necessary measurements and parameters to automate the commissioning process without the need for interaction and remote connectivity recovery and without the need of involving additional hardware. The new tool is a patented technology that calculates instantly the Copol, Xpol, and P1db, which



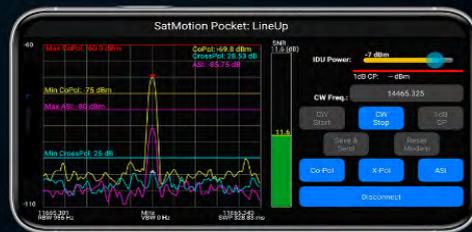
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Satmotion API

No Touch Commissioning in 5 steps



are the most important metrics to optimize the link for high bandwidth, to obtain the highest quality signal and avoid distortion and interferences. Another important point is the autonomy of Satmotion API, which can make an independent remote setup without the need to call to the NOC, which is a tedious process for the troops, and sometimes conditions are not suitable to invest time in having a call with the NOC. The auto commissioning tool also checks the process in order to know instantly if something went wrong, so if there is a hardware failure that is not working as it should or if the signal is distorted at some point, the troops can fix it on the fly.

For the mobility network deployment in the Defense field, it is essential to consider the needs required to succeed in land mobile, maritime, and aero missions. The antennas that need to be placed are ESA, as these devices offer more autonomy, control, and tracking possibilities, due to the fact that ground

technologies such as Satmotion API can be integrated within the ACU, so the deployment can be done just by adjusting automatically the required parameters and the data management can be stored securely.

The future network commissioning for military services is here and with it, the need for flexible electronically steered solutions, that provides multi-band, multi-orbit, capabilities in order to automate the commissioning process become a must for implementing a robust, real-time and reliable network infrastructure. The new market trends carried out by FPA manufacturers open a door for the automation and virtualization of the network, and ground technologies that are able to be integrated with these electronically steered solutions are mandatory to make the most out of these new systems, especially for the military sector.



Juan Manuel Martinez is the Technical Director of Integrasy S.A. based in Madrid, Spain. INTEGRASYS offers a wide range of Satellite Carrier Monitoring and Interferences Detection Systems operating in L, C, X, Ku and Ka frequency bands. For more information on Integrasy's products go to: www.integrasy-space.com

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Cynthia Harty is Vice President-Strategic Business Development at ST Engineering iDirect. Her expertise lies in operations and the introduction of new products, services and solutions to market, establishing channel and pricing strategy. As VP of Business Development, her focus is on the augmentation of the company's 5-year plan and the partnerships that will enable the introduction of incremental capabilities to a product, solution or service and different go-to-market strategies.

Please give us a brief overview of the key features and benefits of your IoT solution?

We are offering flexible IoT Solutions utilizing our existing ST Engineering iDirect hub infrastructure that ease the entry of Service Providers into the IoT market. Our solutions utilizes a family of compact, lightweight IoT terminals that feature a tightly integrated satellite modem and flat-panel antenna design in Ka-band or Ku-band variants for fixed and mobile environments. For our Evolution and Velocity hub platforms, IoT waveform enabled universal linecards (ULC) provide simplified integration into an existing 5IF hub chassis as the IoT modulator and demodulator. Hidden carrier technology allows for IoT and VSAT carriers to coexist in the same bandwidth, ultimately optimizing use of allocated bandwidth. A Hub Base Station (HBS) element is available for activation on the Dialog platform. And what's more, we are also providing optional service enablement solutions that offer Service Providers IoT-as-a-Service options to speed up market entry.

Explain a little bit more on the full turnkey solution that you offer?

We can provide customers with a complete connectivity solution that's built on a flexible service enablement platform paired with IoT-as-a-service options for fixed and mobile IoT environments. These solutions ease the entry of Service Providers into the IoT market by reducing the upfront capital investments and operational complexity usually required to launch an IoT platform and service. Our IoT Solution provides a complete network management system (NMS) that supports both operational support system (OSS) functions as well as business support system (BSS) functions via an application program interfaces (API).

Your solution is specifically for GEO satellites, how does



Cynthia Harty

it compare to the non-GEO solutions now entering the market?

There are many narrowband service options available in L-Band, UHF and the newer smallsat constellations. Many of these services are limited in terms of use cases to Low Data Rate (LDR) applications only. They feature predefined payload sizes and pre-defined polling intervals ranging from per-minute to per-day, for example. Furthermore, they often don't offer the flexibility in increasing throughput beyond the stated data rate and are not cost effective for higher data requirements, limiting use cases to Low Data Rate (LDR) applications only. We offer greater flexibility around branding and customized service plans, message size, polling intervals and bandwidth allocation depending on their end user application requirements in both voice and data use cases.

Our solution enables our partners to leverage their existing capacity, ST Engineering iDirect platforms and systems to launch an IoT service over Ku or Ka band, supporting both Low Data Rate (LDR) as well as Medium Data Rate (MDR) applications. Future development will support High Data Rate (HDR) applications as well.

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EXECUTIVE SPOTLIGHT

What market segments will your IoT solution be serving?

Our solutions can support a myriad of use cases.

Transportation, which includes land, rail, and maritime, is by far the largest satellite IoT vertical due to satellite's reach, reliability, and added security benefits. IoT provides a highly effective solution for asset tracking, fleet management, telematics and analysis of the mobile workforce.

In the Maritime sector, IoT finds use cases in tracking and management of small vessels. This is especially important for the small-scale fishing industry, which has IoT requirements around catch reporting for traceability and regulatory compliance.

In the Oil and Gas and Energy sector, use cases include pipeline monitoring, equipment telematics, predictive and preventative maintenance and beyond line-of-sight monitoring of pipelines and electricity distribution networks. This also applies to water networks, in terms of flow and pressure. IoT can also replace the need for on-site technicians for remote monitoring, advanced meter reading and asset tracking.

In Mining, IoT provides asset tracking of trucks, trailers and heavy equipment, site operations including safety and security. Construction is another sector that holds big potential for satellite IoT. It is used for asset tracking offering intelligence on engine hours, mileage report alerts, fuel consumption and location. On construction sites it gives important insight into operations, most notably safety and critical area monitoring as well as to track progress and security on site. Again, drone line of sight use applications enable easy inspection or survey.

As demand for sustainable farming practices increases, Agriculture, namely precision farming, is becoming increasingly popular. Satellite IoT has an integral role to play here to help analyze different aspects of the farm such as soil, harvest and crop management, fertilizer monitoring and greenhouse and open field management. Important environmental factors such as rainfall, temperature, wind speed, CO₂, power production and consumption of solar panels can be closely watched. IoT can also be utilized for livestock tracking and asset tracking for farm machinery as well and drone beyond line of sight for inspection of crops.

How do you see the IoT solution you are currently providing evolving, in other words, why should your potential clients invest in it now?

As we move towards the implementation of Industry 4.0 and begin to realize the plethora of opportunities that advanced technologies such as 5G, edge computing, automation, orchestration and virtualization bring to the table, here is an opportunity to obtain a complete connectivity solution from a single, trusted source. As the industry leader across many market segments it's our vision to constantly evolve our solutions to meet the current and future needs of our customers. It's what has made us and our customers successful.

As part of this future vision, we are pioneering a world-class cloud-based satellite ground infrastructure platform that enables multi-orbit, multi-access technology services in a converged telco environment driven by the best business case and market strategy.

Our model for ground infrastructure is one that's fully digitized and virtualized, is based on open standards, and orchestrates dynamically configured space resources with real-time demand on the ground. It advances key aspects of a satellite network from more powerful waveforms and more intelligent bandwidth allocation to more capable remotes. It transforms satellite service delivery so that it's perfectly seamless, significantly more economical, infinitely scalable, and can deliver whatever data rate and functionality is needed for any possible application that satellite connectivity can support. 



Download a copy of a MarketBrief report on the Satellite IoT Market at:
http://satellitemarkets.com/Market_Brief

Prospects in the Satellite Data Services Market

by Lalit Katare

Ground equipment and services, spacecraft, and satellite launch segments are considered as the three major pillars of the space industry. The global space market was valued at around US\$ 300 to \$400 billion, which constitutes the satellite as well as non-satellite segments of industry.

Satellite Data Services

Satellite data services play an important role in scientific understanding of environmental processes such as carbon capture, albedo change, and others. This information is crucial to manage and safeguard environmental resources. Satellite data is useful for characterizing and monitoring terrestrial & surface features such as forest, deserts, and urban cities.

According to Allied Market Research, the global satellite data services market is estimated to be valued at \$5.52 billion in 2019, growing at a CAGR of around 19.1% during the forecast period (2020-2027).

Top Impacting Factors

The significant factors impacting the growth of the global satellite data services market include increase in Internet of Things (IoT) & autonomous systems and rise in demand for military and defense satellite communication solutions, which are expected to drive the global satellite communications market growth during the forecast period. However, cyber security threats to satellite communication and interference in satellite data transmission are anticipated to hamper the growth of the market during the forecast period. Moreover, technological advancements

in satellite missions and deployment of 5G network through satellites are expected to offer lucrative opportunities for the market in the future.

Increase in Internet of Things (IoT) and autonomous systems

Robust IoT, artificial intelligence (AI), and autonomous technologies are being increasingly implemented throughout several industries such as automobile, defense, and healthcare. These technical tools are employed to increase the efficiency and effectiveness of the new installation or existing infrastructure.

For instance, in September 2020,

Global Satellite Data Service Market
 OPPORTUNITIES AND FORECAST, 2020-2027

Global Satellite Data Service Market is expected to reach **\$19.3 Billion** by 2027

Growing at a **CAGR of 19.1%** (2020-2027)

Allied Market Research

Microsoft developed a healthcare cloud service. The healthcare cloud service is a digital health technology aimed to provide seamless interactions among various IoT devices, sensors, and users. Multiple tech giants have started developing smart technologies to support the growth and adoption of autonomous systems in real-world applications. Moreover, autonomous systems provide extended safety and comfort for their users by analyzing real-time data to facilitate overall user experience.

Samsung Electronics is developing an autonomous driving chip to be installed in vehicles for providing central control and obtain autonomous driving by further exchanging information in real-time through the data centers of Google. Furthermore, smart technologies, such as IoT and autonomous systems, need extensive and secure network connections for their operation. Satellite communication is being increasingly utilized to provide these systems with the required communication channel. For instance, in March 2021, SpaceX filed for approval from the U.S. Federal Communications Commission (FCC) to enable broadband capabilities in moving autonomous vehicles, which will further ensure connectivity in remote areas through SpaceX's satellite system.

An increase in adoption of satellite communication system to enhance the potential of IoT and autonomous technologies is anticipated to propel the growth of the global satellite communication verticals.

Deployment of 5G network through satellites



Due to rising security concerns, airports are increasingly using artificial intelligence-generated systems.

5G network offers low latency and high bandwidth wireless network. It is still to be deployed in remote and rural areas, owing to lack of infrastructure. Private players are working on increasing the reach of the network through satellite launches worldwide. For instance, in March 2021, SpaceX launched 60 Starlink satellites to provide low latency and high-speed broadband internet globally.

Moreover, satellites built from 5G architecture offer an opportunity for 5G Non-Terrestrial Network deployment in remote regions to provide seamless connectivity to the end users. For instance, in March 2021, Marine Corps, U.S. Navy, Omnispace, and Verizon demonstrated a 5G network based on satellite in the S-band spectrum.

The satellite-based 5G network will allow direct and seamless communication among 5G-capable satellites, terrestrial networks, and small tactical 5G devices. Low Earth Orbit (LEO) satellites enable extended cellular coverage and can be integrat-

ed with 5G infrastructure to further improve the Quality of Experience (QoE) for the service. For instance, in May 2019, Gilat Satellite Networks Ltd. demonstrated Low Earth Orbit (LEO) satellite 5G services. The 5G network will provide simultaneous services such as streaming up to 8K video, web browsing, and video chatting. The emerging development of the 5G satellite to support 5G network deployment is anticipated to drive the growth of the satellite communications market.

Rising use of AI to ensure Safety at Airports

Over the last decade, airport authorities across the world have ramped up their security considerably in response to the growing threats at airports. Artificial intelligence-generated systems can help tackle the safety concerns for airport authorities. In February 2018, the UK government invested around \$2 million for the development of new AI systems to enhance safety and lessen wait times across some of the

continued on page 30...

...designed for perfect signals

"FlexLink K4" Switch Matrix



"QLink" Quad RF-over-Fiber



"HQ Series" Line Amplifiers



"PwrMxG" Dual RF Power Meters



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- ▶ Custom Made Products and Solutions
- ▶ Perfectly Suited for Satellite Earth Stations, Teleports, VSAT ...

Spotlight on key products and services to be showcased at SATELLITE 2021, National Harbor, Maryland, September 6-10, 2021.

Advantech Wireless New State-of-the-Art Ultra-High Power SSPA System

Advantech Wireless Technologies announced recently that it has delivered its 8.5kW Ultra-High Power Modular Summit II Solid State Power Amplifier (SSPA) System to a major Satcom System Integrator.

The newly designed Summit II Systems consist of four, eight or sixteen high-power SSPAs packaged in ruggedized, outdoor enclosures and integrated into a single frame structure that includes combiners, loads, power distribution and M&C – perfectly suited for fixed and full motion antenna installations. Modular architecture with 1:N built-in redundancy and field replaceable amplifiers minimizes downtime, resulting in the highest service availability in the industry.

Advantech's Summit II systems are designed using the latest gallium nitride device technology and operate over the latest Controlled Area Network (CAN) BUS M&C Protocol for maximum speed and reliability. Summit II is available in C, X, Ku and S-band architectures.

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

@SATELLITE visit Advantech Wireless at booth # 1011



AvL Technologies

Join AvL Technologies at SATELLITE 2021, Sept. 8-10 at the Gaylord National Convention Center in National Harbor, MD. Register for the expo as a guest of AvL with the code AVL817. AvL will showcase many new antennas and terminals with new capabilities and features, including:

- AvL 2.4m Model 2020-T Axi-symmetric Auto-Acquire FlyAway Antenna
- AvL 1.35m Model 1315 Ultralight Terminal
- AvL 98cm Model 915 Ultralight Terminal

AvL's Dave Provencher will speak on the Designing Ground Systems for Modern Militaries on the Move panel on Sept. 10.

AvL antennas are the industry benchmark of excellence for defense and homeland security, GEO and MEO ground systems, disaster relief, mobile broadband Internet access, oil and gas data backhaul, and satellite news gathering (SNG).

For more information go to: www.avltech.com

@SATELLITE visit AvL Technologies at booth # 811



Model 915 98cm Motorized Segmented FlyAway

Comtech Xicom Falcon Airborne GaN SSPAs and BUCs

Designed for airborne satcom systems needing high power density with high efficiency, Falcons are high-performance, in-cabin and cabin-exterior SSPAs/BUCs certified to DO-160 and MIL-STD-810 requirements. These Falcon SSPAs with internal L-band BUCs, provide extensive data logging, very high reliability, attenuation control and full calibration capability.

Available in both Ku-band and Ka-band, Falcon SSPAs provide high performance and high linear power density for the demanding airborne satcom applications. These SSPAs are:

- Powerful – 20W to 50W linear power
- Lightweight – 14 lbs to 20 lbs
- Compact – ARINC and custom package
- Reliable – Certified to DO-160 Category A1 to F2
- Flexible – Options for multiple Ka-bands and switched BUCs, extensive attenuation control and calibration capability



The high efficiency technology and advanced packaging techniques used enable industry-leading products that meet the tough environments of airborne applications. These powerful Falcon SSPAs are offered with a range of single and multi-band BUC options in the 27.5 to 31.0 GHz Ka-band. They also incorporate extensive attenuation control, data logging and web GUI availability, and run on 50 MHz frequency reference.

For more information go to: <https://xicomtech.com/product-category/airborne-hpas/>

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Optimize your transportable terminal with Xicom Bobcat GaN BUCs

Contact Xicom for from-stock availability

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See us at
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Booth #1000

Flyaway and Maritime Antennas from JONSA Technologies

Jonsa Technologies from Taiwan is an exceptional manufacturer of communication antennas, and we make invest heavily in new products development. Following up the satellite trend is our mission to satisfy with specific market segments, and we continue to innovate on advanced products-Flyaway and Maritime. The key features of our advanced products include:

- 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.
- 0.6M/0.9M Ka and Ku band Maritime with radome — Maritime is suitable for merchant vessels, fishing, luxury yachts and more, and it can achieve the image, voice, and data transmission with high speed as well. Not only can it provide the tracking function, but it can also enhance the precision.



For more information, go to: www.jonsa.com.tw or email saccount@jonsa.com.tw

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Mission Microwave SSPAs and BUCs

Mission Microwave Technologies is a manufacturer of highly efficient Solid State Power Amplifiers (SSPAs) and Block Upconverters (BUCs) based in Cypress, California. Mission's signature Stinger, Javelin, Titan, and MOAB products have been designed into families of terminals across X-, Ku- and Ka-band frequencies, and are the high power product of choice for tactical end-users. The common form factor and interfaces of these products allows SATCOM terminal designers to create flexible platforms, eliminating the need to re-engineer the implementation when missions change.

Mission Microwave Technologies brings revolutionary design for RF (Radio Frequency) and microwave electronics, supporting ground-based, airborne, and space-based applications. Using the latest in semiconductor technology, Mission Microwave's focus is to minimize the size, weight, and power (SWaP) for these critical applications, while providing its customers with the best possible reliability. Mission Microwave sets the new standard for design, performance, and reliability.



Mission Microwave X-, Ku-, and Ka-band GaN BUCs

Mission Microwave supports the satellite terminal industry with high performance X-, Ku-, and Ka-band products from highly integrated transceivers in the 10-80 watt range to large-scale amplifiers up to 400 watts for gateway installations. Customers rely on Mission to provide the highest level of capability, reliability, support, and on-time delivery. Mission Microwave will be exhibiting their entire line of X-, Ku-, and Ka-band solid-state products at the Satellite 2021 conference September 8-10, 2021 in National Harbor, Maryland.

For more information go to: www.missionmicrowave.com

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The New C-Band IBUC G for Multicarrier Application is Now Available

Terrasat Communications presents the new state-of-the-art 400W/500W IBUC G for multicarrier application. The new GaN IBUC G model now supports multicarrier transmissions across the full C-band spectrum. The 500W model produces +54 dBm of linear output power and is ideal for all high data rate multicarrier applications such as maritime, broadband, broadcast, and network hubs. All IBUCs allow the operator to customize configurations & manage alarms & sensors for real-time network management and control backed by a 3-year warranty. IBUC reliability is baked into the IBUC G design and verified through intensive individual unit testing.



For more information on the available units, go to: www.TerrasatInc.com

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RF-Design's New modular 4+1 Redundant L-Band line Amplifier

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

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

At SATELLITE 2021 you will see our new "FlexLink K4" Switch Matrix, the Quad RF-over-Fiber system "QLink", the innovative 4+1 line amplifier "HQR45C" and our new dual RF power meters "PwrMxG". We look forward to meeting with you and to talking about your individual RF equipment requirements.

For more information, go to: <https://rf-design-online.de> or email contact@rf-design-online.de

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Unlock the potential with your existing ST Engineering iDirect hub infrastructure. By adding cutting-edge IoT terminals and optimized waveform technology, your new satellite IoT Solution begins now with:

- Compact, flat-panel satellite terminals with embedded satellite modems
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- Service enablement models As-a-Service that are flexible and support growth



To learn more, visit: idirect.net/products/iot-solutions.

Spacebridge



SpaceBridge is a proud developer and provider of satellite network equipment and services, including VSAT HUBs and Terminals for Point-to-Point, Point-to-Multi-Point, and Mesh typologies, as well as SCPC and broadcast modems for GEO and NGSO satellite constellations. SpaceBridge also provides Cloud-Based autonomous managed services for its customers.

SpaceBridge Inc.'s diverse portfolio includes the ASAT™ product line, which serves different verticals with various technologies and applications. Key areas of focus are: Cellular Backhaul for 2G/3G/4G and 5G, Industrial Internet of Things (IIoT), Commercial and Military SatComs-On-The-Move, High-Speed Broadband, Multicast IPTV, Voice-over-IP (VoIP), Videoconferencing, L2/L3 VPN, Virtual Network Operator, and HD/UHD TV Broadcasting. ASAT™ Wave Switch™ innovative, award-winning technology enables dynamic return link selection and switching to the most-appropriate waveform, whether MF-TDMA, ASCPC, or SCPC. Thereby optimizing satellite resource usage for satellite networks and operators.

SpaceBridge Inc. continues to enhance its innovative architecture to not only meet today's satellite challenges in managing ground and space satellite resources, but also to provide superior solutions that address the New-Space satellite challenges of tomorrow.

For more information go to: www.spacebridge.com

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Walton De-Ice Systems

W. B. Walton Enterprises, Inc. AKA Walton De-Ice has been the satellite industry leader in Earth Station



Antenna De-Ice systems for over 40 years. Beginning with our flagship, Hot Air Plenum De-Ice as the most economical and efficient method of keeping snow and ice from accumulating on antennas ranging in size from 3.7 meter up to 32 meters.

As the industry has evolved and antenna size requirements became smaller Walton De-Ice has lead the way in providing methods of signal protection such as our patented Snow Shield and Ice Quake/Rain Quake for antennas ranging in size from 0.65 meter up to 6.5 meters. Available in heated or passive solutions, when

considering budget and operating budget no other method of antenna de-icing compares in cost and efficiency.

With the emergence of LEO Tracking antennas and mobile solutions the Walton Portable Radome has no competition when protecting terminals from weather such as rain, snow, ice, heat or blowing sand. Virtually invisible to RF and the ability to withstand wind up to 85 MPH/137 KPH

For more information, go to: www.de-ice.com

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Satellite Data Services...

from page 22

nation's busiest airports. To tighten security, in 2018, the U.S. transportation security administration introduced new computed tomography scanners at John F. Kennedy, Los Angeles International Airport, and Phoenix airports that make use of AI in finding threats. In addition to ensuring security at airport checkpoints, AI can also be used to scale up security at landside zone in airports. Various airports are installing cutting-edge solutions to strengthen safety at airports. For instance, in July 2019, one of California's busiest airports, Oakland international airport, implemented Evolv Edge physical threat detection. The Evolv Edge system makes use of a combination of facial recognition, millimeter-wave technologies, and a camera to inspect individuals walking through a moveable security gate. It scans about 900 people in an hour, making it significantly faster as compared to regular X-ray scanners.

The machine learning models can be deployed to automatically analyze data for several threats. For instance, they can help detect firearms and explosives while ignoring other items, such as keys and belt buckles, that are usually carried by passengers. The rising usage of AI for improving security at airports is expected to propel the growth of the satellite communications and aerospace artificial intelligence market during the forecast timeframe.

COVID-19 Impact

For most of the large space manufacturers, the COVID-19 pandemic has hampered mission-de-

“...The COVID-19 pandemic presented several challenges for the satellite industry such as lowered production, non-availability of raw materials, logistics challenges...”

ployments and also slowed down new product deliveries due to delays in supply chains. Government contractors in Asia, Europe, and North America have benefitted significant administrative and financial support from space agencies through accelerated and advanced payments. However, smaller suppliers, which are dependent on larger firms for contracts, should follow the payment cycle to complete.

The COVID-19 pandemic presented several challenges for the satellite industry such as lowered production, non-availability of raw materials, logistics challenges, among others. Video distribution, maritime, aviation, and DTH satellite communication industries were severely affected by the pandemic and observed a decline of investments initially. Various satellite communication service providers

were not able to recover from huge losses incurred due to the pandemic.

For instance, in July 2020, Global Eagle Entertainment, a global satellite communications provider based in Los Angeles, filed for bankruptcy protection, owing to \$1.1 billion debt owed by the company. However, it emerged out of bankruptcy after 8 months by selling almost all of its assets to first-lien investors. As the pandemic progressed, governments and public & private organizations started the implementation of innovative technologies to tackle the pandemic.



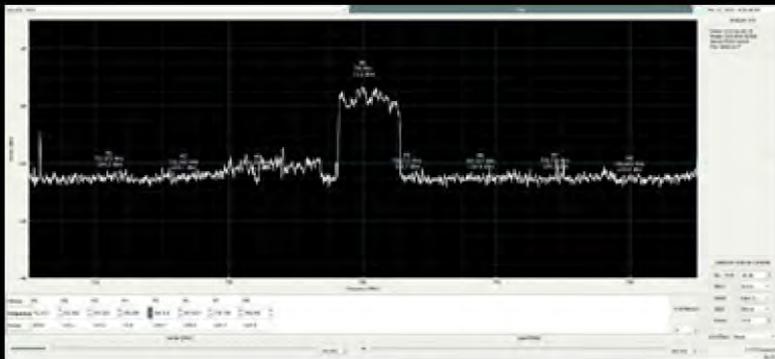
Lalit Katare is a subject matter expert with multiple years of experience in Consulting, Business Intelligence, Market Research, Forecasting, Matrix-Modeling, Data Analytics, Competitive Intelligence, Primary research and Report writing. He can be reached at: Lalit.Katare@alliedmarketresearch.net

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AVEALTO's High Altitude Platform: A Transformative Technology Whose Time Has Come

An up and coming company is leveraging the transformative technology of High Altitude Platforms (HAP) to bridge the digital divide and provide broadband services for various vertical market applications at a shorter time-to-market deployment and lower costs. AVEALTO Ltd., a UK-based company formed to design, build and operate a fleet of HAP vehicles which can transparently replace point-to-point satellite services at a lower cost, with higher quality service has began customer acquisition activities.

Since its formation in 2013, AVEALTO has maintained a very a low profile, as it went through the design and development process. This process is near completion. Recent improvements in the efficiency of batteries and solar cells now have made it possible to create a commercially viable HAP vehicle optimized to provide wireless infrastructure.

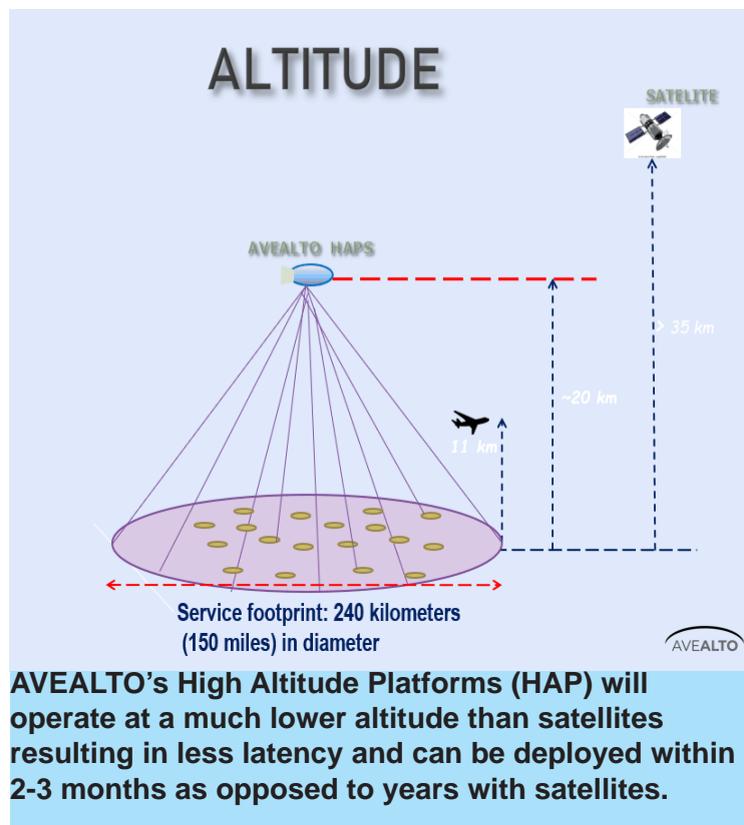
AVEALTO began flight testing on June 28, 2021 under the supervision of the UK Civil Aviation Authority (CAA), with the goal of obtaining UK Flight Approval. The company expects to begin commercial services by end of 2022.

It is likely that the production of AVEALTO HAP vehicles will be relatively limited the first 1-2 years. Customers that make an early commitment to services will obtain preferential pricing and service availability. "Early adopter" customers will also be able to help select the initial regions for HAP services coverage.

Over three billion people in the world still do not

have routine access to the internet. In addition, hundreds of millions of people in remote areas must rely on high cost satellite links. AVEALTO HAP vehicles can provide "satellite equivalent" services at a lower cost than satellites, and with higher quality.

"HAP vehicles are an efficient way to bring low-cost



and high-quality telecom and data services to the underserved and unserved regions of the world. There is a well established correlation between reasonably priced and high-quality telecom infrastructure and economic prosperity. For example, farmers could use data to gain better insight into economic principles and market rates to sell their products at better prices. Mobile tech can also connect people in need with medical professionals to access life-saving treatment and resources regardless of their geographical location," said Walt Anderson, co-founder of AVEALTO.

At a height of 18 to 22 kilometers a High Altitude Vehicle will have line of sight of around 565 kilometers in diameter. Due to topological obstacles and radio propagation characteristics, a realistic coverage area for each HAP is around 240 kilometers in diameter over most land areas and around 480 Kilometers over oceans or plains (where the topography is flat).

HIGH ALTITUDE PLATFORMS ARE COMING IN 2022!



AVEALTO will provide high quality Wireless Infrastructure services to telecom operators

HIGH ALTITUDE PLATFORM (HAP) VEHICLES maintain a stationary position in the stratosphere at an altitude of 18 to 22 kilometers.

Each HAP will cover up to a 240 kilometer diameter area.

- Lower Cost & Higher Quality than Satellites
- Link Mobile Cell Towers in Remote Regions
- Transparent Replacement of VSAT Capacity
- No Capital Investment Needed to Reduce Costs



VSAT PROVIDERS

TOWER OPERATORS



MOBILE BACKHAUL



MARITIME



AVEALTO LTD., a UK company, was formed in 2013 with the goal of designing, building and operating a fleet of High Altitude Platform (HAP) vehicles optimized to provide Wireless Infrastructure services. Over the last 8 years our team has worked diligently to resolve all the technical barriers to building and operating a commercially viable HAP vehicle.

We are meeting with forward thinking companies wanting to embrace the future with new and cost effective technologies

AVEALTO management will be available for meetings at SATELLITE 2021 in Washington DC, September 7 -10, 2021 or, we can arrange a ZOOM call at a convenient time

enquiries@avealto.com

<https://www.avealto.com>





AVEALTO's High Altitude Platform (HAP) vehicle at the Brabazon hangar in Bristol, England.

Avealto's baseline HAP vision is of a solar-powered lighter-than-air vehicle which will remain on-station in the stratosphere at an altitude of 20km (65,000 feet) for missions of several months' duration. Each HAP will provide services to a circular terrestrial footprint between 240 to 480 km (150 to 300 miles) in diameter. Unlike telecom satellites, HAPs can be recovered for scheduled servicing and technical upgrades as required. The flexible nature of HAP provisioning also allows multiple HAPs with overlapping coverage to be co-ordinated for improved redundancy, capacity and quality-of-service. "High-altitude platform technology is now ready to help close the digital divide," said Anderson. HAPs can also be used for various applications such as maritime, cellular backhaul, VSAT, among others.

The global Avealto system when fully rolled out will comprise more than 200 unmanned, stratospheric, long duration telecommunications platforms, providing mobile telephony, broadband communications, backhaul, broadcasting and hosted payloads. Modular swappable payloads will

be tailored to suit specific locations and markets.

"Our management team and investors are dedicated to using HAP technology to eliminating the global digital divide," said Anderson. The Avealto management team has decades of experience in developing and managing new telecom technologies. In addition, AVEALTO is working with a number of world class aerospace and telecom partners in the United Kingdom and the rest of the world to make HAP technology a reality. AVEALTO is a member of the HAPS Alliance, the GVF and the Asia Pacific Satellite Communication Council (APSCC).

AVEALTO will open discussions with potential early customers at the SATELLITE 2021 event in Washington D.C. from September 7-10 and also at the GSMA Conference in Los Angeles from October 26-28.

For more information go to: <https://www.avealto.com> or send an e-mail to: enquiries@avealto.com 

National Harbor Your Way: In Person or Virtual

by **Martin Jarrold**

Welcome to National Harbor, in-person or virtually! In my previous column for Satellite Markets & Research I included reference to some details of the SATELLITE 2021 (<https://gvf.org/event/satellite-2021/>) conference program, an event comprising both digital and in-person content and featuring two panel sessions to be hosted by GVF.

and, Gil Elizov, Head of Products, Gilat Satellite Networks; and, moderated by Lluç Palerm, Principal Analyst, NSR, this session is essentially focused around the progressive digitalization of our world.

This progression will demand vastly improved connectivity to support increasingly bandwidth-hungry consumer and business appli-



ous obstacles; and perhaps the most sensitive of these is rollout cost.

Discussion of the role of satellite



This year's edition of the SATELLITE conference and exhibition, celebrating its 40th anniversary, will be held at the Gaylord National Convention Center at National Harbor, Maryland at the outskirts of Washington, D.C.

The first of these sessions at the Gaylord National Convention Center, entitled Advancements in 5G Satellite Backhaul, takes place on 8 September at 11am EDT (Room: Baltimore 1-2). Featuring as panelists (current at time of writing) Michele Di Paolo, Director of Business Development, SpaceBridge Inc; Bhanu Durvasula, Vice President, International Division, Hughes;

cations and additionally necessitate that high performance mobile services expand to an unprecedented level. Around the world, at varying rates of deployment, the reality of 5G is above the horizon, however, the ability of the technology to deliver on the hype of unlimited services available everywhere requires the resolution of a number of complexities and the overcoming of numer-

– with space and ground segment technologies being wholly integrated with the new terrestrial wireless infrastructure that is 5G – seems to have been going on for some considerable time. Now, with the expected early-2022 publication of Release-17 of the 3rd Generation Partnership Project (3GPP) global standard (i.e., standardization of protocols for mobile telecommunications, including radio access networks, core network

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and terminals), we will get the concrete definition of satellite's role in the 5G vision, and realization of the actual fabric of a "network of networks" that, by definition, includes the non-terrestrial (NTN).

Release-17 will bring to fruition fully reciprocated benefits, opening new market opportunities for satellite in one direction whilst bringing to 5G the benefits of seamless global communications in the other direction. Together, and as one, serving consumer broadband and global commercial business networks, along with maritime and aeronautical, warfighting and peacekeeping, first response and socio-economic development, and numerous other applications in land use, climate monitoring, and smart city evolution, all of which will generate immense volumes of IIoT data and require the computing power of the AI and ML environment. In this session, attendees will learn about the various technologies that are enabling faster speeds and more data over satellite for cellular backhaul broadband connectivity for big-data enterprise applications or connecting remote communities.

Additionally, the session will address the question of whether or not the new paradigms of LEO and MEO satellites – the design, manufacture, launch, and operation of which is getting progressively cheaper and easier with virtualized network functions and software defined radio increasing capability and flexibility – and associated massive spectrum reuse will provide effective backhaul transport for future 5G networks, particularly as dense

"...Around the world, at varying rates of deployment, the reality of 5G is above the horizon..."

LEO satellite networks can provide better latency performance across continents than that which can be provided by the optical fiber backbone of the internet of 2021. The session will also ask, "What is the impact of open standards on satellite backhaul?"

The second GVF session, at 2pm EDT on 8 September in Baltimore 1-2, entitled Reducing Ground Infrastructure Costs in the New Space Supply-Chain, covers (as featured in my earlier column noted above) how NewSpace is challenging established business models whilst creating new supply chains and allowing entrepreneurs to provide services from space in a more affordable way

than before. This session features as panelists (current at time of writing) Stuart Daughtridge, Vice President, Kratos; Sergy A. Mummert, Senior Vice President, Business Development, Americas, SES; and, Joakim Espeland, CEO, QuadSAT. To be moderated by Jai Dialani, Managing Director & Senior Business Developer with Leaf Space U.S., my earlier overview of this session can be read at <http://satellitemarkets.com/events/road-national-harbor>.

Wherever you are while reading these words... whether in Maryland, or elsewhere in the USA or internationally, at one end of a broadband connection, enjoy the show and stay safe. 🇺🇸



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

Companies to Watch at SATELLITE 2021:

- Advantech Wireless Technologies** booth no.1011
- ATCi (Antenna Communicaiton Technologies)** booth no.1611
- AVCOM of Virginia** booth no.1518
- AvL Technologies** booth no. 811
- Comtech EF Data** booth no. 1000
- Comtech Xicom Technology** booth # 1000
- Jonsa Technologies** booth no. 1040
- Mission Microwave Technologies** booth # 519
- RF Design** booth no. 410
- Spacebridge** booth no. 601
- Terrasat Communications** booth no. 1630
- Walton Enterprises** booth no.1719
- WORK Microwave** booth no. 918

Vector Acquisition Corporation Shareholders Approve Proposed Merger With Rocket Lab

Long Beach, Calif., August 20, 2021--Vector Acquisition Corporation (Nasdaq: VACQ), a publicly traded special purpose acquisition company backed by leading technology investor Vector Capital, today announced that Vector's shareholders voted to approve its proposed merger with Rocket Lab USA, Inc., at its annual general meeting of shareholders held on August 20, 2021. Vector also announced that holders of less than 3% of its Class A ordinary shares have properly exercised their right to redeem their shares in connection with the proposed merger. As a result, the gross amount of cash that that the combined company will receive from Vector's trust account and concurrent PIPE financing upon the closing of



these transactions, before transaction expenses, will equal approximately US\$ 777 million.

The merger is scheduled to close on August 25, 2021, and the common stock and warrants of the combined company, which will be renamed "Rocket Lab USA, Inc.", are set to commence trad-

ing on the Nasdaq Capital Market on August 25, 2021, under the new ticker symbols, "RKLB" and "RKLBW", respectively.

"Rocket Lab has created a sustainable, affordable and innovative path to space, a feat once considered nearly impossible. We look forward to further supporting the company, which is

poised to lead the fast-growing space launch, systems and applications markets," said Alex Slusky, CEO of Vector and Founder & Chief Investment Officer of Vector Capital. "This is an important milestone for Vector and Rocket Lab, and we are grateful for our shareholders' overwhelming support as Rocket Lab continues its journey to becoming a public company," he added.

"This significant milestone accelerates our ability to unlock the full potential of space through our launch and spacecraft platforms," said Peter Beck, Founder and CEO of Rocket Lab. "With the support of public shareholders, I'm excited to build on our established track record of mission success as we continue to transform the way we use and access space," he added. 

Spire Global Completes of Merger with NavSight Holdings

Vienna, Va., August 16, 2021--Spire Global, a global provider of space-based data, analytics and space services, today announced it has completed its previously announced business combination with NavSight Holdings, Inc. (NYSE: NSH) to take Spire public. The combined company has been renamed "Spire Global, Inc." and its shares will commence trading on the New York Stock Exchange on August 17, 2021, under the ticker symbol "SPIR" for Spire common stock and "SPIRW" for Spire warrants.

"We are excited to embark on our next chapter as a public company, and to continue to inspire, lead, and develop the business of space-based data," said CEO Peter Platzer. "Building upon our fully deployed, proprietary satellite constellation and global infrastructure, we are focused on strengthening our ability to provide our customers with more data, faster, so that they can make better informed decisions about their missions and businesses, as well as some of the most pressing issues facing humanity today, including climate change mitigation and adaptation."

As a public company, Spire's position as a leading

space-powered data, analytics, and space services company, with one of the world's largest constellation of multi-purpose satellites in low earth orbit (LEO), is further strengthened. CEO and Co-Founder Peter Platzer, along with the rest of the Spire management team will continue to lead the company's operations. As part of the business combination, Jack Pearlstein, Chief Financial Officer of NavSight, will join Spire's board of directors.

"Jack and I are excited to support Peter and his team as Spire continues to execute on its strategic growth plan as a public company," said Bob Coleman, Chairman and Chief Executive Officer of NavSight.

BofA Securities acted as exclusive financial advisor to Spire. Credit Suisse acted as exclusive financial advisor and capital markets advisor to NavSight. Credit Suisse acted as lead placement agent and BofA Securities also acted as placement agent in connection with the PIPE offering. Wilson Sonsini Goodrich & Rosati, P.C. served as legal advisor to Spire. Venable, LLP served as legal advisor to NavSight. 

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John C. Rood Joins Momentus as CEO

Santa Clara, Calif., July 14, 2021-Momentus Inc. a commercial space company offering in-space infrastructure services, announced that **John C. Rood**, former U.S. Under Secretary of Defense for Policy, will join the company as Chief Executive Officer effective August 1.



John C. Rood

Rood brings more than three decades of public and private sector experience to Momentus, including over 20 years of service to the U.S. Government at the Department of Defense, Department of State, White House National Security Council, Central Intelligence Agency, and as a U.S. Senate staff member.

Under Rood's guidance, Momentus will aim to complete a successful merger with Stable Road Acquisition Corp. in August. The company's recent settlement with the Securities and Exchange Commission (SEC) clears the path for the deal and a Stable Road Acquisition Corp. stockholder meeting date is set for August 11 with a record date of July 7, subject to the SEC declaring the registration statement on Form S-4 effective.

Prior to his public service, Rood was Senior Vice President of Lockheed Martin International where he led international business growth. He also served as Vice

President for Corporate Domestic Business Development at Lockheed Martin. Before joining Lockheed Martin, he was a Vice President at the Raytheon Company.

Dawn Harms, who has served as Momentus' interim CEO since January of this year, will step down from the board and return to her prior role as Chief Revenue Officer (CRO).

Firefly names former SpaceX and Blue Origin Veteran as COO

Cedar Parks, Texas, August 17, 2021-Firefly Aerospace, Inc., a leading provider of economical and dependable launch vehicles, spacecraft, and in-space services, today announced

that **Lauren Lyons** will join the team as Chief Operating Officer (COO), working out of their corporate headquarters in Cedar Park, Texas. This appointment comes on the heels of Firefly's recent component business announcement and preparation for its upcoming launch from Vandenberg Space Force Base in California. Lauren will be joining Firefly from Blue Origin where she was a Lead Systems Engineer in Blue Origin's Advanced Concepts. Prior to Blue Origin, Lyons spent several years at SpaceX where she held leadership roles on the Dragon, Falcon 9, and Starlink programs, and with responsibilities in Vehicle Engineering, Safety and Mission Assurance, Chief Engineering, Business Development, and Mission Management. "Firefly is entering a pivotal and ex-



Lauren Lyons

citing phase of its growth," said Lauren Lyons, "I'm thrilled to take on the challenge of leading the efforts in scaling the company's infrastructure to support rapid growth, high execution rate, and deliver exceptional value and service to our customers." "I'm incredibly excited to partner with Lauren to take Firefly to new heights," said Tom Markusic, CEO of Firefly. "In addition to her strong engineering, project management and mission assurance experience, she is a great communicator. Her ability to build productive relationships with the full spectrum of co-workers, collaborators and customers is perfectly aligned with Firefly's vision of 'Making Space for Everyone,'" he added.

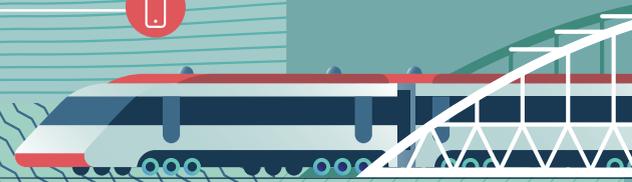
**BlackSky Appoints New
VP of International
Business Development**

Herndon, Va., July 15, 2021--BlackSky Holdings, Inc., a provider of a technology platform providing real-time geospatial intelligence and global monitoring, today announced that it has hired Andy Stephenson to oversee the company's global sales team as its Vice President of International Business Development. Stephenson will be based in the United Kingdom, where he will lead the expansion of BlackSky's international sales efforts.

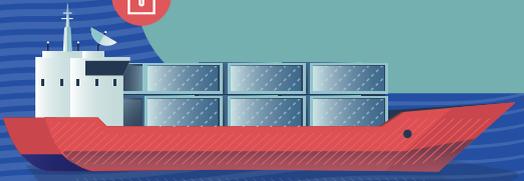
"With more than thirty years of experience as a sales leader in the defense and intelligence, technology, and information sectors, Andy is an ideal candidate to help BlackSky meet the increasing demand for geospatial intelligence worldwide," said Brian E. O'Toole, CEO of BlackSky. "He will be instrumental in leading BlackSky's international devel-



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opment activities to ensure customers around the world understand and have access to actionable insights that give them a first-to-know advantage.”



Andy Stephenson

“I’m thrilled to lead BlackSky’s business development efforts and extend the company’s sales team abroad,” said Stephenson. “International markets are hungry for rapid access to real-time situational awareness and actionable intelligence. BlackSky is well-positioned to help customers in Europe and beyond meet these needs,” he added.

Stephenson joins BlackSky after serving as vice president of international sales and customer success at Preligens, a company that develops artificial intelligence solutions for defense and intelligence customers. Previously, he was the senior director for defense, intelligence for the Asia-Pacific and European regions, and strategic international government programs for Maxar Technologies’ European market. Mr. Stephenson has also held sales leadership roles at companies in the information technology and telecommunications sectors.

WTA Names ATLAS’s Sean McDaniel as 2021 Teleport Executive of the Year

New York City, NY , August 10, 2021–The World Teleport As-

sociatio named **Sean McDaniel**, CEO, **ATLAS Space Operations** as the 2021 Teleport Executive of the Year. Mr. McDaniel will accept the award at the 2021 Teleport Awards Celebration on September 8 during the SATELLITE 2021 conference in Washington, DC. The Teleport Executive of the Year award is presented to an individual for demonstrated entrepreneurship, leadership and innovation in the development or operation of a teleport-based business.

“Sean differs from many of our Executives of the Year in being a relative newcomer to the teleport industry – and also being one of a small handful of leaders who developed a completely new business model for the sector,” said executive director Robert Bell. “The ground-segment-as-a-service model of ATLAS Space is facility-light and software-heavy, and it offers new revenue opportunities to facility-based operators and an online service model for customers. We are glad to mark this milestone through our annual Awards.”

McDaniel has led the implementation of alignment throughout ATLAS. With his vision for the future of LEO teleports empowered by a common cloud-based interface and AI-based satellite contact scheduling, ATLAS has been able to secure patents on its software algorithms and develop a shared-asset model for NGSO satellite support while scaling the ATLAS Freedom network from 6 to 14 LEO teleports. Accountability within ATLAS has empowered individuals to rise to their professional best.

McDaniel lead the ATLAS team to be ranked No. 102 on Inc. Magazine’s annual list of the 5000 most presti-

gious ranking of the nation’s fastest-growing private companies. Furthermore, this ranking positioned ATLAS as No.

15 of the nation’s fastest growing software companies.



Sean McDaniel

He has led ATLAS to be a STEM and industry trailblazer. ATLAS has founded and sponsors the USA’s only BSA Explorer Post focused on the space industry. The ATLAS Space Explorer Post 2025 allows young adults to learn about career opportunities in the space sector through experiential learning. ATLAS was also the founding organization behind the Michigan Space Forum and North American Space Summit, bringing professionals and society together to educate and participate in the exciting opportunities of the emerging space economy.

In addition to McDaniel, the list of Teleport Executive of the Year alumni includes Mauricio Segovia of AXESS Networks; Guido Neumann of CETel; Abel Avellan of Global Eagle; Avi Cohen of RR Media; Bill Tillson of Encompass Digital Media; Jaime Dickinson of NewCom International; Doug Tutt of Global Energy Services, CapRock Communications; the late Kenneth Miller of Globecom Systems; David Rivel of RRsat Global Communications Network; Nick Thompson of Arqiva Broadcast & Media and Jorge Luis Villarreal Schutz of Elara Comunicaciones, among others.





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Space Symposium 2021

by **Virgil Labrador**

The 36th edition of the Space Symposium held at the Broadmoor Hotel in Colorado Springs from August 23-26, 2021 was the first major industry event to be held live since the start of the pandemic in 2020. Organizers estimated the attendance at between 7-8,000 from 25 countries who came to see a full slate of distinguished speakers in various panels and keynotes and 200 companies exhibiting on the show floor. With the exception of everyone required to wear a mask indoors, the show was much like the shows pre-pandemic with the usual receptions and networking activities.

As Colorado Springs is a major center for the defense industry, this year's edition of the Space Symposium, in keeping with previous editions, focused on the military market. This was the first Space Symposium since the formation of the US Space Force was signed into law in December 2019 and the conference program featured several sessions on the Space Force and its upcoming plans.

US Space Force Chief of Operations General John "Jay" Raymond said in his address at the symposium that "Today, we have a single military service that is empowered with the same authorities as the Army, Navy, Air Force,

and Marine Corps, and under the direction of the Department of the Air Force, we have built the Space Force organizations and processes to take advantage of this," he said.



Raymond also said that the Space Force has established the Space Warfighting Analysis Center to "identify a future force design, underpinned by world-class analysis to balance performance, cost, and resiliency."

US Secretary of the Air Force Frank Kendall in his keynote address said: "It is impossible to overstate the importance of space-based systems to national security,"

"Strategic stability depends on space-based reliable early warning and communications systems," Kendall said. "I can assure you that this administration will continue the work of establishing, equipping, training, and sustaining the newly-formed Space Force and of increasing the resiliency of our essential space systems," he added.

John Hill, Assistant Secretary of Defense for Space Policy, warned that "the growth of Chinese and

Russian counterspace arsenals" is a serious threat to the space activities of the United States, its partners and allies."

"Chinese and Russian military doctrines in-

September 2021

Satellite Executive BRIEFING 46



The Space Symposium featured over 200 companies exhibiting on the show floor.



The 36th Space Symposium featured a panel composed of key executives of LEO constellations and service providers moderated by **Chris Baugh** of NSR which included from left: **Maj. Gen. Clinton Crosier**, USSF (Ret.) Director, Aerospace and Satellite Solutions at **Amazon Web Services**; **Mark Dankberg**, Chairman, **VIASAT**; **Chris Johnson**, Senior Vice President of Space Programs Delivery at **Maxar Technologies**; **Dr. Fred Kennedy**, President, **Momentus**; **Neil Masterson**, CEO, **OneWeb** and **Gwynne Shotwell**, CEO, **SpaceX/Starlink**.

indicate that they view space as critical to modern warfare and see the use of counterspace capabilities as both a means of reducing U.S. military effectiveness and for winning future wars," Hill added.

The symposium also featured a panel on "LEO Constellations: New Technologies, Business Models and New Challenges" moderated by **Chris Baugh** of NSR which included **Maj. Gen. Clinton Crosier**, USSF (Ret.) Director, Aerospace and Satellite Solutions at **Amazon Web Services**; **Mark Dankberg**, Chairman, **VIASAT**; **Chris Johnson**, Senior Vice President of Space Programs Delivery at **Maxar Technologies**; **Dr. Fred Kennedy**, President, **Momentus**; **Neil Masterson**, CEO, **OneWeb** and **Gwynne Shotwell**, CEO, **SpaceX/Starlink**. The speakers took turns in extolling the viability of their respective LEO systems both technically and financially and how LEOs will be driving growth in the satellite industry in this decade. The insatiable demand for broadband access will be fueling the deployment of LEO systems which has been accelerating at a rapid pace.

The Space Foundation, which is the main organizer of the Space Symposium, released its annual Space Report at the show. The report revealed that commercial space revenues grew 6.6% in 2020,

exceeding US\$356 Billion despite the global pandemic.

According to the report, infrastructure and support industries grew the most, by 16.4%, surpassing US\$ 137 Billion. Products and services grew 1.2%, accounting for over 60% of commercial space.

More than 1,100 SmallSats launched in 2020, 92% of all spacecraft deployed. "This edition also takes a two-pronged look at recent shifts in small launch vehicle and SmallSat development. In addition to comprising 92% of all spacecraft deployed in 2020, an increase from only 27% a decade ago, SmallSats have more than doubled in average size over the same period. As such, small-lift launchers such as Rocket Lab are developing larger rockets, seeking to court the mega-constellation deployments and hundred-plus satellite rideshares of the past few years," according to the Space Foundation.

From the attendance and the number of exhibitors at the show, the overall outlook for the space industry was quite positive and upbeat. As the first live event in over a year, the Space Symposium was a good indicator of things to come for the space industry.



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The Satellite Markets 20 Index™

Company Name	Symbol	Price			Price Change	
		September 6	52-wk Range		Last Month	From Jan 15
Satellite Operators						
Thaicom Public Company Limited	THCOM.BK	10.40	4.92	14.10	-8%	14%
Eutelsat Communications S.A.	ETL.PA	9.99	8.04	11.01	-1%	6%
APT Satellite Holdings Limited	1045.HK	2.54	1.70	2.95	9%	20%
Echostar	SATS	26.28	19.75	28.85	12%	7%
SES S.A.	SES.F	7.28	5.54	8.55	9%	-4%
Satellite Manufacturers						
The Boeing Company	BA	218.17	141.58	278.57	-5%	2%
Maxar Technologies	MAXR	32.05	21.05	58.75	-9%	-36%
Lockheed Martin Corporation	LMT	356	319.81	399.60	-6%	1%
OHB SE	OHB.DE	38.6	33.15	49.85	-1%	-13%
Honeywell International Inc.	HON	228.36	156.85	236.86	2%	10%
Equipment Manufacturers						
C-Com Satellite Systems Inc.	CMLV	2.56	2.43	4.48	-4%	-5%
Comtech Telecommunications Corp.	CMTL	25.45	12.96	30.40	6%	14%
KVH Industries Inc.	KVHI	10.16	7.82	15.29	-18%	-16%
ViaSat Inc.	VSAT	49.82	29.82	61.35	0%	37%
Gilat Satellite Networks Ltd.	GILT	9.74	4.80	22.69	-4%	33%
Service Providers						
DISH Network Corporation	DISH	45.43	24.51	47.05	12%	40%
Globalstar Inc.	GSAT	2.20	0.29	2.98	29%	147%
Orbcomm Inc.	ORBC	11.49	3.32	11.55	3%	36%
Sirius XM Holdings Inc.	SIRI	6.33	4.95	8.14	-2%	8%
Trimble Inc.	TRMB	94.86	46.78	96.49	17%	36%

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 Index Value Sept. 6, 2021	Percentage Change last month	Percentage Change since Jan 15 2021
Satellite Markets 20 Index™	3,044.13	1%	22%
S & P 500	4,535.43	4%	19%

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