

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

State of the Art: On-Orbit Services

by Elisabeth Tweedie

Many years ago, when I was part of a team considering an investment in Teledesic, one of the engineers at Hughes, produced a computer model, of what would happen if one of the satellites ran into a piece of orbital debris. The assumption was, that this would cause it to break-up, so the satellite behind would inevitably run into the fragments and similarly break-up and so on. The space equivalent of a freeway pile-up, technically known as the Kessler Effect, after the NASA scientist who first modeled this happening.

Teledesic, in common with many of the other Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) systems on the drawing board at the time, didn't get off the ground, and general interest in space debris faded.

Space Debris

Space debris, however did not

go away, it continued to grow. According to NASA there are at least 26,000 pieces of debris greater than 10 centimeters long, including discarded payloads and rocket remains. All of these have the potential to destroy a satellite on impact. In addition, there are around 500,000 smaller objects, about the size of a marble, which would damage a satellite if a collision occurred. As more and more LEO satellites are being launched interest in the subject is increasing, fueled in no small way, by a number of near – and a few actual – collisions in recent years; not to mention Chinese rockets in free fall, with no designated landing spot. There is a genuine fear, amongst those who have studied the situation, that with the vast numbers of satellites now being launched, unless we adopt a more responsible and united approach to managing space assets, the Kessler Effect, won't just be a theory. In the most extreme case, a ma-

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New Space in a Post-COVID World



This month's issue focuses on the new and innovative On-Orbit Services (OOS) that have recently been introduced in the market. Our Associate Editor, Elisabeth Tweedie writes in the cover story of this issue on how these services are looking more and more like the stuff of science fiction. We also have an article on the future prospects in the microsatellite market from Allied Market Research. These are just two examples of new markets opening up for satellite that did not exist just a few years ago.

A lot of these companies are part of the wave of New Space companies that are disrupting the industry. Almost all of them were very busy even in the pandemic developing new technologies or procuring funding for the ventures. Actually, from the interviews I've done with key satellite executives, most companies made use of their time during the pandemic, developing new products or upgrading their current product lines to prepare for the Post-COVID environment. While the world is starting to recover from the pandemic, those who invested time and resources during the down time will pay dividends in the Post-COVID market. Indicators are all leading to an accelerated recovery leading up to the end of this year and most likely full recover from pre-COVID levels next year.

While the different regional and vertical markets may recover unevenly, it is imperative to be able to discern which one have the best potential. OOS seems very promising and the low barrier to entry for microsatellites is certainly attracting many players. We'll keep you posted.

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In-orbit Services...

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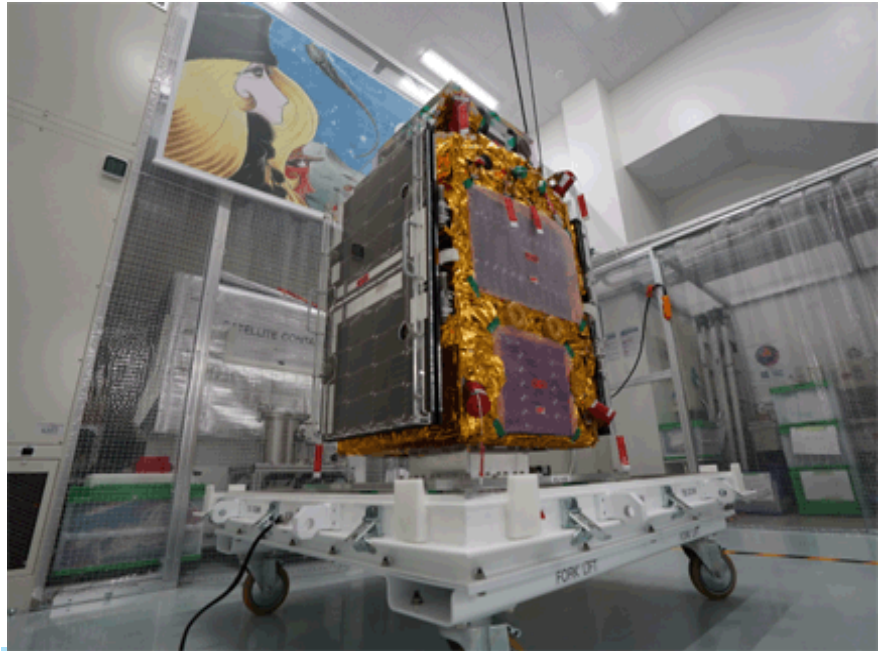
collision has the potential not only to knock out the satellites directly impacted, but to create so much debris as to render space inaccessible.

Fortunately, we are well past the stage of pure academic interest in the subject. In recent years a new industry of On-Orbit-Services (OOS, also known as In-Orbit-Services (IoS)) has been born. Debris removal is one aspect of OOS, Mission Extension, in-orbit repair and upgrade, manufacturing in space and ride-to-orbit are others.

One of the main problems with orbital debris, apart from its existence, is that it has the potential to be a problem for everyone, but no one has ownership of the problem. This makes it really hard to close a business case for its removal, without international cooperation and funding, which isn't there yet.

“Future Proofing Space”

Astroscale has taken an alternative approach, and is focusing its initial efforts on preventing future debris. Astroscale is a young Japan-based company with offices in the UK, US and Israel. John Auburn, Group Chief Commercial Officer and Managing Director, UK described the company's mission as “Future Proofing Space.” To that end, the company has several products in the pipeline aiming to deal with different aspects of preserving space for future generations. The most advanced of these, is End of Life Services by Astroscale, otherwise known as ELSA. ELSA-d, the demonstration satel-



Astroscale's End of Life Services demonstration satellite (ELSA-d) being prepared for delivery to the launch site.
(image courtesy of Astroscale)

lite for this service, was launched in March of this year and will begin maneuvers this summer. This service is to retrieve LEOS at their end of life, move them to a lower orbit, then release them so they burn up. In order to be retrieved, the LEO has to be equipped with a magnetic docking plate. The latest batch of OneWeb satellites are equipped with this plate, and according to Auburn, Astroscale is in discussions with other operators. ELSA-d, will release a dummy satellite equipped with this plate and attempt several different methods of retrieving it.

Assuming that all goes according to plan and the “satellite” is retrieved, the next mission, ELSA-m is planned for 2024. “m” stands for multi-client. ELSA-m will retrieve a defunct LEO satellite, bring it down to a lower altitude where it will be released for burn-up, then return to the

LEO orbit to pick-up another. The aim is to retrieve and remove two or three satellites with each mission.

Obviously, developing the technology to do this, has not been without its challenges. As Auburn said: “No one has ever tried to rendezvous with a satellite traveling at about 17,000 mph hour before.” LEO satellites orbit the earth in 80-120 minutes depending on their altitude and orbit. A GEO orbits the earth in 24 hours, traveling at approximately 7,000 mph. “So the challenge, has been to develop the agility to maneuver very quickly, and the ability to abort should something go wrong.” ELSA-d is operating under a license from the British Government, through the UK Space Agency, so the ultimate risk, rests with it.”

The company also has plans

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for active debris removal (ADR). It has been selected by JAXA the Japan Aerospace Exploration Agency as the commercial partner for the first phase of its Commercial Removal of Debris Demonstration (CRD2) project. In 2023 Astroscale Japan, plans to launch a satellite to go and inspect a piece of debris, one contender for this is the upper stage rocket of JAXA-H2. This satellite (ADRAS-J) will get within 100 meters of the rocket and fly around it, photographing it every 30 seconds. The objective is to identify the best way to grab the rocket, so it can be removed during a follow-up mission. For this sector of its business, Astroscale is focused on working with national space agencies and international organizations.

Multiple studies, many funded by NASA, have concluded that the growth of debris in LEO can be slowed by ensuring that at least 90 percent of all spacecraft are removed from orbit within 25 years of the end of their mission, and at least five defunct spacecraft (that will not deorbit on their own) are actively removed from orbit every year. These are the two markets that Astroscale is targeting.

Mission Extension Vehicles

At GEO orbit, debris is less of an issue, there isn't as much of it, and the satellites are widely spaced, and all in the same orbital plane. There are however, a number of otherwise perfectly good satellites coming to their end-of-life as they run out of fuel. Historically, these have all been "retired" and relocated to a graveyard orbit. Now there is

another option. SpaceLogistics LLC, a wholly owned Northrop Grumman company, has successfully launched two Mission Extension Vehicles (MEVs), and attached them to Intelsat satellites, giving them another five years of life. The first of these, MEV-1 docked with IS-901 in February 2020.

This was not only a momentous occasion for the industry, it was also one for Joe Anderson, VP, SpaceLogistics. In 2001 when the satellite was launched, Anderson was working for Intelsat, and was part of the launch team, which made him one of the last people to see IS-901. As MEV-1 was approaching IS-901 it sent photos back to earth. These were the first ever photos taken of a satellite in orbit (albeit a graveyard orbit in this case). Anderson, of course was there in the control room, making him one of the first, as well one of the last people to see this satellite. A truly unique experience!

Once MEV-1 was safely attached to IS-901, on-orbit maneuvers were checked, before the satellite was maneuvered back into position in the geostationary arc, and returned to service for another five years, after which it will be returned to, and dropped off in a graveyard orbit. MEVs have a design life of 15 years, and potentially could service up to ten satellites, depending on the needs of each customer. MEVs provide attitude control and on-orbit station keeping. Having proved that a MEV can successfully attach to a satellite, in April of this year, MEV-2 was attached to IS-1002 in its working location. The docking is controlled from the

ground, up until the last meter, when autonomous systems kicks in. Once docking is complete, ground control takes over again. MEV was named "The satellite technology of the year" for 2021 by Via Satellite.

SpaceLogistics' plans for OOS, go way beyond MEV. The next step is Mission Robotic Vehicles (MRVs). Defense Advanced Research Projects Agency (DARPA) will supply the robotics to be integrated into these vehicles. The first MRV will launch in 2024, and will be equipped with a robotic arm, supplied by DARPA. This is a win-win situation for both parties. DARPA gets a permanent presence for its Robotic Servicing of Geosynchronous Satellites (RSGS) program: SpaceLogistics, which will run the business, gets use of the robotic arm, which will be used for repairs, to install augmentation devices, capture and relocate satellites and eventually even remove large debris, such as small satellites. But maybe the immediate, most important function of its MRV for SpaceLogistics, is for the installation of Mission Extension Pods (MEPs). These are being designed to provide sufficient fuel for an additional six years life for an average GEO, more for a lighter weight one. If a satellite operator wanted to, a MEP could divide its time between two of its satellites, although fuel would obviously be used during relocation. SpaceLogistics has customers and term-sheets for five of these – all for different commercial satellite operators. These fill the launch manifest up to the second half of 2025. The MEP is a smaller, less expensive extension vehicle, that



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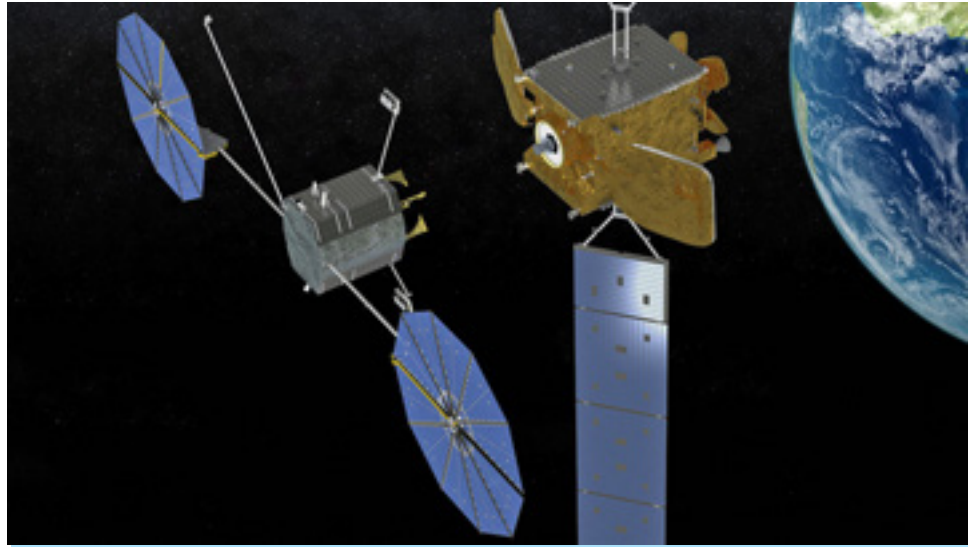
only provides on orbit station keeping.

MEVs and MEPs are both designed to extend the life of satellites that weren't designed to be serviced. The next step in SpaceLogistics' road map, is to service satellites equipped with standard features that facilitate servicing. Grapple fixtures, fiducials, standard refueling ports and even USB slots so that a failed piece of equipment could be replaced, or new capabilities added. It's SpaceLogistics' vision that by 2025 every satellite launched will have these

features. This means, for example, that in the future, the MRV instead of carrying and attaching a MEP, could carry fuel which would be used to "top-up" the satellite. Alternatively, these satellites could potentially be launched with minimum fuel making for a lighter and therefore cheaper launch, to be refueled by the MRV soon after launch. Obviously, this is a financial trade-off that needs to be studied.

Looking even more to the future, Anderson is planning in-orbit manufacturing and assembly. He pointed out that: "most of the constraints on satellites today, are due the launch environment and the size of the payload fairings. Up to 70% of the mass of a satellite, is there to support the launch. If the satellite is assembled or even manufactured, in space this constraint is removed, so there would be a paradigm shift in the design of satellites."

None of this is as farfetched as it may sound. 3D printing has been carried out on the ISS and NASA has plans for two demon-



Artist rendition of the historic mission by SpaceLogistics where their MEV-1 vehicle successfully docked into the Intelsat 901 satellite to perform life extension services, prolonging the service life of the satellite.

(Image courtesy of NASA Spaceflight.com)

strations of in-orbit manufacturing. The first On-orbit Servicing, Assembly, and Manufacturing (OSAM-1) satellite, has just finished its critical design review (CDR). As well as attaching a refueling payload to Landsat 7, a US government satellite, OSAM-1 will demonstrate in-space assembly and manufacturing. The OSAM-1 bus will incorporate a Space Infrastructure Dexterous Robot (SPIDER) to assemble an antenna. The bus and SPIDER are being built by Maxar. A third element, known as MakerSat, built by Tethers Unlimited (TUI), will manufacture a carbon fiber 2x4 beam. In the future this capability could be used to assemble very large structures to support antennas, solar sails, solar arrays etc.. TUI was also one of the companies responsible for a 3D printing demonstration on the ISS. The company is also aiming to recycle in space and is looking for ways to reuse, some of the debris that

is floating around.*

The second NASA mission, OSAM-2 will for the first time, have a satellite manufacture its own solar array in space. OSAM-2 is currently expected to launch in 2023-4 timeframe. Once positioned in orbit, the small satellite will print two beams that will extend approximately 33 feet from each side of the spacecraft. As the manufacturing of these beams continues, they will unfurl solar arrays that will generate up to 5x more power than traditional solar panels on a similar sized satellite. These will be made by Made in Space a Redwire company. Made in Space is another company that has been demonstrating 3D printing on the ISS.

Consortium for Execution of Rendezvous and Servicing Operations

Anderson is very much in favor of establishing open stan-

dards for on-orbit servicing, manufacturing and assembly. To that end, SpaceLogistics is a member of The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS). This is an industry led initiative, initially set up by DARPA, expressly to establish consensus-derived technical, operational and hardware standards for OOS and Rendezvous and Proximity Operations (RPO). There is also a regulatory arm of the organization, working to help, educate and inform national regulators about satellite servicing as they develop new regulations for these types of activities. CONFERS currently has 43 US and international members.

Other members of CONFERS have similar, but as yet, not as far advanced programs for mission extension, debris removal and assembly and manufacturing in space. Last year for example, Astroscale, acquired Effective Space Solutions (ESS), an Israeli company that was planning mission extension services. In 2018 ESS announced that it had a contract for two missions with a commercial satellite operator. Auburn commented: "There has been a lot of interest in mission extension and term sheets are being worked on." It's not clear whether these are for the same two commercial companies, or for others. The mission extension vehicle is now known as Life-Extension in Orbit (LEXi). As yet there is no date for the first launch, but it is expected to be "in the next few years. Each LEXi will supply a few years life extension to a GEO satellite, then relocate it to the graveyard orbit, before returning to the GEO orbit and attaching to another satellite.

Another member, Clearspace

"...Clean-up, refueling, recycling, repair and upgrades, manufacturing and assembly, gas stations and taxi rides. All in space..."

is working with the European Space Agency (ESA) on 2025 mission to capture a Vega Secondary Payload Adapter (VESPA) left behind by a 2013 launch. If successfully captured, it will be dragged down to the earth's atmosphere, where both vehicles will burn up.

Others members of CONFERS are working in different areas: Momentus for example, will be providing "ride-to-orbit" services. The first space taxi. Initially these will be for cubesat and microsatellite customers, which take an initial ride to space as part of a much larger launch. This makes for a more cost-effective launch, but rather like taking a bus, instead of a taxi, the satellites will be dropped off in the general vicinity of the destination, rather than at the destination itself. Momentus' Vigoride will pick them up and deliver them to custom orbits. In the future, Momentus is planning to develop larger transport vehicles, capable of transporting several tons of payload to GEO, the moon and deep space. However, at the time of writing, Momentus' plans are being delayed, due to US nation-

al security concerns. Momentus' Russian co-founder has stepped down, and in a statement to Foreign Policy Magazine, Momentus President Fred Kennedy said the company's objective was to "be above reproach" and that the California-based firm was "completely committed" to resolving any U.S. government concerns about its operations, technology, and ownership." Stable Road Acquisition Corporation, a special-purpose acquisition company (SPAC), that is planning to merge with Momentus, has until August 13th to conclude the deal, after a recent vote by its shareholders on the subject.

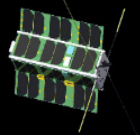
Another company OrbitFab, is planning to establish fuel depots in space.

Clean-up, refueling, recycling, repair and upgrades, manufacturing and assembly, gas stations and taxi rides. All in space. This is starting to make Star Trek look positively mundane. A very exciting time for our industry as it enters a new era!



Elisabeth Tweedie is Associate Editor of the Satellite Executive Briefing has over 20 years experience at the cutting edge of new communications entertainment technologies. She is the founder and President of Definitive Direction (www.definitivedirection.com), a consultancy that focuses on researching and evaluating the long-term potential for new ventures, initiating their development, and identifying and developing appropriate alliances. She can be reached at: etweedie@definitivedirection.com

Microsatellite and Nanosatellite Markets



by Mayank Halmare

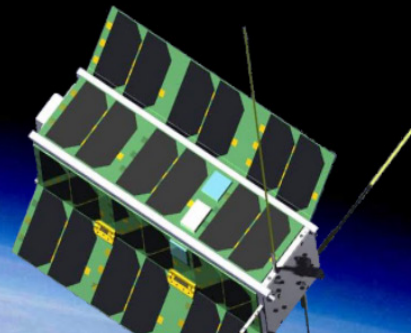


Image courtesy of ExtreTech.com

Microsatellites and nanosatellites are miniaturized man-made satellites that are used for collecting information about the earth and space, among other uses. According to NASA, these satellites are classified on the basis of their overall mass. Microsatellites are artificial satellites, with a mass of 11–100 kg (including fuel mass) while nanosatellites are artificial satellites weighing between 1 and 10 kg, and measuring around 30 cm × 10 cm × 10 cm. Nanosatellites with standard dimensions (“U” or Units) of 10 × 10 × 11 are known as CubeSats. These satellites can be 1U, 2U, 3U, or 6U in size, and typically weigh less than 1.33 kg (3 lbs) per U.

Microsatellites and nanosatellites are more cost-effective than traditional satellites and usually developed for communication, commercial, and space research purposes. The demand for these satellites has increased significantly over the last few years, owing to their lightweight attribute, shorter development cycle, high capability of performing complex computational tasks, and lower cost for development and launch. Major and upcoming companies, such as Planet Labs, GomSpace, Sierra Nevada Corporation, among others, are launching constellations of micro and nanosatellites to offer near real-time remote sensing data.

Microsatellite and Nanosatellite Industry Dynamics

The demand for microsatellite and nanosatellite is increasing significantly in the recent years. According to nanosats.eu, as of January 2021, more than 2,900 nanosatellites were launched in the earth’s orbit. Companies across the globe are launching constellations of nanosatellites or microsatellites in the earth’s orbit for earth observation and telecommunication applications such as high-speed space-based internet services. For instance, in January 2020, Sateliot, a Spain-based nanosatellite and telecommunications operator, signed a Memorandum of Understanding (MoU) with the European Space Agency (ESA) to analyze, develop, and implement innovative technologies, products, and services with space capability using 5G. The company is planning to invest around 100 million Euros to launch constellation of 20 nanosatellites for hybrid terrestrial space networks, 5G network architecture, spectrum management, and spectrum exchange.

Moreover, microsatellites and nanosatellites can provide high-resolution imagery for monitoring and verifying applications in various sectors, including civil engineering & construction, defense & intelligence, agriculture & forestry, transportation, real estate, government, and others. Satellite imaging is



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applicable in topographic mapping, understanding land applications such as infrastructure planning & construction, exploitation of new energy sources, mitigating the impact of disasters, and monitoring drilling projects of the oil & gas industry. Moreover, high-resolution satellite imagery assists in monitoring vegetation, green mapping, vegetation damage due to leaching, traffic management, tracking of fleet, and others. In the coming years, satellite imaging is expected to be significantly used in the real estate industry for enhanced view of buildings and properties, and in the insurance sector for accessing environmental risk through accurate and updated geographical data. Many countries across the globe are collaborating with the microsattellites and nanosatellite manufacturers for satellite imaging. For instance, in 2020, Space-SI, the Slovenian Centre of Excellence for Space Sciences and Technologies, launched a microsattellite collaborated with Space Flight Laboratory and launched the county's first microsattellite NEMO-HD carrying a multispectral high-definition Earth observation instrument. This instrument collects high-definition video at 25 frames per second. The video data and imagery acquired by this satellite will be used to monitor forestry, agriculture, urban development, and marine transport.

The growing focus on reducing the cost of miniature satellites propels the growth of the market. Miniature satellites can be manufactured using low-cost and reusable hardware components & equipment. The use of miniature satellites can reduce the launch expenses by up to 40% as these satellites are small, lightweight, and do not need a dedicated launch vehicle as traditional satellites. Technological advancements, in terms of miniaturization of components and associated software, have encouraged established organizations and SMEs to invest in small satellites. Advancements in microelectronics, such as lightweight apertures, antennas, panels, trans-receivers, control sensors & actuators, and multispectral imagers, are expected to increase the efficiency and processing power of small satellites, reducing the complexities associated with traditional satellites, thereby making them easy to assemble and test. The introduction of reusable space launch vehicles, which could be used for multiple missions, is expected to reduce the costs associated with small satellites. This is expected to result in increase in adoption of microsattellites and nanosatellites.

However, microsattellites and nanosatellites have typically smaller budgets and development time-scales. Moreover, the process of procuring

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the launch is complex for small satellite operators. Therefore, the absence of dedicated launch vehicles for the delivery of small satellites to orbit presents a significant barrier for the microsatellite and nanosatellite market. Moreover, rise in concern for space debris due to increasing launch of microsatellites and nanosatellites restrains the market growth. Contrarily, increasing participation from private players and research & academic institutes; increasing demand for low earth observation (LEO) based services; and growing new space movement present new pathways in the industry to provide lucrative opportunities for the growth of the market.

Trends

Technological advancement and path-breaking innovation have created in a new era of earth observation, making satellites more relevant across businesses. Currently, small satellites, such as nanosats and microsats, are capable of sending terabytes of data and images of an earth on daily basis, enabling varieties of AI driven applications that provide previously inaccessible insights on a global scale in social and industrial processes. AI is disrupting every field, and the earth and space observation sector is no exception. The earth observation industry is reimagining itself and witnessing an increasing use of specified algorithms when cloud and Big Data have become ubiquitous. With the advent of AI, data from space is becoming more accessible and available faster for businesses and governments. Machine learning algorithm has become a powerful tool for analyzing satellite imagery of any resolution and providing better insight. Moreover, these satellites are using Ultra High Frequency (UHF) and Very High Frequency (VHF) bands to increase signal frequency. This increases the speed and reliability of data transfer.

The nanotechnology industry is disrupting the satellite and space industry by offering cheaper and versatile solutions. Affordable satellite connectivity enabled by nanosatellite technology can increase the adoption rate of Internet of Things (IoT) in developing markets and unlock IoT services across remote locations where communication infrastructure is absent.

“...small satellites, such as nanosats and microsats, are capable of sending terabytes of data and images of an earth on daily basis, enabling varieties of AI driven applications that provide previously inaccessible insights on a global scale in social and industrial processes...”

COVID-19 Impact

The outbreak of COVID-19 has forced the World Health Organization to declare a pandemic status. The COVID-19 pandemic has swept the world, with many industries are trying to stay afloat. The government and business involved with space are reacting differently to the new situation. During the COVID-19 crisis, many large satellite launches were canceled or postponed. The launches of majority of microsatellite and nanosatellite are dependent on large satellites as microsatellite and nanosatellite are dependent on launch vehicles of large satellites for the delivery of small satellites to orbit. This has drastically impacted the market for microsatellite and nanosatellite.

Furthermore, due to the COVID-19 pandemic, small and medium-sized companies in the satellite industry may face liquidity challenges in the short term and may struggle to survive without support from their investors. According to a survey of Korea Association for Space Technology Promotion, 66% of space companies surveyed in March 2020 are anticipated to have negative impacts throughout 2020. Moreover, 42% of companies are expecting to recover business in the first half of 2021. According to the United State Department of Commerce's study on the space industrial base, in the U.S., around 90% of space firms with Research and Development (R&D) as a primary business line were small businesses. These SMEs are mostly the only source providers of critical equipment, parts, and services. The



Artist rendition of Sateliot's nanosatellite. Sateliot, a Spain-based nanosatellite and telecommunications operator, signed a Memorandum of Understanding (MoU) with the European Space Agency (ESA) to analyze, develop, and implement innovative technologies, products, and services with space capability using 5G. The company is planning to invest around 100 million Euros to launch constellation of 20 nanosatellites for hybrid terrestrial space networks, 5G network architecture, spectrum management, and spectrum exchange.

negative impact of the pandemic on the business of these SMEs is anticipated to create major challenges in the near future. Moreover, as governments across the globe are focusing on healthcare due to the pandemic, the space budget of many countries has reduced, which is directly affecting the market growth.

However, the COVID-19 pandemic also created an opportunity for existing satellite operators. The demand for earth observation and satellite communication has increased significantly during the pandemic. The operators are using the data gathered from their satellites to study the impact of COVID-19 on the earth's environment. For instance, NASA, Japan Aerospace Exploration Agency (JAXA), and the European Space Agency (ESA) are keeping track of how COVID-19 has changed the global economy and environment. Moreover, the images collected from satellites are used for tracking the coronavirus spread and to control the pandemic. Therefore, attributed to these factors, the demand for satellite data is expected to propel significantly during the pandemic.

According to a recent report published by Allied Market Research, titled, Microsatellite and Nanosatellite Market gives detailed analysis of the pandemic on the market. This includes the current impact on the revenue, sales, and new measures taken by players, among others. For more information go to: <https://www.alliedmarketresearch.com/request-sample/7856> 



Mayank Halmare is a seasoned professional with more than 3 years of experience in Market Research, and Business Consulting. He has worked on various successful consultation projects with well-known brands in Aerospace and Defense industry such as Sierra Nevada Corporation, Airbus, Planet Labs Inc., and others. His expertise has helped clients across the globe to formulate successful business strategies

which contributes significantly in growth of the company. For more information on research on the Microsatellite Market go to: <https://www.alliedmarketresearch.com/request-sample/7856>

A Promise Kept

The 1960s ushered in an era of human space exploration that has never been equaled. Humans traveled farther from our planet than ever before – not once but half a dozen times – and those journeys sparked the dreams and ambitions of millions.

And then we stopped. We flew robots to other planets. We put satellites and space stations into orbit. But people never again answered the call to leave our planet far behind in a quest for knowledge and opportunity, to open new horizons for others to follow.

Never – until now.

From Earth to the Moon - Again

NASA's Artemis program is committed to landing American astronauts

on the Moon again – to explore, to make discoveries and lay the foundation for a permanent and productive human presence.

This new NASA mission will do science – but also search for water to turn into oxygen and fuel, and for materials to build landing pads, housing and workspace.

NASA is designing a new spaceship called Orion to carry astronauts from Earth to lunar orbit, where a lander will deliver them to the Moon. Orion will climb into space on a massive new rocket called the Space Launch System.

Those few minutes of rocket flight are among the riskiest in the journey. The Space Launch System will battle gravity by burning nearly a million gallons of fuel at enormous temperature and pressure. The rocket must balance on that pillar of fire and settle into the right orbit with the precision of a

star athlete scoring a goal.

A COMET on Earth

Helping to make that possible is Peraton's software product OS/COMET. The men and women of Peraton developed and deployed it decades ago to monitor and control space vehicles and rocket launches. Improving and expanding year by year,

OS/COMET is now one of the key platforms on the Artemis program, used to monitor and control the Orion spacecraft and the liftoff of the Space Launch System.

OS/COMET is one small part of a great adventure. Humanity's return to the Moon keeps

the promises made more than half a century ago. It also represents the first steps toward the next giant leap: from the Moon to Mars. Returning to the Moon, we begin to seize a greater destiny. To become a people who sail the vast darkness and silence of space as readily as we do the seas and skies of Earth. To ensure humanity's future regardless of how our home planet changes.

That future begins now.



Produced for Satellite Executive Briefing by Space & Satellite Professionals International. See more stories and videos of satellite making a better world at: www.bettersatelliteworld.com



Click here to view a video on "A Promise Kept":

<https://www.youtube.com/embed/K24J5aHqhdM>

C- & KU-BAND CAPACITY FOR THE EASTERN HEMISPHERE

Yamal-601 (49°E) Yamal-402 (55°E) Yamal-401 (90°E) Yamal-300K (183°E)

The wide coverage areas of Yamal satellites enable communication services delivery to different parts of the world for the purposes of Oil & Gas, Government, Aviation, Maritime, Education and Emergency segments. Yamal Satellite Capacity is successfully used for communication links and data transmission, TV distribution, occasional use, trunking, backhaul, inflight and maritime connectivity.

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Spotlight on key products and services now available in the market.


AvL's New 2.4m Axi-symmetric Antenna

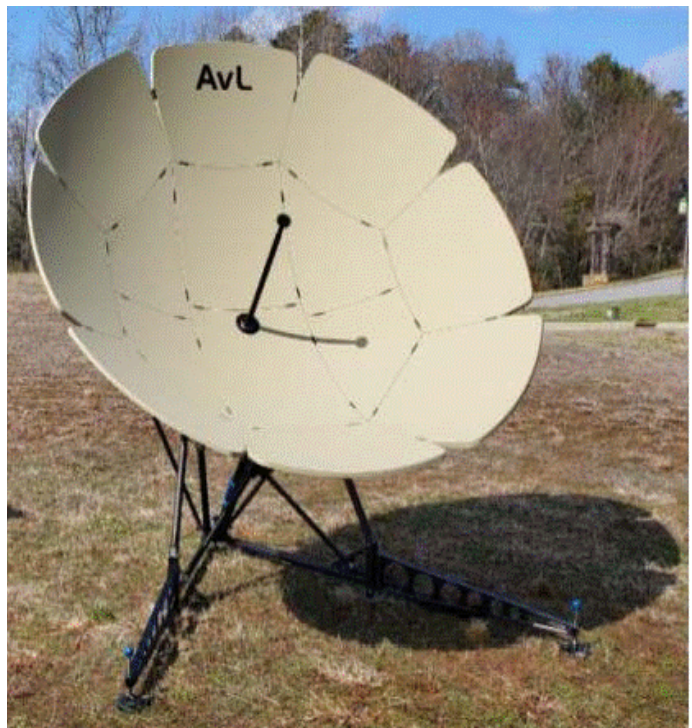
AvL's new 2.4m axi-symmetric antenna is ultra-lightweight and has a breakthrough three-case pack-up. The 14-piece carbon fiber reflector operates in X-, Ku- or Ka-band with new bayonet-style feeds and quick-change RF kits, and a C-band capability is in the planning as an upgrade. The antenna is modular, flexible and operates on an aluminum space frame, which enables set-up or pack-up by one person in minutes. Once the antenna is set-up and anchored, the manually operated antenna is easily repositioned using simple, ergonomic pointing assist features – no anchor adjustments needed – for fine tuning to one satellite or pointing to a different satellite.

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

AvL Technologies is a company that produces visionary, innovative, reproducible satellite communications antennas and positioners for emerging markets that combine elegant designs, unique style and technical superiority for ultimate performance. We are dedicated to technical excellence and extraordinary customer service. We strive to do good work in a good working environment, where employees are treated with respect and trusted to produce the best quality possible with the best possible attitudes.

AvL Technologies, Inc. was formed in 1994 to design and manufacture a lightweight positioner for the ERA Technology 1.5M diamond-shaped, Ku band, carbon fiber reflector for BAF Communications. The founder of AvL is Jim Oliver who began his experience designing antenna positioners on satellites in 1967 for Lockheed Missiles and Space. His earth station antenna experience started in 1979 as Engineering Manager for the Antenna Division of Scientific-Atlanta where he was responsible for the development of antennas from 3M to 11M, most of which comprised the company's initial earth station antenna product line. He later was co-founder of SatCom Technologies (now a division of General Dynamics) where he developed another complete product line including the first 2.4M SNG antenna system.

Today, AvL Technologies, Inc. is a privately held US company specializing in the design, development and production of mobile satellite antennas and positioner systems. With corporate headquarters based in Asheville, North Carolina, and a regional office located in the UK, AvL is able to offer superior service and support to customers around the world. AvL provides systems integrators with positioner and complete antenna system products, product development and services that maximize the technical and commercial benefits for their customers with cost, performance, quality and reliability requirements. 





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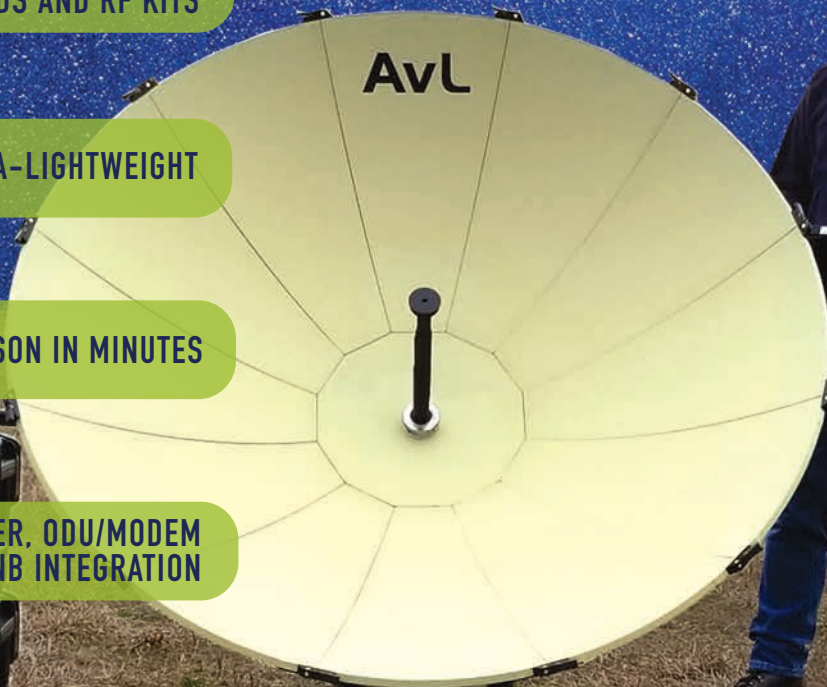
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INTEGRATION & BUC/LNB INTEGRATION

ARSTRAT CERTIFICATION



avltech.com

Coming Out of the COVID Tunnel

by Robert Bell

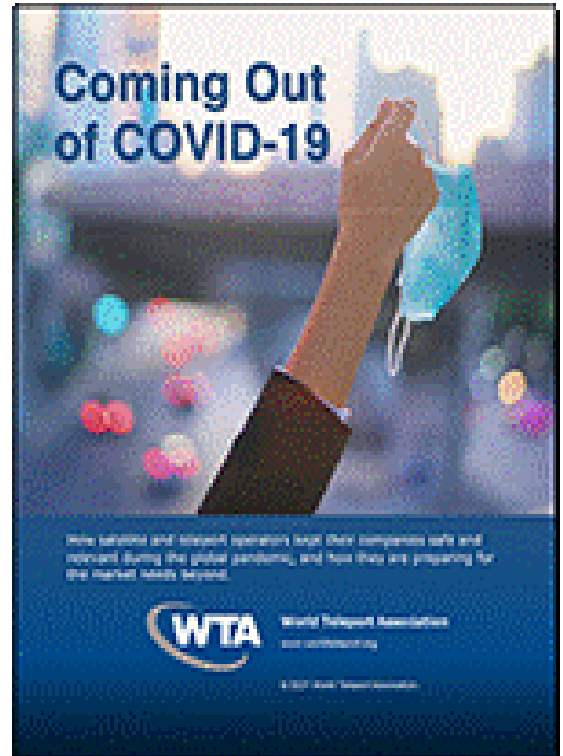
Depending on where you are in the world today, the light at the end of the tunnel is either welcome daylight or an oncoming train. Since it first appeared in late 2019, COVID-19 has been an unequal opportunity curse, killing many, sickening more and leaving even more of us untouched but isolated and afraid. Now that vaccines are pouring out of production facilities and into people's arms, the inequality has actually grown, varying from nation to nation based on economic might, the capabilities of governments and national and regional culture.

At this critical juncture, the World Teleport Association interviewed executives at teleport and satellite companies to learn how the pandemic impacted them and how they responded. The result was a new report, *Coming Out of COVID-19*, full of lessons about dealing with the unexpected and unprecedented.

It told us some things we already knew: that satellite sectors from aviation and maritime to oil and gas and broadcasting were especially hard-hit, and that a lot of masking and sanitizing and working from home went on inside these companies. The most interesting takeaways from the report – and a recent webinar we hosted – were the unexpected value that teleport and satellite operators gained from being forced to adapt to a global crisis.

Unexpected Growth

The first value was growth in new lines of business. Key vertical markets for satellite connectivity certainly cut back sharply as cruise ships went out of service, aircraft went into storage and network technicians stayed home. But there was unprecedented demand for bandwidth from new quarters. A November 2020 report from HelpNetSecurity showed that multiple networks experienced a year's worth of traffic growth – between 30 and 50 percent –



within just a few weeks in March. Telstra, which sponsored the report, saw a 70 GB jump in bandwidth demand just to serve schools in Australia. Enterprise customers were on the phone asking for assurance that their allocated bandwidth would remain available despite rising demand. One company was able to win several contracts from incumbents by demonstrating that it could operate leaner and meaner than they could.

Several contributors predicted that the demand surge would not just be a blip. The pandemic, combined with the massive growth in ransomware attacks on critical infrastructure, has sparked great interest in network diversity, particularly diversity over satellite, which effectively airgaps the network to keep it secure. Technology plays its part as well, with the adoption of software-defined wide-area networks (SD-WAN) for managing multiple forms of connectivity including VSAT and L-Band. This

has significantly increased the ability of multi-mode networks to deliver a quality user experience.

Been Down So Long, It Looks Like Up to Me

Other contributors noted that the large disrupters coming into the business – HTS, VHVS, MEO, LEO, video streaming and cloud computing – were already putting operators under major pressure to become as efficient and flexible as possible. That came in handy when the pandemic made efficiency and flexibility into top-priority survival skills.

The pandemic led many operators to cut administrative red tape, such as requiring multiple approval for certain work to be done. That let employees respond to sudden bandwidth demand, or drastic changes in customer needs, within days instead of months. Operators whose workloads were lagging in early 2020 took the opportunity to achieve new levels of product and process certification, including WTA's Teleport Certification program.

Remote Can Be Better

Perhaps the biggest surprises were in the power of remote operations to meet the need. One operator with a big cruise business had made a decision months before COVID struck to standardize its network hubs and remotes on ST Engineering's Newtec Dialog platform. A major cruise line agreed to the upgrade and the company meticulously planned a swap-out for ships during their scheduled stays in port.

As cruise passengers were ordered ashore, however, the careful plans went out the window. Ships no longer had itineraries, so equipment could not be integrated and shipped on schedule. Technicians could not board ships to do the installations. Yet within a matter of months, the company was doing dozens and then hundreds of installations per quarter without cutting off the connectivity that officers and crew required.

To make it work, the company began ship-

ping unconfigured systems to ports without regard to schedule. It developed training materials, both written and on video, to walk the cruise line's on-board IT staff through the process of configuring Dialog and installing it on backup and then primary antennas, all without an outage. The operator's staff was online throughout to offer guidance and answer questions. The cruise line actually saved substantial money and time, and the operator's eyes were opened to possibilities it had never considered before.

Meanwhile, nearly every company was pleasantly surprised to find out how effective their employees could be from home. While many set up A/B staffing and COVID protocols for their NOCs, others equipped their at-home staff with high-end laptops and software that made it possible to control the network and engage with customers remotely.

Reliance on videoconferencing also had a democratizing effect across organizations. Many of the intangible barriers separating executives from front-line workers melted away, and it became possible to efficiently hear from more voices in making key decisions. People still complained about so many online meetings, but they tended to arrive more prepared than before and came away feeling sure they had not been left out of decision-making.

As with everything else about the pandemic, the unexpected value was unequally distributed. But generally, the more agile and flexible operators proved themselves to be, the better they performed in the pandemic and the stronger they expect to emerge from it.



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.

Coming Out of COVID is available for free to members and for sale to non-members at <https://www.worldteleport.org/store/viewproduct.aspx?id=18216774>.

He can be reached at: rbell@worldteleport.org

It's Singapore, Virtually!

by **Martin Jarrold**

As I write this column on a sunny Saturday afternoon in late-May in the south of the UK I reflect that, just as I approach the 20th anniversary of my joining GVF, it's still going to be some time until my GVF duties will require me to take a flight departing from London Gatwick, my nearest international airport, or London Heathrow, some one-hour away by motorway. As the impact of the pandemic in many parts of the world not only continues but becomes yet more serious, some parts of the UK are affected by the Covid-19 strain officially designated B.1.617.2, and commonly known as the "Indian variant". Also, as I write, I am eagerly anticipating the second of my Oxford-AstraZeneca vaccinations... This, at least, will be a step in the right direction, though the watch word will remain one of caution.

Indeed, this caution has been illustrated in the news of the past week or so with yet further adjustments to the calendar

of forthcoming industry events. One major European event now having being pushed from its usual September schedule to December 2021; and, Asia's major show, until just recently known as ConnecTechAsia, going entirely virtual over the period 14-16 July as Asia Tech X Singapore 2021 (<https://gvf.org/event/asia-tech-x-singapore/>) bringing BroadcastAsia, CommunicAsia and SatelliteAsia to a new online



platform presence with streaming live content and online networking.

As GVF and Satellite Evolution Group (SEG) continues its webinar series – so far capturing the attention of now well over 11,000 live and archived record-

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ing views – with such recent and current titles and themes as Partnerships for Connectivity Enable a Brighter Tomorrow in Africa; Connectivity in Latin America: The Satellite Solution; Satellite Solutions for Enterprises in

EMEA; and, Antennas in the Goldilocks Zone, we will also be preparing our content for the Asia Tech X Singapore 2021 virtual program.

GVF's day, or rather afternoon, in Singapore is on 14 July, between 2:00 and 5:00 pm when we will feature three webinars – [1] Bridging the Divide: Enabling Affordable Busi-

ness & Community Digital Connectivity; [2] Natural Disasters: Preparation & Response via Satellite; and, [3] Planes, Trains, Automobiles & Ships: Satcoms-on-the-Move.

Bridging the Divide: Enabling Affordable Business and

Community Digital Connectivity

The Digital Divide is the product of many factors but two are of great significance: 1. Connectivity; and 2. Affordability. Once characterized as primarily a developing world issue for low- and middle-income, the COVID-19 pandemic has underlined the degree to which access to affordable broadband is also a need felt by people in other, wealthier and better infrastructurally developed, countries.

Satellite has long been correctly seen a means of solving the “connectivity” problem as satellite can be deployed anywhere, and its coverage is ubiquitous. The emergence of High-Throughput Satellite (HTS) technology has already changed the capabilities of the satellite industry, transforming the economics of satellite-based connectivity, and thereby addressing the “affordability” problem. Further radical change has come with expansion of more powerful HTS coverage across the globe, with increased capabilities in existing MEO satellite systems and with the new wave of LEO mega-constellations. However, orbiting infrastructure is only part of the solution. We must consider the ground segment: the satellite terminal, or Customer Premises Equipment (CPE), and its affordability for both consumer-oriented solutions and business focused solutions. By the very definition of discussing the digital divide, satellite will continue to serve

wherever broadband networks are needed to change the underserved into the well-served. There are many fundamental questions to be answered during the panel discussion, and just some of these questions are:

- ‘What are the principal barriers to serving those on the wrong side of any digital divide?’
- ‘How exactly is satellite now fulfilling the urgent need to bridge the digital divide?’
- ‘What is the ongoing role of Universal Service Funds?’
- ‘What is the role of satellite Community Wi-Fi in providing broadband internet access?’
- ‘For how much longer will we still be discussing the search for affordable solutions to the digital divide?’

Natural Disasters: Preparation & Response via Satellite

Disaster response has taken on a new connotation since the word “pandemic” has become more familiar to us all, and whilst disasters of various types are rarely out of the news, the current pandemic has brought into even finer focus the critical role of satellite following catastrophic events. While COVID-19 continues, other disasters do not stop. Typhoons continue to destroy coastal areas, earthquakes continue to devastate communities, and wildfires destroy homes and businesses. Many disasters – both natural and man-made – destroy infrastructure which includes the telecommunications infrastructure upon which disas-

ter response and recovery greatly depend. Most tragically, disasters like COVID-19 continue to kill people with those most vulnerable often disproportionately impacted.

When disasters strike and telecommunications infrastructure is destroyed or taxed by increased needs arising from the disaster, satellite communications networks are vital tools in the arsenal of the first responder. Whether it be a new satellite-enabled network to assist responders, or an expanded network to meet increased needs for tele-health and distance education as arose following the pandemic, communications satellites provide ubiquitous and robust services to responders. However, the ability of satellites circling hundreds or thousands of kilometers above the disaster zone to provide life-saving assistance is only made possible by the existence of satellite communications terminals which are lightweight, rugged, easy to operate, and affordable for the humanitarian sector.

This combination of ground and space segment capabilities means that satellite provides quickly available, quickly deployable, rugged, self-contained, in-field, user-friendly global communications links for disaster-affected regions. This panel will explore the role played by communications satellites following disasters and the often-under-appreciated role played by satellite networks in preparing for disasters.

Planes, Trains, Automobiles & Ships: Satcoms-on-the-Move

Consumers expect no limitation on exactly where to get access to the Internet – including in planes, trains, automobiles, and ships. Satcoms-on-the-Move, or SOTM, fulfils these expectations.

- In aircraft, passengers want high-speed, uninterrupted Wi-Fi capable of supporting streaming movies, social media and messaging, and bandwidth hungry work applications. Airlines want a robust platform to launch innovative connected services, including lucrative ancillary revenue generators, and broadband connectivity to the cockpit. SOTM terminals, or Earth stations in motion (ESIMs), provide broadband connectivity solutions.

- High-speed rail networks are an expanding potential market for internet connectivity, and rail travellers’ demand for always-on connectivity is particularly high where cellular connectivity solutions are absent. Through rural/remote areas without terrestrial networks coverage, or where there is coverage high-speed trains move between cellular base stations faster than networks can handle location transitions, the solution is satellite communications based on low-profile, high gain antennas and network utilization optimisation to overcome satellite delay and enable signal reacquisition when exiting tunnels.

“...Satellite has long been correctly seen a means of solving the “connectivity” problem as satellite can be deployed anywhere, and its coverage is ubiquitous...”

- The modern automobile is a sensor-laden mobile IoT device, with considerable on-board computing power and communication systems. All of these systems use cellular technology, amongst others. With growth of 5G-connected IoT solutions in the automotive space, the automotive industry will be a major market opportunity for 5G IoT solutions, solutions that we know will have a degree of satellite network inter-dependency for which the satellite industry is quickly gearing up.

- Ship owners and operators are increasingly embracing digitalization, enhancing use of information and operational technology, and of satellite as the broadband connectivity enabling technology. Satellite’s role at the core of maritime safety has been established for over 40 years. Satellite is also at the core of crew welfare, more so now with pandemic disruption necessitating fast, reliable and secure connectivity between ships and shore. For the cruise industry, passengers expecting connectivity

throughout their cruise have their expectations met by satellites.

This session will explore a wide scope, reflecting the potential exponential growth of a new era in satellite communications where the emphasis is on unrestricted mobility over transportation networks whilst the user migrates around the digital world.

I anticipate moderating at least one of these July sessions... So see you then on Zoom or a similar platform, or perhaps before that in the GVF Zoom slot on 8 June for the Satellite Solutions for Enterprises in EMEA Roundtable and on 24 June for the Antennas in the Goldilocks Zone event. For all of the GVF-SEG online events (webinars, Roundtables and Spotlight sessions) during the months ahead you can keep up to date with the schedule by regularly visiting <https://gvf.org/webinars/>. Meanwhile, wherever you are while reading these words...

Keep well, stay safe. 

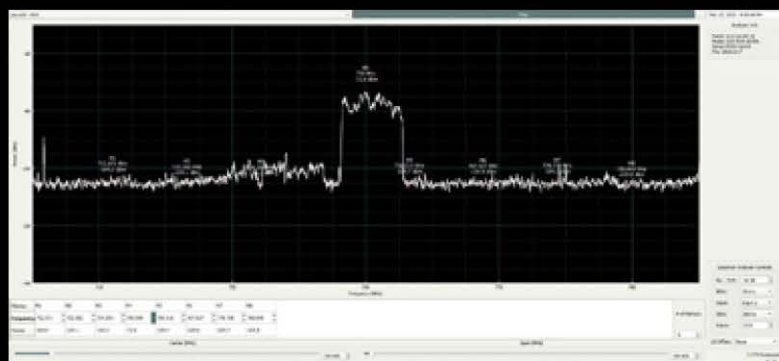


Martin Jarrold is Vice-President of International Program Development of GVF. He can be reached at: martin.jarrold@gvf.org

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Hanwha Systems US\$ 30 Mil. Investment in Kymeta Corp. Approved by CFIUS

Redmond, Wash., May 26, 2021--Kymeta Corporation announced that the Committee on Foreign Investment in the United States (CFIUS) has approved a US\$ 30 mil-

GEO satellite constellations and enabled to take advantage of the growing capacity within space.

"We are thrilled that the investment is approved and eager to lever-

meta and the LEO satellite market."

The investment from HSC will further Kymeta's global market reach, accelerate production, and improve the overall growth trajectory of the company. The funding will support increased unit



Hanwha Systems

lion investment by Hanwha Systems Co., Ltd. (HSC), a leading global solutions company that provides differentiated smart technologies in defense electronics and information infrastructure, in Kymeta.

The approval provided by CFIUS clears the way for HSC and Kymeta to close on the transaction that was jointly announced last December. The investment moves Kymeta one step closer toward developing solutions that are future proof and interoperable with both LEO and GEO mega constellations. Today, the Kymeta™ u8 is the only commercially available flat panel antenna that is compatible with LEO and

age Kymeta's expertise in hybrid satellite and cellular connectivity


solutions," said Youn Chul Kim, CEO of HSC. "Kymeta's solutions will further our aerospace capabilities and deliver reliable communications for our defense customers."

"We look forward to moving ahead and working with HSC," said Doug Hutcherson, Executive Chairman, Kymeta. "We believe this investment will be instrumental in enabling the continued innovation, advancement and commercialization of Kymeta's connectivity solutions. We're excited about the future of Ky-

KYMETA™

production, enhanced customer experience, and the ongoing development of Kymeta's next generation capabilities. With the capital investment HSC will also receive a seat on the Kymeta Board of Directors.

HSC plans to support Kymeta's metamaterial-based antenna technology and gain a foothold in the rapidly growing Low Earth Orbit (LEO) antenna market.

Kymeta is a privately held company based in Redmond, Washington. 

OneWeb to Acquire TrustComm and Creates New Government Subsidiary

London, UK, May 10, 2021--OneWeb announced today it has entered into a definitive agreement to acquire Texas-based TrustComm Inc., which will enable OneWeb to offer its Low Earth Orbit (LEO) network and connectivity services to U.S. government clients and TrustComm customers.

Based at the highly secure Ellington Joint Base in Houston, Texas, TrustComm was established in 1999 as a provider of managed satellite communications and professional services to commercial organizations and governments. TrustComm offers services ranging from

broadband Internet access, VoIP and voice, video conferencing and data communications for business continuity to emergency response, tactical field deployment, and temporary use.

"OneWeb's acquisition of TrustComm underpins our strategy to rapidly scale satellite communications service to the U.S. Department of Defense and other government agencies as they look to integrate high throughput, low latency solutions to meet new connectivity demands," said OneWeb's Head of Government Services Dylan Browne. "We are excited to have TrustComm join our team and leverage their strong reputation providing the

MERGERS & ACQUISITIONS

remote communications our customers want, particularly in Alaska and the Arctic,” he added.


Under the terms of the agreement, a newly acquired proxy subsidiary of OneWeb will be led by TrustComm CEO Bob Roe and focus on introducing OneWeb’s enterprise grade network services to customers. Terms of the transaction are confidential, and it is expected to close in 2021, subject to customary closing conditions including regulatory approvals.

“The TrustComm team is thrilled to be joining OneWeb at the dawn of this new era of satcom services. TrustComm’s heritage and customer-focused support teams will enable us to expand the portfolio of services we offer and allow us to pursue new opportunities. This is an exciting development and we look forward to taking our government business to new heights in the coming year,” said Roe.

OneWeb will offer DoD and other government clients a new suite of services with network speeds up to

195 Mbps, lower latency, smaller and more compact multi-orbit user terminals and built-in network management tools providing substantial economic savings over traditional GEO sales models.

The acquisition follows the successful demonstration of OneWeb’s turnkey satellite-based communications system to the DoD in March of 2021, with data rates up to 500Mbps at latency levels as low as 32ms. The demonstration also illustrated the seamless handover of connectivity between multiple LEO satellites as they passed overhead.

Designed to provide organizations and governments with truly global and resilient connectivity services, OneWeb’s solution will feature a network of 648 Low Earth Orbit (LEO) satellites, global gateways and air, maritime, and land user terminals. In late 2021, OneWeb will begin providing commercial services across the Arctic and expanding to global coverage in 2022. 

EXEC MOVES

For the latest go to: www.satellitemarkets.com

SatService Founder Michael Ulbricht Transitions to Senior Consultant

Steisslingen, Germany, June 1, 2021--SatService’ Founder Michael Ulbricht has transitioned from his position of Managing Director to Senior Consultant effective June 1st, 2021. He will be succeeded by his co-Managing Director Wilfried Megger, who will now take over the




Michael Ulbricht

company, built it up and made it into what it is today: an

reins of the company. Ulbricht’s transition coincides with the 25th anniversary of the company he founded in 1996. “We all look back on our joint successes with joy, pride and gratitude. Michael Ulbricht founded the com-

innovative and reliable partner for all users and providers of professional ground-based satellite communication. His transition was previously planned in 2019 when he brought in a co-managing director Wilfried Megger and sold his shares in SatService to Calian Group Ltd.,” his staff said in a statement.

“Michael Ulbricht has been an excellent leader for his staff, a steadfast partner in business and wonderful ambassador for SatService and Calian,” said Patrick Thera, President Advanced Technologies, Calian. “We wish him all the best and are grateful for his continued support as he changes his focus to help us with strategic initiatives. Since acquiring SatService in April 2019, their organization has thrived on the leadership of Michael and Wilfried and we have had opportunities to combine our satellite communications capabilities for even further growth. This is just the beginning of a new era for our combined organization under Calian,” he added.

“As a senior consultant, he will continue to serve the company, the partners and the management as an important and competent contact person with all his knowledge and experience. We are looking forward to continuing our successful cooperation.” concluded the company statement. 

Ryan Reid Appointed President of Boeing Commercial Satellite Systems International

El Segundo, Calif., May 24, 2021--Ryan Reid has been appointed President of Boeing Commercial Satellite Systems International. In this



Ryan Reid

role, Reid oversees the strategy, integration and execution of Boeing's commercial satellite business and is responsible for general management of all Boeing commercial satellite, ground system and services contracts.

Prior to this role, Reid led the development of the 11-satellite O3b mPOWER program for Boeing customer, SES. Previously he served as director of Space Systems Architectures at Boeing and has engineering, management and program leadership roles across both commercial and government satellite businesses during his over 20 years with the company.

Reid holds a Bachelor of Science degree in electrical engineering from the University of California at Riverside and a Master of Science degree in electrical engineering from the University of Southern California.

Ksenia Drozdova Elected Director General of Intersputnik

Moscow, Russia, May 23, 2021--Ksenia Drozdova, Deputy Director General for Business Development of Russian Satellite Communications Company (RSCC), was elected Director General of the Intersputnik International Organization

of Space Communications (IOSC).

The decision was passed at the joint 49th session of the Board and 23rd session of the Operations Committee of the Intersputnik International Organization of Space Communications (Intersputnik IOSC), held from April 5 to May 14, 2021 in a remote format.

Drozdova was nominated to the post of Director General by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation (Ministry). In this respect, the Ministry expressed confidence that Drozdova being elected the Director General of Intersputnik would ensure stable operation and further development of the organization. Sixteen organizations acting as the members of the Board of Intersputnik IOSC and on behalf of the Members, and 19 organizations members of the Operations Committee took part in the voting for the Director General.

As Director General of the international organization, Ksenia Drozdova will head the Directorate – the permanent executive and administrative body of Intersputnik – and will be engaged in the further development of the organization. Intersputnik IOSC will continue the policy of strengthening ties and coordinating interaction both within the system of international organizations and with regional telecommunication organizations. Intersputnik also plans to actively develop its own space fleet, including in the virtual network operator (VNO) model.

“Our priority is to provide people of the Intersputnik member states with convenient access to all satellite-based services: from B2B solutions to end user communication options,” said Ksenia Drozdova. “The members of our organization have satellite fleets in different orbits – low, medium, geostationary – and the service areas of their spacecraft cover the entire globe. I believe that



Ksenia Drozdova

Intersputnik will use all advanced capabilities of the constellations in any type of orbit to provide the most modern services and eliminate the digital divide around the world.”

Founded in 1971 under the Agreement on the Establishment of the Intersputnik International System and Organization of Space Communications, Intersputnik is an international intergovernmental organization headquartered in Moscow. The organization's mission is to contribute to the consolidation and expansion of economic, scientific, technological and cultural relations using satellite telecommunications, video and audio broadcasting and to support cooperation and coordination of the efforts of the member countries aimed at designing, procuring, operating and expanding an international satellite telecommunications system. Intersputnik can be joined by the Government of any state that shares the principles of Intersputnik's activity. Today, the organization has twenty six member countries.

Intersputnik's core activity is to make available to interested customers the world over geostationary satellite capacity used to offer a full range of satellite telecommunications services. At present, Intersputnik provides access to satellite resources of major satellite telecommunications systems.



Impact of Global Pandemic on Maritime Connectivity Market Reflects Stark Contrast between Sectors

In its latest report, titled “Prospects for Maritime Satellite Communications,” Euroconsult, the world’s leading authority on space and satellite-based applications markets, quantifies the heavy impact of the Covid-19 pandemic on satellite services for the maritime market. With in depth detail on maritime communications market dynamics today and over the next ten years, the research highlights coming opportunities for consolidation and how non-geostationary orbit (NGSO) satellite constellations will change the playing field.

There was a surprising disparity in the effect of the pandemic on various sectors of the market. Demand for satellite connectivity for cruise ships plummeted with an 80 percent reduction in active VSATs compared to the previous year. However, the demand for satellite connectivity for the merchant shipping industry remained strong, driven by increased need for crew welfare due to quarantines and longer times at sea because of Covid-19 restrictions. Merchant shipping remains the largest segment of the maritime connectivity market, generating nearly half of the total maritime VSAT service revenue with \$584 million in 2020.

Other sectors discussed in the maritime connectivity report include leisure vessels, oil and gas offshore, and the commercial fishing industry. The former

two suffered from the pandemic with lowered revenues however, the market for connectivity services for fishing vessels grew by six percent. Euroconsult forecasts that the fishing industry has further growth potential for mobile satellite services.

With the entire value chain severely impacted by the losses in the cruise, leisure, and offshore markets, 2020 was a year of restructuring for many satellite service providers.

“2020 was a challenging year for the Maritime Connectivity market,” said Xavier Lancel, Senior Consultant at Euroconsult and author of the report. “As service providers lost market share, several entered into the process of reorganization or reshaped their market approach. As a result, we expect to see consolidation and M&A deals in 2021.”

The report includes projections through 2030, with stabilization expected in the near term to be followed by growth. The coming NGSO broadband constellations are expected to play a major role in maritime connectivity. Based on newly revealed plans from several NGSO constellation operators, Euroconsult forecasts that these new entrants will capture half of the market for leased capacity by 2030.

Prospects for Maritime Satellite Communications addresses the market dynamics that impact the entire value chain including both maritime VSAT service providers as well as satellite operators. It delves into the strategic issues, regulations, and technologies that are driving change and forecasts pricing and revenue expectations for each of the five market segments.

Now in its tenth edition, Prospects for Maritime Satellite Communications is available for download from the Euroconsult store: <https://digital-platform.euroconsult-ec.com/> 



Read the latest news, analysis, market trends, executive moves and many more at:

www.satellitemarkets.com

The Satellite Markets 20 Index™

Company Name	Symbol	Price June 3	52-wk Range		Price Change	
					Last Month	From Jan 15
Satellite Operators						
Thaicom Public Company Limited	THCOM.BK	12.10	3.74	12.50	14%	32%
Eutelsat Communications S.A.	ETL.PA	10.24	7.98	11.01	-3%	9%
APT Satellite Holdings Limited	1045.HK	2.59	1.70	2.95	0%	23%
Echostar	SATS	27.88	19.75	35.33	13%	13%
SES S.A.	SES.F	6.55	5.54	8.55	4%	-14%
Satellite Manufacturers						
The Boeing Company	BA	250.32	141.58	278.57	6%	17%
Maxar Technologies	MAXR	33.65	13.70	58.75	-15%	-32%
Lockheed Martin Corporation	LMT	387.35	319.81	417.62	0%	9%
OHB SE	OHB.DE	35.85	33.15	49.85	0%	-19%
Honeywell International Inc.	HON	229.2	137.53	234.02	2%	10%
Equipment Manufacturers						
C-Com Satellite Systems Inc.	CMI.V	3.15	2.00	4.48	0%	17%
Comtech Telecommunications Corp.	CMTL	24.75	12.96	30.40	2%	11%
KVH Industries Inc.	KVHI	14.25	7.38	15.29	7%	18%
ViaSat Inc.	VSAT	53.97	29.82	61.35	2%	48%
Gilat Satellite Networks Ltd.	GILT	10.31	4.80	22.69	2%	41%
Service Providers						
DISH Network Corporation	DISH	44.89	22.51	47.05	0%	38%
Globalstar Inc.	GSAT	1.20	0.29	2.98	-1%	35%
Orbcomm Inc.	ORBC	11.16	3.32	11.55	-3%	32%
Sirius XM Holdings Inc.	SIRI	6.38	4.95	8.14	5%	9%
RigNet Inc.	RNET	9.60	0.82	11.19	0%	44%

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 June 3, 2021	Percentage Change last month	Percentage Change since Jan 15 2021
Satellite Markets 20 Index™	2,898.34	2%	17%
S & P 500	4,195.85	0%	10%

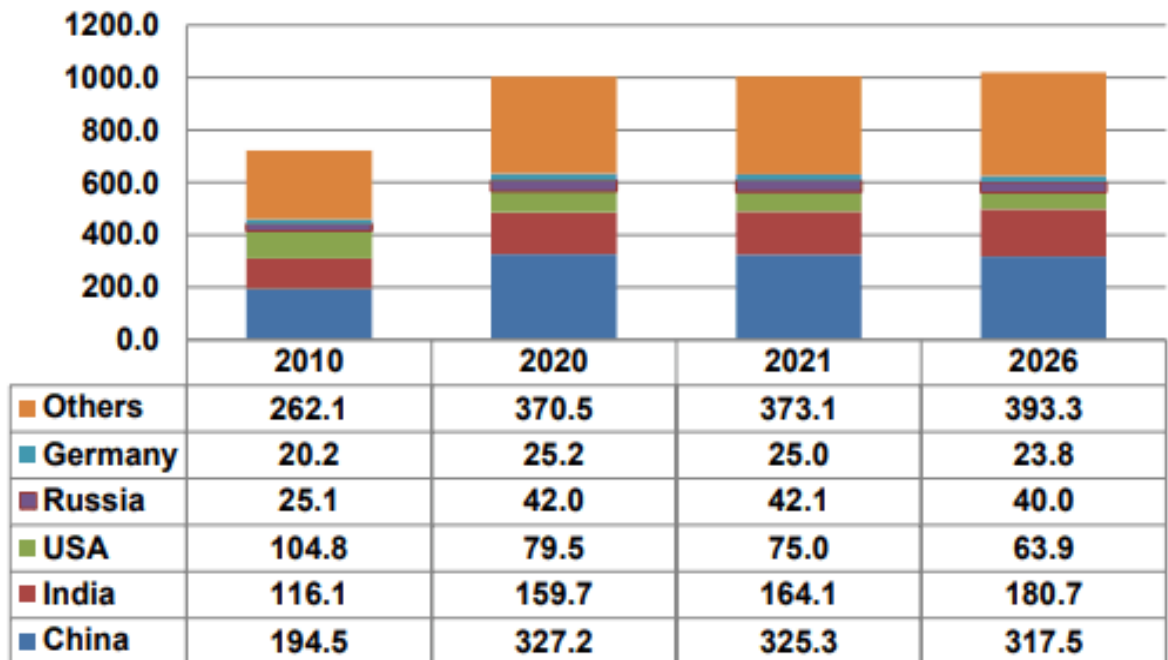
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VITAL STATS

Global pay TV subscribers by country (million)



Global pay TV revenues for 138 countries peaked in 2016 at \$201 billion. Revenues will fall to \$143 billion in 2026 from \$173 billion in 2020 - despite the number of Pay TV subscribers rising by 15 million according to Digital TV Research 

We have taken Summit to new heights



Kilowatts of
Solid State RF



Highest
Availability



Lowest
MTTR



No Single Point
of Failure



Available in C, X,
Ku and S-Band
Architectures

INTRODUCING SUMMIT II

The **Summit II** high-power, modular, soft-fail redundant SSPA systems are wide bandwidth and ruggedized for outdoor applications. They can be configured with 4, 8 or 16 amplifiers and are field expandable. All of the amplifiers are phase combined into a single system that can generate extremely high levels of RF output power – 10,000 watts or more.

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