

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

Trends to Watch in the New Decade

by Virgil Labrador, Editor-in-Chief

Here we are in the new decade of the 2020s. The recent history of the satellite industry have been highlighted by key developments that have had a profound impact on the industry. The 1970s and 80s saw the rise of C-Band which facilitated the distribution of video to various networks. The 1990s gave us Ku-Band technology that brought about the explosion in Direct-to-Home (DTH) services. The new millennium of the 2000s brought Ka-Band to the fore enabling broadband services. If there is anything that will epitomize the 2020s for the satellite industry, it will be the so-called Non-Geostationary Orbits (Non-GSOs) with the upcoming Middle Earth Orbits (MEO) and Low Earth Orbit (LEO) constellations.



Non-Geostationary Orbit constellations will dominate the satellite landscape in the 2020s.

pages, new LEO constellation filings dominate the regulatory landscape. Thousand of LEO satellites are planned for deployment. There is also a growing market for smallsats and cubesats which is lowering the barriers for entry for almost anyone to enter the satellite business.

Not all of the planned constellations and new satellite systems will meet with success. Some are in a more advantageous position than others. We have already seen the demise of one of the leading contenders (LeoSat), but we have also seen the rapid deployment of the OneWeb and Starlink systems. The jury is still out on the business case for these new constellations, but there is sufficient cause for optimism with the rising demand

As we have reported in these

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The New Decade



2020 rings in not only a new year but a new decade. With the major changes that the industry has been undergoing in recent years, the industry will be looking a markedly different in the 2020s than in past decades. There will be new players, more satellites, new constellations and new markets for satellite services and applications.

In this issue, we look at the key trends to watch in the new decade. We also look back at 2019 and review the most significant events and their implications for the future. We also take a very close look at the Chinese space industry--which will be a force to reckon with in this decade and beyond.

This year will be our thirteenth year of publication and we will continue to keep you abreast of the key trends and opportunities in the constantly changing industry. It's going to be an exciting year, so fasten your seatbelts and stay tuned. We'll cover it all for you.

Virgil Labrador

Virgil Labrador
Editor-in-Chief

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Trends to Watch

from page 1

for broadband access and promising potential of vertical markets as Internet of Things (IoT), Machine to Machine (M2M), In-Flight Connectivity (IFC), Maritime and others.

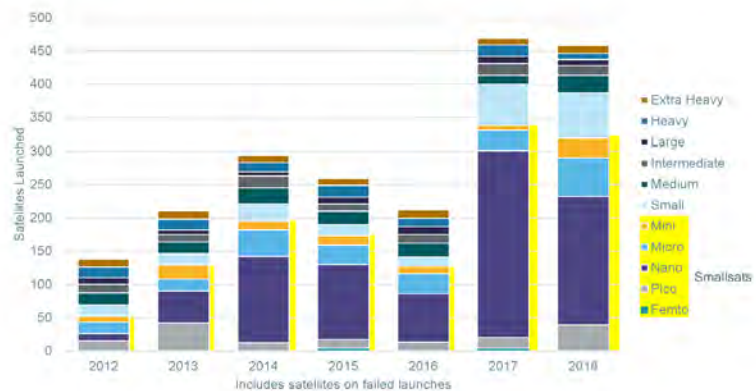
New Space

One key difference in decades past is the influx of investment in the space industry from the private sector including successful Billionaires like SpaceX' Elon Musk, Amazon's Jeff Bezos, Virgin's Richard Branson, among others. These new players are dubbed "New Space" mainly to differentiate them from "Old Space" which leaned heavily on governmental support. We have already seen the positive impact new space entrepreneurs have made in instilling new dynamism and competition in the satellite markets.

One area where New Space has been in the forefront is Space Tourism. After many delays in last decade, we will finally see the first commercial space flight by Virgin Galactic in 2020. NSR in a recent report believes that the delays in the commercial launch of space flights has led to pent up demand for it. Regular commercial flights into space will have a spillover effect on other industries much like commercial aviation has made an impact 100 years ago. An example of how commercial space flights can affect other industries is that the same technology can be used to dramatically shorten commercial flights between cities by using rockets in a space trajectory. There are also many other spinoffs from

The Big Picture of Smallsats

Smallsats and All Satellites Launched, 2012 - 2018



Small satellite launches are steadily increasing every year and will continue through the 2020s.

Space Tourism like Virgin Galactic's foray into launch services for small satellites.

The Rise of China, India and Other Up and Coming Players

The past decades has seen the rise of China as an economic superpower. China has a very aggressive space program, managing to be only the third country after the US and Russia to have landed on the moon. As we can see from the article by Blaine Curcio in this issue on China space developments, the growth in its space sector is strongly supported by the government with many new private sector initiatives.

In October 2019, China stirred a lot of interest when it announced that it aims to build an Earth-moon space economic zone by the mid-century. This zone is projected to generate US\$ 10 trillion for the Chinese economy by 2050.

India is another country to watch. In 2017, the Indian Space Research Organization (ISRO) made waves in the global satellite

industry by placing 104 satellites (including 103 nanosatellites) in orbit in a single launch. India's ISRO, a governmental organization has pursued the development of the commercial space sector in India through incubator programs and development of key technologies such a low cost launchers and small satellites. With its competitive costs, India can be a big player in the low-cost launch business and manufacturing of small satellites.

Other countries are developing their space industries as well. Look out for Isreal, Brazil and otehr to be making inroads into the commerical space sector.

Military Space

Concerns over the weaponization of space with anti-satellite missile launches conducted by China, Russia and India has led to U.S. forming a new military branch of service-the Space Force. The US Space Force became official in 2019 and other countries like France have announced that they will be organizing a space

force as well. More emphasis on military space applications will revitalize the military satellite market which has been declining in the last decade.

Challenges

While there appears to be much cause for optimism for the satellite industry in this new decade, the road is fraught with challenges as well.

Analyst Roger Rusch, CEO at TelAstra said that terrestrial growth from fiber and wireless is threatening future growth of the satellite sector. "The wireless and fiber providers are more agile at introducing new technology and expanding throughput into more remote regions. They provide service for much lower cost when available in urban regions," said Rusch. Terrestrial operators will be actively pursuing the very same markets that satellite providers will be going after such as broadband internet, IoT, M2M, etc. The ability of satellite service providers to obtain as much of the market share in these key verticals would be crucial.

The resulting proliferation of satellites in various orbits pose a set of challenges as well. For one, more satellites have resulted in lower prices and dropping revenues for satellite operators. Satellite operators and service providers should maximize the potential in the key verticals in order to supplant the revenue losses from traditional sources like video. The satellite industry should also focus on the areas where it has little competition from terrestrial such as in the maritime and in-flight connectivity markets.



China has been pursuing a very aggressive space program that is challenging the established players in the market.

The influx of thousands, perhaps tens of thousands more satellites of various sizes--mostly very small nano satellites and cubesats--will result in more orbital debris posing a risk to operating space assets. In the vacuum of space, even a very small piece of orbital debris travelling at 17,000 miles per hour can disable an operating satellite. Thus there is a need to address this problem on a global scale and find workable solutions for clearing orbital debris.

Conclusion

It would be a very interesting

decade, to say the least, for the satellite industry. The forthcoming changes in the composition and complexion of the industry will make it almost indistinguishable from the industry that started in the middle of the last century. How the industry will shape up in the next decade would largely depend on its ability to take full advantage of the opportunities before it and surmount the accompanying challenges. Given the resilience of the industry over the years, it should make for very exciting times. 🚀



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

The Most Significant Satellite Industry Stories of 2019

by Elisabeth Tweedie

Trying to choose the most significant stories of the year, is always a challenge! Is x more important than y and does z really have an impact? Inevitably, the choice of topics to include will always be subjective. So, here's my short list.

Shakeup Among the LEO Constellations

Firstly, Low Earth Orbit Satellites (LEOs): the good and the not so good. We've been hearing about them for years and every year the number of filings increases. The current number is in excess of 150. However, in 2019 several of the better-known constellations started launching, moving at least one step closer to reality. OneWeb launched its first six satellites in February and was planning to launch more in December, but the second launch has been delayed until January 2020. Monthly launches of at least 30 satellites are planned for 2020. It is planned to start offering service in the Arctic towards the end of next year.

After two launches, SpaceX now has 120 of its Starlink satellites in orbit. It plans to continue with regular launches next year, and start service in the USA in mid-2020 when a total of 6-8 launches will have been completed. However, as yet, there is no final design for the consumer terminal, so it is likely that initial service will be focused on government users. Data connectivity of 610 Mbps has been demonstrated to U.S. military aircraft. SpaceX has also filed with the ITU for 30,000 satellites, in addition to the 12,000 already filed for.

Compared to the numbers of satellites planned, 126 launched is a pretty small number, but it is one step closer to reality. There are however many boxes to be ticked before we have an operational service. Affordable antennas, user terminals, landing rights, distribution, frequency coordination, to mention just a few....oh and financing of course. The latter looks to have proved an insurmountable hurdle for LeoSat when it's first two investors JCSAT and Hispasat withdrew. This is particularly significant, as



The signing ceremony of the ST Engineering acquisition of Newtec. On left is Ravinder Singh, President-Electronics, ST Engineering and on right is Roald Borré, Chairman of the Newtec Board of Directors.

LeoSat was going after commercial customers and already had signed commitments to the tune of US\$ 2 billion, proving that there is nothing as fickle as investors. LeoSat finally had to announce that it is ceasing operations in November, making one less player in the crowded LEO field.

ST Engineering iDirect Acquisition of Newtec

In March 2019, ST Engineering, owner of iDirect, announced its planned acquisition of Newtec. This acquisition was finalized on October 1st. Newtec is now known as ST Engineering (iDirect) Europe, NV. Thomas Van den Driessche, previously Chief Executive Officer (CEO) of Newtec, is now President of the Executive Strategic Board & Chief Commercial Officer of the combined companies. In this role he will lead the newly-formed Strategy Group which comprises product lifecycle management (PLM), vertical market development, marketing and strategic business development. Frederik Simoens, previously Chief Technology Officer (CTO) of Newtec, is now CTO of the combined company.

In the last ten years or so, Newtec has grown from a relatively minor player in the ground segment, to



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a major force to be reckoned with. Although its focus was originally on the broadcast segment, whereas iDirect is better known for its dominance of the maritime market; in the last few years, since the introduction of Newtec Dialog, on more than one occasion, I've heard iDirect customers admit that they were considering Newtec for future purchases.

Acquisitions of a small company by a significantly larger one, can have two outcomes. The smaller company gets "swallowed," staff get laid off and the innovation that got the small company to where it is, all but disappears. Alternatively, the smaller company gets an injection of cash, to foster future innovation and the best of both companies is preserved. The company is now in the consolidation phase "conducting a joint deep dive" into the combined products and technologies, so it will be 2020 before we know the full impact on the product line of both companies. However, initial signs are positive and everyone I've spoken to at Newtec is enthusiastic about the new company.

Tom Choi's New Endeavors

The next two stories are about Tom Choi and his latest endeavors. We all know Tom as the founder and outspoken former CEO of ABS. Since leaving ABS Tom founded Airspace Internet Exchange (AirspaceIX). This company currently has two subsidiaries. Saturn Satellite Networks and Curvalux.

Saturn is a builder of small (600 to 1,1700 kilograms) geostationary (GEO) satellites, known as Nationsats. As would be expected from the name, the target market is small nations that do not have their own satellite. Ideally nations that can't afford to roll out fiber or 4G, and require a national footprint to provide broadband. According to Choi, a nationsat can provide 60-80 gigabits per second capacity. The first satellite is due for delivery in 2020. In September, Saturn announced plans to acquire a California based company, NovaWurks. NovaWurks has developed modular satellites, known as Hyper Integrated Satellites (HISats), and has conducted a demonstration for the US Defense Advanced Research Projects Agency (DARPA).

Curvalux is described as a multi-beam phased array wireless broadband access and backbone technology. The stated target is to be 10x to 100x faster than current wireless technology and 10x to

1000x cheaper than current platforms. It currently operates in the 5GHz unlicensed band, but it is planned to also make the technology available in the 2-3GHz licensed bands. The same frequencies that will be used for low-band 5G in some parts of the world. Field trials were conducted with Curvalux earlier this year. In Manila, fixed user terminals achieved speeds of over 2Gbps, and in Las Vegas a WiFi 6 (also known as 802.11ax) enabled smartphone located 800 meters from the tower achieved a 400Mbps connection. According to the website, it is intended that connectivity will be achievable at a distance of 15 kilometers from the tower for a fixed connection and 2 kilometers for a mobile device.

When Tom spoke at World Satellite Business Week, in Paris this year, he talked about combining Curvalux with Nationsat to provide low-cost broadband to unserved areas of the world. It will come as no surprise to anyone who has heard Tom speak in the last few years, to hear that this is something he believes he can provide far more efficiently than any of the LEO constellations. If he is correct, not only will he be challenging the satellite industry, he will also be taking on the wireless industry.

C-Band War

The C-Band Alliance formed by Intelsat, SES, Eutelsat and Telesat was dealt two separate blows this year. Firstly, Eutelsat departed the alliance saying that its voice wasn't been heard, then in spite of promises by the alliance to put funds into rural 5G in the US, on November 18th the FCC declared that a public auction would be used to release the bandwidth. The alliance had intended to run a private auction, thereby benefitting from giving up the spectrum. The C-Band alliance was always contentious, and its aims vehemently opposed by many other satellite operators. It is a matter of opinion whether the motive was simply financial gain, or an attempt to have some control over what many regard as an inevitable event, i.e. the loss of some C-Band spectrum to the mobile industry. No matter what the motive, the decision by the FCC caused a 75% drop in Intelsat's share price and nearly a 30% drop in SES'.

New Space Startups

SpaceX revolutionized the launch industry, firstly by undercutting the price of existing providers


and then by demonstrating great skill in reusability. Relativity space is poised to revolutionize the launch industry again, but in a different manner. Its rockets are built entirely by 3D printing. The shell can be built in 25 days and the complete rocket in 60 days. As Tim Ellis, CoFounder and CEO Relativity Space said at Satellite Business Week, this means that we can improve the design of the rocket every 60 days. The company has raised US\$185 million to date. US\$140 million of which came in this October for Series C financing. According to Jordan Noone, co-founder and chief technology officer (CTO) Relativity now has sufficient capital to complete development of the rocket, and begin commercial operations in 2021, as well as fund the expansion of its headquarters and establish a factory for rocket production in Mississippi. If all goes as planned, the possibility to launch two months after signing the contract is a huge change for the industry. The target price is under US\$6000 per kilogram. Contracts have been signed with Telesat for its LEO constellation and with Momentus. The contract with Momentus enables Relativity to offer service to geostationary transfer orbit (GTO). Momentus is another startup and one that aims to provide in-space transport, moving satellites from an ISS orbit to other orbits including GEO.

WRC 2019

Although at the time of writing, very little is known of the outcome, no article on the important stories of 2019, would be complete without a mention of WRC 19. This is the World Radiocommunications Conference held every four years to make decisions on spectrum usage and allocation. The conference was attended by over 3,500 participants from 193 ITU member states, as well as observers from private sector members and members of international organizations. There are several issues on the agenda relevant to the satellite industry. The one that has garnered the most attention is the allocation of millimeter waves for 5G. Given that this happens to include spectrum used for Ka-Band this is hardly surprising. The Global System for Mobile communications Association (GSMA) is asserting that US\$565 billion of global economic expansion is at risk, if the mobile operators don't have access to this spectrum. Interestingly the delegates are divided on this issue. Europe is seeking to constrain



usage claiming potential interference with some satellite services. The US, along with Africa and Arab nations, on the other hand, wants to authorize usage for 5G pointing to studies that indicate that 5G usage of mmWave spectrum can safely co-exist with satellite services. One of the arguments used by the GSMA is that the fastest 5G speeds have been obtained in the US where mmWaves are being used for 5G. This argument fails to point out, that mmWaves don't travel very far, necessitating a significant increase in the number of base stations needed, nor does it make any mention of the fact that these frequencies don't penetrate buildings, limiting these faster speeds to outdoor areas only. As well as Ka-Band, usage of the Q and V-Bands are also on the agenda. 5G is of particular interest to the operators of teleports located in urban areas, who will need to take steps to shield antennas from 5G spillover.

Other topics on the agenda of interest to the satellite community include: the introduction of deployment milestones for the large constellations, the establishment of a regulatory framework for "short-duration" satellites. i.e. those that orbit for less than three years. Whatever the outcome of WRC 19, it is inevitable that the battle for spectrum between the satellite industry and the mobile operators will continue into WRC 23. 



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2019: The Year in China Space Industry

by **Blaine Curcio**

A lot happened in the Chinese space industry in 2019. So much, that my friend and collaborator Jean Deville recently recorded a podcast on the year that was, with our conversation going nearly 2 hours, and we still felt like there was much more to say. To capture everything that happened in China in space in 2019 in a single article would make for an incredibly long article, so for the sake of brevity, I've distilled our nearly 2 hours, plus everything else we did not get to, into a 2019 in review on the Chinese space industry, from my perspectives. (Listen to the podcast here: <https://china-aerospace.blog/2019/12/18/discussing-the-most-marking-events-of-chinese-space-in-2019/>)

Lower Launch Total, but More Mature Launch Industry

China led the world in number of launches in both 2018 and 2019, although the country saw a drop in 2019 following what was a peak year for several government programs in 2018, with 2019 seeing 33 launches by China with two more still to go as of time of writing, compared to 39 in 2018. Despite this drop, the launch industry in China became more balanced. This was particularly true in the case of the Kuaizhou-1A rocket, manufactured by Expace.

The Kuaizhou-1A, many



Kuaizhou-1A rocket

would rightly say, is a repurposed missile from CASIC that is converted by Expace—a nominally commercial subsidiary—into a small rocket. But, that does not take away from the fact that a launch company founded in 2016 successfully completed 5 launches in 2019, with all 5 coming after 30 August, and with 2 coming within 7 hours of one-another at the same launch site. With the Kuaizhou-1A now fairly flight-proven, next year will be an important one for Expace, with the planned first launch of its Kuaizhou-11, a rocket with around 5x the payload mass to orbit of the Kuaizhou-1A (around 1500kg compared to 300). With the small launch market looking increasingly competitive, Expace can to some extent compete on speed/response with its Kuaizhou-1A, but will be well-positioned by bringing into service an order-of-magnitude larger rocket in the Kuaizhou-11.

Other than Expace, 2019 saw iSpace complete the first orbital launch by a private Chinese rocket company, with its Hyperbola-1 launching into orbit in July of this year. We also saw LandSpace raise a massive 500 million Yuan (US\$70 million) C-Round of funding in December, with this an important step for the development of the company's ZQ-2 medium rocket. With multiple commercial rocket companies capable of launching with some regularity, it will become increasingly necessary for the industry in China to become more open to these private companies actually doing business (rather than R&D), with this being a complicated issue in China given incumbents' power. The launch industry has expected some degree of deregulation for some time now, as iSpace, along with several other private launch companies including LandSpace, OneSpace, etc., have been devel-

oping rockets over the past 2-4 years. The companies are now reaching the stage of launching, with several companies have talked about capacity to produce 20-30 small-medium rockets per year, each, by 2020 or 2021. With this glut of launch supply coming (not just in China), there will need to be a major increase in demand for putting things into orbit. 2019 has started to see possible green shoots of such demand.

Constellations of All Type

The most obvious answer to “how do we fill this huge glut of launch supply,” is of course to launch massive constellations of hundreds or thousands of satellites. While China’s major state-owned constellations have seen a relatively quiet 2019, with zero satellites launched between Hongyan, Hongyun, and Xingyun, 2019 has seen increasing interest by private companies in constellations, though this has led to some challenges.

Roughly a dozen companies in China today are building business models around the concept of low-earth orbit IoT/narrowband satellites, sometimes cubesats, sometimes smallsats, with the companies sometimes focusing more on applications or equipment, or sometimes more on satellites themselves. This has led to a certain degree of difficulty to differentiate, and has also made it difficult for constellation companies to raise larger, later rounds



Galaxy Space Q/V-band test satellite

of funding, as there are so many companies developing what seem to be fairly similar business models.

In terms of constellations in China, 2019 saw only one major financing round, however that financing round was indeed quite a major one indeed. Galaxy Space, a company developing Q/V-band technology for communications constellations, announced in September a round of funding that valued the company at 5 billion yuan, or around US\$700 million, i.e. nearly to “unicorn” status of US\$1 billion valuation, before a single satellite has launched. One of the company’s major investors to now has been Shunwei Capital, the VC firm of Xiaomi, the IoT and 5G mobile phone company. Xiaomi’s CEO and multibillionaire Lei Jun has become increasingly visible in his support of Galaxy Space, a likely contributor to the company’s bubbly valuation

given Lei’s deep connections in the Beijing tech investment scene. Galaxy Space will launch its first test satellite—a Q/V-band LEO satellite with 10 Gbps of throughput weighing a few hundred kg—before the end of this year, on, you guessed it, a Kuaizhou-1A.

While Galaxy Space will soon have its satellite in orbit, it seems unlikely that a privately funded company in China would be capable of getting market access with its own LEO constellation. More likely, in my view, is that the company tries to prove a concept for a LEO constellation system using Q/V-band, and sell said concept to CASC or CASIC in development of Hongyan/Hongyun, with Galaxy Space then concentrating on integration of the constellation (which they designed) with IoT (of which Xiaomi has an entire ecosystem). While 2019 has seen a quiet year on the constellations front in China, 2020



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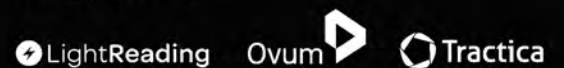
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is likely to accelerate, with all three state-owned constellations launching more test satellites.

What Else Did We See in 2019?

Another highlight of the year that was, from my perspective, was the increasing internationalization of the Chinese space industry in 2019. Several significant projects began or hit major milestones in 2019, with this including projects in Egypt, Sudan, Ethiopia, and others. Moving forward, China is likely to use space as a tool of soft power in much the same way it has been utilized by the west to now, with this likely leading to increasing cooperation in the space domain between China and primarily developing countries, but in some instances developed ones as well.

Finally, China's space industry in 2019 started to see a few more instances of environmental concern by everyday people. For years, spent rockets have been falling on villages downrange in China's inland launch sites, in particular Xichang. Videos of the spent rockets leaking poisonous fuel have been increasingly circulated online, in both Chinese and English media. The response by Chinese internet users has become more outraged over the past year or so (in my observation), though many users do still take the view that these villagers are compensated and that rockets are an important thing for the nation to develop. Interestingly, however, some companies are trying to market themselves as such,

“...Moving forward, China is likely to use space as a tool of soft power in much the same way it has been utilized by the west to now, with this likely leading to increasing cooperation in the space domain between China and primarily developing countries, but in some instances developed ones as well...”

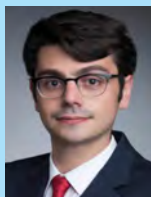
with the most interesting being LandSpace, which points out that the company's liquid metholox engines are “eco-friendly, low carbon emission, nontoxic, pollution-free, compliant with the development trend of next-generation launcher technology.”

Conclusion

2019 was most likely the last year in the Chinese space industry where we can see breakneck growth with absolutely no revenues from the vast majority of private/commercial companies. As 2020 arrives, many of these

companies are going to start operations, which will require an infrastructure of regulations, policies, technology, etc., to develop.

While we have seen exceptional growth in the Chinese space industry from 2014-2019, it has remained entirely the investment phase. If the initial investors are truly to get decent returns on their investment, the implied growth that we must still see is enormous. 2020 may or may not bring such growth, but it will most certainly bring us a big step closer to finding out whether such growth is even on its way at all. 



Blaine Curcio is the Founder of Orbital Gateway Consulting. He's an expert on the commercial space and satellite industries with a focus on the Asia-Pacific region. He can be reached at: blaine@orbitalgatewayconsulting.com



Listen to the podcast on China Space developments with Blaine Curcio and Jean Deville at:

<https://china-aerospace.blog/2019/12/18/discussing-the-most-marking-events-of-chinese-space-in-2019/>

The Maritime Satellite Market

by **Bernardo Schneiderman**

Historically the Mobile Satellite Services (MSS) providers Inmarsat, Iridium and Globalstar were the only satellite operators that were providing services for the maritime market. During the last ten years the market changed and now all the major satellite operators both MSS and Fixed Satellite Services (FSS) providers are now offering maritime solutions with a range of frequencies from L-Band (Inmarsat, Globalstar, Iridium) and C-, Ku-, Ka- and X-Bands (All major satellite operators e.g. Intelsat, SES, Eutelsat, Telesat).

The critical factors for the maritime market is antenna efficiency and size as well as capacity of bandwidth available for a portfolio of applica-

tions that start with Internet of Things (IOT) to full internet broadband services for cruise ships and Oil & Gas market and offshore Platforms among other segments.

According to Euroconsult's latest report about Maritime Satellite Communications the maritime connectivity market continues to be vibrant, as ship-owners' transition to the next level of broadband connectivity. The merchant, passenger and leisure segments have all been supporting growth in revenues and capacity usage, while a rebound on oil pricing would accelerate the offshore segment. In

addition to capacity, an increasing focus is on the supply of value-added services and on the outsourcing of daily operations by shipping companies.

The maritime satellite VSAT communications market experienced extensive growth in 2018, with the number of terminals increasing by almost 18% YOY and reaching 26,000 at year-end 2018. VSAT services revenue exceeded US\$ 1 billion, resulting in growth of almost 11% compared to the previous year. Increasing demand from passengers, as well as regulatory pressure on communications and crew

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

In addition, decreasing prices for capacity and terminals encourage more customers to adopt VSAT services, while existing client's transit to higher data pack-

ages. HTS capacity is rising fast and is expected to grow even faster in the next five years, as new operators enter the market. Hardware, such as receiving antennas and modems, is also evolving rapidly; smaller, lighter, and more efficient antenna systems are gaining traction as the industry constantly evolves.

"The VSAT market is anticipated to grow quickly; the number of terminals should increase to more than 65,000 in 2028," said Xavier Lancel, Senior Consultant at Euroconsult. "As a consequence,



MARKET INTELLIGENCE

VSAT solutions will generate more than 90% of the maritime satellite communications revenue in 2028. VSAT revenue is anticipated to increase to \$2.7 billion by the end of the decade.”

NSR’s Maritime Satcom Markets, 7th Edition report forecasts VSAT-enabled Maritime vessels to grow from over 20,000 vessels in 2018 to over 75,000 by 2028. Generating almost \$42 Billion in cumulative revenues between 2018 – 2028, the Maritime satcom connectivity market has never looked more promising.

Brad Grady, Principal Analyst and report author “mentioned the right combination of price, end-user requirements, and connectivity demand is having a significant impact on the market. With new investments across the throughput spectrum, there is one clear message – a significant part of the maritime market has become unlocked for broadband satellite connectivity. Falling capacity prices in addition to lower equipment costs have opened the next-tier of Maritime end-users, accelerating adoption rates, and unlocking more vessels. FSS and MSS will play pivotal roles in generating retail revenues, but HTS from GEO and Non-GEO is the growth story.”

The maritime satellite communications market is at a crossroad; more capacity is available in all frequencies and orbits thanks to Iridium’s recently launched Certus plans, VSAT terminals are getting lighter and cheaper, and end-users continue to find value in some flavor of higher throughput connectivity. Unlike Aeronautical Markets that struggle with complex business plans, the Maritime sector is very much in the ‘connect-it’ mode.

Maritime vessels are adopting broadband satellite services at an ever-increasing rate. From 2017 to 2018 over 7,700 vessels adopted some flavor of VSAT or MSS Broadband connectivity – nearly double the rate from 2016 to 2017. By 2028, NSR’s latest projections place the market at over 140,000 vessels with broadband connectivity, more than half of which will be VSAT. 🇺🇸



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PRODUCT SPOTLIGHT

Cobham SATCOM announced the arrival of its new **SAILOR 100 GX High-Power High-Power Fleet Xpress** user terminal, building upon the proven success of its market-leading SAILOR 100 GX system. The compact 1 meter, 3-axis stabilized Ka-band user terminal is specifically designed to enable Inmarsat’s newly launched high data rate plans packaged for bandwidth-hungry segments, such as Offshore Support Vessels (OSV), Global Cruise, and Superyachts. Delivering twice the RF power of standard GX terminals, the SAILOR 100 GX High Power dramatically improves the economics of pushing large amounts of data from ship to shore, while also improving overall service quality and availability around the globe.



KVH Industries (KVH), has introduced the **TracPhone V11-HTS**, the world’s fastest 1 meter Ku/C-band maritime VSAT antenna. It is designed to deliver data speeds of up to 20 Mbps downlink and 3 Mbps uplink to commercial maritime vessels and super-yachts around the world. The fast data speeds support the critical needs of commercial ships today for operations, Internet of Things (IoT) applications, and crew connectivity. Owners or guest on a super-yacht will now be able to enjoy fast connectivity for streaming HD content and accessing Internet and social media platforms while at sea. Designed, engineered, and manufactured by KVH, the TracPhone V11-HTS features a dual Ku/C-band design with automatic switching to deliver expanded global coverage, including Northern and Southern latitudes, and reliable connectivity, even in extreme weather.



Satellite Executive Briefing spoke with JC Seo, Ph.D., Head & VP, Marketing Communications, Intellian, a major provider of maritime VSAT products, who gave an update on their product portfolio.

Satellite Executive Briefing (SEB): What is your current portfolio of products and services for the maritime market?

For maritime satcom we currently provide C-, Ka- L- and Ku-band antennas systems, as well as multi-band systems which can operate on various frequency bands. We have recently implemented a brand-new technology platform for our maritime VSAT antennas. The new NX Series make VSAT easier, faster and stronger by introducing a number of important new features. Firstly, through a number of new technical features, such as a single cable between the antenna and control unit, a built-in mediator for dual antenna installations and the cutting edge AptusNX user interface, NX Series antennas are faster and lower-cost to install.

All NX Series antennas can work on Ka- or Ku-band frequencies, and can operate with satellites in any orbit with a simple upgrade kit. This is very significant, as it means ship owners and managers can enjoy unmatched performance on Geostationary satellite services right now, while being ready for the future; when new Low Earth Orbit and Medium Earth Orbit services are available, NX Series users will not need to purchase a new antenna to benefit from the speed and low-latency they should offer. Additionally, all NX Series antennas share main components, meaning there is a 40% reduction in the amount of spare parts that need to be kept in stock.


SEB: Are you planning to launch new products for the maritime market in the next two years?

2019 has been the year of the NX Series and we have launched multiple variants to ensure that more of the market can take advantage of its unique new features. We will continue to launch more NX antennas in 2020 and are also gearing up for new products outside of the NX Series, aimed at more specialist markets as well as high volume low bandwidth demand markets on L-band and non-geostationary orbits.

SEB: Considering a new wave of new players LEOs and MEOs satellites in the next five years how are you addressing this market?

Transformation in the space segment is an integral aspect of our long-term plan to deliver the most value to our customers and end-users. The NX Series is built to deliver high performance on any satellite orbit, which means it has a conceivable lifespan of decades. Its arrival to the market is very timely, as the industry knows about planned new LEO and MEO networks and the benefits they could bring. But with NX Series antennas, they can upgrade for the most performance now, and still migrate to new services in the future without having to change their antenna and bearing the associated costs.

Intellian was early to invest in technologies that ready the market for new networks in the future and the unique v240MT – developed in conjunction with Carnival Cruise Lines – is perhaps the most powerful demonstration of we can do. It is the world's first antenna system that can offer communication services in three different frequency bands with automatic switching on board and is capable of tracking geostationary Earth orbit (GEO) satellites and medium Earth orbit (MEO) satellites.

The v240MT system supports identical, mirrored Dual Data Centers, fully equipped with antenna controllers, Intelligent Mediators and satellite modems, which can affect instant changeover from one to the other with no manual control required. For high demand users in energy and cruise, this resilience is essential as it ensures they always have a strong and stable satellite link for operations, but also for cruise, to deliver on guest expectations. 



Intellian NX 1.25-meter Ku-Ka convertible VSAT system

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Portable Radome



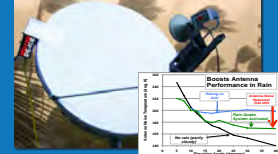
Deploy into extreme environments. Protect your antennas from winds up to 85 Mph (134 Km/h) — plus snow, ice, heat, and sand. C, Ku, X, Ka Bands.

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Rain Quake



Minimize Signal Loss due to Rain Fade. Reduce data loss — by 20X or more.

A 20:20 View: Satellite and the Cloud

by **Martin Jarrold**

A new addition to the GVF-C21 Partnership's conferences and round-tables portfolio, Satellite and the Cloud, will be introduced in London on 3rd March 2020. Whilst not "a match made in heaven" the affinity between the two is a match made in – GEO, MEO, LEO – orbit.

My observation at the outset is that it has taken the satellite industry time to realize the full potential of going beyond just the delivery of Cloud-based applications to remote locations via satellite – the way that the Cloud has been making its mark in the satellite sector over the course of the last decade. But now, recognition of the greater opportunities in partnering with the Cloud is working through the entire, and expanding, satellite industry value chain. This is resulting from leveraging reduction in upfront CAPEX, reduced OPEX, rapid scalability, ease of development and ubiquitous ac-

cessibility, which is, in a virtuous circle, bringing further evolutionary change to that value chain.

This is a value chain that engages both space segment and ground segment – with a cumulative revenue opportunity of



nearly US\$17.7 billion by 2028, according to the July 2019 NSR report Big Data Analytics via Satellite (3rd Edition) – and characterized as encompassing data volumes and analytics products not only arising out of satellite communications network operations, but also generated by NewSpace Earth imaging/observation/remote sensing, and the IoT/IIoT revolution.

Pre-NewSpace, Earth imaging/observation/remote sensing

was confined to governments, their various specialized agencies, and their big program budgets. A myriad of private companies – start-ups and spin-offs from academia – driven by commercial competition for customers,

are the very fabric of NewSpace. Various flavors of small satellites have rapid revisit times/frequencies for the same part of Earth's surface, generating many thousands of images, vast quantities of imagery-based geospatial

analytics and information to feed into GIS applications. Combining this with IoT/IIoT sensor-based applications (with hundreds of zettabytes of data generated each year by billions of devices) we can begin to comprehend the magnitudes of the big data analytics forecasts, such as that cited above.

Dublin-based Research and Markets define Cloud computing as follows: "...[It] delivers

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software, platform, and IT infrastructure services via a shared network. In this model, businesses access resources such as hosted software and applications remotely, i.e., via the Internet. The model not only obviates the need for making capital investments in servers and storage, but also results in zero operational expenses for running data centers. Cloud computing not only reduces business costs, but also makes applications accessible from any location, and reacts swiftly to changes in business needs...”

The Cloud benefits users by allowing flexibility in utilizing computing resources needed at any given time, but, due to the open nature of Public Clouds, information security needs have become increasingly complex. Concerns about Public Clouds, as opposed to Private Clouds, have tended to focus more on issues of control rather than on reliability or robustness. Major Cloud providers spend vast sums on cyber security innovations and yet customers in satellite (and in terrestrial) communications have tended to prefer using their own Cloud infrastructures, keeping data centers in-house. Confidence in using Public Clouds, as far as satellite networks are concerned, should, at least in part, be contingent on ensuring that networks which do extend to Public Clouds for critical functions have robust secure links into the Cloud.

Beyond the current traditional mainstream of Public Clouds, Cloud Service Providers are beginning to take note of increased opportunities for Cloud adoption in the satellite industry which is posing both interesting use cases

“...Security and risk management should be part of an organization’s overall corporate culture...”

and models for Cloud storage on space-based assets.

From the perspective of the Internet world the diversity of standards in the satellite equipment manufacturer and operator environment may be perceived as potentially impeding the growth of Cloud via satellite services. However, where satellite technology provides a complete end-to-end solution, as is increasingly the case in the solutions market, this obstacle becomes of reduced relevance.

Adjunct to the DVB-S2X satellite standard is Adaptive Coding and Modulation (ACM), a technology which automatically changes the modulation and forward error correction (FEC) of a satellite link to compensate for changes in link conditions, caused by such factors as the weather (e.g. rain fade), but also due to changes in the RF environment. ACM has been generally introduced into satellite networks, allowing operators/users to provide near 100% service availability in the presence of link disruptions. Whilst actual throughput would drop-off during the link recovery process, Internet applications are accustomed to variable data rates.

Satellite teleports have not changed very much in 20 years and often they are still, very largely, racks of hardware. But, are teleports verging on major change? Does it not now make sense for satellite teleports to be considered as data centers or, on the flipside, data centers to be

considered teleports?

After all – leveraging any more advanced satellite-Cloud service synergies aside – more and more of the satellite industry’s long-standing (and more recent) end-user customer-base sectors are themselves undergoing rapid digitization and – particularly where these sectors operate in mobile or remote environments, traditional sectors like shipping and oil & gas (and sectors like farming and mining) – want their IoT/IIoT and other-sourced data available and accessible wherever it is needed. The ground infrastructure companies which provide hardware and software for teleports — used by satellite operators to distribute and control their services — increasingly recognize that such facilities could be made a lot more efficient by relying on Cloud servers to virtualize network functions.

Running data analytics offerings on virtual systems has many benefits: information and insight extraction for end-users becomes much less expensive, and the focus moves away from building the underlying infrastructure to dealing with the influx of big data and solving actual problems.

Additionally, of course, the (Public) Cloud providers want to get to their customers, and to get their customers data to everywhere around the world, which is more easily achievable using high throughput broadband satellites. When this data is – as is increasingly the case – very bandwidth-intensive, such as vid-

eo streaming, the imperative for Public Cloud providers like Amazon, Google and Microsoft is all the greater.

Some perspectives highlight certain limitations of satellite networks, particularly bandwidth and latency, and how these interact with application acceleration. Satellite links are now capable of delivering higher and higher bandwidth, and at lower and lower cost, with high throughput satellites (HTS). Traditional FSS spacecraft operating in GEO, with throughput measured in the high Mbps range are giving way to newer generations of GEO satellites, with throughput approaching the Tbps range. In the course of this generational shift more traditional satellites – with a capability of 1-3 Gbps, and a CAPEX of US\$180-200 million – have a Gbps price tag in excess of US\$60 million; the newest upcoming generation of HTS – with capabilities in the 500-1000 Gbps range, and a CAPEX of US\$600-700 million – come with a Gbps price tag of less than US\$0.7 million.

In addition to the new GEO generations, an expanded MEO constellation, and upgraded and new LEO mega-constellations, will bring vast additional bandwidth capability to orbit. This additional throughput will also provide lower latency. Whilst this will further facilitate the continuing rise of fully managed satcom services, it should be noted that most applications offered via Software as a Service are not real-time but rather capabilities that rely upon servers and databases. Since most of the latency is due to processing and database look-


up, satellite delay is secondary in the user's experience. Managed Platform as a Service solutions can combine VSAT hubs, tele-port/data center uplinks, and a terrestrial network enabling easy deployment of high-throughput connectivity in customer locations across the globe.

With constellations in LEO and MEO resolving latency issues satellite network operators and service providers now look to further improve their bandwidth delivery services to meet demand. They look to such Cloud technologies as dynamic Software Defined Wide Area Networking solutions that allow for real-time network optimization, understood in terms of the virtualization seen in the Cloud computing world.

Some facets of the Cloud will be impacted by the widespread arrival of 5G, although the full extent of this cannot be known until this new mobile broadband standard is rolled out and being used by corporates, enterprises, and governments as part of a communications “network of networks” that uses satellite in a wholly integrated functional role with terrestrial systems. However, it is possible to extrapolate from certain key features of 5G.

5G will effectively eliminate latency, allowing devices to connect nearly instantly. In extremis this might suggest the nadir of some aspects of Cloud computing as a whole. One of the main

reasons the Cloud is so beneficial is that numerous devices – either in an organization for a Private Cloud or any user with an Internet connection for a Public Cloud – can connect to and transmit data with a central machine or hard drive located on the Cloud. But, if devices can connect with only milliseconds of latency and a minimum connection speed of 20 Gbps down and 10 Gbps up, 10 gigabyte video files can be transferred from user to user in about eight seconds and there's no need to use a Cloud server as a repository. The Cloud will still have significant use cases in a 5G world – especially as Cloud providers are ready to adapt – as new use cases in Cloud computing and IoT/IIoT are driving greater-than-ever demand for high-capacity, low-latency connectivity.

The satellite industry is catching up in its adoption of the Cloud. Irrespective of particular application, Cloud computing reduces barriers to market for new start-ups in the satellite industry. As noted above, incorporating the Cloud into satellite businesses in network operations, or in Earth imaging/observation/remote sensing, brings several advantages. Perhaps soon, just like the telecoms groups comprising the broader telecommunication ecosphere, satellite operators and network service providers will pivot more towards becoming software companies. Time will tell. 



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Maxar Technologies to Sell MDA to Northern Private Capital for CAD\$1 Billion

Westminster, Colo., January 1, 2020--Maxar Technologies (NYSE:MAXR) (TSX:MAXR), announced it has entered into a definitive agreement to sell MDA to a consortium of financial sponsors led by Northern Private Capital (NPC), for CAD\$1 billion (US\$765 million), subject to customary adjustments. The company expects to use proceeds to reduce leverage and improve its capital structure to prioritize investments for growth in its core areas of Earth Intelligence and Space Infrastructure.

The transaction includes all of MDA's Canadian businesses, encompassing ground stations, radar satellite products, robotics, defense, and satellite components, representing approximately 1,900 employees. These businesses are expected to generate approximately US\$370 million and US\$85 million in revenue and Adjusted EBITDA, respectively in 2019. This revenue is inclusive of approximately US\$78 million of intercompany sales to other Maxar entities.

Following the completion of the transaction, the MDA team will operate as a stand-alone company within NPC's portfolio, retaining its name and standing as the leading space and defense company in Canada. MDA expects to continue to supply Maxar with certain components and subsystems, and the companies expect to sell each other's complementary satellite data. The revenue and Adjusted EBITDA numbers for MDA highlighted above include approximately US\$52 million of revenue and US\$29 million of Adjusted EBITDA for certain radar related imagery sales which have historically been included in Maxar's imagery segment. This business activity has been included in the sale of MDA.

"The sale of MDA furthers execution on the company's near-term priority of reducing debt and leverage," said Dan Jablonsky, Maxar CEO. "It also provides increased flexibility, range, and focus to take advantage of substantial growth opportunities across Earth Intelligence and Space Infrastructure categories. After the transaction is complete, Maxar will retain leading capabilities in geospatial data and analytics, satellites, space robotics, and space infrastructure, and we will continue to have

strong alignment with our defense and intelligence customers, the evolving requirements of civil governments, and the pursuit of innovation seen in the commercial marketplace. We thank the talented employees of MDA, who have built a world-class business with unique capabilities, and we look forward to working with them as a commercial partner and component supplier to Maxar going forward."

"This transaction — when combined with the recently completed sale of real estate in Palo Alto — reduces Maxar's overall debt by more than \$1 billion and significantly reduces Maxar's leverage ratio," said Biggs Porter, Maxar CFO. "Also, the loss of future cash flow from MDA will be significantly offset by interest savings from the reduction of debt. We expect the net effect of all these factors to only reduce our prior guidance for Adjusted EBITDA and free cash flow generation in the 2022 to 2023 time period by approximately \$50 million."

Porter continued, "While the sale of MDA will re-base-line the size of the overall company, we continue to expect significant Adjusted EBITDA and Free Cash Flow growth over the next several years as the Legion constellation construction spend completes and the constellation comes online, Services executes on its growing backlog, and Space Infrastructure sees improved profit and cash flow driven by recent re-engineering efforts and new program wins."

The completion of the transaction is conditioned on regulatory approvals, including review by the Committee on Foreign Investment in the United States, Hart-Scott-Rodino review by the U.S. Department of Justice and the U.S. Federal Trade Commission, and Canadian government reviews under the Radiocommunications Act and the Competition Act.

PJT Partners, RBC Capital Markets, and Bank of America Merrill Lynch are serving as financial advisors to Maxar. Wachtell, Lipton, Rosen & Katz and Stikeman Elliott LLP are serving as the company's legal advisors for this transaction.



A MAXAR COMPANY

Satcoms Innovation Group Appoints Helen Weedon as Managing Director

Ledbury, Herefordshire, UK, January 7, 2020-The Satcoms Innovation Group (SIG) has appointed Helen Weedon as Managing Director. The appointment marks significant restructuring of the innovation forum. Helen succeeds Martin Coleman who will commence as a member of the group's advisory board. Helen has played a pivotal role within the group since 2011, in which time she has developed and implemented membership and public relations strategies. Through her own PR agency (established in 2007) Helen has built up extensive knowledge and experience within the satellite industry.



Helen Weedon

Andreas Voigt of Eutelsat, Guido Baraglia of Kratos Communications and Mark Steel of Inmarsat will deliver technical expertise by resuming their roles as directors of the group. Alongside Martin Coleman, the SIG advisory board includes representatives from ArabSat, GOVSAT, Intelsat and SES. As part of the restructuring, the organisation has been relocated to mainland UK from the Isle of Man.

As part of its updated membership fee structure, SIG has introduced both start-up and academic membership tiers to promote the group's accessibility for new businesses and academic projects. Start-ups may join SIG

for an annual fee of £500. The Academic membership tier is free to those who qualify.

Errol Olivier Joins Rignet

Houston, TX, January 6, 2019-RigNet today announced that effective immediately, Errol Olivier joins RigNet as Senior Vice President and Chief Operating Officer. Reporting directly to President and Chief Executive Officer Steven Pickett, Mr. Olivier will be responsible for all customer-facing functions, including Sales, Sales Engineering, Service Delivery, Bids and Proposals, and the company's Global Network Operations Centers.



Errol Olivier

Olivier brings more than thirty years of experience in the satellite communications industry. His previous roles include President and Chief Executive Officer of MTN Satellite Communications; President, Chief Executive Officer, and Chairman of Broadpoint; and President and Chief Operating Officer of CapRock Communications.

RigNet also announced the departure of Senior Vice President, Sales Jay Hilbert, effective January 6, 2016. Mr. Hilbert will provide consulting services on several discrete initiatives between now and March 31, 2020. Mr. Hilbert joined RigNet in 2016.

"Jay joined the company at a critical time in the midst of the oil and gas industry downturn,"

said Pickett. "Under his leadership, RigNet regained lost market share and made great inroads with customers as we began offering our new, differentiated technology services, like Intelie, as part of our strategic transformation." he added.

Shnaiberg Appointed as Acting CEO of Spacecom

Tel Aviv, Israel, January 3, 2020--Itzhak Shnaiberg has been appointed Acting CEO of Spacecom by the company's Board of Directors, following the retirement of former CEO David Pollock on January 1, 2020. Shnaiberg, Spacecom's Deputy CEO since 2008, was among the company's founding management team.

Joining Spacecom in 1996, Shnaiberg led all financial aspects of establishing Spacecom as an international satellite service provider from its inception. Since he joined the company, Shnaiberg served as Spacecom's CFO, and in 2008 he was appointed Deputy CEO.

Before joining Spacecom, Itzhak was employed by IAI (Israeli Aerospace industries) in various positions, where in his last role he was part of the AMOS-1 program (Spacecom's first satellite). Itzhak Shnaiberg holds a BA in Economics and an MBA from the Bar-Ilan University. 



Itzhak Shnaiberg

Euroconsult Forecasts Satellite Demand to Grow Fourfold in the Next 10 Years

Paris, France, Jan. 13, 2020--In its latest analysis of satellite manufacturing and launch services, **Satellites to be Built and Launched by 2028**, Euroconsult projects that the satellite market will experience a radical transformation in the quantity, value and mass of the satellites to be built and launched with a four-fold increase in the number of satellites at a yearly average of 990 satellites to be launched, compared to a yearly average of 230 satellites in the previous decade. The market will reach US\$ 292 billion over the next decade. This reflects a 28 percent increase over the previous decade which totalled \$228 billion in revenues.

“Newcomers like OneWeb, SpaceX’s Starlink or Amazon’s Project Kuiper are becoming the largest owners of assets in orbit, challenging the satellite industry in many ways” said Maxime Puteaux, Editor-in-Chief of this research product and Senior Consultant at Euroconsult.

These changes are characterized by several factors:

LEO and MEO constellations are expected to account for 77 percent of the projected demand in the next decade driven by broadband projects like SpaceX’s Starlink, OneWeb, Amazon’s Project Kuiper, Telesat LEO and SES’s O3b mPOWER.


Incumbent GEO comsat commercial satellite operators are transitioning from a legacy of GEO comsat broadcasting business to more data-centric use cases, impacting satellites orders. The gradual recovery of contracts will continue, following the low point of seven awards in 2017 with demand driven by the first orders of satellites with fully reconfigurable digital payload.

Euroconsult expects an average of 13 GEO comsat orders per year post-2020 based on a replacement scenario that considers the competition of NGSO satellite systems and the introduction of life extension services. Demand from global and regional GEO comsat operators will reach a yearly average

of \$8 billion over the next ten years.

Civil government agencies are projected to be the top drivers of satellite demand, accounting for 40 percent of the entire market value, ahead of both defense and commercial demand. This is a result of increasing interest in space science, exploration, and Earth observation. On the defense side, a new cycle of orders is beginning with new strategies and replacement satellites needed by the U.S., China, Russia, Japan, India and Europe.

Satellites to be Built and Launched by 2028 is a research product based on in-depth analysis of satellite applications and missions, satellite operators and users, technology advances, and the impact of these factors on the manufacturing and launch industry. It includes a database of all satellites, regardless of mass, that were launched from 2009 to 2019, as well as satellites currently under construction, and those forecast to launch by 2028. It also provides detailed status and maturity assessments of 55 commercial constellations of five satellites or more and discusses the business cases for the four mega-constellations and their differing vertical integration strategies.

In its analysis, Euroconsult reviews strategic issues and trends for four categories of satellite operators, six types of orbit, six regions of the world, and seven distinct satellite application categories. It provides quantitative analysis of satellite numbers, mass, and cost with forecasts based on qualitative top-down and bottom-up assessments. With separate sections for both the manufacturing and launch industries, the research covers strategic issues, industry structure, financial performance, among others. 



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Is Big Data a Big Deal for Teleports?

by Robert Bell

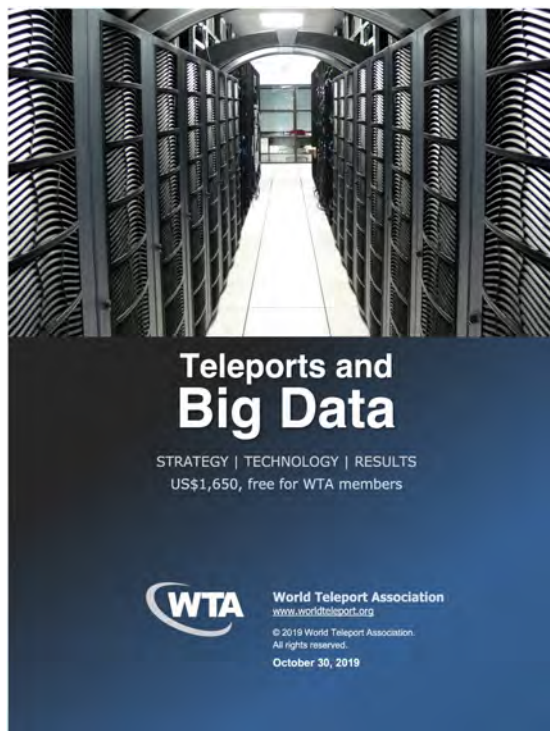
Big Data is information on steroids. It is generated at high volume, high velocity and with enormous structural variety from billions of devices flooding the world's data centers with bits. But the same term encompasses an even more radical development: the data analytics that can turn this explosion of digital content into business insights and actionable intelligence. The accompanying revolution in machine learning is what gives Big Data its impact. The systems learn from the data, identify patterns and make choices, producing real-time analysis with huge impact on performance, productivity and profitability.

Big Data has one more important aspect. The cloud services business – which did not exist fifteen years ago but reached \$325 billion in 2018 global revenues – is a massive enabler of Big Data applications. Near-unlimited compute capacity and specialized applications are available worldwide on a pay-as-you-go model that has stimulated innovation on a major scale. Indeed, Big Data has become shorthand for data that is big (in volume, velocity and variety), able to be analyzed for valuable insights and available almost everywhere.

The Teleport Opportunity

In a recent report, Teleports and Big Data, the World Teleport Association breaks down this global information revolution into opportunities accessible by the teleport operators who have been driving innovation in the industry for decades.

NSR starts the ball rolling by



pegging the Big Data opportunity for satellite at US\$ 18.1 billion in cumulative revenues from 2017 to 2027. The biggest sectors will be earth observation and the Internet of Things, each contributing about half the total revenues. But there is a third sector that is already benefiting from Big Data,

and that is the teleport operator.

For service providers, the Big Data revolution presents a mix of big opportunities and challenges in three critical areas. They include the chance to win and retain connectivity business specific to Big Data, whether for media and entertainment customers or those operating in the data-centric niches of maritime, energy, transportation, enterprise and government. The second opportunity is to become more than a connectivity provider by delivering services the Big Data customer needs, from local processing of applications to data analytics and hybrid cloud services. The third is to transform their own operations using Big Data, enabling them to do more with fewer, higher-skilled people, improve service continuity, optimize bandwidth and increase profitability.

Where is the Growth?

The good news, for teleport operators who can deliver Big Data capabilities, is that the opportunities are in markets they already serve.

Land, maritime and aeronautical transport markets will be responsible for 30% of space Big Data revenues, according to NSR. Executives interviewed for the report cite double-digit growth.

Government and military

Big Data customers will contribute 26% of total revenues through 2027, according to NSR – but interviewees were appropriately silent on the applications and services they provide. The energy business, however, will be a much bigger market, from exploration and production to utilities and green energy. As one interviewee put it, “Big Data is worth billions to oil companies, to help them identify where to invest and how best to develop assets.”

The role of Big Data analytics in online, social and mobile advertising is just as big. Monetization of business intelligence about content viewership, location, preferences and buying intent represents billions of dollars. As they originate and distribute media online as well as by satellite, teleport operators are well positioned to profit in this field.

Narrow and Broadband

Big Data can start out small. Narrowband connectivity is critical to pulling data from sensors in small bursts. Teleport operators are creating high-value solutions by integrating narrowband and broadband satellite technologies. It requires significant expertise to combine technologies into seamless networks, but the scale of the opportunity makes it worthwhile. Technologies include a mix of space and terrestrial links backed up by cellular, IP-VPN and VSAT/BGAN satellite. Other operators are using VSATs to aggregate narrowband traffic from devices and backhaul it to the cloud for analysis, using

“...The good news, for teleport operators who can deliver Big Data capabilities, is that the opportunities are in markets they already serve...”

low-power radio for the last mile to IoT devices.

Seeking Competitive Advantage

Teleport operators are also consumers of Big Data. They use it to optimize network operations, improve capacity planning and provisioning, and manage field service and supply chains. Based on their growing expertise, they are also offering high-value applications to customers, ranging from predictive maintenance and vehicle tracking to continuous improvement in the online experience of cruise line passengers. Their goal is to become the essential provider in the value chain for their customers.

Contributors to the report were unanimous about one thing: Big Data is driving them to redefine the value they provide. That means developing new capabilities but also finding the right place in the value chain. Serving IoT customers is a team sport

involving multiple connectivity paths, edge devices, transmission systems, hub services, network management and analytics. Each operator we interviewed is working to best leverage their capabilities and find a defensible market niche.

One networking technology supplier’s executive foresees a radical change ahead in how satellite networks support future communications architectures. He expects satellite to integrate more closely with terrestrial services in a dynamic, software-driven future. An automation supplier executive agrees: “Satellite is going like terrestrial, where bandwidth and services are dynamic.” It’s a future that the industry is working hard to seize.

The Teleports and Big Data report is available for free to members and for sale to non-members at:
www.worldteleport.org/store/ViewProduct.aspx?id=15096909



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. He can be reached at: rbell@worldteleport.org

InterBEE Highlight New Media Innovations

by **Naoakira Kamiya**

The Japan Electronics and Information Technology Industries Association (JEITA) held the 55th International Broadcast Equipment Exhibition (InterBEE2019) for three days from November 13 to 15 at Makuhari Messe Convention Center located at Chiba City, near Tokyo. Under the slogan of “Conveying the Possibilities of New Media to the World,” a record number of 1,158 companies and organizations including 632 from 37 countries and regions overseas, exhibited at 2,125 booth spaces. JEITA proudly announced that the total visitors marked 40,375.

This year’s show floor was consisting of four categories: Video Production & Broadcast Equipment, Professional Audio Equipment, Video Expression & Professional Lighting, and ICT/Cross Media.

The hot topics of Video Production & Broadcast Equipment stage were proliferation of 8K Ultra HD camera, content, and display.

Top-notch camera manufacturers in Japan such as Panasonic, Sony, Canon, Astrodesign, Hitachi Kokusai Denki revealed their latest 8K camera solutions. Panasonic, for example, introduced the world’s first 8K multi-purpose camera with organic sensor and global shutter. Astrodesign demonstrated 8K microscopic camera, which is absolutely compact and lightweight.

Visitors were also dazzled by such 8K sports content as Rugby World Cup 2019, Japan Swimming Competition, National Championships in Athletics among others. Particularly super slow-motion replay of pristine quality video captured eyeballs.

As regards 8K display, NHK, Sony, Astrodesign,

NHK Technologies, and Cannon demonstrated breakthroughs in technologies.

NHK built three rooms for 4K and 8K presentation. In the first room NHK set up 88-inch 120Hz sheet type OLED display developed jointly with LG Display and Astrodesign, and showed fascinating 8K video featuring Rugby World Cup 2019. Thickness of such display is about 1 millimeter.

Ardent Rugby World Cup matches were played at twelve stadiums all over Japan from 20 September to 2 November. NHK broadcasted nine action-packed matches via BSAT-4a satellite, where they hold one 4K and one 8K channel. J Sports broadcasted all matches via JCSAT-110A satellite in full HD and 4K.

In the second room NHK introduced Sony’s 120-inch and 85-inch 8K resolution TVs and showed 8K program specialized in national treasure,

Horyuji Temple. 120-inch 8K TV is not sold at Japanese local electrical retailers. They must have bought from Sony in China where they said they have already started selling.

In the third room they unveiled flexible 30-inch 4K OLED-based TV developed jointly with Sharp. Actually it is the first time for NHK to roll up and down such type of TV in front of visitors while showing 4K 60Hz content. According to NHK the thickness of the screen is 0.5 millimeter. It seemed a larger size flexible TV than 30-inch will be available in near future.

Sony built 8K x 4K HDR 120Hz Crystal LED display in front of their booth and released 8K video of Sony Hawaiian Open Golf Tournament. This display is as large as 19.3m x 5.4m and its resolution



was proclaimed as high as 15,360 pixels x 4,320 pixels.

Sony also unveiled the latest version of 8K portable camera UHC-8300 and 4K slow motion camera HDC4800.

Astrodesign arranged stunning 8K World with 250-inch screen and 37,000 ISO lumens Insight Laser digital projector developed by Delta Projector and powered by Astrodesign. The 8K content presented was colorful fashion event called Tokyo Girls Collection 2019.

Astrodesign also unveiled 8K microscopic camera to be used for surgery and 8K camera with fish-eye lens for VR (Virtual Reality) shooting.

In addition they set up 8K theater and screened the latest video named “Kanashimino Kunino Alice (Alice in Heart-Broken Country).” In the theater, visitors wore ExpanD glass and enjoyed 8K x 3D x Interactive video.

NHK Technologies introduced rear projection 170-inch 8K Acryl Screen. The content screened was beautiful scenery of Yellow Stone. They also exhibited 8K 3D microscopic camera system and astonished visitors showing video of actual ophthalmic surgery.

Canon used 120-inch 8K display made of four 4K 60-inch TVs and introduced fascinating video of ancient Kyoto taken by their own 8K camera.

Besides the above-mentioned demonstrations, a new initiative at the show named InterBEE Sports attracted visitor’s attention. Such companies as JVC Kenwood, Mediaedge, Entania among others showcased next generation broadcasting and communication capabilities that will enhance sports entertainment. JVC Kenwood unveiled Connected CAM Studio KM-IP6000 and Mediaedge introduced 240Hz high speed box camera called QDCAM. InterBEE Sports also hogged the spotlight by offer-

“...It was obvious that in preparation for the commencement of full commercial services at the time of 2020 Tokyo Olympics and Paralympics, the Japanese public broadcaster NHK is further expanding 4K/8K production especially for premium sports...”

ing unique video of sitting volleyball over 200-inch screen.

In the course of shifting broadcast system from SDI to IP, key manufacturers in the world jointly constructed IP Pavilion and demonstrated interoperability based on SMPTE ST2110, ST2110-30, and ST2022-6. It was particularly interesting to find out four Japanese IP gateway manufacturers such as NEC, Media Links, Fuyo Video Agency, and FOR-A successfully conducted high-caliber 10Gbps live video transmission with their gateway model, MF4200, MDP3020, IPG3000, USF-10IP-TRC respectively. IP switch was provided by Alaxala Networks.

In addition Nara Television Company unveiled all IP OB Van at IP Pavilion. Inside the van they installed Sony’s IP live system manager PWS-110NM1, IP production switcher XVS-6000, and many other avant-garde IP solutions. They proudly said that they used 10 Sony 4K cameras and such OB Van, and successfully broadcasted this year’s Senior High School Baseball Games.

As regards 5G (next generation communication technology) solution, two telecommunication companies, SoftBank and Rakuten Mobile revealed their



NHK unveiled for the first time in InterBEE 2019 a 30-inch 4K flexible OLED-based TV with 0.5mm thickness.



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recent development.

SoftBank proudly said they transmitted live 8K video of International Basketball Matches with 300Mbps over their 5G networks. They used MPEG DASH format. They also revealed that extremely low latency transmission of Noh-Kyogen live video from Oenougakudou in Kyoto to various viewing site was accomplished. The format was 8K 60fps 100Mbps based on MMT.

Rakuten Mobile together with NHK Technologies demonstrated 8K video transmission via 5G networks from Yoyogiuehara studio in Tokyo to Makuhari Messe convention center in Chiba. Technical support for demonstration was made by NEC and Nokia.

In the satellite communications and broadcasting equipment stage, a number of leading players such as AT Communications, Moubic, Kato Denki/Tokyo Keiki, Matsuura Kikai Seisakusyo showcased their latest products and services.

AT Communications rolled out two SNG vehicles this year. One of the vehicles was made of 1.2 meter antenna on the roof and 10 meter pole with FPU and IP camera on the top. In this 4WD car, NTT's 4K encoder HC11000E and Paradise Datacom's Q-Flex DVB-S2 satellite modem are installed.

Other notable products at AT Communications booth were portable Ku-band flat antenna, CCT series flyaway system, and Inmarsat Global Express antenna made by Cobham. Very small flat antenna (470mm x 300mm x 55mm) was made by SATCUBE in Sweden and it weighs only 8kg. CCT series flyaway system is offered in the antenna diameter of 75cm and 120cm.

Regarding SATCUBE, Makio Komatsubara, President, said "Long-cherished VSAT services will start in Japan from April 1 2020 by using Ku-band transponder to be provided by SKY Perfect JSAT."

Moubic owns SNG vehicle named Moubic-M01 and is very active in video contribution services. Makoto Ozawa, President, proudly said "We have been very busy recently with our digital SNG vehicle. We

were asked to uplink Rugby World Cup, Formula One Japanese Gran Prix, and MotoGP Japan."

Besides contribution business, Moubic sells video-related products from such companies as Vislink Technologies and Newtech. At this year's InterBEE2019, they introduced Vislink's Mantis MSAT and DVE6100 4K HEVC multi-format exciter in addition to Newtec's MDM6100 ASI modem and MDM6000 IP modem for satellite gateway.

Kato Denki teamed up with Tokyo Keiki launched 1.2 meter parabolic antenna on-the-move and tried to sell to broadcasters for their SNG operation. The attendant at the booth proudly added that they also made 4.5 meter Cassegrain reflector and provided recently to Yamagata Broadcasting Company and Television Kanazawa Corp.

The latest offering on the floor from Matsuura Kikai Seisakusyo was a specialized small-size flyaway on their unique pan head, which was made for SKY Perfect JSAT.

It was obvious that in preparation towards the commencement of full commercial services at the time of 2020 Tokyo Olympics and Paralympics, the Japanese public broadcaster NHK is further expanding 4K/8K production especially for premium sports. At the same time other commercial broadcasters are gearing up to broadcast 4K and 4K HDR content not only over right-hand polarized transponders but also via left-hand polarized transponders of BSAT-4a and JCSAT-110A. According to A-PAB (the Association for Promotion of Advanced Broadcasting Services), 4K/8K channels broadcasted in Japan are eighteen at last count. One more broadcaster WOWOW plans to commence 4K channel from December 1 2020. 🇯🇵



Naoakira Kamiya is the Managing Director of the Satellite System Research Institute and Director of the Japan Satellite Business Association. He can be reached at: zum05241@nifty.ne.jp

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RF-Design Receives ISO 9001:2015 Certification



RF-Design receives ISO 9001:2015 certification from “M-Zert Zertifizierungsgesellschaft für Managementsysteme mbH” which is an approved organization for ISO 9001:2015 Quality Management audits and certification.

RF-Design is a privately held company founded by Ralf Mayr in 1998 and specialized on the design and manufacturing of high quality RF equipment, RF distribution, RF-over-Fiber solution for the international Satcom, Broadcast, Broadband and Telecommunications industry.

RF Design’s wide range of products are in operation in Satellite Earth Stations, Teleports and broadcasting facilities throughout the world. In addition to our standard product range RF-Design is also well known for designing, developing and manufacturing custom made products for individual customer requirements.



“One of our most important goals is a continuous improvement of the quality and performance of our products and our processes. Now being ISO 9001:2015 compliant and certified we have proofed that our processes, policies and procedures as well as our management and staff is following a strict Quality Management guideline, constantly focusing on customer requirements and satisfaction,” said Ralf Mayr, Founder and CEO.

RF Design went through an extensive audit process of review and improvement of all operational procedures resulting in the creation of a corresponding quality manual and procedures manual to received the ISO 9001:2015 certification.

Ralf Mayr and the RF-Design team have been trained and instructed on all future procedures while key management members have been part of the review and improvement actions. “With the ISO 9001:2015 certification and its guidelines we are glad to give confidence to all our customers and partners around the globe. We are constantly dedicated to maintaining and improving high effi-

ciency for our operation, best product quality and performance so to meet the high requirements and expectations of all our customers and partners,” said Mayr.

ND SatCom’s SKYWAN 5G

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

SKYWAN 5G unlocks new business opportunities for



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

SKYWAN 5G enables star, mesh, multi-star and hybrid topologies. Each unit can act either as a hub or master station, therefore adding agility in terms of its network role. Geographical redundancy of the master station is already built-in and a DVB-S2X outbound can be added easily at every station. Network virtualization allows seamless integration into all IT infrastructures. The device is so flexible: the customer can change the topology anytime, or cascade units to increase traffic volume per site according to business growth. 🌐

The Satellite Markets 20 Index™

Company Name	Symbol	Price		
		Jan 15, 2020	52-wk Range	
Satellite Operators				
Thaicom Public Company Limited	THCOM.BK	3.96	3.76	8.70
Eutelsat Communications S.A.	ETL.PA	14.29	14.09	19.24
APT Satellite Holdings Limited	1045.HK	3.15	2.65	3.80
Inmarsat Plc	ISAT.L	544.40	355.00	617.20
SES S.A.	SES.F	12.91	11.19	18.81
Satellite Manufacturers				
The Boeing Company	BA	313.37	305.75	446.01
Maxar Technologies	MAXR	20.71	3.83	21.45
Lockheed Martin Corporation	LMT	426.15	278.00	427.78
OHB SE	OHB.DE	42.7	30.55	48.65
Honeywell International Inc.	HON	180.93	138.70	184.06
Equipment Manufacturers				
C-Com Satellite Systems Inc.	CMLV	1.80	1.16	1.98
Comtech Telecommunications Corp.	CMTL	36.10	20.95	38.00
Cobham Plc	CBHMY	4.49	2.31	4.52
ViaSat Inc.	VSAT	71.64	60.55	97.31
Gilat Satellite Networks Ltd.	GILT	10.29	7.32	10.75
Service Providers				
DISH Network Corporation	DISH	36.75	28.24	44.66
Globalstar Inc.	GSAT	0.48	0.34	0.70
Orbcomm Inc.	ORBC	4.06	3.58	9.35
Sirius XM Holdings Inc.	SIRI	7.15	5.23	7.23
Speedcast International	SDA.AX	0.85	0.68	4.15

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 15-Jan-20
Satellite Markets 20 Index™	2,875.54
S & P 500	3,320.79

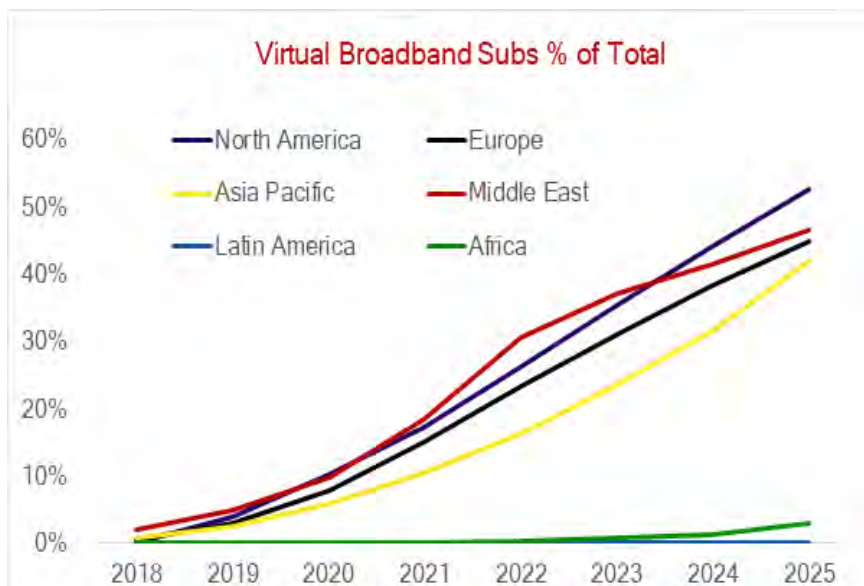
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VITAL STATS

Virtual Broadband Connection to Reach 500 Bil. by 2025



A boom in virtualization of fixed broadband access infrastructure is developing and will sweep through almost all connections over the next decade, passing the 500 billion mark in 2025. That will be 40% of the total 1.26 billion global broadband subscriber base by then, compared with just 0.48% at the end of 2018 and 2.58% now at the start of 2020. These findings have just been reported by Rethink TV, the research arm of Rethink Technologies Research, in its latest report, Broadband Virtualization Accelerates to 500 million connections By 2025.

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