

Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

The Asia-Pacific Satellite Market

by Omkar Nikam

In the recent years, the Asia-Pacific region has become a bright spot for connectivity solutions. One of the reasons is its huge population, which represents approximately 60% of the humanity (4.6 billion people as of 2020).

India is one of the biggest consumers of satellite content and has made significant progress in the past

few years to unlock its full potential of the video market. Though DTH is very popular in India, companies like Reliance JIO are now becoming the competitor in the broadcasting segment due to their low-cost services.

Over the past several decades, Asia Pacific has been one of the major drivers of global economic growth, and this is expected to continue moving forward. There are several factors that play a crucial role in the Asian market that makes it a huge opportunity for Direct-to-home (DTH) operators



such as the rural community who don't have access to the terrestrial TV network and other is the limited channel services via cable network.

One of the major factors is the rollout of the DTH services in the most demanding regions. Many of the developing Asian countries have numerous remote sites, where people are unable to access television services.

Considering the developing nations and their ability to adopt new technologies, China and India are the ones contributing to the rapid transformation of Asia. China is currently one of the biggest consumers of IPTV, though has a very limited satellite broadcast market that is dominated by China Satcom. On the other hand, India's media and entertainment industry are flooding with numerous regional Over-the-top (OTT) platforms. In terms of developed nations, Singapore is the

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"A New Space Age"



This summer in the northern hemisphere is off to a very promising start with the first commercial flight of Virgin Galactic's VSS Unity spacecraft. It took all of 17 years to reach this point, but a triumphant Richard Branson, the flamboyant billionaire owner of Virgin Galactic, declared after the historic flight that he was a passenger "we are now in a new space age."

Branson just beat out another billionaire space entrepreneur Jeff Bezos who was scheduled to launch the maiden flight of their Shepard spacecraft nine days later on July 20th, the 52nd anniversary of the Apollo 11 moon landing. There's a healthy competition going on in the space market and having billionaires in the mix makes for an interesting situation to say the least. One thing is for sure--the space tourism market is bound to takeoff in a big way.

NSR projects that the Space Tourism and Travel market will generate nearly US\$ 8 Billion in revenues by 2030. "Demand exists, but experience is key", says Hameed Mohamed Manoharan of NSR. "No one has flown passengers frequently enough to make passengers feel that it is a safe and reliable 'tourist' destination. Once the supply part of the market offers frequent launches, demand will grow further," he added.

If space tourism does take off, some are comparing the impact that will have on various industries just as the advent of air travel in the early 20th century. The certainly will be some spillover effect on the satellite industry. This remains to be seen. With billionaires one-upping each other, it will at least be entertaining.

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Asia-Pacific Market...

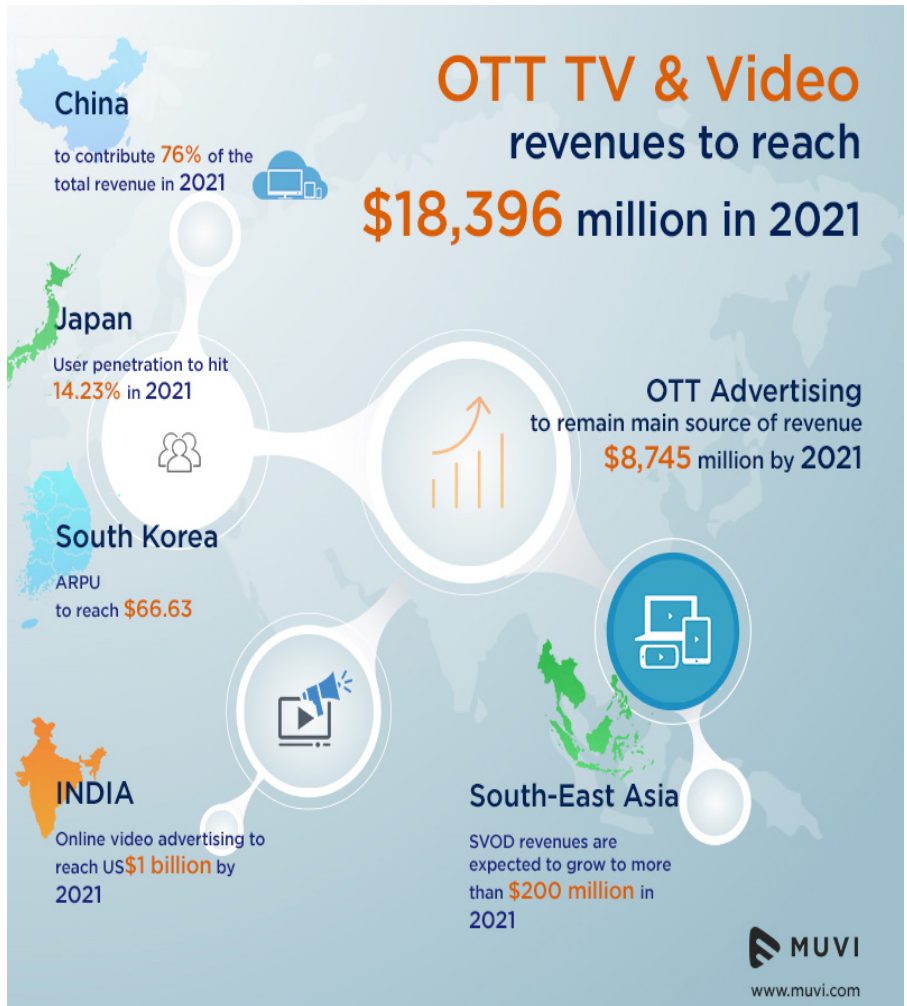
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first country in Asia to become fully digital for video content delivery from January 2019. While Australia, South Korea and New Zealand are covering 80% of their regions for delivering video content via digital mode. Asia's huge diversity in culture gives the OTT players strong benefit to target the regional audience. In the near future, increasing demand of such regional OTT platforms might lead to the decline of traditional TV consumers in the near future. Nevertheless, Asia Pacific remains the major hotspot for satellite companies. Simultaneously, it is also the only biggest continent of the world to consume huge amount of Free-to-air (FTA), DTH, and Digital Terrestrial Television (DTT) content.

Market Outlook

For almost four decades, the Asian satellite broadcasting market has grown consistently. It has also reshaped itself in time with the evolving technologies in the media and entertainment industry. India tops in the list of DTH market, while Australia, Indonesia, New Zealand, Philippines, and Sri Lanka, are also some of the biggest consumers of satellite video content.

The growth in subscriber base is not the only strong asset for the DTH companies, as video on demand (VOD) services are rising. Average Revenue Per User (ARPU) is something that plays a crucial role in the combined revenues of the DTH companies. As many companies in Asia are trying to offer huge amount of con-



tent in lower prices, the ARPU eventually falls as there is still a considerable gap between the consumer demand and the tailored service offering. According to a 2021 report published by Media Partners Asia (MPA), Asia Pacific pay-TV subs will grow at a CAGR of 1% between 2020-25 to reach more than 715 million by 2025, representing 63% penetration. According S&P Global, Australia had highest DTH Average Revenue Per User (ARPU) in Asia at USD 66 per month and India register lowest ARPU at USD 4 per month.

OTT is slowly becoming popular in Asia, and it is mainly due

to its wide variety of the content as well as its tailored design for the regional audience. DTH operators should make the use of huge international and national HD, UHD, and 4K video content to segregate it as per the needs of the subscribers in the specific region. This will lead to the rise in VOD, which will in-turn increase ARPU regardless of the monthly packages that a subscriber is paying as per the standard rates.

Singtel, Thaicom, Measat, Intelsat, and SES are some of the prominent satellite operators in Asia, with each having several DTH content broadcasting on their fleets. Currently there are more 100 million active pay sat-

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elite TV subscribers in Asia. FTA content is also very much popular in Asia Pacific. On the other hand, Dish TV, Tata Sky, Airtel, Independent TV and MNC Vision are the dominant DTH companies in Asia. Though companies like Dish TV alone have combined 20 Million subscriber bases in India and Sri Lanka, Sky Perfect JSAT and KT SAT DTH platforms tops the HD content services in South Korea and Japan.

Market Transformation from Satellite Broadcasting to Satellite Broadband

The OTT and IPTV trend of in the Asian video market will not create a significant amount of loss for satellite operators, as most of the population still consumes traditional TV content rather than OTT or IPTV. As of 2020, Asia has more than 600 million Pay TV subscribers. This massive number of subscribers certainly will take some time to adapt to OTT and IPTV solutions. But companies like SES, have already started tapping the IPTV market by utilizing HTS capacity to feed content into cable head-ends. This allows the broadcaster to distribute content by using a local operator's IP network. Also, companies like Astro Malaysia are trying to establish themselves in the OTT market on the basis of regional content broadcasting.

As broadband solutions are rapidly gaining momentum in the Pacific region, companies like Kacific, a Singapore-based broadband satellite operator, are expanding their next-generation broadband solutions across


“...given its huge population, the Asia Pacific region has the potential to amplify demand for satellite broadband services...”

several countries. Christian Patouraux, CEO Kacific, recently mentioned in one of the APSCC Webinars that “The later months of 2020 has accelerated the demand in the satellite industry. And it is highly possible that pandemic will leave with strong demand in the connectivity segment as many people are preferring to work from home.” With growth in satellite broadband demand, maritime and In-flight Connectivity (IFC) will also help drive demand in the Asia Pacific region. Though pandemic has temporarily halted the growth these markets, in the post-pandemic world, maritime and IFC are also the growth hotspot for the satellite companies in the Pacific region.

Post-COVID Opportunities

While the pandemic can be seen as both an opportunity and challenge, it is by far safe to say that given the huge population, the Asia Pacific region has the potential to amplify the demand satellite broadband services. Aligning the upcoming race of low earth orbit (LEO) satellite internet, the Pacific will soon be a competitive region with companies like SpaceX and CurvaNet at

the forefront of the LEO satellite services segment.

Taking a closer from another angle of integrating new technologies, cloud services can also be a major game changer in the video market. Especially in Asia, where most of the developing nations prefer economically viable solutions, cloud adoption can reduce the cost for the content producers and distributors. The migration of services from traditional to the cloud will provide higher reliability for end-to-end video delivery solutions. And the transition from multicast to Adaptive Bit Rate (ABR) video delivery will reduce the cost across the whole video supply chain. This transformation will take some time due to the lack of appropriate infrastructure in Asian countries. But in a decade or so, satellite broadcasters can take a huge pie out of the cloud market. Simultaneously, satellite operators and service providers should take advantage of HTS and VHTS technology to open the doors for HD, UHD, and 4K content in Asia. 

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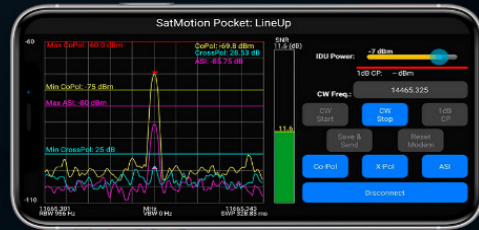


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The Satcom Industry in China: Accelerating to ‘China Speed’

by Blaine Curcio



Having lived in Shenzhen for a handful of years, I would hear time and time again about things developing at “Shenzhen Speed.” In local parlance, the peak of Shenzhen Speed coincided with the early-1990s to mid-2000s building boom, when some buildings went up at a rate of 4 floors every 9 days. In the broader Chinese context, the phrase “China Speed” also gets used often, referring to industries developing quickly or infrastructure being built in the blink of an eye.

Over the past several years, parts of the Chinese space sector have grown at China speed. This includes launch vehicles, satellite manufacturing, and EO and satnav applications. Somewhat absent from this acceleration to China speed has been satcom—until recently. The past year and a half have seen the acceleration of Starlink, and a subsequent acceleration in China by policymakers, companies, and investors to build the infrastructure needed for a “Chinese Starlink”. At the same time, the continued advent of HTS and development of end user applications that are more mainstream than before (in-flight broadband vs. VSATs in remote villages), has led to more impetus by Chinese satellite operators to launch HTS capacity and

vertically integrate into high-growth parts of the industry. The first half of 2021 saw quite a few significant events in China’s satcom sector, including funding rounds into service providers, events surrounding different end verticals, and the topping out of a billion-dollar satcom tower. Here, we will discuss half-year updates in the GEO satcom and LEO satcom sectors, deriving insights and analysis from the recently-released Euroconsult China Space Industry Quarterly, Q1 and Q2 2021 Edition.

GEO Satcom: Enter HTS, Open the Downstream

China’s GEO satcom market has long been more or less a monopoly, with China Satcom controlling much of the capacity, and a few big service providers, including ChinaSat subsidiary SinoSat, have controlled the services part of the industry. More recently, as satellite internet has become more strategically important in China, there has been impetus to launch more capacity, which has created more opportunities for service providers downstream.

The additional capacity has thus far taken the form of the Apstar-6D satellite, launched by APT Mobile Satcom, a Shenzhen-based partial subsidiary



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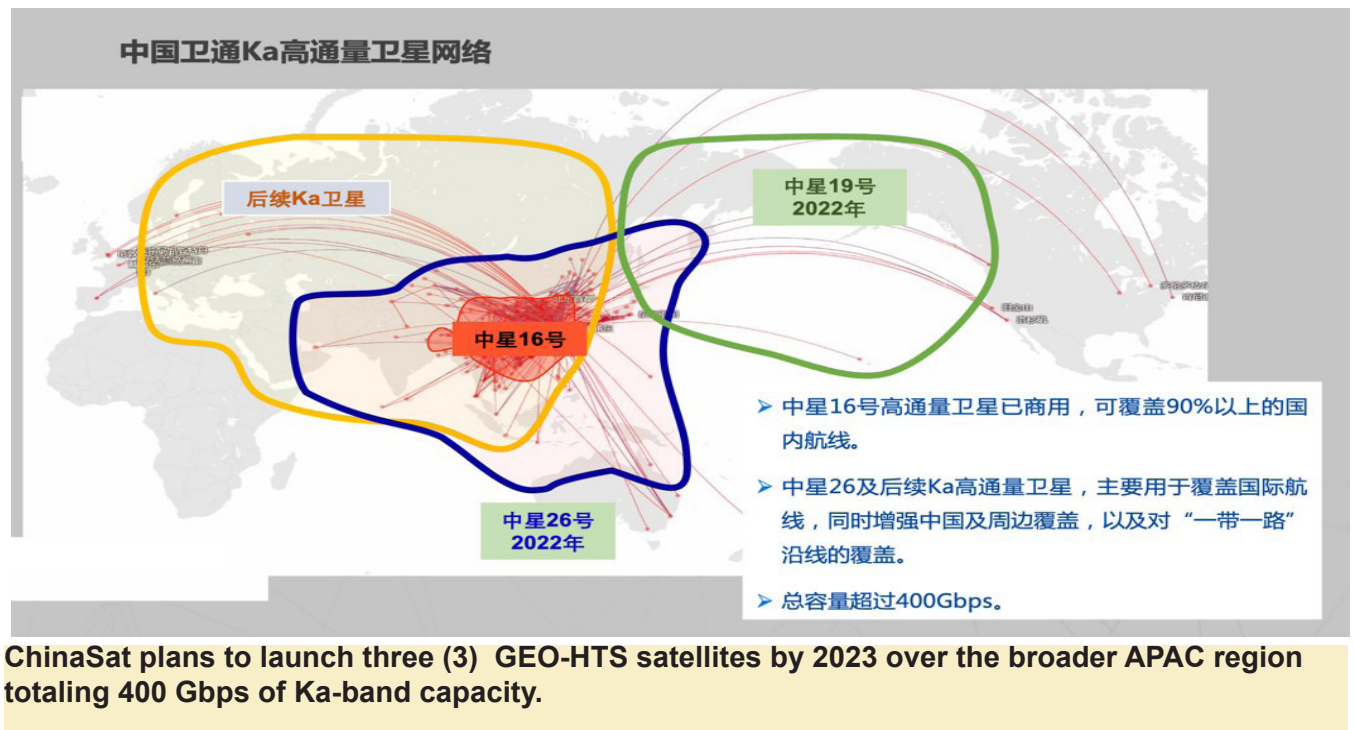
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of the Hong Kong-based APT Satellite. The satellite brought some dozens of Gbps of Ku-band capacity to the APAC region, with a focus on IFC and to some extent maritime. At an IFC conference in Shanghai in May of this year, we saw a representative of AeroNet, an IFC-focused subsidiary of China Satcom, present a coverage map of 3x GEO-HTS satellites to be launched by ChinaSat by 2023 over the broader APAC region totaling 400 Gbps of Ka-band capacity (slide below at right). On the supply side of the GEO satcom industry, the first half of the year also saw the launch of the 3rd Tiantong-1 satellite, which completes the GEO MSS constellation that aims to offer a sort of “Chinese version of Iridium-4”, which is to say a global narrowband MSS constellation. Overall, China saw quite a H1 2021 on the supply side of the GEO satcom industry.

Looking at the demand side, we also saw some significant updates. In the IFC vertical, China Satcom continued to grow its IFC-focused subsidiary, the aforementioned AeroNet. The company was created to commercialize ChinaSat-16 Ka-band HTS capacity, and future HTS capacity, in the IFC sector, with a management team that largely comes

from ChinaSat’s internal Ka-band R&D center. We also saw TDLink, a Chinese IFC service provider, sign an agreement that will extend the company cooperation with Qingdao Airlines, the first airline in China to do commercial IFC services (late 2020).

In the maritime sector, the first half of the year saw Shenzhen-based maritime service provider Sky and Sea World raise an undisclosed amount of funding from Mengsheng Electronics, a publicly-traded electronics manufacturer. Around the same time, Ningbo-based Ditel, another maritime satcom service provider, announced groundbreaking on their new headquarters, which will include a Ku-band gateway for utilizing Apstar-6D capacity. At the time, the company noted that their network will see a 10x increase in bandwidth, from 1 Gbps to 10 Gbps.

Land mobility also saw some interesting updates, with the Yangtze River Delta International Emergency Expo in May seeing new terminals announced by GeeSpace and SatPro. That being said, despite all the updates in the GEO satcom sector over the first half of 2021, LEO satcom saw arguably much more significant events

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taking place, partly in response to Starlink.

LEO Satcom: Hitting the Ground Running

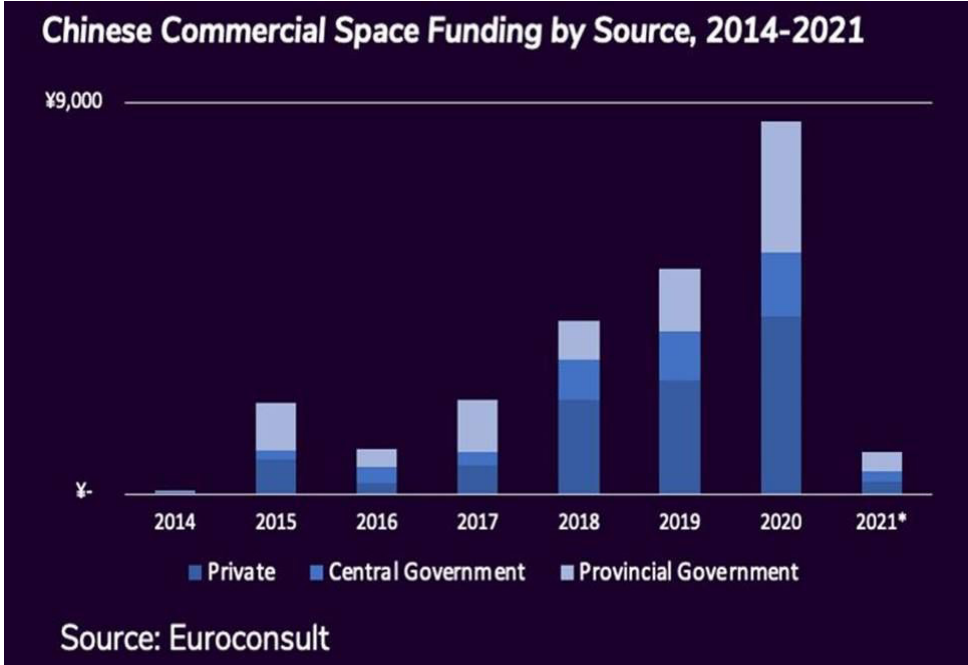
China’s LEO satcom industry did not really exist as recently as 10 years ago, in the sense that the country had a fair number of satellites in LEO, but almost all were either for scientific research, government missions, or other pretty turn-key projects. Ideas such as mass manufacturing of smallsats, or rockets that could send tens of tons to LEO, were in their infancy, or not in the picture at all. How that has changed in just the past 2 years, and with an acceleration in 2021.

A short review: in April 2020, the National Development and Reform Commission (NDRC), a high-level governmental body, added “satellite internet” to its list of “New Infrastructures”, a list of digital infrastructures that the government wants to prioritize for investment. In the months that followed, companies raised money for satellite factories, application development, and other parts of what will be a large and sprawling industrial base.

2021 has thus far seen the publication of China’s 14th Five-Year Plan, covering the period of 2021-2025, and the plan includes a global constellation

“...The satcom market in China has historically been pretty limited. Excellent terrestrial infrastructure, a monopolistic industry, and limited incentives to grow have contributed to this. More recently, this has begun to change, with the government supporting the sector, with a degree of opening up in the downstream part of the industry..”

of communications satellites. We have also seen the establishment of a “China SatNet” company, a company directly controlled by the State-Owned Assets Supervision and Administration Commission (SASAC), and which is tasked with operating China’s LEO broadband constellation, currently known as the GuoWang project. China SatNet will likely have significant autonomy over procurement, administration, and other decisions, as it finds itself at the same level of the state-owned enterprise hierarchy as space industry giants CASC and CASIC, as well as the three telcos.



Since the establishment of China SatNet, it’s leadership—primarily taken from a variety of SOEs including the aforementioned CASC and CASIC—has traveled to multiple cities to speak with local leaders about developing synergies between SatNet and their

existing industrial bases. Noteworthy, SatNet leadership signed an agreement with the city of Chongqing for co-development of a satellite industrial base. It is likely no coincidence that Chongqing is the focus city of Hongyan, the CASC LEO broadband constellation project that is likely to be rolled into GuoWang. By meeting with the Chongqing officials, SatNet leadership can better ascertain what they are working with in Chongqing in terms of industrial development, and likely discuss areas to collaborate.

Ultimately, a very powerful company with a clear mandate to centralize China's disparate LEO broadband constellation plans (no less than 6-7 have been talked about over the years), China SatNet represents a major step in the development of China's response to Starlink. Over the past 2 months, we have seen multiple prominent scholars and officials speaking to official media about the need for China to organize a fast and well-coordinated response to Starlink, and the idea that SatNet is that response. Most recently, this included Bian Yongzu, a researcher at the Center for International Security and Strategy of Tsinghua University, speaking about the need for a response to Starlink, and the role that the commercial sector can play in filling that need.

Conclusion

The satcom market in China has historically been pretty limited. Excellent terrestrial infrastructure, a monopolistic industry, and limited incentives to grow have contributed to this. More recently, this has begun to change, with the government support-



China launches "China SatNet." a company directly under the State-Owned Assets Supervision and Administration Commission (SASAC i.e. at the same level as the big 3 telcos, CASC, and CASIC), with the purpose of operating a LEO constellation. (image courtesy of CCTV)

ing the sector, with a degree of opening up in the downstream part of the industry, and, perhaps most importantly, with a lot of new capacity coming into the market. Moving forward, it's not entirely clear how all these variables will play out, but a likely outcome is that they will develop at China Speed. 🚀



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Blaine co-hosts the Dongfang Hour podcast on developments in the Chinese Aerospace market (www.dongfanghour.com).

Satellites and 5G

by **Bernardo Schneiderman**

Satellite communication will play a significant role in 5G and beyond as a complementary solution for ubiquitous coverage, broadcast/multicast provision, aeronautical & maritime communications, emergency/disaster recovery, and remote rural area coverage.

There are several use cases where standard terrestrial coverage is either not present or possible, making satellite systems uniquely positioned to provide a solution to bridge this gap. By 2020-2025 there will be more than 100 High Throughput Satellite (HTS) systems using Geostationary (GEO) orbits but also mega-constellations of Low Earth Orbit (LEO) satellites, delivering Terabit per second (Tbps) of capacity across the world.

New cost-effective system architectures as Starlink (SpaceX), LightSpeed (Telesat), OneWeb, O3B (SES) systems should be considered as a major impact in the 5G infrastructure. Beside these ones during the 1Q21 Lockheed Martin's space division announced a strategic interest agreement with satellite start-up Omnispace "to explore jointly developing 5G capability from space."

5G wireless technology promises to deliver performance upgrades across the entire telecommunications industry. The purpose of the 5G network is to deliver faster speed and sustain a highly concentrated number of devices. This new infrastructure will transform the entire telecom industry.

The current 5G implementation process is ongoing, but in its early stages. Major mobile carriers already are rolling out the 5G network, although there will be a gradual transition from the 4G LTE. With the early stages of implementation of 5G beginning in 2019 and 2020, there will be several opportunities for transformation over the next decade.

Another goal of 5G is to support the expansion of devices comprising the Internet of Things (IoT) more devices will be able to transmit data without causing performance issues.

Driverless cars and autonomous vehicles are a related technological category that stand to benefit from 5G, as the demand for an interconnected transportation system rises. Maintaining fast software downloads such as GPS mapping routes will be critical for a system of connected cars.

DriveNSR's report entitled "5G via satellite: Impacts, Demand and Revenue potential to 2029," forecasts deep 5G impact in the satellite ecosystem with close to 10 million active units by 2029. Beyond the obvious use cases, like Cellular Back-

haul and Trunking, a wide spectrum of applications will experience accelerated demand from 5G, including IoT, Private 5G for Corporate Networks, Mobility or even more conservative users like Gov/Mil.


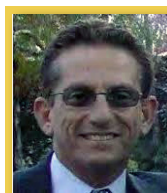
"While 5G use cases generate a lot of hype, one must not underestimate the transformative power of 5G in how satellite networks are designed," states Luc Palerm, NSR Senior Analyst and report author. "Incorporating and standardizing technologies like SDN/NFV or Cloud, 5G Network Management System will be at the core of how future satellite networks are built, offering the scale and flexibility to optimally operate future VHTS, constellations and software defined satellites under standardized service orchestration." 



Image courtesy of ESA



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To shed light on the market for 5G services via satellite, Satellite Executive Briefing (SEB) invited major companies to participate in a virtual roundtable. We received feedback from following executives: **Richard Swardh**, SVP, Premium Enterprise & Mobile Operators-**Comtech EF Data**; **Bhanu Durvasala**, VP International Division-**Hughes Network Systems**; **Jaume Sanpera Izoard**, CEO-**Sateliot**; Semir Hassanaly, Head of Cellular Backhaul and Trunking-**ST Engineering iDirect**; **Manik Vinnakota**, Director, Commercial and Product Development-**Telesat**; and **Kyle Griffin**, VP for space advanced program development, Lockheed Martin.

Follows are excerpts of the discussion:

Satellite Executive Briefing (SEB): Please provide a summary of products or services that you currently offer or are planning to provide for the 5G market.

Comtech EF Data: Comtech EF Data is a leading provider of innovative and optimized satellite communications solutions, and a subsidiary of Comtech Telecommunications Corp. We provide the highest performing satellite platforms and modems in the market that serve the needs of all generations of wireless technologies. Our link optimization solutions help provide a similar look and feel for end users connected to 5G over a long delay link as they would experience over a fiber or microwave connected base station.

Hughes: The 5G network is often called a “network of networks” because it is, effectively, a patchwork of various transport types enabling connectivity, and this includes, of course, satellite transport. In fact, satellite will be a critical element of 5G globally. There will always be places where terrestrial fiber/microwave backhaul is not available and where satellite provides the most cost-effective – if not the only – backhaul connectivity path. To support this application, the Hughes JUPITER™ System is already 5G ready utilizing non-standalone (NSA) mode, with functionality for Layer 2 transport support and

the ability to support 16,000 simultaneous TCP sessions per terminal. The JUPITER System currently supports what we believe is the largest Layer 2 implementation in the world – in Indonesia. The Hughes integrated 4G/LTE acceleration with NSA 5G implementations enables operators to enhance the user experience while also conserving bandwidth and is in use in places like India with Reliance Jio and Latin America with Telefonica

Sateliot: We are going to have a direct to sensor LEO constellation for 5G IoT (NB-IoT).

ST Engineering iDirect: The 5G standard promises to totally transform overall network capabilities. However, to successfully deploy the full potential of 5G, mobile network operators (MNOs) need satellite to supply connectivity hand in hand with the terrestrial network, in hard-to-reach areas, for mobile terminals, to offload network congestion, to enhance user experience i.e., by using multicasting, rerouting non-latency sensitive services and backhauling 5G traffic from remote areas, among other use cases. That’s why the satellite industry, including ST Engineering iDirect, is transforming the fabric of our network to better align with 5G standards, making it easier for MNOs to adopt and sell satellite services in the 5G future. In order to facilitate the integra-

tion of satellite into 5G networks, we have been involved with many initiatives and testbeds to prepare for the future.

Our 5G-enabled Intelligent Gateway (iGW) satellite ground infrastructure helped enable the successful integration of a commercially available 5G core network into a live satellite network – the aim of the SaT5G project. The integrated 5G Non-Terrestrial-Network (NTN), consisted of a remote terminal which connected over a live satellite to the 5G-enabled ST Engineering iDirect hub. The satellite connection continued to use the native satellite radio at the physical layer. The 5G-enabled Intelligent Hub gateway included physical network functions for terminating the native satellite connection, along with a satellite RAN and a standard and unmodified commercially available 5G core network, both of which were virtualized.

We have also been involved with proof-of-concept testing for 5G content distribution leveraging edge computing where video content distribution technology is designed to operate over a satellite network with 4G/5G and Multi-access Edge Computing (MEC) integration. The technology transforms multimedia streaming on mobile devices by leveraging efficiencies of a tightly integrated hybrid cellular and satellite network, enhancing user streaming experience and reduc-

ing network operation costs.

Our Mx-DMA return technology also fully addresses 5G use cases for very high throughput but also IoT/Machine to machine MTC and optimized latency. The technology abides to Self-Organizing Networks (SON) rules with automatic configuration, optimization, and diagnostic functionality.

We are ultimately working towards end-to-end service orchestration and seamless integration of satellite into the 5G telco infrastructure which will also enable edge computing. This will ensure a great user experience when accessing popular content at the edge thanks to content edge storage, but also reduce latency for applications which will be able to leverage this edge capability.

Telesat: Telesat is one of the largest and most successful global satellite operators and today serves the wireless backhaul needs of mobile network operators through our fleet of geostationary (GEO) satellites. While GEO can support a wide range of applications and is particularly well suited for distributing broadcast video, our telecom customers require very high throughput, Secure, low latency connectivity to meet their 5G network requirements.

For this reason, Telesat is building its next-generation Low Earth Orbit (LEO) network, Telesat Lightspeed, that is specifically engineered to deliver fiber-quality, high-speed, low latency broadband for enterprise and telecom customers. Telesat Lightspeed satellites are 35 times closer to Earth, which results in low-latency (<50 ms) everywhere on the planet.

Telesat has demonstrated the ability of serving 5G requirements with the world's first 5G backhaul demo over its LEO satellite, in partnership with the Vodafone Group and the University of Surrey's 5G Innovation Centre. Test results confirmed round-trip latency of 18-40 milliseconds and the ability to deliver throughput to meet the demand of live transmissions of 4K and 8K video, along with simultaneous encrypted video calls and web browsing.

Telesat Lightspeed is a non-GEO network that has international Ka-band priority spectrum rights. The Telesat Lightspeed network has over 15 Tbps of capacity and covers every point on Earth. It is the most technologically capable satellite communications network in history and exploits the latest advances in space-based data processing, laser communications, digital antenna technology and machine learning."

Lockheed Martin: Lockheed Martin is interested in two primary areas using the speed of today's 5G and building resilient, adaptable architectures in space for ubiquitous global communications.

First, we want military users operating in communications-contested and denied environments to have ready and reliable access to data so they can perform their missions anywhere in the world when terrestrial systems are unavailable or compromised.

Second, we are developing these military-grade capabilities in space that use commercially deployed 5G features like high-bandwidth, low latency and prioritized connections but secur-

ing them to reduce the possibility of detection or interception. This is the next step in resilient, global communications and networks that are expanded in both capability and access.

Ubiquitous global communications from space provides tremendous opportunity to deliver direct access and roaming to disconnected users. Based on the 3GPP standards, Non-Terrestrial Networks (NTN) can support voice over IP, text, IOT device data and government command and control solutions. These services can be quickly delivered worldwide, and user equipment as small as a smartphone can be used to close the links.

SM: Considering the expansion of 5G penetration globally, how are you planning to increase your market share in the short, medium and long term?

Comtech EF Data: 5G brings some very interesting innovations to market and will allow satellite to play a greater role in delivering connectivity either directly to user terminals using 5G waveforms from space or through traditional backhaul as frequently used today in 2G, 3G and 4G networks.

Comtech EF Data has been the market leader in high performance mobile backhaul for 2G/3G/4G for over 20 years. We will continue to build on that heritage and introduce additional products and features in our portfolio that meet the demands of our end users as they make the move to 5G. Initially we believe the market for 5G will develop for the higher end use cases like disaster recovery, emergency re-

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sponse and military. Over time, we believe it will also move to more mainstream use cases and also include communities and business that are today served with mobile backhaul by previous generations.

Hughes: High availability of the global 5G network demands that there be redundant connectivity paths employing alternate technologies. For example, when the primary terrestrial link fails – during natural or manmade disasters – satellite backup provides the necessary resiliency. What's more, the overall 5G architecture calls for hybrid solutions of terrestrial/satellite technologies to reach the full potential of universal connectivity no matter where on the planet. The JUPITER System already enables cellular backhaul at more than 12,000 sites globally, and we continue to work with mobile network operators worldwide to help expand their network reach with satellite backhaul. In Latin America, where we have satellite capacity, we offer a vertically integrated solution for MNOs to expand their networks using the JUPITER fleet of satellites and the JUPITER System ground capabilities.

At the same time that operators implement 5G services in urban and ex-urban areas, we expect that demand for cellular network service will reach further into sparsely populated and hard to reach communities. Considering that “a rising tide lifts all boats,” we are seeing more deployments in these rural areas of 2G, 3G and 4G/LTE networks. In fact, as operators deploy 5G towers in the densely populated areas, they are able to repurpose

the 2G, 3G and 4G/LTE towers in their networks, farther out from the network core.

Sateliot: 5G is expanding and all the operators are willing to extend their networks coverage. The MNOs have in this moment a huge pressure in having more coverage with less investments and this is exactly what we offer. Full coverage for their 5G IoT customers without any investment and with exactly the same equipment NB-IoT their customers are using today through a single roaming agreement.

ST Engineering iDirect: In the short term, we will focus upon leveraging our existing solutions to enable us to establish our place in the 5G ecosystem. We ensure that our modems are 5G enabled and that we are continuously adding new capabilities to our new modems to optimize 5G processing.

In the mid to long term, we will build upon and expand our already developed solutions for multiple market verticals such as maritime, aero, private networks, emergency services, land mobility, IoT further leveraging 5G architecture, cloudification and slicing functionality.

Telesat: Nearly half of the world's population lives outside urban areas where affordable and high-quality Internet to the home or 4G/5G mobile networks may not be widespread. A critical gap is the lack of cost-effective and quality backhaul connecting remote areas to the urban fiber backbone. Telesat Lightspeed will be truly transformative by offering such a solution.

Telesat Lightspeed will be certified to MEF standards for

easy plug-and-play integration with their mobile networks, allowing them to take advantage of ubiquitous, high capacity and low latency connectivity, without the complexities inherent in integrating traditional satellite-based solutions.

Lockheed Martin: The U.S. and allies need ubiquitous global communications, and 5G is one more tool in the tool box to provide services. Adding into this a commercial market, being supported by mobile network operators and user equipment manufacturers, the scale and scope of the market is tens of billions of dollars.

SEB: Are there any specific vertical markets that you are focusing on?

Comtech EF Data: Comtech EF Data is a market leader in high performance satellite communication across many markets. With our recent addition of UHP Networks, we are expanding our reach even further. Our solution set spans from delivering multi-Gbps links of trunking in support of mobile broadband to thousands of VSATs in support of Internet of Things (IoT). We also service mobility markets with large links over GEO/MEO to cruise ships to over ten thousand fishing and shipping vessels across our platforms.

Hughes: The Hughes JUPITER™ System is already the de facto ground network platform of choice, operating on more than 40 satellites worldwide. Across those implementations, Hughes technology supports both backhaul and mobility applications and we will continue to partner

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with customers to support those solutions. Another important vertical market for Hughes is the Community Wi-Fi opportunity which brings crucial connectivity to villages and towns outside the reach of terrestrial services. Hughes equipment supports more than 50,000 Community Wi-Fi hotspots around the world. Throughout Latin America, Hughes works together with Facebook Connectivity to deploy Hughes Express Wi-Fi hotspots which empower local shop-owners to sell their own Wi-Fi service, bringing much needed internet access to these communities and a new revenue opportunity for the storekeepers.

Sateliot: Massive IoT in a wholesale model for the mobile operators.

ST Engineering iDirect: There are many applications that we see that will benefit from 5G. Our focus includes IoT, backhaul, maritime, aero and land mobility, enterprise and broadband, broadcast and government and defense. There are also set to be other use cases, ones that we're not even aware of yet, that will emerge as we move forward into the 5G era.

At ST Engineering iDirect, we believe that satellite within the 5G network will be about more than just backhaul — 5G presents new use cases for satellite to break out of its niche, open new markets, and participate in a fully converged, end-to-end network.

Telesat: Telesat Lightspeed is the only NGSO network that was designed specifically for enterprise B2B/B2G customers. We believe that there is a massive market

for global broadband connectivity. Other LEO systems were designed primarily for consumer broadband, while Telesat intends to serve enterprise applications with the ability to deliver up to 7.5 Gbps to a single terminal, or over 20 Gbps to a single 'hotspot' like an airport hub, sea port or remote community.

Telesat Lightspeed will provide backhaul connectivity for ISPs, MNOs, aggregated IoT and private LTE or 5G networks serving enterprises, remote industrial or mining facilities. In addition, we will also serve the aviation, commercial maritime, cruise ship and energy connectivity markets, as well as enterprise, government and defense customers.

Lockheed Martin: We're focused on delivering secure 5G benefits to users directly, without ground station intermediaries. VOIP, IOT, secure backhaul and command and control applications can all be supported through our solutions for mobile, commercial, personal, marine and infrastructure services.

SEB: Considering the influx of Non-GEO constellations in the next few years, do you have any solutions to cover this market with hardware or services to complement 5G solutions with terrestrial 5G operators?

Comtech EF Data: Comtech Telecommunications family of companies are involved in many aspects of the NGSO markets. As a corporation, we can be a one-stop shop offering a full turnkey Ground Terminal and User Terminal solution for NGSO networks. Comtech Xicom Technology is a market leader in providing high

linearity, high power Q/V and Ka amplifiers for many new NGSO platforms. We can scale our manufacturing facilities to deliver thousands of amplifiers each year that may be needed for the large size LEO satellite networks being planned by some of the larger players in this market. Comtech AHA licenses intellectual property including FPGA cores and waveforms. Comtech EF Data provides hub infrastructure, as well as SCPC modems and similar to Comtech Xicom Technology, the Comtech EF Data company can manufacture modems at very high volumes and at competitive prices to support some of the larger NGSO constellations. Finally, Comtech Mission Critical Technologies provide tracking X/Y hub antennas for MEO and LEO constellations and also help with system integration and building teleports that are tying everything together.

Hughes: Hughes engineers and patents are at the center of satellite ground technology innovation — whether for GEO, MEO or LEO constellations. Hughes is an investor in and a technology provider to OneWeb, developing the gateway electronics and the core module that will be used in every user terminal for this LEO system. The Hughes JUPITER™ System was central to a recent multi-orbit demonstration of aeronautical connectivity with SES and Thinkom. And Hughes continues to innovate multi-transport solutions for terrestrial/satellite connectivity using the company's proprietary Active Technologies™ that enable real-time quality of service, additional virtual capacity, automatic traffic classification and

value to many of our customers. Very few companies in the industry have similar capabilities today. Another trend we see is from some of the larger and new LEO satellite entrants/operators that plan to compete with terrestrial networks to provide broadband internet services globally. They plan to roll out hundreds of satellite gateways and thousands of user terminals, so they offer a tremendous growth opportunity to suppliers that can meet their stringent requirements of high performance, high volume and low cost. Comtech Telecommunications and its subsidiary companies have been planning for this market for a few years and we are already engaged with several of these large LEO operators to offer the most advanced solutions at very competitive prices. We have also made significant investments in our factories to scale production capacity to meet the demands of these large LEO networks.

Hughes: There are multiple opportunities that we are seeing for satellites in the 5G ecosystem. These include the IoT sector, connecting billions of devices for applications including precision farming, smart mining, smart cities, fleet management, disaster monitoring, smart grid, telehealth, oil and gas, shipping, aviation and many more. We are also seeing trends for using satellite for offloading of terrestrial traffic during busy hours and/or providing network resiliency during disaster events. Another trend is the use of satellites to fill voids in connectivity as users move in and out of terrestrial coverage areas on airplanes, ships and vehicles.

Hughes is well positioned for the 5G transition with our next generation smart and flexible JUPITER™ ground system, which works with very high throughput and efficient satellites that are capable of providing service when and where it is needed for both fixed and mobile applications. Our ground networks incorporate virtualized gateways and software defined networking to allow operators to significantly improve deployment time for new applications as well as for network expansion, while bringing down both operational and capital costs.

Sateliot: IoT is exploding and the 5G Standard (NB-IoT) has the best competitive offer in cities (under mobile coverage) to extend this offer in non-urban areas through the mobile operators is the winning bet.


ST Engineering iDirect: ST Engineering iDirect is well positioned to provide MNOs with a platform that extends anywhere in the world; supports 2G, 3G and 4G/LTE backhaul scenarios; and will be forward compatible with 5G standards, ready to enable partners to take part in new use cases and opening up new opportunities arising from 5G.

To explain further, in terms of 5G to premises, satellite will complement terrestrial networks such as broadband connectivity to a home or office in underserved areas or to enterprise sites as a backup. For 5G fixed backhaul, satellite will bring broadband connectivity where it is difficult to deploy terrestrial connections (e.g., in rural and remote areas or across a wide geographic region). From the perspective of mobili-

ty, satellite will bring broadband connectivity to remotes or user equipment (UEs) on the move such as airplanes, trains, vehicles, and maritime vessels.

Telesat: We designed our LEO network to enable MNOs to expand the reach of their 5G services to rural and remote populations. But in order to serve this market, telecom operators need large amounts of bandwidth at low costs. In addition, they want to know their satellite operator is their partner and not competing against them in other offerings like broadband connectivity to homes and businesses.

Telesat is ideally positioned to meet the capacity and performance requirements at disruptive economics with Telesat Lightspeed. As a B2B-focused operator, we will not compete against our customers to provide consumer services.

Lockheed Martin: Mesh networking is important for our Department of Defense customers who prioritize a JADO-centric future, and we're actively experimenting with that through our Pony Express nanosatellites. SmartSat™ with software-defined platforms also shape that future state. All this is bolstered with our experience in secure, faster data networks from space, as evidenced by our work with LTE over satellite, which is patented by Lockheed Martin and currently fielded. In the near future, these sorts of systems will be able to be upgraded in orbit not just with remote software upgrades but with hardware upgrades, and we're testing common architecture for that now. 

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Rain Quake for antennas ranging in size from 0.65 meter up to 6.5 meters. Available in heated or passive solutions, when considering budget and operating budget no other method of antenna de-icing compares in cost and efficiency.

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

“I Think You Are On Mute”

by **Lou Zacharilla**

If they asked me to write my personal history of the Pandemic the title would be, “You’re On Mute.”

While technology for sure allowed us to continue to do our work online, it is fact, as John Updike wrote, that “for every piece of candy there is a toothache somewhere.”

The era of Zoom, WebEx, TEAMS, Skype, Face Time have also given us a new type of burnout.

A year or more of well-educated, driven and ambitious human beings sheltered like hermits in their fine homes, restrained from normal social activities by a disease no naked eye can see and no physician could until recently keep in check, has taken a toll on our durable but frail species. Psychologist Lisa Wolf recently wrote, “Early findings show that symptoms of anxiety and depression as a result of COVID-19 are present in up to 41.5% of the USA’s population. To quote myself, and not Ms Wolf, we have been through some pretty shitty times.

Now to the candy part.

There has been, as the law of physics dictate, a reaction. There are inevitably unintended consequences from even awful events, including during a time of plague. The most appealing were the days during the Lockdown when Nature showed her resilience. Suddenly, our air was clean. I recall vividly a walk to the East River as my first moment of surprise. Looking at the sky over New York City and its deserted roadways I saw a clear, primal blue. A clean blue. So THIS is what clean air looks like!

We read famously of fish (including dolphins) showing up in the Grand Canal of Venice, perhaps for leftover pasta with anchovies. Haggard but eter-

nally beautiful Venice seemed revived while its tourists, who usually flock like chum to hit on its stone flesh, were home watching Chappelle on Netflix.

We could breathe again even as, ironically, a virus was spreading through our pulmonary passages. “It felt like I had crushed glass in my lungs every time I coughed,” said a friend from Rochester who had it early on.

The planet was evidently feeling the same way.

As a result, plans and ideas for monitoring climate change were pushed upstream. A new report by the Oceana organization noted that wealthy nations subsidizing large-scale fishing fleets are transferring overfishing risks to other nations. It recommended something called the Transparent Oceans Initiative (TOI). <https://www.instagram.com/p/CQwWoXJFjyd/>

The TOI documents the activities of nations engaged in fishing on the high seas and the distant waters of other countries. It attempts to find a way to restrict or eliminate harmful fishery subsidies.

That is one step toward restoring the balance. Other

actions, like monitoring methane gas emissions are the low-hanging fruit for reversing global warming, according to Dr. Steve Hamburg, Chief Scientist of the Environmental Defense Fund. He noted how this will work in his “Better Satellite World” Podcast where he describes the MethaneSat initiative. <https://www.sspi.org/articles/better-satellite-world-podcast-risk-a-conversation-with-environmental-defense-funds-dr-steve-hamburg>

Many policy-makers are now asking, “How do we monitor compliance with environmental or climate change treaties, rules or legal endeavors?”

The answer is as simple as watching a swan pad-



dle along a Venetian Canal. Satellites and satellite services companies.

If you have been paying attention, you will note that dozens of companies in our industry offer service and data analytics services related to climate change and ESG. Companies like Bluefield Technologies, SatSure and Planet. Dr. Hamburg's MethaneSat is one example of a well-planned business model and program. It locates and measures methane emissions from oil and gas operations with precision and at a scale never achieved. This provides real data for making decisions about climate change. In the Podcast he talks about what they accomplished in the State of Florida, where the impact of climate change is quite devastating.

We were never trying to be slick or presumptuous when we claimed that satellites make a "Better Satellite World." We were on mute as an industry for a long time about what we were doing since the days when NASA satellites discovered the hole in the Ozone Layer. Now, the commercial side is breaking out. What we need to watch for are

the unintended consequences of our effort. Whether it is orbital debris (national hubris by any other name), spectrum interference or a lack of attention to seizing opportunities in new markets – each can become the toothache if we forget to remember what it was like that day when the blue sky was blue again.



The Better Satellite World Podcast airs every Monday. You can download it on Spotify, Apple Podcasts and at www.sspi.org. An upcoming series on Satellites and Climate Change is available for sponsorship.



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

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The Road to National Harbor

by **Martin Jarrold**

The latest webinar in the GVF-SEG series posed a very important question – Antenna Innovations: Keeping Up with the Rest of the Industry? It is based on a very important premise – that the transformation of the commercial exploitation of space and rapid progression from “Space 2.0” to “Space 3.0” (exemplified in such innovations as re-usable and 3-D printed launchers, assembly line satellite manufacturing, terabit-per-second satellite networks) can only be fully realized if comparable innovations occur with antennas.

Antenna innovations in performance, cost, and operation may perhaps be less attention-grabbing than the sight of launch vehicle stages softly landing after yet further successful orbiting of multiple satellites, but are no less transformative. Electronically Steered Antennas (ESAs) are just one example of the increased capacity, and even greater future potential, of the satellite terminal to provide more, better, and increasingly vital communications links.

In the webinar discussion, moderated by Jeremy Rose of COMSYS and featuring panelists representing some of the leading voices in the antenna world – Kymeta, INSTER, AvL Technologies, and ANYWAVES – the

objective was to inform a global audience as to whether, or not, the antenna industry is keeping pace with other segments of the satellite communications industry.

Discussion began with a request made to one of the panelists to explain the notion of the “disadvantaged antenna”, seemingly a rather novel term – related to the challenges of the technological drive towards small ESAs – requiring significant clarification. That clarification was fascinating, prompting an energized following dialog which additionally included something of an exposition as to why the ‘world’ of the parabolic antenna is so different to the ‘world’ of the ESA.

Later questions covered differences in the performance and price requirements of high-end ESAs versus those of consumer units; requirements for antennas communicating with NGSO satellite constellations; panelists’ perspectives on the headline-grabbing Starlink antenna; and, what the panelists would like to request of satellite operators to help with more effective and efficient antenna certification processes. This was an illuminating dialog, so take some time if you can and visit the GVF web page <https://gvf.org/webinar/antenna-innovations-keeping-up->



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[with-the-rest-of-the-industry/](#) and watch the video.

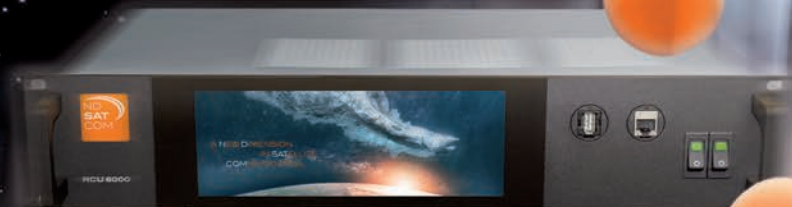
The various technologies being developed in the ‘world’ of ESAs are indeed a feature of, and vital contributory driver of, “Space 3.0”, or the NewSpace revolution. While the ongoing development of those technologies is a principal foundation on which the future of satcoms is principally dependent, those technologies remain expensive to engineer, making current unit cost of manufacture too high to secure mass market interest and penetration. Of course, the market for ESA technology is not entirely closed as some companies are selling actual product, albeit on a limited scale. Whilst this situation should change as more of the numerous actual and projected NGSO constellations are orbited, reductions in unit prices will not change the fact that ESAs are highly complex high-tech devices.

While there is not a single ESA technology (and different manufacturers make great claims for their own ‘state-of-the-art’ technology), all ESAs – in order to ensure precise satellite pointing in

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Henri Lefebvre

the most demanding of circumstances where the antenna/ESIM platform is moving and the target satellite is also moving in its LEO or MEO orbit and the target satellite must continually change as one spacecraft hands-off to another – have to be able to make thousands of tiny, individually tuned elements work together as one, unified antenna. This process must operate for long periods of time, covering extreme temperature ranges, with power to actively control high-demand phase shifter components and amplifiers. However, having noted this broad definition, other technological approaches to how satellites are tracked, how the beam is pointed, and how quickly the beam can be moved to another satellite are available!

The NewSpace revolution is

a multi-faceted one and can be analyzed from any one, or combination, of several angles. At SATELLITE 2021 (<https://gvf.org/event/satellite-2021/>), taking place over 7-10 September at the Gaylord National Convention Center, National Harbor, Maryland, GVF will be hosting various panel discussions, one of which, Reducing Ground Infrastructure Costs in the New Space Supply-Chain, will address how NewSpace is challenging established business models whilst creating new supply chains and allowing entrepreneurs to provide services from space in a more affordable way than before. However, required investments in ground systems and infrastructure remain the biggest roadblock in the NewSpace supply chain. So this discussion will tackle such questions as: “Could ground in-

frastructure be replaced by an integrated service?” This session will explore the scope of such a service, the benefits it could deliver to customers, investors, and the supply chain, by reducing required investments in time, money, and training.

In moving towards a ‘world’ of ESAs,

we won’t be leaving behind the ‘world’ of the parabolic antenna, at least, in my view, not for some time, and initiatives to make the current parabolic ‘world’ more efficient and cost-effective are still an important contribution to commercial space. Indeed, some of these initiatives may be considered themselves to be both a part of NewSpace, and additionally to have a contributory role in the beyond-parabolic future.

Referencing the aforementioned point made by the panelists during Antenna Innovations: Keeping Up with the Rest of the Industry? that they would like to request of satellite operators moves to help facilitate smoother and faster antenna certification processes, there is, of course, SOMAP – the Satellite Operator Minimum Antenna Performance

specifications – an initiative that was previously undertaken to improve the Quality of Service (QoS) worldwide for the industry and to minimize satellite interference, and which exist alongside the GVF’s Mutual Recognition Arrangement (MRA) terminal type-approvals procedures.

The GVF MRA Working Group (GVF MRA-WG) has developed a consensus-based framework to improve the efficiency of satellite operators’ terminals type-approval procedures. Using this framework, once a type-approval is provided to an antenna manufacturer by any one of the participating satellite operators, other operators may mutually recognize the results of the tests conducted during the first operator’s type-approval process, so that tests are not repeated unnecessarily. To achieve this objective, the MRA-WG created a procedure which defines a set of standard tests that an antenna or earth station manufacturer should perform in order to apply for type approval from any satellite operator. Use of this procedure not only improves the quality and completeness of test data but helps reduce the time and cost required to bring new ground-segment technology to the market.

The GVF MRA-WG works closely with the SOMAP group – AsiaSat, Eutelsat, Inmarsat, Intelsat, and SES – collaborating to produce updated guidance to antenna manufacturers regarding the satellite operators’ expecta-


“...The NewSpace revolution is a multi-faceted one and can be analyzed from any one, or combination, of several angles. ...”

tions for new antenna products and how to demonstrate compliance with the SOMAP specifications.

GVF, through the MRA-WG (and also with the SOMAP group), has over the years worked closely with the European Space Agency (ESA) under the ARTES – Advanced Research in Telecommunications Systems – program on a number of antenna-related projects. The most recent of these applied the MRA terminal type-approval procedures to the context of a novel approach to conducting on-site antenna verification – using Unmanned Aerial Systems (UAS) or drones, a technology developed by QuadSAT, a GVF member based out of Denmark.

GVF successfully supported QuadSAT on the delivery on a joint project ARTES contract – Unmanned Aerial System for Antenna Performance Evaluation (UAS-APE) – to develop and validate the technology which has been acknowledged by the satellite operators as a valuable alter-

native to traditional methods of testing. Use of a transportable airborne platform avoids the need to ship the test antenna to a remote location such as an outdoor far-field antenna range compact range/near-field test facility. The SOMAP requirements were used to compare performance data acquired by drone measurements with comparable test data acquired from a traditional far field outdoor test range.

Future columns here will keep the industry fully up-to-speed as to how the delivery to market of this technology progresses. Until then, wherever you are whilst 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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Satellogic to Go Public Through Merger with Cantor Fitzgerald's CF Acquisition Corp. V

New York City, NY, July 6, 2021--Satellogic, a provider of high-resolution satellite data collection, and CF Acquisition Corp. V (Nasdaq: CFV) ("CFAC V"), a special purpose acquisition company sponsored by Cantor Fitzgerald, announced today that they have entered into a definitive merger agreement that will result in Satellogic becoming a publicly traded company.

The transaction is expected to be completed early in the fourth quarter of 2021, subject to regulatory approvals and other customary closing conditions. After closing, Satellogic will trade on the Nasdaq under ticker symbol SATL.

On July 5, 2021, Satellogic entered into a definitive merger agreement with CFAC V. The transaction reflects an implied pro forma enterprise value of US\$ 850 million for

Satellogic, representing a multiple of approximately 1.1x projected revenue of approximately US\$ 800 million by 2025.

The transaction is expected to result in cash on the balance sheet of up to approximately US\$ 274 million, after transaction expenses and debt repayment, through the contribution of up to US\$ 250 million of cash held in CFAC V's trust account (assuming no redemptions by CFAC V's public stockholders), and a concurrent PIPE offering of US\$ 100 million led by SoftBank's SBLA Advisers Corp. and Cantor Fitzgerald, among other top-tier institutional investors.

The transaction, which has been unanimously approved by the Boards



of Directors of Satellogic and CFAC V, is subject to approval by CFAC V's stockholders and other customary closing conditions.

J.P. Morgan is serving as exclusive financial advisor to Satellogic, with Friedman Kaplan Seiler & Adelman LLP and Greenberg Traurig LLP serving as legal counsel to the Company. Cantor Fitzgerald & Co. is serving as financial advisor and capital markets advisor to CFAC V as well as placement agent on the PIPE, with Hughes Hubbard & Reed LLP serving as legal counsel to CFAC V.

Xenesis Acquires Minority Interest in Assured SpaceAccess Tech

Chicago, IL, June 15, 2021--Xenesis, Inc., an innovator in the free space optical communications (FSO) technology sector acquired a minority stake in Space Micro Inc. Through this agreement, Space Micro will become the exclusive manufacturer for componentry used in the Xenesis product line (including Xen-Hubs and Xen-Nodes) and Space Micro will also include the Xenesis devices in its product catalog and website.

While the devices can be integrated into many other satellite designs, a number of the units have been earmarked for the Xenesis Intercessor constellation due to be launched in 2023. The strength of both these companies joining forces goes far beyond vertical integration as each brings unique value to the table that will only set to enhance the common goal of building the first all optical (FSO) global mesh network.

Mark LaPenna, CEO of Xenesis, stated he "is elated at this opportunity to join forces with Space Micro as they have some of the most advanced LCT's on the market to-

day." "Partnering with Space Micro will help us to build our constellation design and generate revenues only utilizing less than 50 satellites while maintaining the ability to cover the majority of the earth's population, including many areas like parts of Asia and Africa which have never had access to a connected world. Take our two companies, Xenesis and Space Micro, and together you now have one of the most advanced backhaul networks ever launched."

David R. Czajkowski, CEO of Space Micro added, "The unique and transformative Xenesis business model will aid in enabling rapid growth in the emerging space optical marketplace. This teaming of a telecom company, Xenesis, and a space optical communications hardware company, Space Micro, will benefit both commercial and governmental users. We are very pleased to have been selected by Xenesis as their exclusive manufacturer of lasercom terminals, and to support our joint demo mission called Intercessor."

Iridium Names Greg Pelton As New CTO

McLean, VA., June 14, 2021 – Iridium Communications Inc. (NASDAQ: IRDM) announced that Greg Pelton will join the company as Chief Technical Officer (CTO), effective



Greg Pelton

June 17, 2021. Reporting to Iridium Chief Operations Officer Suzi McBride, Pelton is taking

over for retiring CTO Hermon Pon and will lead Iridium's world-class technology and system engineering teams both internally and with Iridium's vast partner ecosystem.

Pelton joins Iridium from Pryon, an AI company focused on augmented intelligence for the enterprise, where he served as Chief Product Officer. In this role he was responsible for all aspects of the company's augmented intelligence product portfolio, leading the engineering team and product development efforts. Prior to this, Pelton was Vice President of Collaboration and Devices at Avaya, where he managed a portfolio of voice and video endpoints, soft clients and collaboration services. Before Avaya, he served as CTO and Vice President for Infrastructure Engineering at Polycom and led Cisco's corporate Technology Center where he worked on the Internet Routing in Space (IRIS) program consisting of developing a router for use in satellites and transitioning of satellite ground networks to multiservice IP networks.

As Chief Technical Officer of Iridium, Pelton will drive innovation

and oversee the technical aspects of Iridium's products and services, while managing the day-to-day activities of the company's award-winning technology development and engineering team. This includes technical roadmaps and strategy, system architecture and design, engineering design and process, performance and analysis, and system integration, verification and validation.

"I'm beyond excited to be joining a company and a team with such a storied history of innovation," said Pelton. "Iridium built and operates the first truly global communications network and that feat has yet to be matched by anyone. Our industry is at an inflection point where dramatic changes in workforce distribution and widespread adoption of IoT technology will drive demand for the kinds of services that only Iridium can offer. It's an opportunity you don't want to miss."

A holder of 39 patents, Pelton has a history of innovation and has worked extensively in the telecommunications and networking industries, as well as serving on management and advisory boards across a range of innovative technology startups.

Aaron Herps Appointed GM of AVIA's Coalition Against Piracy

Hong Kong, June 14, 2021 – The Asia Video Industry Association (AVIA) has appointed Aaron Herps as the General Manager of its Coalition Against Piracy (CAP), following the departure of Neil Gane, who leaves AVIA to take up a position with the Alliance for Creativity and Entertainment.

Herps joined AVIA in 2019 as the Operations Manager for CAP,



Aaron Herps

working alongside Gane on all CAP initiatives from government outreach to criminal investigations and associated enforcement actions against syndicates and streaming website operators in Southeast Asia, Hong Kong and Taiwan.

In his role as General Manager of CAP, Herps will build on the strong legacy that he and Gane have built, maintaining the coalitions and alliances across the industry which have made CAP so effective and continuing to provide expert technical and forensic analysis of the shifting state of the piracy ecosystem to members and government officials.

"Aaron has been instrumental to the success of CAP over the last two years so it gives me great pleasure to see him now taking over the role of General Manager," said Louis Boswell, CEO, AVIA.

Herps has over 15 years of content protection experience in the sports and entertainment industries across Asia Pacific. Prior to joining AVIA, Herps was Manager of Digital Content Protection for Asia Pacific at beIN Media Group and was the Senior Manager of Global Content Protection at the Motion Picture Association of America for more than a decade..



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24,700 Satellites to be Ordered and Launched by 2030

NSR's latest report, Global Satellite Manufacturing and Launch Markets, 11th Edition, sees post-pandemic rebound driven by constellations, innovative technologies, and new services offerings. Over the next 10 years, satellite manufacturing and launch order volumes reach nearly 24,700. Upcoming deadlines for international regulatory filings, strong investments from public and private investors, and the associated capacity influx by Non-GEO HTS will drive significant orders and launches through 2030.

"With several ambitious and well-funded programs aiming to meet international deadlines under immense financial pressures, constellations will drive satellite manufacturing and launch volumes," states NSR Principal Analyst and report lead author, Dallas Kasaboski. "While larger GEO satellites take on more complexity via software-defined and multi-mission payloads, other applications, like In-Orbit Servicing (IoS), Space Situational Awareness (SSA) and IoT drive additional market growth."

"The demand for new types of spacecraft and services in-orbit is increasing," adds NSR Analyst and co-author Hussain Bokhari. "The drive for SSA continues, focusing on protection of assets via more satellites for Gov/


Mil customers. Meanwhile, research and development satellites will help smaller players enter the market."

Commercialization of crew and cargo flights also see a positive market outlook. Regardless of the forthcoming ISS decommissioning, Crew & Cargo missions dominate the Launch Market, generating the most revenue over the next decade, with private operators increasingly in the foreground.

As governments and private companies pick up pace, the Beyond Earth and Deep Space Exploration markets will be greenfield opportunities. Upcoming deadlines for international regulatory filings, strong investments from private investors, and the associated capacity influx by Non-GEO HTS will drive significant levels of orders and launches through 2030.

NSR's Global Satellite Manufacturing and Launch Markets, 11th Edition report (GSMLM11) offers the most comprehensive analysis available of the manufacturing and launch market in the next decade across 5 regions, 7 applications and 5 mass ranges. The report takes a

deep dive into where sector demand is leading in terms of complexity, launch requirements, and operations. The report provides decision makers business-critical metrics into the traditional and NewSpace markets – their interactions, impacts, developments, and trends through to 2030.

For additional information on this report, including a full table of contents, list of exhibits and executive summary, please visit www.nsr.com or call NSR at +1-617-674-7743. 



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The Satellite Markets 20 Index™

Company Name	Symbol	Price July 12			Price Change	
			52-wk Range		Last Month	From Jan 15
Satellite Operators						
Thaicom Public Company Limited	THCOM.BK	11.30	4.20	14.10	-7%	23%
Eutelsat Communications S.A.	ETL.PA	10.05	8.04	11.01	-2%	7%
APT Satellite Holdings Limited	1045.HK	2.34	1.70	2.95	-10%	11%
Echostar	SATS	23.44	19.75	32.42	-16%	-5%
SES S.A.	SES.F	6.65	5.54	8.55	2%	-13%
Satellite Manufacturers						
The Boeing Company	BA	230.59	141.58	278.57	-8%	8%
Maxar Technologies	MAXR	35.29	14.95	58.75	5%	-29%
Lockheed Martin Corporation	LMT	378.43	319.81	402.38	-2%	7%
OHB SE	OHB.DE	38.95	33.15	49.85	9%	-12%
Honeywell International Inc.	HON	224.19	142.29	234.02	-2%	8%
Equipment Manufacturers						
C-Com Satellite Systems Inc.	CML.V	2.66	2.30	4.48	-16%	-1%
Comtech Telecommunications Corp.	CMTL	24.06	12.96	30.40	-3%	8%
KVH Industries Inc.	KVHI	12.46	7.42	15.29	-13%	3%
ViaSat Inc.	VSAT	49.61	29.82	61.35	-8%	36%
Gilat Satellite Networks Ltd.	GILT	10.13	4.80	22.69	-2%	38%
Service Providers						
DISH Network Corporation	DISH	40.48	24.51	47.05	-10%	24%
Globalstar Inc.	GSAT	1.71	0.29	2.98	43%	92%
Orbcomm Inc.	ORBC	11.16	3.32	11.55	0%	32%
Sirius XM Holdings Inc.	SIRI	6.47	4.95	8.14	1%	11%
Trimble Inc.	RNET	80.94	43.59	84.87	4%	16%

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 July 12, 2021	Percentage Change last month	Percentage Change since Jan 15 2021
Satellite Markets 20 Index™	3,014.27	4%	21%
S & P 500	4,373.39	4%	15%

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African Space Industry Revenues to Surpass US\$10.24 billion by 2024

Lagos, Nigeria, July 14, 2021-

A new report from Space in Africa projects that the African space industry revenues will surpass US\$ 10.24 billion by 2024 despite setbacks from the COVID-19 pandemic. Highlights of the report includes:

- Africa's space budget for 2021 is USD 548.6 million, a 9% increase from 2020 and a 94% increase from the 2018 budget.
- 114 new satellites are currently under development by 20 countries, expected to be launched between now and 2025.
- Ten countries are now working on developing their first satellite, hoping to join the current list of 14 countries that have put a satellite in space.
- New opportunities in the launch segment have opened as foreign partners are beginning to capitalise on existing African launch sites; the East and the Horn of Africa are the leading destinations.
- Space technologies continue to be instrumental to Africa's development, with an increasing number of space application projects being implemented across the continent.

As the leading analytics and consulting company focusing on the African space and satellite industry, Space in Africa has released the African Space Industry Annual Report, 2021 Edition. The report was built on the two previous editions to analyse space activities across the continent, industry dynamics, and trends, opportunities for government and commercial players, as well as the regulatory framework.

Increasing government budget

The African space industry has maintained positive growth despite the ongoing Covid-19 pandemic. From a budget of USD 283.12 million in 2018, government space budgets in Africa rose to USD 325.11 million in 2019 and USD 503.12 million in 2020, contributing 0.7% to global space budgets in 2020, the fourth highest region after North America, Europe, and Asia. In 2021, African countries budgeted USD 548.6 million for the space program, a 9% increase from the 2020 budget.

New Players on the Block

African governments have increasingly become aware of the potential and opportunities underlying the space sector, which is evident by the growing number of African countries developing national space programs. For example, Botswana launched a space program in December 2020, the Rwandan legislature approved the law establishing Rwanda Space Agency in March 2021, Namibia launched a National Space Science and Technology Policy in June 2021, and Burkina Faso, Djibouti, and Zambia are now developing new satellites that will launch their National space program.

Space for sustainable development


Through Agenda 2063: The Africa We Want, the African Union has identified space technologies as a critical tool that can boost Africa's economic growth and development and lead to the rapid transformation of the continent. 81 space application projects are currently being implemented across the continent funded

July-August 2021

by African and foreign institutions. These projects are capitalising on earth observation resources and satellite communications to address various socio-economic problems across the continent, from disaster monitoring to security, agriculture, land use and management, forest management, among others.

Growing satellite market

Tunisia launched Challenge-One in March 2021, while Mauritius launched MIRSAT-1 in June 2021. These two satellites bring the number of African satellites launched to date to 44. At the same time, 125 satellites are now under development across 23 African countries, all expected to be launched before 2025. New opportunities have emerged around satellite constellations on the continent, with Egypt, South Africa, and Tunisia leading various initiatives. While Africa is currently unable to launch satellites from the continent, new opportunities are now emerging for foreign players to capitalise on several launch sites available on the continent. The industry made revenue of USD 7.37 billion in 2019 and is expected to generate over USD 10.24 billion in revenue by 2024, with growth across earth observation and geospatial services, satellite communications services, satellite navigations services, and component manufacturing and equipment services.

Visit www.spaceinafrica.com/reports to access the report. 

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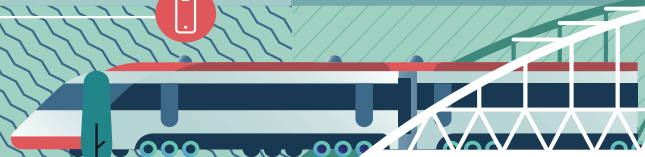
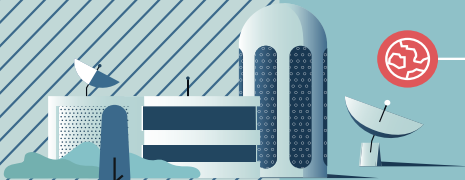
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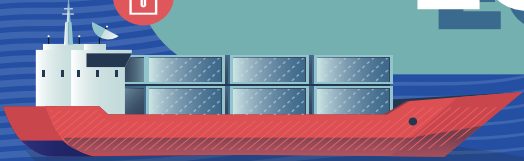
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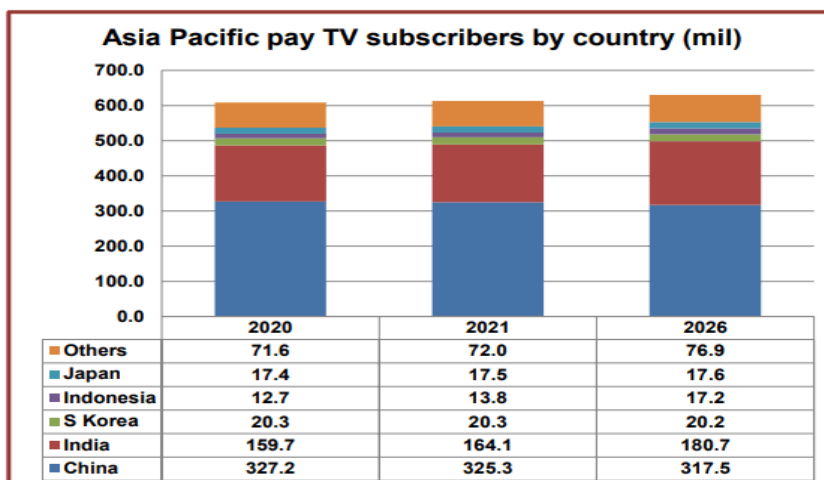


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VITAL STATS



Source: Digital TV Research Ltd

Asia Pacific will have 630 million pay TV subscribers by 2026, up from 609 million at end-2020. India will add 21 million. China and India together will have nearly 500 million subs. The number of TV households will grow by 54 million to 979 million according to Digital TV Research.

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