

# Satellite Executive BRIEFING

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Industry Trends, News Analysis, Market Intelligence and Opportunities

## Industry Trends to Watch 2022

by Virgil Labrador

We begin 2022 entering the 25th month of the glob-

al COVID-19 pandemic, with yet a new variant of the virus wreaking havoc on recovery plans worldwide. I can only describe the times we live in as Charles Dickens did

in a "Tale of Two Cities" that "these are the best of times and these are the worst of times." And yet there is a lot to be optimistic about 2022 and beyond. Just to provide some perspective, the number of satellites launched in 2020 and 2021 during the pandemic is almost equal to all the satellites launched in the previous three decades.

In this issue we look at the key developing trends in the satellite industry going forward.

### The Impact of the COVID-19 Pandemic will Linger for Some Time

Despite the current omicron surge, which is showing signs of decline, the indicators are quite good that the pandemic is headed towards

being endemic this year. This does not mean it will be going away, but

will stay, albeit in a more manageable form, like the seasonal flu. The impact, however, of the global pandemic will be felt for a longer time, perhaps up

to two more years.

The pandemic has disrupted supply chains and changed fundamentally how we live and do business and those effects will be here for some time. Some of the changes have actually been beneficial for the satellite and telecommunications industries. For example, the increased popularity of remote work and doing business virtually will drive bandwidth demands. Other effects can be detrimental to the economic recovery such as shortages of essential goods and materials due to supply chain disruptions. We will all have to live with these changes for a while and be prepared for the next pandemic. If we learned our lessons well from this pandemic and instituted

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## Off to a Good Start



I've always maintained that trade shows, which has been around since the Middle Ages, are a good bellwether of how the economy or an industry is going. Exhibitions and conferences have been hard hit by the pandemic with many being canceled or resorting to virtual event that let face it, does not have the cachet of a live event. If trade shows are good indicator, then 2022 is off to a great start with the Consumer Electronics Show (CES) starting off a few days after the new year as a live event. It wasn't as big or as well-attended as it was before the pandemic but it still managed to generate the usual buzz.

Always looking into the future, a new addition to the CES show this year is a SpaceTech section where they highlight innovative technologies for space applications and the future of space tourism. Putting space technology on display at CES is indicative of the popularity and great public interest in space generated by the recent high profile forays by civilians in sub-orbital space.



**Sierra Space's Large Integrated Flexible Environment (LIFE) habitat, an inflatable house for moon colonization on display at CES 2022.**

Speaking of live events, we have in this issue a report on the World Satellite Business Week held in Paris last month. This year, the major satellite shows are on track to be held as live events as per their usual schedule starting with the Satellite show

in Washington, D.C. in March. Let's hope it stays that way and we look forward to seeing you at one of the shows.

*Virgil Labrador*



**Virgil Labrador**

Editor-in-Chief

virgil@satellitemarkets.com

**Peter I. Galace,  
Elisabeth Tweedie**  
Associate Editors

Contributing Editors:

North America:

**Robert Bell,  
Bruce Elbert, Dan Freyer,  
Lou Zacharilla**

Latin America:

**Bernardo Schneiderman**

Europe:

**Martin Jarrold (London)  
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Bruce Elbert, President  
Application Technology Strategy, L.L.C.

Office: +1 512 9430454  
Mobile: +1 310 9181728  
Fax: +1 512 9430455  
Web: www.applicationstrategy.com  
E-mail: bruce@applicationstrategy.com

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1418 South Azusa Ave.  
Suite # 4174  
West Covina CA 91791 USA  
Phone: +1-626-931-6395  
Fax +1-425-969-2654  
E-mail:  
info@satellitemarkets.com  
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## Trends to Watch...

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measures that will prepare us for the inevitable coming pandemics, we should be in good stead.

### Increased Investment in Space-related Ventures

2021 was a record year for investment capital flows in space-related ventures and companies. Consulting firm Space Capital estimates that in 2021 aerospace companies raised some US\$ 39 Billion. 2021 also saw mergers of satellite companies with Special Acquisition Companies (SPACs) which made it easier for startups to raise capital. Buoyed by high-profile space activities from Billionaires like Elon Musk, Jeff Bezos and Richard Branson, interest from the investment community in space ventures is at an all-time high. Despite some slowing down in SPAC activity towards the end of 2021, look to continued influx of investments in space in the next few years.

### Innovations

The relative ease of raising capital has lowered the barriers to entry in the competitive satellite industry and led to a proliferation of start-up ventures. With increasing numbers of start-ups with access to funding comes many innovations. One example is Australian manufacturer Fleet Space Technologies which developed the first 3D-printed satellite. 3D printing enables custom-made satellites at much lower cost than conventional ones. Other innovations include optical or laser technologies and the use of artificial intelligence, among others.

Faced with increasing competition from niche manufacturers,



**Several startups have benefited from mergers with Special Acquisition Companies (SPACs) to raise funds for their ventures. Pictured here is upcoming launch services company ASTRA after its merger with Holicy, a SPAC controlled by cellular pioneer Craig McCaw, who co-founded Teledesic. (image courtesy of ASTRA)**

the established satellite manufacturers have also stepped up their game with innovations such as software-defined satellites which are cheaper to build and more flexible. At the end of 2021, satellite operator Intelsat announced an order for two software-defined satellites from Thales Alenia Space designed to advance Intelsat's global fabric of software-defined GEO connectivity as part of its 5G software-defined network.

Satellite manufacturer Boeing Commercial Satellite Systems has invested in 3D printing for small satellites through its subsidiary Milenium Space Systems.

Of course not all start-ups will be successful. Those who manage to rise above the pack might be ripe for takeover by the bigger players. Smaller companies might want to consolidate with other companies in order to be able to compete with the larger companies.

### More Consolidation

2021 saw the mega-merger (by satellite standards) of Viasat (by satellite standards) and Inmarsat in a US\$ 7.3 Billion transaction. The combination of the two companies created a powerhouse in key vertical markets such as mobile services, aeronautical and maritime, among others. Viasat previously acquired Rignet, a major service provider in the oil and gas business.

Even companies in bankruptcy proceedings like Speedcast was purchased by private investment firm Centerbridge Partners in March 2021. Speedcast emerged from bankruptcy debt-free (getting rid of US\$ 634 million in debt from its balance sheet) and proceeded to consolidate its prior acquisitions and rebuild its business.

Look to have more consolidations as more companies enter the business and competition heats up.

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## Space Tourism Will Continue to Grow

Prior to Virgin Galactic's first suborbital flight carrying four commercial passengers including its Billionaire founder Richard Branson in July 11, 2021, only about 580 people have been to space. Since that historic flight in July more than 20 more civilians or "space tourists" have gone to space. NSR's newly released Space Tourism & Travel Markets, 3rd Edition (STT3) report sees over 57,500 passengers heading to space through the decade, generating US\$ 20.3 Billion cumulative revenues. NSR's STT3 finds the rapid growth seen in the Space Tourism & Travel Markets driven by a growing commercial passenger interest, along with government funding and demand.

As the most stable and lucrative segment through 2031, Orbital Travel is set to capture 66% of total revenue opportunity. Orbital Travel has strong government support with initiatives such as the Commercial Crew program and commercial company led Space Station development. High ticket prices, coupled with very strong demand, results in a fast-growing market, even among delays according to NSR.

## Space and National Security

Despite a year of uncertainty, the space sector has received record government investment totaling over \$92 Billion, an 8% increase compared to 2020 according to Euroconsult. Civilian space budgets, totaling US\$ 53 billion in 2021, continue to receive more funding than defense space programs, at 58% of total spending, though the share going to defense, US\$ 39 billion in 2021, is increasing. Geopolitical tensions, increasing rivalry between leading space powers, and

the value of space as the ultimate high ground drive the militarization of space trend, with leaders increasing their investments in defense space assets and technologies.

The Space Symposium held in late August 2021 in Colorado Springs highlighted the ambitious plans of the US Space Force--the first dedicated national space security organization. We are now seeing other countries planning to follow suit and create their own national space forces.

Tensions are also running high when last November 14, Russia used an anti-satellite weapon (ASAT) to destroy a retired satellite, Cosmos 1408. This could lead to a new "arms race" in space.


## Broadband and Mobility to Drive Demand for Telecom Services

In November 2021, the International Telecommunications Union released a report that revealed that an estimated 37 per cent of the world's population--or 2.9 billion people--still have never accessed the Internet, 97% of which are in developing countries.

The global pandemic accentuated the need to be connected for most of the world's population. It

is clear that broadband access and mobility will be driving demand for satellite and telecom services in the next few years. SpaceX' Starlink Low Earth Orbit (LEO) constellation has already launched 2,000 satellites in the past two years and are planning thousands more to address the insatiable demand for broadband connectivity.

Satellite companies would want to reach out to as many of the addressable market for broadband services. ABI Research estimates that the serviceable addressable market (SAM) for global satellite broadband over geostationary (GEO), medium earth orbit (MEO) and low earth orbit (LEO) satellites will be 330 million premises, equivalent to 1.3 billion household members, in 2026. They will be facing stiff competition from telecom companies that provide fiber and other ground-based solutions. But, the satellite industry, which has proven its resilience through many challenging situations in the past have been slowly transforming itself to be more like telecom companies by providing hybrid services and other creative connectivity solutions.

The last two years in some ways has certainly been one of the worst of times, but the next few years could be one of the best of times. 



**Virgil Labrador** is the Editor-in-Chief of Los Angeles, California-based Satellite Markets and Research which publishes [www.satellitemarkets.com](http://www.satellitemarkets.com), a web portal on the satellite industry, 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](mailto:virgil@satellitemarkets.com)



# World Satellite Business Week Highlight Industry Prospects Going Forward

by Elisabeth Tweedie

Unlike the IBC, which was canceled at the last minute, World Satellite Business Week organized by Euroconsult, went ahead in December 2021 in Paris as planned. Normally an in-person only event, held in September, the December event was both in-person and online, resulting in close to normal attendance. Euroconsult took extraordinary precautions, including making on-site Covid-19 testing available.

Nathan de Ruiter, Managing Director Euroconsult Canada, opened the conference with some rather disturbing news. Namely, that the 25% growth in satellite data

Looking ahead, Euroconsult is projecting that there will be 4.1 terabytes of capacity in orbit by 2025, the majority of which will come from the non-geostationary orbit satellites (NGSOs), and will be relatively low-cost. It believes that there are three main markets for this capacity. Firstly, the unconnected three billion people on earth. Euroconsult has done some analysis and believes that ~700,000 of these are addressable by satellite. This could mean residential broadband, WiFi hotspots or cellular backhaul. Secondly, mobili-



**The show must go on. World Satellite Business Week organized by Euroconsult went on as scheduled last month in Paris as a hybrid virtual and live event.** (image courtesy of Euroconsult)

consumption was still not enough to compensate for the overall decline in video, caused by viewers transitioning from direct-to-home service to over-the-top (OTT) and streaming services. In the four-year period to 2020 total satellite revenues (operating and service) declined by 7%.

ty markets, of the 250,000 maritime vessels and planes only 15% are currently connected, leaving plenty of room for growth, particularly if prices decline. And thirdly, increasing data requirements in all markets; some growth has already occurred, and Euroconsult



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is expecting demand to triple over the next few years.

We've been talking about changes in space for many years now, as the processing power of satellites exploded and commercial satcom moved from primarily geostationary orbits (GEOs) to encompass NGSOs delivering broadband services; firstly, with O3b and more recently with Starlink and OneWeb. Innovation in space has to be accompanied by innovation on the ground, without this, new space would be dead space.

### The View from the Ground Segment

One of the panels with the rather odd title of "Virtualization, Constellations etc.: A revolution for the ground segment" brought together all of the major ground segment providers (with the exception of Via-Sat) to discuss this innovation in the ground segment. The conversation centered around the physical growth in the ground segment driven by the new constellations. NGSOs need more gateways with more antennas in each one than a geostationary satellite with a limited footprint does. OneWeb for example, has 42 gateways. The sheer volume and complexity of data generated and needed to support these networks, is one of the key drivers towards software defined systems and virtualization. As much as possible needs to take place in the cloud, as Thomas Van den Driessche, President and CCO of ST Engineering iDirect pointed out: "Today we have a task to do multiple architectures and multiple instances of types of deployments. We already have cloud architecture for processing using virtual machines..... but our ultimate goal is not just to share our technology with cloud service providers, although that is part of the goal, but also to do edge service. 5G can help with this.....and we can learn from the standardization that has been done on the ground. We are trying to leverage all of this to come up with the ultimate solution. It's not trivial....we need to add our "special sauce" on top of the cloud solution." Phil Carrai, President of Space, Training and Cybersecurity, Kratos summed it up by saying: "you have to be virtual, you have to be dynamic, you have to be open and orchestratable by others, the telecom sector for example." He went on to echo Van den Driessche's point saying that the satellite industry has an advantage by being able to leverage what has already been developed by terrestrial networks and just needs to lay software that deals with space specific issues on top of that. David Gelerman, CEO of Spacebridge

***"...Looking ahead, Euroconsult is projecting that there will be 4.1 terabytes of capacity in orbit by 2025, the majority of which will come from the non-geostationary orbit satellites (NGSOs)..."***

Inc., was particularly adamant regarding the importance of moving towards fully software defined infrastructure and being able to build upon terrestrial systems to derive economies of scale. Another advantage of software systems was mentioned by Paul Gaske, EVP and GM Hughes Network Systems, namely that all software systems require updating, which creates the opportunity for an on-going relationship with your customer.

### Regulatory Issues

Discussions in Paris, also focused on the responsible use of space. As well as many existing filings for LEO constellations that we hear little about, there have been another spate of these filings in recent months. There are two potential impacts from this: economic and physical disaster. Michel Azibert, COO, Eutelsat, pointed out that between them by 2030, the known NGSO constellations (O3b mPOWER, OneWeb, Starlink, Lightspeed and Kuiper) and new GEO satellites will add 80TB of capacity of which 50TB will be for broadband. Demand for broadband is projected to be 20-30TB, so already there is overcapacity. Azibert, however felt that growth in the market would make this a manageable situation. Add in all the "extreme," or "exuberant" filings, as Steve Collar, CEO, SES, called them, which would double or triple capacity and there is potential for not only an economic disaster, but also a physical disaster, should any of the LEO satellites collide. Space, particularly at the LEO orbit is becoming very congested. As Azibert said: "Even if we develop the technology to remove all the debris, we still risk the Kessler effect." Many people think we are already at that point. Collar pointed out, that with no penalties for "bad behavior" it was up to the industry to act responsibly. Mark Dankberg, Executive Chairman, Viasat, agreed, but added that we had now reached a point, where ITU filings effectively don't mean anything, securing the landing rights is the real issue.

## Industry Prospects are Mostly Good

In spite of the overall decline in revenue mentioned at the opening of the conference, all of the major operators present (SES, Eutelsat, Telesat, Viasat and Hughes) for the session “Global Satellite Business: new horizons” described 2021 as being as good or better than expected. Opinions were divided as far as video is concerned, with Collar, saying that video revenues were well ahead of expectations, whilst Azibert, indicating that video revenues had fallen relative to the previous year.

Interestingly, in spite of differences of opinion in the past, this year all the operators spoke enthusiastically about their belief in a multi-orbit strategy and the importance of low-latency. However, given that one way or another, all of the operators now own or have investments in NGSO constellations, this is hardly surprising.

The operators shared Euroconsult’s view that there will be sufficient demand to use the 4.1 TB of capacity coming on line in the next three years. Dan Goldberg, CEO, Telesat pointing out that the majority of that new capacity is going to be used for broadband applications in all sectors: consumer, enterprise and government, echoing a statement made by Jonathan Hofeller, SpaceX, VP of Starlink and Commercial Sales in another session (Broadband Constellations in the Fast Lane). Hofeller described Starlink’s market strategy as a three-legged stool: consumer, B2B and government, saying that whilst many people considered Starlink to be a consumer service, as well as the more than 100,000 consumer subscribers there are Starlink antennas on planes, cell towers, schools and hospitals.

Consumer demand for broadband capacity continues to grow in all regions; there are, however, two obstacles to be overcome to meet this demand. Growth

in satellite capacity is never linear, there is always a step change as more satellites are launched, and it’s not always possible to get them launched in sync with growth in demand. Hughes is currently dealing with this issue, as is out of capacity over north America until the launch of Jupiter-3 next year. In developing regions, the challenge is to meet the demand at a

price that consumers can afford. As Revillon explained, the real untapped market is closer to 700 million, not the 3 billion that everyone refers to, this diminution is largely due to affordability. Mark Dankberg, Executive Chairman, Viasat concurred saying: “There is a constant increase in demand. If you can deliver bandwidth at cost points that customers can afford, there are some big opportunities.” Viasat is also focused on mobility markets as an important segment for expansion. Inflight connectivity (IFC) has long been an important market for Viasat, and the industry as a whole, but at approximately 20% penetration there is plenty of room for growth. Land mobile is the lagging mobility sector and one that Viasat intends to focus on in the next few years. With the recent acquisition of Inmarsat, Viasat will have narrowband capacity for the first time, making the internet-of-things (IoT) market another area of focus for the company.

The world is still dealing with a very cunning virus, that unfortunately has the ability, to change the trajectory of things in a very short timescale. At the beginning of December, when World Satellite Business Week took place, omicron was causing havoc in a few countries, but had not become a global phenomenon. The general view was that the IFC and Cruise markets would continue their rebound in 2022. Less than three weeks later, we are dealing with thousands of canceled flights and cruise ships returning to port due to Covid outbreaks onboard. Right now, all we can do is hope that this setback, will be a short term one, and one that does not leave a lasting impact.



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

# Risks and Benefits of Venture Capital for Space Firms

*Rotoiti, a space consulting firm, interviewed several finance experts in the space industry. This brief, based on those conversations, summarizes the risks and benefits that venture capital poses to space firms.*

**M**any firms assume that they must attract venture capital (VC) in order to succeed, but it is important to first define success and then assess if VC is necessary to achieve that success. The definition of success depends on the firm. VC tends to invest in high-risk, high-reward propositions. VC is arguably appropriate—even necessary—for some firms, such as those whose business is capital-intensive, transformational, or high growth-seeking. For firms that do not have such business, on the other hand, VC is arguably not necessary to achieve success.



In exchange for high risk tolerance, VC expects high potential rewards, often linked to portfolio firms' potential to transform the industry. The more transformational, the more the potential reward. For example, an on-orbit manufacturing firm is arguably more transformative than yet another thruster firm.

that founders of space firms conduct due diligence when engaging VC. Even if VC makes sense given business objectives, VC should be approached with caution. An inherent information asymmetry exists between VC fund managers and founders. Fund managers are regularly interacting with firms and are well-versed in financial mar-

kets. Founders, in comparison, rarely interact with fund managers and have less understanding of financial markets. Receiving VC funding is like “getting married” – it is a long-term relationship which, if there is disagreement, can be very painful to end. Founders should strive to overcome their inherent information

disadvantage before entering into a relationship with a VC fund.

- **Capital-intensive business:** Some businesses require more capital expenses than others. Developing a launch vehicle, for instance, may require more capital than developing an algorithm to analyze Earth observation data. VC is arguably more appropriate for capital-intensive businesses since they need to spend money up front to succeed.
- **High growth-seeking business:** Some firms want or need to grow more quickly than others and often must spend money to do so. VC is arguably suited to helping firms that seek rapid growth, particularly firms in a pre-revenue stage; other traditional financing options, such as bank loans, are difficult to access without preexisting cash flows.
- **Transformational business:** It is strongly recommended

**VC dilutes ownership and may lessen the value of founders' stakes.**

In exchange for financing, founders must give stakes in their firm to the VC fund. Founders must “dilute” their ownership, in other words. All else equal, this lowers the value of founders' stakes; 50% ownership of a firm is worth less than 100% ownership of a firm. Of course, VC's purpose is usually to multiply a firm's valuation, so diluted ownership may

end up being more valuable than undiluted ownership. To know if dilution is worth VC investment depends on future valuation multiples.

- VC fund managers will often argue for lower valuations of firms in which they are investing. This is because if a firm has a lower valuation, then the fund manager can more easily demand more ownership. Founders negotiating with VC fund managers should thus be wary of undervaluations that lead to giving away too much ownership.
- VC investors are moreover incentivized to argue for low valuations because this helps improve returns on investments. When VC investors exit a firm, the size of their return is informed by how much a firm's valuation has multiplied since they invested in it. The lower the initial valuation, all else equal, the more impressive will be later multiples.
- For these reasons, founders may feel compelled in negotiations with VC to argue for higher valuations. They should be wary, though, to avoid overvaluations. If a firm's valuation is too high, this sets unrealistic expectations for growth. Subsequent funding rounds can have flat or even lower valuations, which damages business prospects.

**VC constrains decision-making by prioritizing fund managers' expectations about valuation multiples.** The general goal for VC fund managers is to, across a portfolio of firms in which they invest, achieve a valuation multiple in a certain time frame. Valuations are estimates of

***"...It is strongly recommended that founders of space firms conduct due diligence when engaging venture capital..."***

portfolio firms' worth. In exchange for receiving financing from a VC fund, portfolio firms will come under pressure to achieve desired valuation multiples. Often this influence is formalized in board membership. Different fund managers have different ways of determining firms' valuations and there is no uniformly agreed upon way to determine valuations – valuations are debatable and different stakeholders are incentivized to over- or underestimate them.

- There is no single way to define a firm's valuation, but some metrics are more important for fund managers than other metrics. This can be problematic because ignoring other metrics that are not important for valuations may negatively affect business. Sales, for instance, may be more important than profits in terms of determining valuation, but firms with large sales can still fail to make profit and thus be in precarious positions.
- Sometimes focusing on sales over profits makes sense, depending on business strategy. If the goal is to be acquired, for instance, it may make sense to aim for a "land grab" –increasing sales to gain access to distribution channels. A firm with many distribution channels may be an attractive acquisition target because the acquiring firm can use the acquired firm's distribution

channels to sell more profitable products or services.

- VC funds often have defined life cycles during which profits must be returned to investors. It is important to know at what point a fund is in its life cycle. The point at which a fund is in its life cycle affects how quickly portfolio firms must achieve valuation multiples. It behooves founders of space firms, therefore, to understand the details of VC funds' lifecycles before they decide to accept any financial support from those funds.

**Venture capitalists spread investments among a portfolio of firms, which means they care less about a firm failing than does its founders.** This is a basic but important point. A VC fund manager does not care if any particular firm succeeds or fails. Fund managers need to provide returns on the portfolio level, not the firm level. This means there can be a competitive dynamic amongst portfolio firms. Firms that seem likelier to yield higher returns will receive more support from fund managers. This "asymmetry of care" usually means the VC fund will push portfolio companies towards a high-risk, high-reward approach to growth. To anticipate fund managers' decision-making, it is worth knowing about other investments in their portfolio.

**It is possible that VC investment in space will slow; if this**

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happens, it will lead to difficulties for firms whose plans depend on VC. There is currently significant VC interest in space. It remains to be seen if hype is creating unrealistic expectations about growth in the industry. It is possible that the space industry is currently experiencing a “bubble” in terms of VC interest in space; portfolio firms may ultimately have less success than expected, yield lower returns, and thus dampen VC interest. This has implications for firms whose business plans depend on VC; if VC interest in space shrinks, this will make it more difficult for space firms to access VC.

- Different people have different opinions, often very strong ones, about the extent to which there is hype in the space industry. Generally, the less space-focused that investors are, the more skeptical they are about space. Conversely, investors who are focused on space tend to be more bullish about the industry. There is in fact no way to know if the industry is experiencing a bubble; bubbles can only be seen in retrospect.
- One factor exciting VC interest in space is initial public offerings (IPOs) via special-purpose acquisition companies (SPACs). SPACs are shell companies that raise money through IPOs and then merge with actual firms. Several space firms have recently gone public in this way, highlighting a “liquidity pathway” for VC in space firms. SPAC IPOs arguably reduce transparency and lead to overvaluations. Appetite for SPAC IPOs may di-



**Even if venture capital makes sense given business objectives, VC should be approached with caution. An inherent information asymmetry exists between VC fund managers and founders.**

minish as firms listed in this way prove to be less successful than expected. Fewer SPAC IPOs might close a liquidity pathway for VC and thus dampen VC interest in space.

**Firms should consider having in-house finance expertise.** Many funds, especially early-stage ones, will sell themselves to space firms not only as providing financing but also giving finance expertise. It is expected, in other words, that portfolio firms may be inexperienced when it comes to finance. Firms thus do not need in-house finance professionals in order to access VC funding. But it is worth considering having internal finance expertise for more fundamental reasons. In-

house finance professionals can help answer questions such as: Does the firm even need VC, given its objectives? Which VC fund most align with the firm’s priorities? What are fair terms for financing regarding valuations, the amount of capital, and stakes? Clearly, fund managers may not be incentivized to provide firms with honest answers to these questions.

- There are two common ways for firms to have in-house finance expertise. One way is to have experts deeply integrated in the firm from the very beginning – as founders of the company, for instance. A second way is to retain or contract finance experts as advisors.



**Rotoiti** provides market research, strategic advisory, and business development services. Clients are company executives, government policymakers, and academic researchers. Rotoiti focuses on the Asia-Pacific and works in all segments of the space industry. For more information go to: [www.rotoiti.space](http://www.rotoiti.space)

# "Embalm, Cremate, Bury at Sea..."

by Lou Zacharilla

A man receives a telegram reporting the death of his mother-in-law and asks for instructions. He immediately replies back: "Embalm, cremate, bury at sea. Take no chances!"

One defining feature of the space and satellite industry is that it knows how to take risks but does not take chances. It is where the reasoning of science and the logic of engineering met the vision of entrepreneurship and venture financing. These four are wonderful companions. And as such, we are an industry on the rise. Equally important, because of the kind of people we

attract, grace is flowing in pursuit of the greater good. Perhaps this is because in the space and satellite community the only place to go is UP! And when you are looking UP, you are aspiring. I have always wondered why people lower their heads to pray. The object of their adoration is up - straight up - well beyond GEO.

This industry is among the few that has as a default model the collective task to make a better world. [www.bettersatelliteworld.com](http://www.bettersatelliteworld.com) In this fraught moment, that is like making jam from cement. Or vice versa. But our collegial nature makes us fully capable of taking on the

BIG universal gorillas.

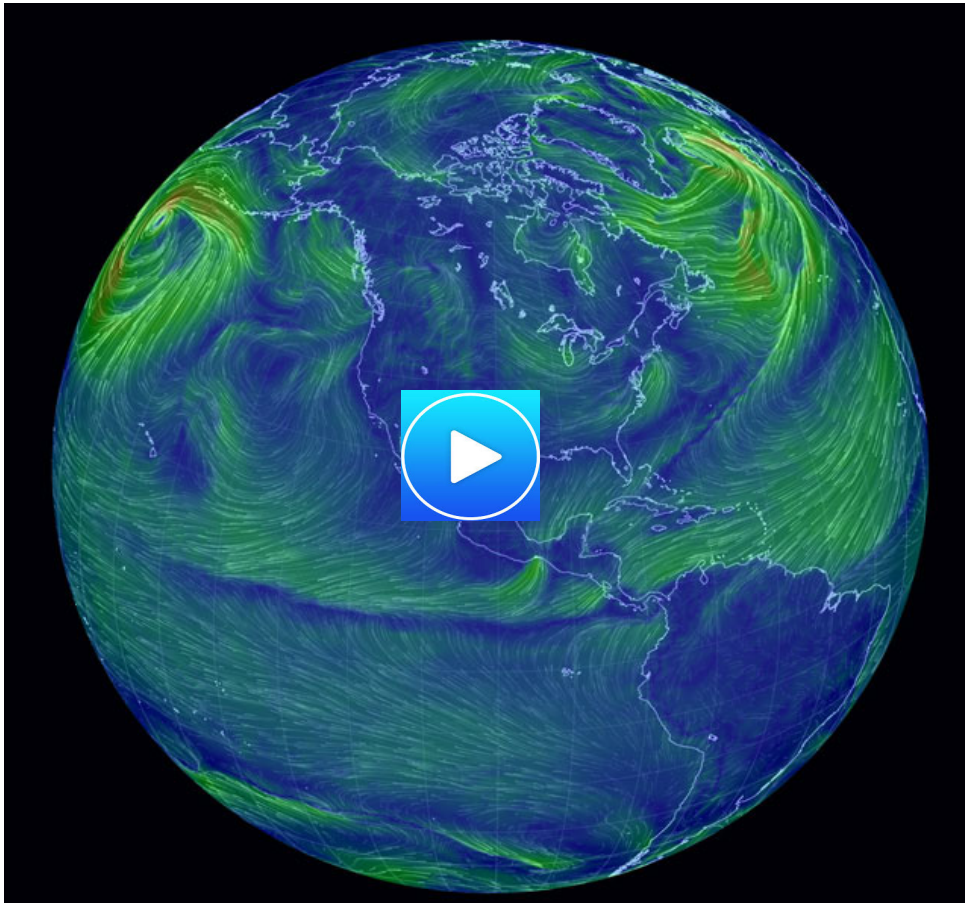
When it comes to the one shared challenge for every human being, the Climate, we are not only orbiting in the right location we are the essential "go-to" industry for supplying the solution.

Recognizing this, SSPI has launched a comprehensive campaign to help the world work through global warming and its related challenges, and to let the world know what we are doing about it. We have termed the project "Climate Sense." In an-

other era those who graduated from the "Old School" would have called it common sense. It is as clear as can be that now is time for the industry to step forward.

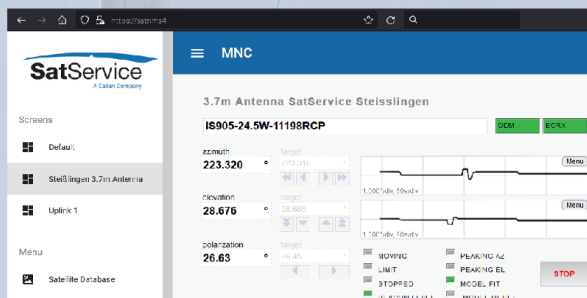
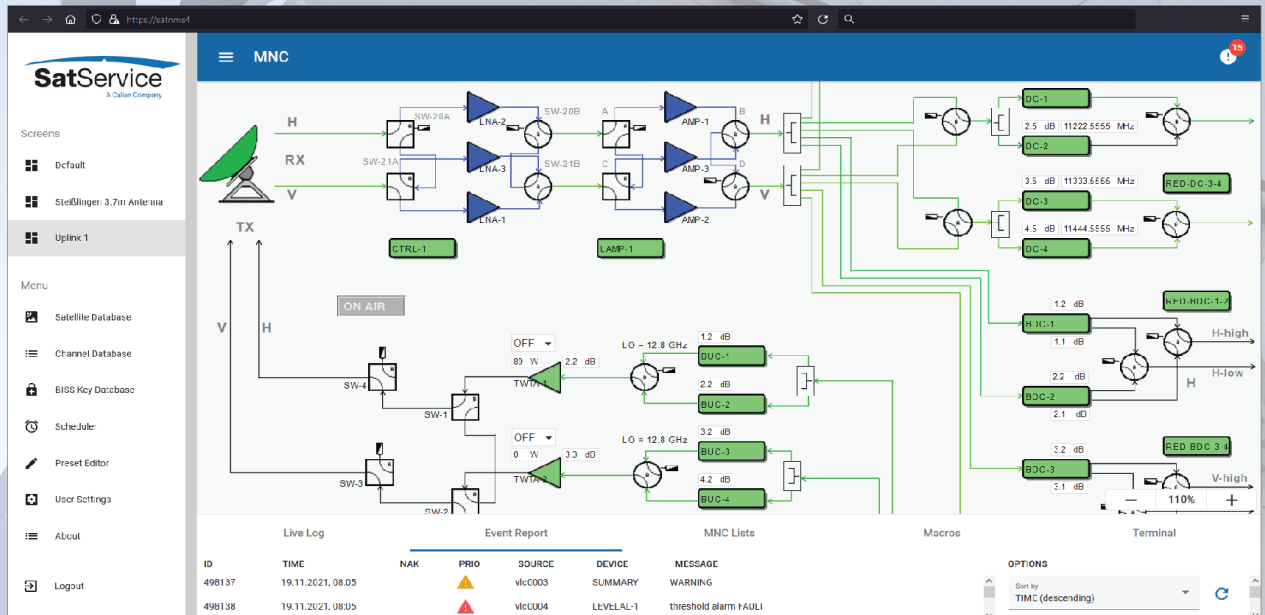
And that is what is happening.

Satellites, earth science and data modeling, like the guy who takes our bet on the Super Bowl, remind us



Click on the image above to view a video from NASA on the impact of climate change on the earth's environment ([https://climate.nasa.gov/climate\\_resources/261/video-movement-of-carbon-dioxide-between-the-air-and-sea/](https://climate.nasa.gov/climate_resources/261/video-movement-of-carbon-dioxide-between-the-air-and-sea/))

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**Cities near bodies of water such as Bangkok are being threatened by climate change.**

(Image courtesy of World Economic Forum)

constantly that our species has taken a chance with its climate. In fact, our climate sense tells us that we are preparing a bill for future generations. This one has a lot of zeroes for services not rendered to clean up an environmental mess they didn't produce. And among those zeroes may include the cost of being on a planet bereft of, oh I don't know, cities such as Miami, Osaka and Bangkok. (<https://www.weforum.org/agenda/2021/12/coastal-cities-underwater-climate-change/>)

It is presumptuous to say "here come satellites to the rescue." But let's say it anyway. There is no industry better suited to boost the goal of reversing climate change in the near-term than the satellite industry. Earth observation, satellite capabilities have long ago started to map coastline erosion, farmland changes and methane emissions. The data and services from orbit enable businesses and governments to make real reversals possible using real data. We KNOW what is happening to our ice caps and oceans and air because we have that eye in the sky.

To share this view from above and sustain this global conversation SSPI is combining its most popular platforms to make sure as many as possible who can use us know the role of satellites in managing climate-related issues.

John Kerry knows the role. In a post-Glasgow interview, the doe-eyed USA Special Envoy on Climate spoke about the progress that has been made generating the cooperation needed to take action. He reported on a commitment by countries representing 65% of the

world's GDP to work to limit the rise in the earth's temperature of the earth to less than the 2% agreed upon in Paris. When a journalist asked how compliance would be assured, Kerry said "we have satellites." It was the simple sound of assurance.

Political cooperation among nations is good news. The use of satellites to identify a problem and ensure compliance, or provide a commercial solution to solve it is, well, old news. It is satellites to the rescue when you wish to take no chances. 🚀

**To learn more about the "Climate Sense" campaign contact [tbond-williams@sspi.org](mailto:tbond-williams@sspi.org). To learn more about the role SSPI plays to communicate the value of doing business with our industry, visit: <https://www.sspi.org/cpages/about-sspi>**



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

# Regulatory Imperatives in the Disaster Response Ecosystem

by **Martin Jarrold**

**M**y choice of title for this month's column is but a mirror to the complexities of what is to many, but certainly not to all, the rather remote topic of satellite regulation. If perhaps rather obscure, satellite regulation is something we certainly cannot do without; utter chaos would follow from its absence.

GVF is now twenty-five years-old. Born in 1997 and registered

as a not-for-profit, limited by guarantee, company in London, where its headquarters remain, GVF is a quite different animal twenty-five years on, but its original primary brief to tackle regulatory matters resoundingly continues to this day.

For that quarter century GVF has been the sole global trade association of the entire satellite communications ecosystem – space segment AND ground segment – and this unique status remains unchanged. Throughout, GVF has advocated and lobbied on behalf of the satellite communications industry before the ITU, region-

al regulatory bodies, and national regulators. We have brought to the up-close attention of the global regulatory community an understanding of all that the satellite industry brings to humanity's need for better communications solutions, often right to their collective doorstep, as with the November-December 2018 workshop delivered by GVF and its members adjunct to the World Radiocommunication Seminar held in



Satellite. Solutions. The World.

and others; and repeatedly advocating on behalf of the industry via discussions with multiple regulators – For example: the Secretary General's participation in the ITU 22nd

International Space Radio Monitoring Meeting in which he presented on interference issues in the GSO environment; and participation in CITEL's PCC. II meetings held during 2021 where GVF repeatedly advocated for the industry on matters such as ESIMs and 28 GHz. All have been features of the

countdown to WRC-23.

As with World Radiocommunication Conferences before, WRC-23 (20 November to 15 December) will result in decisions that will drive multi-billion dollar investments designed to enhance, grow, or develop businesses ranging from mobile communications and the Internet of Things, to 6G and broadband services for underserved populations. Leading up to WRC-23 will be many more meetings, and decisions, taken at the national and regional lev-

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Geneva, and which was preparatory to the World Radiocommunication Conference of 2019 (WRC-19).

Despite the pandemic having mandated a stop in international gatherings, the likes of Zoom and Teams have facilitated a “no change” to GVF’s primary mission in submitting comments on behalf of the industry in response to national consultations throughout the world; making presentations at regulatory conferences convened by the ITU,

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el which will greatly influence the Conference's outcomes. As noted above, regulation is often a topic left to those expert in the finer things of spectrum management, but wider stakeholder communities need to be alert to the discussion agenda.

To this end the resumption, in late-January 2022, of the acclaimed GVF Webinar Series with an event entitled 'Spectrum Regulation and Business' will bring forth panel discussion to examine key spectrum issues to be decided upon in the run-up to, and at, WRC-23 and how such decisions will impact business in the years to come. Individuals responsible for developing new products and delivering services dependent upon satellite connectivity will find this panel discussion important.

While it has obviously been for many more reasons than its impact on international gatherings alone, the industry and wider world has been focused on the ongoing pandemic as we continue to face new virus variants and as we continue in our failure to address the imperative of universal global vaccination. At the outset of Covid-19 the satellite industry quickly responded to the elevated connectivity demands of economy, society and individuals; the latest illustration of the industry's legacy of highly effective responses to disasters of many types.

Natural disasters around the world take many forms. Earthquakes, tsunamis, cyclones/hurricanes/typhoons, volcanic eruptions, floods, droughts, and famine. Human-made disasters – such as war, refugee population migrations, and now the exacerbation of weather events with warming oceans and rising sea-levels through anthropogenic climate change – make our global condition yet more perilous. Build-

***“...At the outset of Covid-19 the satellite industry quickly responded to the elevated connectivity demands of economy, society and individuals; the latest illustration of the industry's legacy of highly effective responses to disasters of many types....”***

ing on its legacy, satellite is being increasingly called upon to yield up its unique advantages as exemplified in solutions for immediate response logistics operations and longer-term recovery programs, particularly when terrestrial communications infrastructures are knocked-out by the nature and magnitude of a disaster itself, just when they are needed most.

GVF has long been active at the very core of delivering satellite's disaster response, no more so than when partnering in the development and implementation of the UN Crisis Connectivity Charter to which it is signatory; when as a member of the World Food Program administered Emergency Telecommunications Cluster; and when called upon to support the annual 'Pacific Endeavor' exercise of the United States Department of Defense Indo-Pacific Command Multinational Communication Interoperability Program for Humanitarian Assistance & Disaster Response, with which GVF has had a collaborative partnership since 2012.

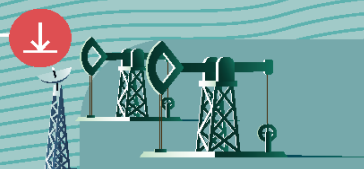
One of my pre-pandemic business trips for GVF was to Port Moresby, Papua New Guinea, for 'Pacific Endeavor' 2019. Together with my GVF colleague, Riaz Lamak, GVF's Pacific Endeavor Lead, I had the pleasure of meeting senior and staff officers of many Indo-Pacific militaries. The primary element of GVF's 'Pacific Endeavor' mission is to bring communications capacity

building to the military communications and signals personnel of around 27 nations, together with their civilian partners. Over the years GVF has variously conducted presentation sessions, and hands-on practical training workshops to certify J6 military officials of participating nations in the installation and maintenance of satellite terminals, to ensure that during crisis or disaster GVF-certified first responders are on the ground, across the Indo-Asia-Pacific region. It can be noted here that GVF Training Certification, through its online training portfolio tool, offers over thirty courses which have been taken by more than 17,000 students worldwide.

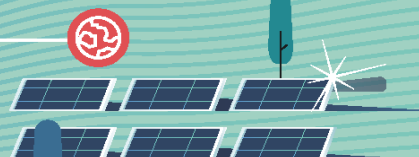
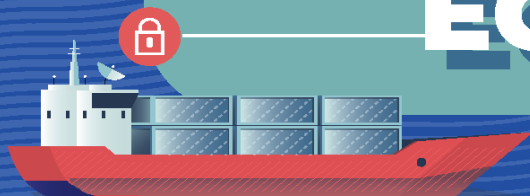
Further illustrating its role in humanitarian assistance and disaster response, GVF has been asked to contribute to the REDCON Asia Webinar Series in 2022, under the theme 'Advancing Disaster Resilience through Game-Changing Emergency Telecommunications'. The webinar's wide reaching dialogue – exploring how satellite services are a uniquely reliable and invaluable tool for emergency responders during disaster relief, and examining how satellite aids humanitarian organizations and repair crews during disaster management and recovery, as well as providing business continuity services post-disaster and backhaul capacity for network restoration – will encompass satellite regulatory matters as they



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pertain to the implementation of effective disaster management policies for using a diverse range of communication solutions, such as those in Fixed Satellite and Mobile Satellite services.

Every natural disaster and emergency is different, however, UN agencies, NGOs, military and other first responders recognize recurrent patterns, in as much as the damage typically sustained by terrestrial communication infrastructure can be quickly replaced using small aperture earth stations (fixed VSATs), vehicle-mounted earth stations (VMES) and transportable earth stations. VSATs, mobile-satellite terminals and ancillary equipment may be deployed to provide voice and data communication, field reporting, position information and facilitate data gathering and image transmission.

International recognition – through not only the UN Crisis Connectivity Charter but also through the earlier Tampere Convention (which eases deployment of telecommunication facilities during a disaster and is ratified by multiple nations) – of the centrality of satellite communications must be accompanied by more national administrations following ITU (also a signatory to the Crisis Connectivity Charter) recommendations on the use of satellite frequency bands in their national disaster planning.

With the importance of satellite communications in disaster relief needing to be translated into the pre-planning of spectrum usage, the continuing challenge is at a national level, where regulators need to implement ad hoc licensing frameworks for the deployment of fixed and mobile satellite for disaster re-



**After 25 years, the GVF's original primary brief to tackle regulatory matters resoundingly continues to this day.**  
(image courtesy of the ITU)

lief. Progress in this area has been achieved, but challenges remain in striving for a more harmonized framework for satellite services in disaster recovery. More transparency in satellite regulation and simplicity in licensing processes will yield more effective and speedy responses to – more numerous, more frequent, and more damaging – emergencies.

Of course, with the advent of non-geostationary satellite constellations we are now expanding beyond the geostationary-only legacy. Current forecasts indicate that more satellites will be launched in the next two or three years than in the last 50 aggregated, and thus the industry and its regulators must ensure that a growing multi-orbit world can meet the expanding demands of all user communities, ensuring that the rules and regula-

tions governing access to spectrum are sufficient for satellite networks to meet the needs around the globe. As well as continuing industry advocacy of regulatory streamlining, GVF works for the preservation of satellite spectrum in opposition to the terrestrial mobile industry's exclusive spectrum resource-use demands.

National government policies and national regulator's rules must be based on technology-neutrality, balanced to ensure that all technologies have access to the spectrum they require so as to avoid negatively impacting the ability to meet user demands. With satellite, and the next generation of space-based connectivity, meeting the spectrum needs of the world's first responders, and all those that follow them, must prevail.



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

## HISPASAT Raises its Stake in HISPAMAR to 100%

**Rio de Janeiro, Brazil, January 13, 2022**--On December 28, 2021, HISPASAT agreed to acquire from Telemar 19.04% of the shareholding of its Brazilian subsidiary HISPAMAR Satélites, after obtaining the necessary permits and authorizations from the Brazilian government. Consequently, HISPASAT will hold 100% of its subsidiary's share capital.

The conclusion of this transaction, which is the most important at a strategic level since HISPAMAR was established 20 years ago, strengthens the commitment that HISPASAT made to the Brazilian telecommunications market when in 2001 it acquired the

orbital rights at 61° West, of Brazilian sovereignty, and established this subsidiary, with which it operates and markets the Amazonas fleet. Since then, HISPAMAR has become a cornerstone of its activity on the American continent, which is already responsible for 60% of its income.

At present the HISPAMAR fleet is made up of the Amazonas 2, 3 and 5 satellites, which provide capacity across the whole of Brazil and the rest of the continent. High performance, cost efficient services are operated on this satellite fleet to distribute C-band audiovisual content and for direct to home (DTH) Ku-band television solutions. In addition, it has Ka-band capacity to provide satellite connectivity solutions and bridge the digital divide in rural settings. The fleet will be joined in late 2022 by the Amazonas Nexus, an innovative satellite that will provide great flexibility to offer rural broadband connectivity services

and across land, air and maritime mobility environments throughout the Americas, the North and South Atlantic corridors and Greenland.


Clovis José Baptista Neto, President of HISPAMAR, said that "this operation is of great importance to strengthen HISPASAT's role in Brazil. This country has huge potential for developing satellite communications solutions, and we are ready to work with its public and private sectors on projects that bring the greatest value to their society."

Rodrigo Abreu, President of Oi, said that the agreement represents another step in the company's strategic plan. "It is an asset that was expected to be sold in the modification of the Judicial Reorganization Plan approved in 2020. It is another step that we take in the process of improvement and transformation of



**HISPAMAR's teleport and satellite control center in Serviente near Rio de Janeiro, Brazil.**

the company."

HISPASAT is the leading satellite operator in Spain and a driver for innovation in the aerospace sector. The company is the main communication link between Europe and America as a broadband and connectivity service provider in America, Europe and North Africa through its companies in Spain and Latin America, where its Brazilian subsidiary, HISPAMAR, is located. HISPASAT is the leader in broadcasting and distributing multimedia content in Spanish and Portuguese, including broadcasts from major digital Direct to Home (DTH) and High Definition Television (HDTV) platforms. These activities make it one of the top companies in the world by revenue in its sector and it forms part of the Red Eléctrica Group. 

## Eva Berneke Appointed CEO of Eutelsat

Paris, France, December 20, 2021—The Board of Directors of Eutelsat Communications (Euronext Paris: ETL) announced the appointment of **Eva Berneke** as Chief Executive Officer, with effect from January 1st, 2022. She will also be co-opted as a member of Board.

Berneke brings considerable experience of the Telecoms and Technology industries. She joins Eutelsat from KMD, Denmark's leading IT and software company, specialising in IT solutions and services for the public and private sector, and now part of the NEC Group. During her tenure she oversaw the transformation of KMD from a mainly government service provider to a modern, digital company competing in both the public and private sectors.

Prior to that Berneke held several senior positions at TDC, formerly Tele-Danmark, the largest telecommunications company in Denmark, notably as Head of Strategy and Head of the company's Wholesale Business division. Eva began her career at McKinsey where she developed a specialization in the TMT sectors and where she was based for 10 years at the group's Paris offices.

She sits on the Boards of international groups Lego and Vestas Wind Systems as well as France's Ecole Polytechnique. She is a graduate of Denmark's Technical University, where she gained a master's degree in mechanical engineering, and holds an MBA from INSEAD.



**Eva Berneke**

## SpaceLink CEO Dave Bettinger Elected to MSUA Board

McLean, Va., Jan. 4, 2022-- SpaceLink announced its Chief Executive Officer,

**Dave Bettinger** has been elected to the Board of Directors of the Mobile Satellite Users Association (MSUA).

The MSUA's prestigious Mobile Satellite Innovation Awards, celebrate top market-proven mobile advances, and the organization collaborates with conferences around the world to shape and facilitate programming dedicated to satellite industry development.

"I'm honored to be selected to join the MSUA board and look forward to contributing to its mission to amplify the voice of satellite mobility users and innovators," said Bettinger. "My passion for the satellite communications industry is driven by a commitment to innovation so helping to guide MSUA's direction is a perfect fit for me."

Bettinger joins a team of 12 directors made up of satellite industry leaders from a variety of companies including satellite operators, component suppliers, and service providers. By participating, the directors contribute to the growth and success of the satellite communications industry and its users.

Bettinger is CEO of SpaceLink, a company that provides fast, continuous, high-capacity connectivity to spacecraft on orbit. He has a track record of cultivating partnerships and transforming startup ventures into competitive positions. SpaceLink is building a constellation of relay satellites in Medium Earth Orbit (MEO) that use optical intersatellite links for real time tasking and access to the huge flow of information that satellite operators need to provide to their customers for the intelligence to make split second decisions.

MSUA is a non-profit association dedicated to promoting the interests of users of satellite services for mobile communication, navigation, and safety worldwide. The association fosters the



**Dave Bettinger**

exchange of news, information, and ideas among and between users, suppliers of equipment and services, operators of satellite systems, and the various entities affecting the future of the industry. MSUA sponsors the annual Satellite Mobility Innovation Awards, celebrating the top anticipated and market-proven advancements in satellite services, and collaborates with conference organizers around the world to shape and facilitate conference programming dedicated to the users of satellite services.

## Iridium Names Manjula Sriram as New CIO

McLean, Va., January 5, 2022—Iridium Communications Inc. (NASDAQ: IRDM) announced that **Manjula Sriram** has joined the company as Vice President & Chief Information Officer (CIO). Reporting to Chief Financial Officer Tom Fitzpatrick, Sriram is now responsible for leading Iridium's Information Technology (IT) organization in implementing information systems to support both distributed and centralized business operations.

Sriram joins Iridium with more than twelve years of senior IT management experience. Previously and for the past four years, Sriram was Vice President in the role of CIO for The Joint Chiropractic where she was responsible for the commercial and enterprise IT infrastructure for the company's corporate and clinical operations, servicing approximately



**Manjula Sriram**

700 standalone chiropractic offices. Prior to this, Sriram spent four years as the Director of Customer Implementation & Support for Early Warning Service, a financial systems company, to provide risk management solutions over a diverse network of 2,300 financial institutions, govern-

ment entities and payment companies.

As Vice President & CIO, Sriram will drive the strategic and tactical planning, development, evaluation, and coordination of Iridium's technology roadmap and to provide the vision and leadership necessary to drive the Company's IT infrastructure into the future. This includes overseeing the implementation, maintenance and compliance of the entire enterprise-wide technology, security, and billing systems.

Sriram holds a Bachelor of Science degree in Computer Science & Electrical Engineering from the University of Wisconsin, an MBA from Keller Graduate School of Management at DeVry University and is currently working on a second master's degree from Arizona State University in Cybersecurity Policy.



**Michael Porcelain**

### **Michael Porcelain Appointed CEO of Comtech**

**Melville, NY, January 3, 2022--Comtech Telecommunications Corp.** (NASDAQ: CMTL), a leading global provider of next-generation 911 emergency systems and secure wireless communications technologies, announced that, as previously planned, it has appointed **Michael Porcelain** Chief Executive Officer as of December 31, 2021, and a member of the Board of Directors, effective January 3, 2022.

Porcelain, who will also remain President of Comtech, succeeds Fred Kornberg, who will serve as an advisor to the Company on technology matters and continue as a director and non-executive Chairman of the Board.

This appointment completes the Company's long-term CEO succes-

sion planning effort, initiated by the Board of Directors with its appointment of Porcelain as Chief Operating Officer in 2018 and President in 2020.

Comtech also announced the appointments of **Wendi Carpenter** and **Mark Quinlan** as independent directors of the Board, effective January 3, 2022.

Porcelain has served as President since January 2020 and as Chief Operating Officer of Comtech since October 2018. He previously served as the Company's Chief Financial Officer from 2006 to 2018, and as Vice President of Finance and Internal Audit of Comtech from 2002 to 2006.

Prior to joining Comtech, Mr. Porcelain was Director of Corporate Profit and Business Planning for Symbol Technologies (subsequently acquired by Motorola Technologies, Inc.), a mobile wireless information solutions company, where he was employed from 1998 to 2002. Previously, he spent five years in public accounting holding various positions, including Manager in the Transaction Advisory Services Group of PricewaterhouseCoopers. Since 1998, he has owned and operated The Independent Adviser Corporation, a privately held company which holds the rights to use certain intellectual properties and trademarks (including various Internet websites) related to the financial planning and advisory industry. Porcelain is on the Board of Directors of Air Industries Group, a New York Stock Exchange listed company and a U.S. defense contractor, and serves as the Chairman of its Audit Committee. Porcelain is also a Member of the Board of Directors of the Fund for Modern Courts, an independent organization that promotes reform and equal justice in the New York Court system.

### **Gilat Names Benyamini as New CFO**

**Petah Tikva, Israel, December 30, 2021--Gilat Satellite Networks Ltd.** (Nasdaq: GILT, TASE: GILT), announced

that the board of directors approved the appointment of **Gil Benyamini** as Gilat's Chief Financial Officer (CFO) effective February 1, 2022.



**Gil Benyamini**

Bosmat Halpern will assist the company in the transition as she

steps down from her role as Gilat's CFO. Gil Benyamini joins Gilat with a wealth of experience most recently from Panaxia Pharmaceutical Industries (TASE: P-NAX), where he served for the past four years as CFO. In this position he was part of the core management team successfully leading the company RTO into TASE and its equity and debt financing. Previously Mr. Benyamini held the CFO role at Walla Communications from 2009 until 2016 and at Exent Technologies from 2006 until 2009. Mr. Benyamini is a Certified Public Accountant and holds an MBA (major in finance) cum laude from Tel-Aviv University. "I want to welcome Gil Benyamini to Gilat's management team. I strongly believe that Gil Benyamini is the right person for the CFO role, as we face major opportunities and expect to take Gilat to the next level, anticipating substantial growth," said Adi Sfadia, Gilat's CEO. "Furthermore, I want to take this opportunity to thank Bosmat Halpern for her invaluable contribution over the past eight years as Gilat's AVP Finance and as Gilat's CFO. Mrs. Halpern has been my right hand during Gilat's incredible journey, and I wish her best of luck as she moves on," he added.



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## Government Space Budgets Driven by Space Exploration and Militarization

**Paris, France, January 6, 2022**—Space consulting and market intelligence firm Euroconsult has released its highly anticipated “Government Space Programs” report for 2021. The highlight of this year’s findings is a continued, even accelerated, volume of governmental investment in the space sector, driven by two major drivers: ambitious space exploration programs by leading space countries, and rivalries driving the militarization of space. A highly anticipated annual industry study, Euroconsult’s “Government Space Programs” flagship market intelligence re-

port draws on 36 years of experience to provide readers with unrivalled insight into the prevailing strategic space trends among governments.

Despite a year of uncertainty, the space sector has received record government investment totaling over \$92 Billion, an 8% increase compared to 2020. Civilian space budgets, totaling \$53 billion in 2021, continue to receive more funding than defense space programs, at 58% of total spending, though the share going to defense, \$39 billion in 2021, is increasing. Geopolitical tensions, increasing rivalry be-

tween leading space powers, and the value of space as the ultimate high ground drive the militarization of space trend, with leaders increasing their investments in defense space assets and technologies.

This year’s edition of the report takes a close look at the surge of public funding intended to shore up the space industry against the economic repercussions of the COVID-19

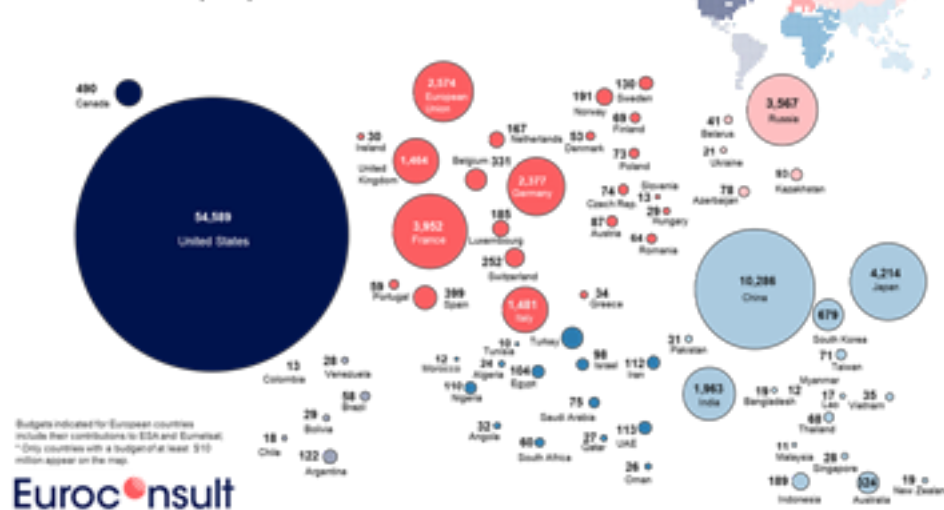
the thousands of data points included in the entire database to create customized datasets tailored to their specific needs. A long running paragon of the trademark methodology that has made Euroconsult the global leader for in-depth data and reliable intelligence for the space sector, “Government Space Programs” boasts 89 country profiles in exhaustive detail, including analysis on

policy & strategic objectives, Governance tables and organigrammes, Space Expenditures, Civil Space Programs, Defense & Security Space Programs, Missions Road Maps, and more.

In addition to this valuable data granularity, “Government Space Programs” sets the industry

benchmark for useability and transparency, with features appealing to government, industrial, and satellite operator readers in particular. Access to Euroconsult’s extensive database provides customers an exclusive look “behind the curtain” with thousands of data points for annual space budgets from 1990 to 2030. Detailed Country Fact Sheets provide key, high-level take-aways, providing key information on national space programs quickly and easily. These include total 2021 space budgets with five-year CAGR, top 3 applications, space spending

WORLD GOVERNMENT EXPENDITURES FOR SPACE PROGRAMS (2021)\* TOTAL \$92.4 BILLION



pandemic. Government Space Programs 2021 provides details on national space programs’ spending priorities as well as two potential 10 year forecast scenarios, digested into negative and optimistic models.

For only the second year in the long history of this report, Government Space Programs is now available on Euroconsult’s innovative Digital Platform, a powerful tool packed with premium features to help customers easily sort, compare, customize and visualize datasets of their choice. With a few clicks, Premium Users can now sift through

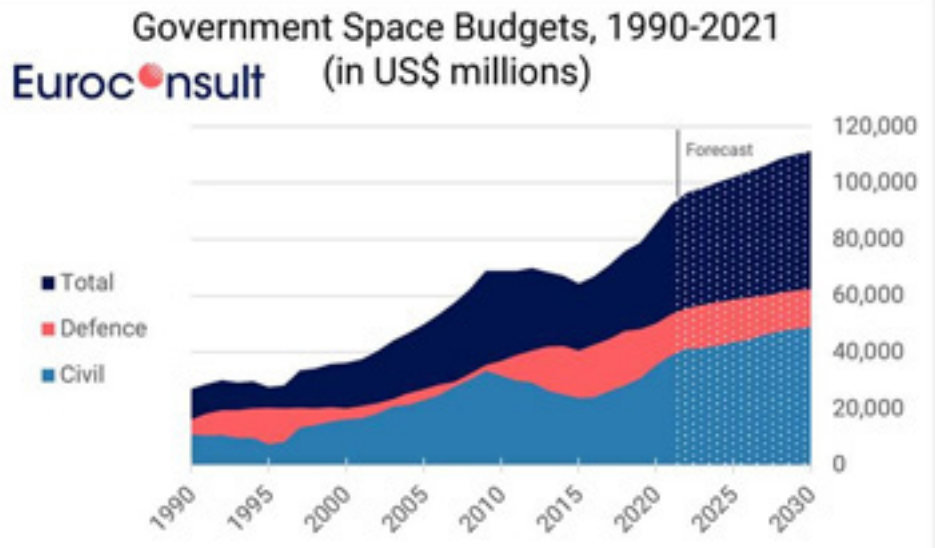
per capita and as a % of GDP as well as select high-profile missions and satellites.

New in this year's edition, the "Government Space Programs" forecast, its foremost feature, has now been extended to 2030. In addition, "country pages" on the Digital Platform further implement ease of use functionalities by linking directly to official online resources for government space policies, strategies, budgets and legislation. Finally, the report includes more detailed governance organigrammes, illustrating the relationships between government bodies and institutions, to help readers navigate complex decision-making processes and better understand the policy making landscapes and players.

"Government Space Programs" is a must-read and the essential tool to understand the state and drivers of all space programs worldwide. Euroconsult's highly-regarded and repeatedly trend-setting analysis is

now enhanced by its innovative Digital Platform, providing leading-edge insight and unmatched perspective on the evolution of government investments in space.

Premium customers now benefit from the full range of powerful tools on the Digital Platform for easy data management, visualization and export, in addition to the Classic version including expansive Excel database. Read the report today at Government Space Programs.



## Satcom on the Move Market Projected to Grow to US\$ 42.8 Billion by 2026

Northbrook, IL., December 21, 2021- The SATCOM on the move market is projected to grow from US\$ 17.7 billion in 2021 to USD 42.8 billion by 2026, at a CAGR of 19.3%. SATCOM equipment is an integral part of the communication in commercial and defense industry according to a new report by Markets and Markets.

The deployment of low earth orbit (LEO) satellites and constellations of satellites for communications applications has increased their demand across the globe. Other factors driving the market growth include growing demand for Ku- and Ka-band

satellites, and the growing fleet of autonomous and connected vehicles used for various applications in the military and commercial sectors, which require customized SATCOM-on-the-move antennas.

COVID-19 Impact on the SATCOM Equipment Market The COVID-19 pandemic has caused significant damage to the economic activities of countries across the world. The manufacturing of SATCOM equipment, including systems, subsystems, and components, has also been impacted. Although SATCOM

equipment are critically important for a proper outcome from a satellite, disruptions in the supply chain have halted their manufacturing processes for the time being. Resuming manufacturing activities depends on the level of COVID-19 exposure, the level at which manufacturing operations are running, and import-export regulations, among other factors. While companies may still be taking in orders, delivery schedules may not be fixed.



## The Satellite Markets 20 Index™

Company Name	Symbol	Price		
		January 6	52-wk Range	
Satellite Operators				
Thaicom Public Company Limited	THCOM.BK	10.70	7.90	14.10
Eutelsat Communications S.A.	ETL.PA	11.15	8.93	13.42
APT Satellite Holdings Limited	1045.HK	2.34	1.70	2.95
Echostar	SATS	25.95	20.65	30.90
SES S.A.	SES.F	7.20	6.12	7.91
Satellite Manufacturers				
The Boeing Company	BA	211.85	185.26	278.57
Maxar Technologies	MAXR	29.42	25.07	58.75
Lockheed Martin Corporation	LMT	359.83	319.81	396.99
OHB SE	OHB.DE	35.65	33.50	49.85
Honeywell International Inc.	HON	211.48	194.55	236.86
Equipment Manufacturers				
C-Com Satellite Systems Inc.	CML.V	2.40	1.96	4.48
Comtech Telecommunications Corp.	CMTL	23.87	20.64	30.40
KVH Industries Inc.	KVHI	9.29	8.67	15.29
ViaSat Inc.	VSAT	46.52	33.13	68.76
Gilat Satellite Networks Ltd.	GILT	8.17	6.58	22.69
Service Providers				
DISH Network Corporation	DISH	33.18	28.53	47.05
Globalstar Inc.	GSAT	1.11	0.38	2.98
Telesat Corporation	TSAT	29.29	22.37	56.54
Sirius XM Holdings Inc.	SIRI	6.24	5.75	8.14
Trimble Inc.	TRMB	82.46	65.37	96.49

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 Dec. 7, 2021	Percentage Change last month
Satellite Markets 20 Index™	2,817.60	1%
S & P 500	4,713.65	1%

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## VITAL STATS

### Satcom on the Move Market Trends



Source: *MarketsandMarkets.com*