

# SATELLITE EVOLUTION

February 2024

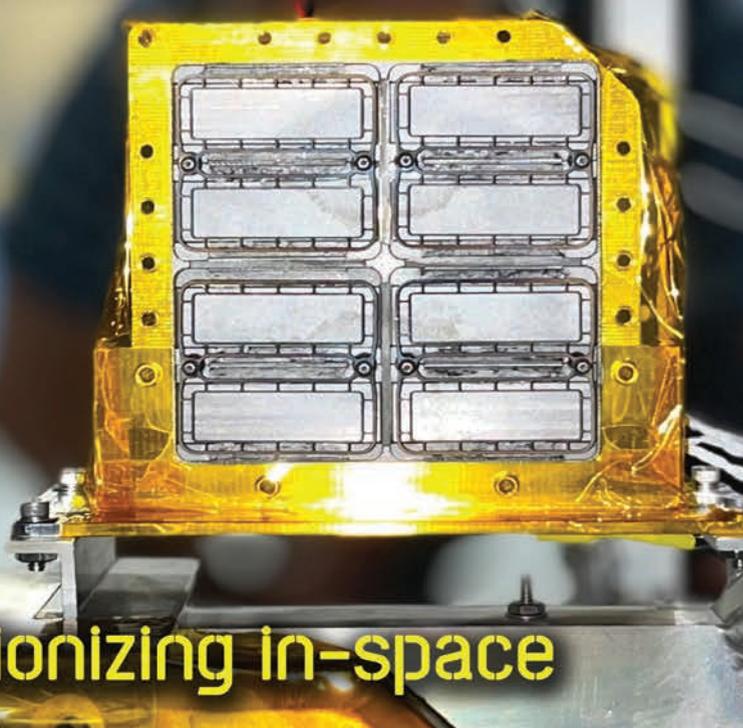
# GLOBAL

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## Revolutionizing in-space propulsion

### Plus:

- Satellite connections direct to cell phones becoming a reality
- Ovzon: Addressing clear market demand
- 2024 - Unpacking the defense spend in a year of budget increases



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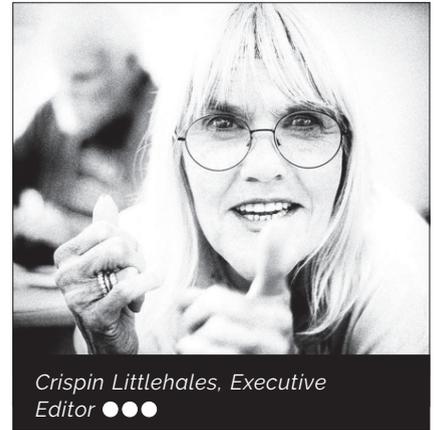
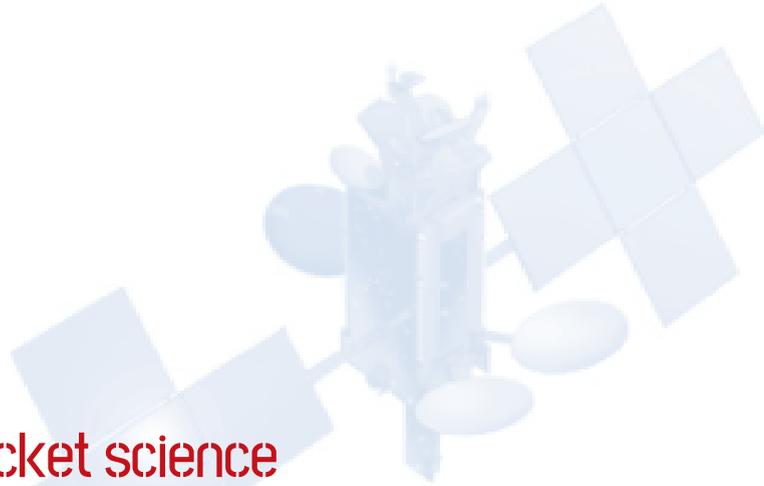
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## Rocket science

**As complex, expensive, and risky as building and launching a rocket is,** there are currently more than 100 launch service providers worldwide. That's a far cry from the 1960's when there were only two players—the United States and the Soviet Union. Still, the playing field is far from level. SpaceX continues to dominate with 98 successful launches in 2023 and 148 scheduled thus far for 2024, five of which could well be crewed missions for NASA, Axiom, and Polaris Dawn. There are, however, a number of competitors hoping to chip away at Elon Musk's near monopoly.

In 2024, we can expect to see three new heavy launch vehicles enter the arena. ULA's Vulcan launched successfully on January 8. According to ULA, more than 70 Vulcan missions have been sold with roughly half booked by government customers like NASA and Space Force. Although Vulcan will start out slow with only a few more launches scheduled for 2024, plans are in place for that cadence to bump up to twice a month in 2025. The inaugural flight for Arianespace's Ariane 6 should take place mid-summer of this year with 28 launches booked, 10 of which could take place this year. Blue Origin's New Glenn, which has a reusable first stage, is supposed to launch for the first time with the ESCAPEDE demo flight in August 2024. If all goes well, New Glenn will initiate the deployment of the Kuiper constellation in December.

Several microlaunch companies are readying for lift off as well. Isar Aerospace's Spectrum will be delivered to its launch pad in Norway soon for lower and upper stage fire testing. ABL Space Systems is preparing the first flight of its RS-1 microlaunch vehicle, Flight 2, which will take off from the Pacific Spaceport Complex on Kodiak Island in Alaska later this year.

The satellite industry needs more launch options. In addition to smallsat constellation developers that are hoping to expand existing constellations, there are plenty of startups and universities seeking to launch their first missions. Military space operations are ramping up and a growing number of government agencies are also seeking a ticket to ride. According to Ill-Defined Space, from January 2019 through December 2023, approximately 527 spacecraft operators from 72 nations deployed spacecraft into orbit—40 percent of which left Earth last year. Those numbers are expected to escalate. Research firm NSR predicts that some 200 launches will take place in 2024 deploying about 1,900 satellites from around the world.

Given the history of rocketry, we can expect delays and disappointments, but we should also look forward to successes and breathtaking progress. Robert H. Goddard, who built the world's first liquid fueled rocket which was launched successfully in 1926, once said, "It is difficult to say what is impossible, for the dream of yesterday is the hope of today, and the reality of tomorrow." We need to bear that in mind as we hold our collective breath during each and every countdown in 2024.

In this issue of Satellite Evolution Global, we sit down with Josh Brost, the Senior Vice President of Revenue Operations for Relativity Space who provides an update on the development of the company's new Terran R rocket. Ryan McDevitt, founder, and CEO of Benchmark, gives us the inside scoop on how his company is revolutionizing in-space propulsion. Jennifer Manner, Senior Vice President of Regulatory Affairs at EchoStar shares her insights on how satellite connections direct to cell phones are becoming a reality and Bogdan Gogulan, Managing Director of NewSpace Capital tells us why we should invest in the satellite industry in 2024. Finally, Matt Medley, Global Industry Director, A&D, IFS unpacks the defense spend in a year of budget increases.

Photo courtesy Relativity Space



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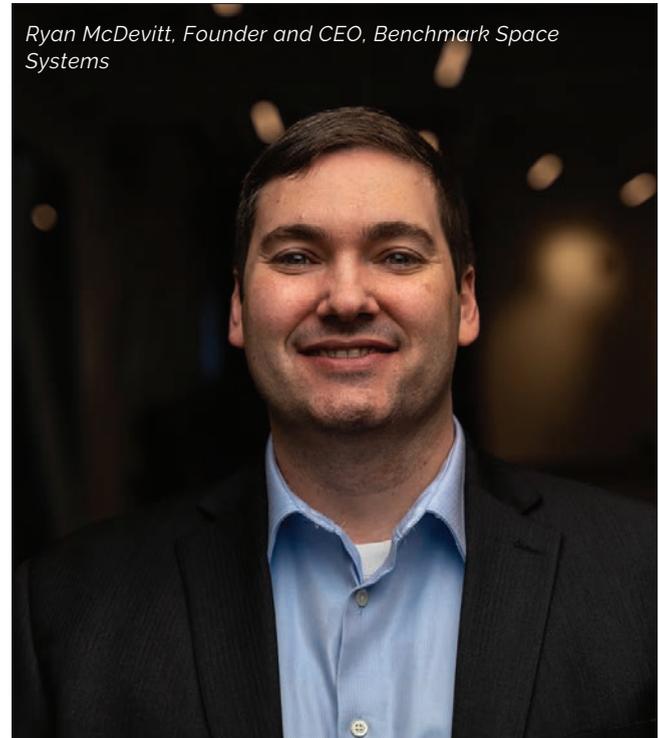
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Ryan McDevitt, Founder and CEO, Benchmark Space Systems

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## Gilat awarded \$10 million follow-on order from the US Department of Defense

**NORTH AMERICA:** Gilat Satellite Networks Ltd has announced that the US Department of Defense has awarded a \$10 million follow-on order to one of the company's US-based subsidiaries, DataPath. This additional order is for DKET 3421 terminals, transportable satcom hubs that deliver the operational flexibility, capacity, connectivity, and control required to ensure success anywhere in the world. The field-proven DKET 3421 terminal supports multi-carrier operations with a scalable modem architecture (up to 32 modems) while weighing under 5000 lbs. to allow for easy transport over air, land, or sea via a variety of aircraft and vehicles. Deploying in less than three hours, the DKET 3421 provides a satellite network hub in the form of a single-skid with the flexibility to leverage available satellite assets.

"Our solutions are specifically tailored to meet the strict requirements of government and military operations. We

take great pride in our unwavering dedication to meeting and exceeding the expectations of our customers, and our team works tirelessly to provide innovative solutions to their mission-critical requirements" said Barry W. Botts, Vice President, Sales and Business Development for DataPath. "This follow-on order is a testament to the outstanding performance and satisfaction our solutions consistently deliver." ●

## Telesat selected as one of the National Capital Region's Top Employers for 2024

**CANADA:** Telesat announced its selection as a National Capital Region's Top Employer for 2024 by Mediagroup Canada Inc., organizers of the annual Canada's Top 100 Employers project. This prestigious recognition underscores Telesat's commitment to creating an exceptional workplace environment and fostering a culture of excellence.

The National Capital Region's Top Employers is a special designation that recognizes employers in the Ottawa-Gatineau area. In addition to the selection reasons

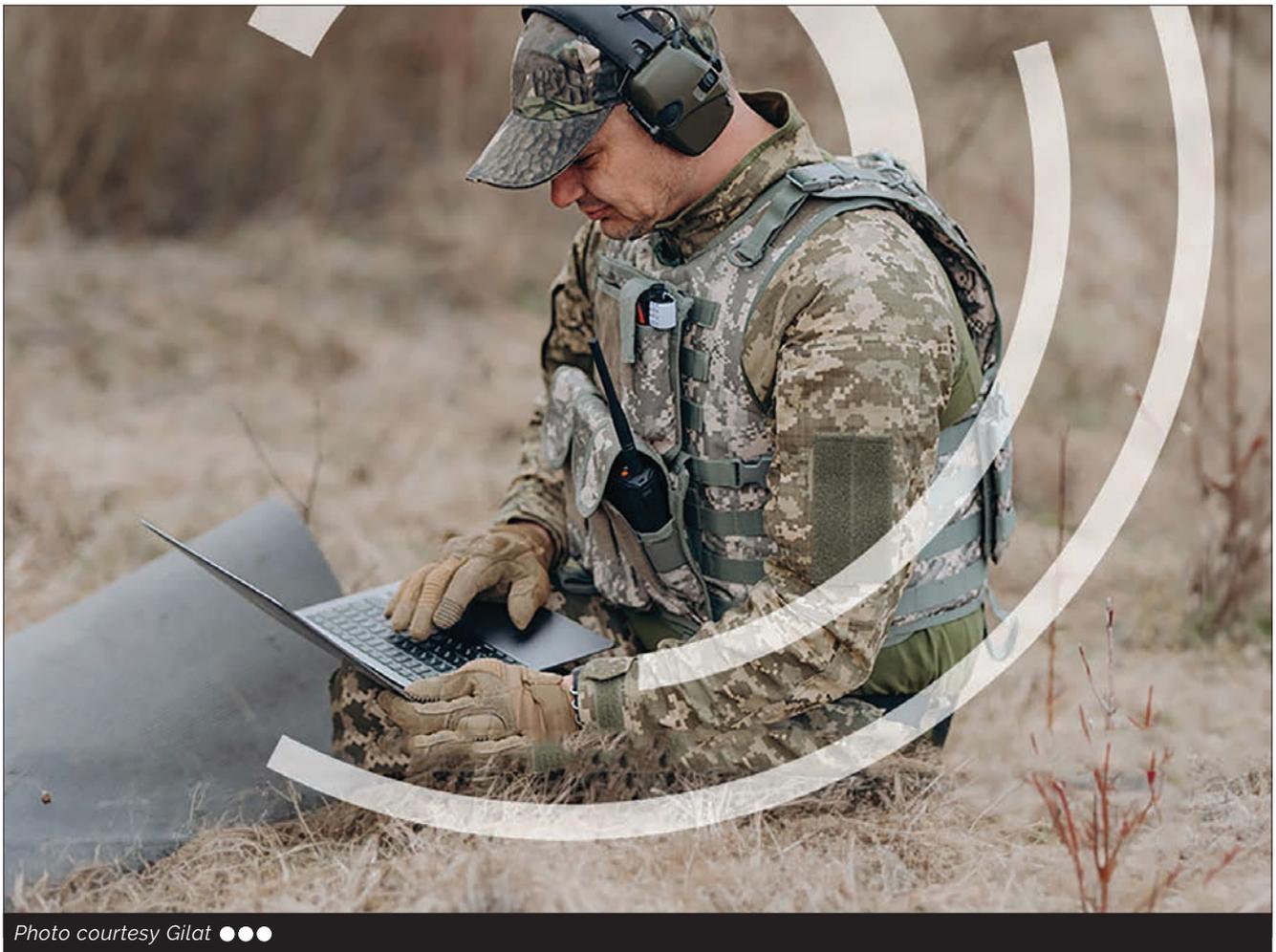


Photo courtesy Gilat ●●●

noted by the editors at Mediacorp, Telesat implemented a wide range of initiatives to support its employees including comprehensive benefits packages that extend past retirement, retirement planning, and financial incentives. These efforts have not only enhanced the overall employee experience, but also positioned Telesat as an industry leader in attracting and retaining top talent.

"Telesat's culture embraces inclusion, collaboration, and empowerment for each employee to take initiative and develop creative solutions to support the company's mission," stated France Teasdale, Telesat's Vice President of People. "Our greatest asset is our people, and being acknowledged as a top employer for fostering a workplace where innovation, diversity, and employee well-being are valued is a tremendous honour."

Telesat's employees are at the forefront of innovation, working passionately to bridge the digital divide. Through Telesat Lightspeed, the company's revolutionary low earth orbit (LEO) satellite constellation, they are expanding the reach of 5G networks and enabling affordable, broadband data connectivity worldwide. This ambitious initiative, the largest space program in the company's – and Canada's – history, will not only transform connectivity, but also create over hundreds of high-quality jobs in the National Capital Region. Current full-time and co-op job openings can be viewed at <https://www.telesat.com/careers>.

As Telesat continues to push boundaries and shape the future of connectivity, this accolade reinforces its commitment to providing an extraordinary work environment, where employees feel valued and inspired to achieve their best. ●

## XipLink demonstrates multi-orbit LEO/GEO/Cellular via XipNet

**NORTH AMERICA:** XipLink has announced the successful completion of multi-orbit, aggregated, and optimized bonded connectivity at the recent "Resilient LEO/GEO Demonstration" at the Maritime and Defense Technology Hub in Saint Petersburg, Florida. Each of the partners brought unique expertise to the event including systems integration, live GEO/LEO/Cellular links, Teleport Services and XipNet cloud connectivity for this live demonstration.

The GEO services were terminated using Eutelsat's Advance Modem, while two LEO connections via OneWeb were terminated with Inster terminals for communications on the pause and Kymeta for communications on the move. Cellular data was supplied with standard 5G modems.

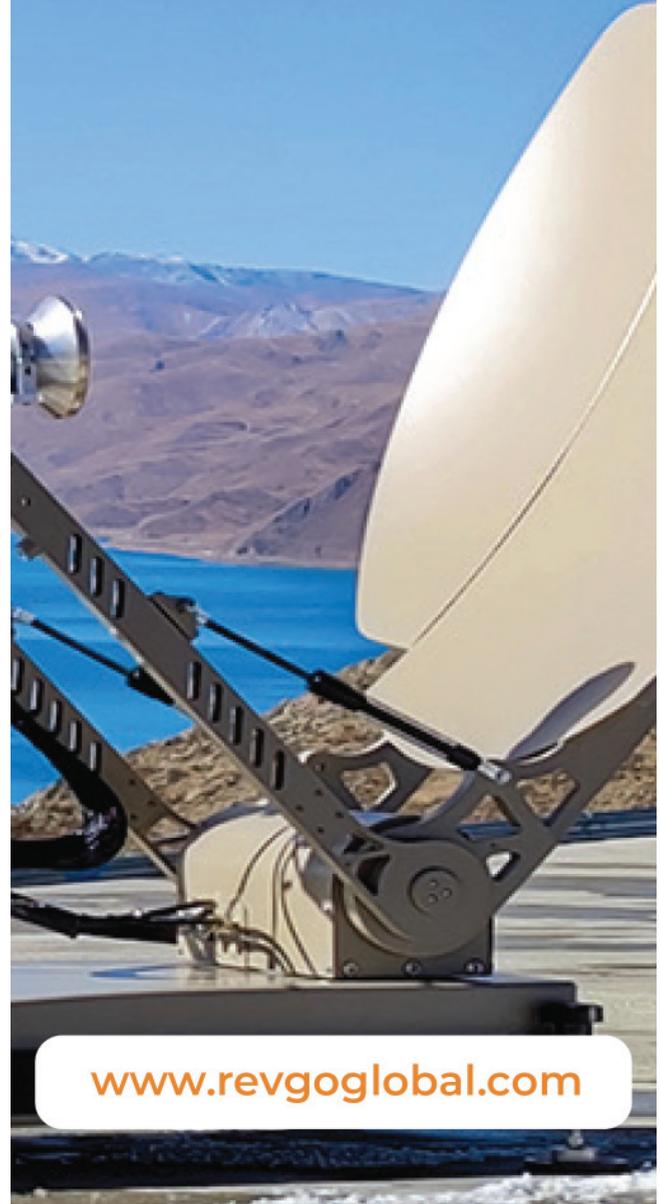
These terminations were aggregated using the XipNet edge node, which provides bonded/balanced aggregation for all connections, routing, quality of service assignment, traffic steering, TCP acceleration and optimization in one unit. These links were aggregated and terminated in the XipNet cloud for simplicity and scale. The high-level view is depicted in the drawing below:

Many functional tests were run including aggregation of all connections for increased capacity, traffic recovery under failure scenarios including lost link (subsequent



## Multi-Band and Multi-Orbit

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automatic return to primary), priority for voice traffic including normal and fail/recovery scenarios with no loss of SIP call connection, multiple file transfers for capacity test and classification tests for prioritization. Due to critical system requirements for the military and maritime users present, session persistence for TCP connections was essential for seamless connectivity in the multi-orbit configuration. The network was then opened to the audience for random live testing.

Artel's Ed Spittler, who hosted the event, said "In one of the first live demonstrations for multi-orbit connectivity, it was amazing to see the cooperation of the partners as well as new technologies combining for flawless

bandwidth access, increased capacity, proper assignment for the traffic paths and extremely fast re-assignment upon link failure or other blockages. Overall, Artel and the audience were extremely pleased with the outcome."

Jack Waters, CEO at XipLink, added "We very much appreciate the opportunity to show the ease of configuration and outstanding results for the XipNet cloud service with remote aggregation capability. While not demonstrated at this event, by adding TCP and Optimization to links requiring them, XipLink is highly differentiated from other solutions with typically 30 percent higher goodput and outstanding user experience benefits." ●

## Sateliot and EWT To revolutionize wildlife conservation in Southern Africa with 5G IoT satellites

**AFRICA:** Sateliot and EWT (Endangered Wildlife Trust) have finalized an agreement. The collaboration aims to deploy 5G IoT sensors on vultures, a significant step toward safeguarding endangered species and combating poaching in Africa.

Sateliot's collaboration with NGOs extends 5G satellite coverage to the organizations. This extension is seamlessly facilitated through standard roaming with existing Mobile Network Operators (MNOs), eliminating the need for additional satellite user equipment. NGOs can now leverage the same terrestrial standard used by Mobile Operators to expand their operational reach.

Access to connectivity for IoT in remote areas has remained a big challenge, especially in the large expanses of water and land where most of the Earth's biodiversity is located. Numerous animals and plant species live here, some under significant pressure and endangerment.

With this agreement, EWT will benefit from true Global connectivity at no extra costs, enabling massive deployments of IoT devices and improving their current operations.

### "The Eye in the Sky" is a proven technology

Illegal trade has seen thousands of vultures poisoned across Africa, devastating populations, and driving them rapidly towards extinction in the wild. Scavenging mammals, including Lions, Hyaenas, and Leopards, are also severely impacted by poisoning. A key factor limiting the capacity to reduce or avoid the large loss of wildlife to poisoning is our ability to locate and respond quickly to poisoning events. The early detection of a poison source and the decontamination of a poisoning scene radically reduce the further loss of wildlife. Fast action also allows response teams to save surviving wildlife.

To address this ominous threat in southern and east Africa, the Endangered Wildlife Trust has harnessed the natural sentinel and foraging behavior of vultures to our advantage and coupled this with novel GPS-tracking technology; developing a pioneering rapid poisoning detection system, which we call Eye in the Sky. This system closely monitors the behavioral signatures in GPS-tracked vultures to remotely detect the presence of poison sources and feeding events associated with potentially poisoned-laced carcasses. Using this rapid detection system, the EWT has already started to reduce the impact of wildlife poisoning in southern Africa significantly.

Presently covering approximately 15 million km<sup>2</sup> with over 380 vultures of five different species, the EWT's Eye in the Sky is a game-changer. Monitored through EarthRanger software, the GPS-equipped birds send alerts to various front-end platforms, enabling rapid response teams across Africa to react swiftly to poisoning events.

In the past year alone, this revolutionary system has successfully identified 15 poisoning events. The quick response allowed teams to rescue over 100 highly threatened vultures, swiftly eliminate the poison sources, and decontaminate the scenes, ultimately saving countless lives. The Eye in the Sky is a testament to innovative technology's power in preserving our planet's invaluable wildlife heritage.

Alison Janicke, EWT's Head of Business Development, said: "Sateliot's support will significantly impact our organization. This financial relief will enable us to allocate these funds to other critical conservation work. Beyond the monetary savings, partnering with Sateliot will also spare us some time and effort spent on fundraising, allowing us to invest that time in on-the-ground conservation activities."

Gianluca Redolfi, CCO at Sateliot, envisions a future where satellite connectivity revolutionizes how NGOs engage in conservation efforts. "By harnessing Sateliot's advanced capacity allocation techniques, NGOs can tap into free satellite capacity during specific time slots and locations at no extra cost." This breakthrough strategy ensures efficient data transmission, empowering NGOs to maximize their impact on the ground. ●

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## Ovzon: Addressing clear market demand

Resiliency is a critical aspect of military satellite communications (milsatcom), ensuring the continuity of critical communication networks in the face of various disruptions and challenges. In the dynamic and unpredictable nature of the battlefield, milsatcom systems must be able to withstand physical damage, electromagnetic interference, or cyber threats to maintain essential communication links. Disruptions to these communications links can have severe consequences, hindering operational coordination and even endangering troops and assets.

### MARKET DEMAND

Established in 2006, Ovzon was conceived by industry experts to address a clear market demand: a satcom solution that blended the mobility and ease of use of MSS with the high data throughput of HTS/FSS. The goal was straightforward — to meet multiple customer needs by pioneering a satellite communication system marked by exceptional mobility, performance, and resiliency.

To realize this vision required complete control over the entire communication process, from proprietary terminals, satellite capacity, and teleports, as well as support and services. This is how Ovzon created a complete end-to-end solution: Ovzon SATCOM-as-a-Service.

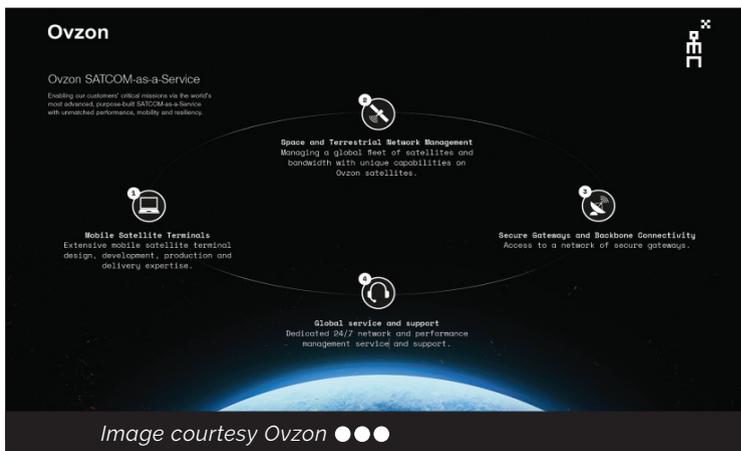


Image courtesy Ovzon ●●●

For Ovzon, developing and launching a new satellite system, like Ovzon 3, was not an end in itself. Every technical choice made during the conception and development of the satellite was meticulously tailored to meet several core customer requirements simultaneously. Ovzon 3 is a revolutionary new class of geostationary satellites, the first in its class, that has been specifically developed to provide the highest degree of mobility, performance, and resiliency - offering superior performance for mission-critical assignments.

Military forces must preserve their critical communication infrastructure at all costs in order to



Photo courtesy Ovzon/Maxa Space Systems ●●●

maintain operational effectiveness. Modern warfare is characterized by complex and dynamic environments, including weather conditions, hostile near-peer environments, adversaries employing sophisticated electronic warfare capabilities, or compromised gateway stations.

Ovzon 3 is unlocking a disruptive next-generation technology platform, enabling key customers to fully take advantage of premium satellite communication.

With Ovzon 3, Ovzon will have its technology both on the ground and in space. Ovzon 3 and its on-board-processor will enable Ovzon to meet these pivotal requirements for resiliency and assured connectivity.

The software loaded allows the OBP to:

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- Full-mesh support in a teleport-denied environment.

These new capabilities give military forces a significant strategic advantage as they are able to maintain situational awareness, coordinate actions, and project power effectively, even in the face of adverse conditions.

But resilience is an ongoing process, requiring continuous adaptation and improvement to address emerging threats and technological advancements, with Ovzon 3's on-board-processor, a fully reprogrammable software-defined payload, Ovzon has a future-proof asset in space that allows for the adjustment and the development of features against emerging threats. ●

To find out more about Ovzon 3 and its capabilities visit: [www.ovzon.com/en/section/ovzon-3](http://www.ovzon.com/en/section/ovzon-3)



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## Satellite connections direct to cell phones becoming a reality ●●

More than a billion people — about a fifth of the world's population — live in areas with no mobile phone service. Even in highly developed countries like the United States, hundreds of well-traveled rural areas have no cell coverage. There's a good reason for this: it costs too much to build cell towers in out-of-the way places to serve just a few customers.

*Jennifer Manner, Senior Vice President of Regulatory Affairs at EchoStar*

Network providers have known for years that satellites offer the best means of delivering service to those off-the-grid customers. The challenge has been making it affordable for the end user. From the first satellite telephones in the late 1990s to just a year or two ago, using satellites for phone service has required specialized user equipment and expensive connection fees.

That is beginning to change. A partnership of mobile service providers, satellite operators, and network equipment manufacturers has finalized a standard to use 5G cellular technology with non-terrestrial networks such as satellites. The adoption of the standard after years of development allows mobile phone manufacturers to embed chips in cell phones that can receive a satellite signal.

The widespread use of mobile phones with such chips gives satellite operators the incentive to launch low-earth-

orbit (LEO) satellites capable of providing widespread phone coverage.

Today operators like EchoStar and GlobalStar are already providing direct to cell services for one- and two-way messaging using existing satellite systems. But these operators, as well as others, are on their way to launching LEO satellite constellations which can deliver direct to cell phone services that support email, texting, video, and more with minimal latency. These systems will begin to be active in the next couple of years.

### NEW REVENUE STREAM

The promise of a new revenue stream for cell phone manufacturers, mobile service providers, and satellite operators will provide the incentives necessary to get these direct-to-device networks up and running. Some analysts predict that the new business will be generating US\$1 billion annually in just a few years.

For consumers, having satellite connectivity will allow for roaming on a 5G network in areas that are not currently served by cellular ground stations. It will also bring mobile

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Jennifer Manner, Senior Vice President of Regulatory Affairs at Echo Star ●●●

Companies such as auto manufacturers will be able to quickly do mass software updates in cars on the road or manage fleets of autonomous vehicles. The technology also has many Internet-of-things applications, including helping farmers with precision plowing and livestock monitoring; tracking valuable assets like shipping containers in transit; and monitoring equipment such as oil rigs and weather stations.

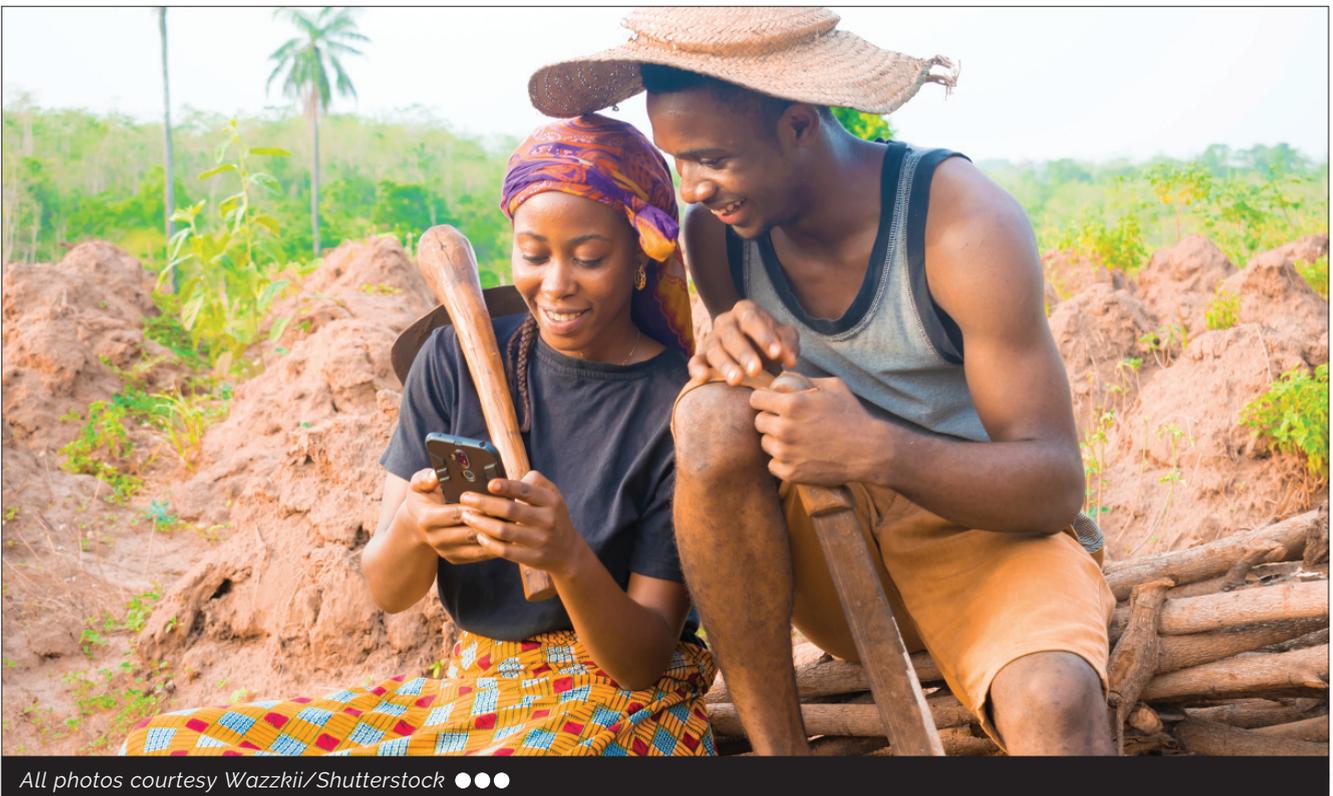
However, a few challenges must be dealt with before 5G connectivity from satellites is truly global:

- Existing regulatory procedures in most countries have not anticipated direct-to-device satellite connections and may need to address issues such as device approval. These regulatory issues will need to be harmonized so that service providers are able to bring services to market quickly.
- The new 5G standard includes the necessary requirements for satellites in the L and S-bands. But additional work needs to be done to include additional features and functionality and additional frequency bands.
- Increased demand for satellite connections will require additional spectrum allocation for mobile satellite services. Regulators may need to allocate additional bandwidth to support the additional demand.

service to parts of the world that currently have no connectivity or only have older 2G services, which do not support Internet connections. This will be an opportunity for service providers to add new customers.

Mobile connections to satellites will offer vital new services to consumers, companies, and governments. For example, people enjoying the great outdoors can check-in with their loved ones or, if worse comes to worse, call for help. The 5G connection from space will offer continuous connectivity for disaster response teams, search and rescue operations, and military maneuvers.

The operations of these new networks are just beginning and the roll-out of services will be gradual but, in the very near term, availability will be widespread. What is clear is that connecting cell phones to satellite networks is a major step toward making ubiquitous connectivity a reality. ●



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● ● Ryan McDevitt, Benchmark's Founder and CEO

Satellite Evolution Global

Q&A

## Revolutionizing in-space propulsion ● ●

Benchmark Space Systems has evolved from developing propulsion systems for cube sats to providing sophisticated hardware, software, and operational expertise enabling precise mobility in space. We talked to Ryan McDevitt, Benchmark's Founder and CEO to find out more about the company's remarkable technology.

*Crispin Littlehales, Executive Editor, Satellite Evolution Group*

**Question: What inspired you to found Benchmark and what has surprised you most about the company's evolution?**

**Ryan McDevitt:** In 2014, when I got my PhD, I was watching companies like Planet and Spire use cube sats to do cool stuff in space. I was excited and inspired by that, but I also thought there was an opportunity for a company with a focus on propulsion to contribute to the missions of all these small sat companies.

What has been surprising is how much the falling costs of launch have increased opportunities for satellites to get into orbit and to witness the evolution from the very small satellites to larger satellites that are performing very complex applications like viewing climate change from space using hyperspectral imaging.

**Question: As we increase the number of satellites that go up, we have some serious issues with crowding and collisions. Isn't propulsion key to addressing those ills?**

**Ryan McDevitt:** We have been advocates and thought leaders for the responsible use of space from the moment we started the company. Our products are very well suited to being a low cost, reliable solution to this problem that is facing everyone. Last year, we introduced our COLA



Benchmark and AFRL are unleashing ASCENT as a viable safer green propellant. Photo courtesy AFRL ● ● ●



Benchmark's new 40000 sq ft HQ features full end-to-end internal test and manufacturing capabilities ●●●

(collision avoidance) Kit which can bolt onto a spacecraft to provide augmented protection against on-orbit threats.

It's a challenging problem and it has been gratifying to see how the industry is also thinking about sustainability. Of course, it will take the cooperation of everyone involved to get the problem solved. Benchmark is contributing not only to the technology side but also to the policy side. We were out at the AIAA (American Institute of Aeronautics and Astronautics) ASCEND conference in October leading a panel on space traffic management.

**Question: You describe Benchmark as "Your In-Space Mobility Partner" on the website. What do you offer to customers and what sets you apart from competitors?**

**Ryan McDevitt:** When we got started, our primary customers were subsidiaries of NASA and the Air Force—people who knew how to use propulsion. They wanted us to build things for them and hand them over. As the barriers for entry to get into space lowered, we would talk to companies and find ourselves getting involved in the very early stages. Over time, we became more and more embedded in the planning and pre-integration stages including guidance, navigation, and control. That then led us to helping with the design of the missions.

In the early days, we sometimes worked with customers who needed a product that we didn't have and so we would find the right fit. Over time, through partnerships and acquisitions, we have developed a full suite of solutions. We evolved organically through our desire to help customers at every step along the way.

What I believe sets us apart from competitors is that we view our role not as a company that sells a product, but, rather, a company that sells a solution to a problem.

We'll take care of the software, electronics, hardware, on the ground fueling, in-space operation, and end-of-life decommissioning. We can be a company's partner for all those different things. That's our value proposition and each customer can pick which parts they want.

**Question: Benchmark has made a couple of acquisitions in its six-year history. What was the rationale behind those moves?**

**Ryan McDevitt:** We've done two acquisitions. The first was a transaction with Tesseract Space in 2020 and the second was with AASC (Alameda Applied Sciences Company) in 2022.

Tesseract is a chemical propulsion provider located in California. In 2017, when both companies got started, cube sats were the trend. As the years passed, satellites got larger and larger. While the propulsion technology Benchmark first commercialized was best suited to the smaller size satellites, Tesseract was concentrating on medium to large propulsion systems. We got together with the founders of Tesseract and decided to bring the two companies together under one umbrella. I am proud to say that within the first month of us working together, we landed a contract for flight demonstration hardware.

Fast forward to 2022. We were then helping customers identify what products were going to be the best fit for them. Chemical propulsion is the right choice when you want to move quickly in space, electric propulsion shines when it comes to efficiency. We saw this metal plasma thruster technology (MPT) that had been developed by AASC. It was so interesting and unlike anything else that was on the market. NASA, the DoD, and several commercial entities were also excited by it. By acquiring

this technology, Benchmark obtained a unique, differentiated product which we've since commercialized under the name, Xantus.

**Question: You now have offices in Vermont, California, and the UK. What prompted your decision to branch out to those locations?**

**Ryan McDevitt:** We moved AASC into a new research and development facility which we built in California. Having a facility there gives us great access to our customers up and down the West Coast. Setting up in the UK is all about taking advantage of the resources for customers interested in green propulsion technology. In Europe there's tremendous interest in space sustainability. We are seeing a lot of emphasis from ESA on a zero debris future with efforts such as the ClearSpace-1 mission. In addition, for decades the UK was an industry leader in the specific chemistry that we use at Benchmark—hydrogen peroxide-based thrusters. As a result, they have infrastructure and talent that is pertinent to us. So, it was a natural fit for us to expand over there.

**Question: In August 2023, Benchmark moved to new headquarters touting world-class manufacturing and testing capabilities. How did you manage to fund the expansion and what are you creating there?**

**Ryan McDevitt:** In 2022, we asked ourselves how can we deliver quality, on time, at scale? Many satellite manufacturers are now planning to produce dozens or even hundreds of units. Those companies are going to want partners that can do the same. We saw that the big limitation for us was going to be on the build side and the

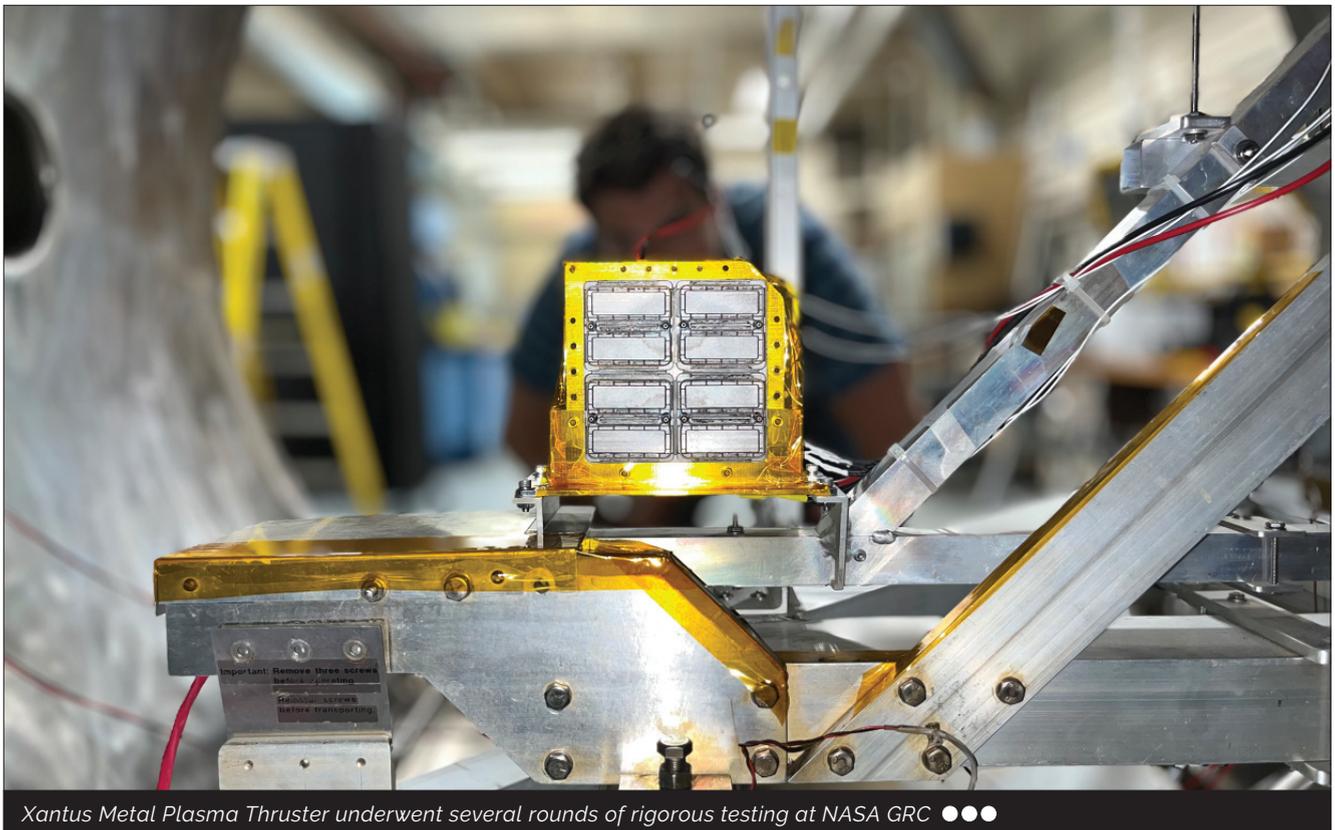
test side. If we didn't have the capability to do those two things at scale, we were never going to be able to keep up.

We put together a strategy to go out and get funding. We raised our Series B—US\$33 million in capital—in 2023. It took a lot of work from our investors and board of directors and our management team to accomplish that in today's difficult fundraising environment, but we were able to set up the new facility and transition from an early-stage research and development company into a more mature production-based company.

All our flight hardware is produced at the Vermont facility. The primary products that we are shipping from there are the 22N Ocelot thruster and systems built around that. Then, too, we have contracts with companies to build orbital transfer vehicles, re-entry vehicles, and onboard propulsion systems. We also produce our 2 Newton Lynx thruster systems there. Those are our smaller spacecraft. We've got 160 of those thrusters that we've been building out over 2023 and into 2024. The new and exciting product that we're setting up to create here is the Xantus metal plasma thruster. Our thruster development, both on the chemical and electric side is done out of the California office and as that technology reaches its production stage, we move it over to Vermont where we build and test.

**Question: The company's Xantus metal plasma thruster is being supported by NASA for flight readiness. Can you provide some details about both the technology involved and the relationship with NASA?**

**Ryan McDevitt:** We now have several patented innovations around the MPT technology. The idea is very simple in



concept and hard to implement. A variety of metals can serve as the propellant (everything from stainless steel to copper, which we've demonstrated in vacuum chambers). We use molybdenum. The voltage discharge looks like a lightning bolt in a vacuum. It strikes the metal, shoots in one direction, and the spacecraft goes in the opposite direction. Because it is a metal propellant, there are no moving parts; there are no valves; there is no pressure. We can ship it, fully fueled to the customer. They can install it without any special safety equipment.

Xantus produces very small, discrete thrust events that chain together. It enables two types of movement in space. One is rendezvous and proximity operations where you have multiple spacecrafts. This includes applications such as on-orbit fueling and in-space manufacturing. One of the big challenges with that is the ability to match up relative motion. If you only have large thrust capability and a small spacecraft, it is very difficult. Xantus is well suited to that fine precision maneuvering and therefore a perfect technology to support those kinds of rendezvous operations.

The other area that's garnering increased interest is laser pointing which requires maintaining a very tight window. So that was something NASA found exciting during the time that the technology was being developed under AASC. NASA invested through various funding mechanisms to help get the technology demonstrated. We've been able to continue the relationship and are doing vacuum testing at Glenn Research Center to prove that the propulsion system works as expected. Indeed, this MPT technology is in consideration to be the primary propulsion for some important NASA missions going forward.

**Question: Benchmark recently won a 2-year AFRL SPRINT award from the DoD to further develop and test flight optimized thrusters using the ASCENT fuel. How is that project progressing?**

**Ryan McDevitt:** ASCENT non-toxic fuel has been in development at the Air Force for the better part of a decade. It was developed to replace hydrazine and is much safer to use. The trade-off is that it's not easy to get it to burn at the smaller stages. The Air Force has done in orbit demonstration of this propellant in the 1Newton scale and now the Air Force is interested in looking at how Benchmark can make it work in larger propulsion systems.

We've had some ideas about how to optimize the fuel injection and the ignition mechanism which is one of the challenges associated with using ASCENT on a larger scale. As you scale up the thruster, you have infinite power, and you can get the catalyst bed hot and make it work. However, in space, you're limited. You don't have infinite power; you have solar panels and a battery. Our focus is on figuring out how to overcome those limitations.

Benchmark has an upcoming critical design review with the Air Force and from there we will move to procuring and building this first flight like thruster. We are bringing forward the technology that the Air Force needs—the five pound or 22 Newton thrusters.

**Question: Space Force Lt. General John Shaw has said that maneuverability will provide a significant national**

**security edge in space. How is the company positioned to meet the intensifying DoD demand for rapid deployment propulsion systems to enable dynamic space operations?**

**Ryan McDevitt:** There are three parts: operational, hardware, and software. From an operational standpoint, we are now able to produce and test at scale under one roof at the Vermont facility. That's a big part of getting the product into the hands of the war fighter as quickly as possible.

On the hardware side, we are taking core components of our hardware and qualifying them for a wide range of in space operation capabilities. For example, we have a thruster that we know will work in LEO, GEO, and cislunar orbit and we can have that sitting on the shelf. This means we can rapidly reconfigure different building blocks into propulsion systems that can be used for different missions.

For Benchmark this includes chemical, electric, and MPT systems and it also means working with partners who are building other technologies. The Holy Grail for us is the hybrid solution where you get chemical and electric on the same platform, giving you the best of both worlds—rapid maneuvering when you need it and high-efficiency maneuvering when that's the requirement.

The development of our software platform, SmartAIM™, was funded by the Air Force which saw the need for software that is flexible and adaptable to different mission types. At the time, it wasn't called SmartAIM™, it was just Benchmark developing technology for the Air Force and then we productized it. We made it as seamless as possible for the integrator and as easy as possible for the operator using it in space. We've incorporated other capabilities and technologies over time, but ease of use was the genesis.

When you put these three areas together, it means that Benchmark can be responsive to a wide variety of mission types and mission operations in a very short period. We don't need to reconfigure and go through the traditional route going back and forth with RFPs. We have the solution on the shelf. That's what is going to be necessary for the US and our allies to be competitive and protected in the current environment.

**Question: Where do you see the company going in 2024 and beyond?**

**Ryan McDevitt:** In 2024 we will be launching the next upgrade of our Ocelot thruster. There are also several opportunities coming up for Xantus and Lynx thrusters to be demonstrated in orbit. That is what is most exciting. Seeing our products get into the hands of customers and then get into space.

As far as the longer-term roadmap does, it's all about building the in-space economy. Pretty much all the value in space is generated on Earth. At Benchmark we are thinking about things like lunar habitats, lunar landers, and a lunar economy. We're considering the logistics involved in supporting our aspirations beyond Earth and our role in delivering solutions for things like moving goods and services between space stations or how to recover things from space and bring that back for use on Earth. All that will be happening, maybe not in five years, but faster than we think. ●

# Why 2024 will be a big year for satellites – and why they need investment ●●

This year may be another landmark year for satellites, especially in low Earth orbit (LEO). Satellite communications, or SATCOM, may see its biggest comeback this year. Developments in this sector have been quickening – and catching the attention and imagination of non-specialists.

*Bogdan Gogulan, MD of NewSpace Capital*

These days, we have satellites to thank for a great number of things which we increasingly take for granted. Accurate location tracking for instance, which supports logistics, navigation, and traffic management, 5G communications, and more. Precision farming, also enabled by satellites, improves yields, irrigation management, and sustainable farming in agriculture. Satellites track emissions, floods, fires, and other climate events, giving governments the data to take action. Satellites – unseen and, for many non-readers of this magazine, unsung – facilitate much of daily life.

## DRIVERS FOR CHANGE

There are a number of drivers of these changes, one of which is cloud computing. Driven by demand, cloud revenue is forecast to continue to grow at a rapid rate worldwide in the months ahead. Microsoft took its Azure cloud platform into space in August 2023, showing that satellites have a part to play in the future of the cloud. Amazon's Project Kuiper, which aims to increase global broadband access through a constellation of more than 3,000 satellites, is set to offer cloud services for Amazon Web Services (AWS) via satellite.

Meanwhile, telecommunications companies and mobile network operators, who have been facing a number of obstacles to growth, are seeing satellites as a possible solution.

Changes in price points and ease of access, as well as the increasing standardization of compliance rules with telco operations, are driving this. Indeed, the convergence of satellite and telecoms is a trend to watch. Satellite players have already started to adopt the standards used by telecoms operators and only cost, which is coming down, has prevented deeper integration.

Then there's the Internet of Things (IoT). In principle, using IoT, businesses can operate remotely, monitoring devices from a base of operations. But in remote areas, a lack of mobile coverage makes this impossible. Satellites can step into the void, as they already have done for mobile phone providers and other companies, to provide IoT anywhere on the planet.



## A QUESTION MARK OVER STARLINK

Established SATCOM players will be keeping a watchful eye on Starlink, a creation of Elon Musk and a subsidiary of SpaceX. Starlink, which currently has around 5,000 satellites in orbit, has full vertical integration, powerful brand recognition, and a growing customer base. SpaceX can launch Starlink satellites at the lowest possible cost, and so the company can optimize its capital expenditure, which will force Starlink's rivals to reduce their prices and thus their margins.

But Starlink, despite announcing US\$1.4 billion in 2022 revenue – more than a billion more than in 2021 – remains opaque. In brief, it isn't clear exactly where or how the money is made. Elon Musk's portfolio of businesses is so vast that money could plausibly be moved around as needed to improve the optics of a certain company. Therefore, it remains too early to say exactly what Starlink's ultimate market position will be. Certainly, it is a disruptor and it may come to be one of the market leaders. But a highly competitive environment can be expected in the coming years, fueled both by legacy and emerging players alike, with end users likely to be the ultimate beneficiaries.

## THE NEED FOR INVESTMENT

Investment is the engine of growth in just about every sector, and SATCOM is no different. Generous and sustained funding will be necessary if 2024 is to be the Year of the Satellite.



Photo courtesy CodedeathH33/Shutterstock ●●●

It's true that investors have become more conservative of late, thanks to the fairly grim economic outlook; but in many ways that has been a good thing. After years of chasing unicorns (and, in some cases, finding they really were imaginary), investors have become more diligent, choosing to direct funds into areas where not only the outlook is positive, but the supporting data is robust. One of these is the space sector.

McKinsey and Co. found that over the past decade, the space sector has seen massive growth in investment activity. Between 2012 and 2021, total annual investment grew to more than US\$10 billion, up from just US\$300 million. And its LEO ventures have received the lion's share of the funding from investors, who have recognized the sheer diversity of use cases for low-Earth orbit satellites.

But the opportunity that the space sector presents is so vast, and the rate of growth in the sector so rapid, that more investment is needed. Consider how in 2021, at the end of the period McKinsey and Co. looked at, data could

be gathered by satellites and made usable on Earth at a rate of 2.7 terabytes, which isn't bad. In 2023, it hit *48 terabytes* a second. That's a small indication of how the sector is growing which is why Morgan Stanley's Space Team estimated that the roughly US\$350 billion global space industry could hit US\$1 trillion by 2040.

#### CONNECTIVITY, CONNECTIVITY, CONNECTIVITY

The watchword in SATCOM this year is: connectivity. The industry will be dynamic. There will be disruption. There will be many, many more constellations floating around in the sky above us, serving ever-more customers with broadband access. The established satellite communications operators may have a tough time of things, but many people will benefit for the same reason.

Some questions remain unanswered. Will Starlink blow away the competition? And how sustainable are satellites? But some things are certain too, and one of them is that this year will be a big year for the satellite. ●



● ● Josh Brost, Senior Vice President of Revenue Operations, Relativity Space

Satellite Evolution Global

Q&A

## An iterative approach to building rockets ●●

Relativity Space has experienced a meteoric rise since its founding in 2016. Last March the company launched the world's first 3D printed rocket, and while it didn't reach orbit due to a stage-two anomaly, its creation gave Relativity a mighty jump-start on the development of a much larger reusable rocket—Terran R. We talked with Josh Brost, the company's Senior Vice President of Revenue Operations about Relativity's remarkable journey and its ultimate destination.

*Crispin Littlehales, Executive Editor, Satellite Evolution Group*

**Question: What sparked the genesis for Relativity Space and what are the key milestones in the company's evolution?**

**Josh Brost:** The co-founders, Tim Ellis and Jordan Noone, saw that there was a swiftly emerging need for more players, more capacity, and more diversity of capabilities for launching to space. The company decided to go after a small rocket first because it was a more tractable problem. In many ways, Terran 1 was a much more ambitious and complicated first rocket than it needed to be, but that was intentional because we knew we wanted to go on to something bigger.

So, we started with Terran 1 which was a great learning tool for the whole company. We learned what it takes to develop a launch system from end to end. Even though we had a bunch of senior leaders who had done rocket programs at other companies, here it was fundamentally different than what they had done before. There were different gaps to fill. It was essential to exercise the system from beginning to end to learn all the things required.

The work we did on Terran 1 set us up very well to do our next clean



Terran 1 launch. Photo courtesy Relativity Space ●●●

sheet development and we knew from the number of customers that were signing up that it was perfect timing for that medium to heavy lift capability rocket. We felt like we had learned to demonstrate enough things on the Aeon R engines to have that confidence to move forward. Obviously, Terran R is a much bigger launch system, and we were also moving from an expendable system to a reusable one, but the Terran R does leverage a lot of what we had learned.

**Question: Tell me more about Relativity's approach to additive manufacturing. How does it enable you to bring Terran R to market faster?**

**Josh Brost:** When you're in development, the key thing that additive manufacturing unlocks is the ability to take a more iterative approach. You can go from concept to manufacturing in a much shorter timeframe. This means that, over the course of a couple of years, you can go through many different generations of various components and make them better faster. Contrast that to traditional manufacturing where you need to be right on your final design years ahead of time. That has two negative impacts: it means you cannot get experiential learning from testing hardware, and it means you're not going to try as many new things.

We've brought in the best of breed of outside additive capabilities, and we've developed internal additive capabilities. All of those are coming together to enable us to iterate swiftly. For example, on the engine development program that we've had for an Aeon R, which is a much larger engine than the one we used to power Terran 1, we were able to go from the initial conceptual sizing to a full mission duty cycle in less than two years! That accelerated timetable was enabled by a vast amount of component testing that we were able to accomplish along the way. We would design an injector and then test it, learn from it, and have the next generation on the stand a few weeks later. When you do that throughout the whole system you have an exponential learning curve. It changes the way you design. It changes the optimization, the analysis, and the testing. The benefit is that the pace of learning that you get from using additive manufacturing in smart ways lets you get to a better product far more rapidly.

**Question: Direct-to-device connectivity is making headlines. What does that mean for satellite launch demand and how does Relativity Space figure into the scenario?**

**Josh Brost:** Direct-to-device connectivity has gone from a nice capability to a mainline expectation. Just look at Apple

coming out with the SOS capability and suddenly everyone who owns an iPhone has a satellite phone. The technology developments that are making such applications possible are also leading to a large uptick in companies that are investing heavily in space-based capabilities. That, in turn, means more satellites need to be launched and that is accelerating demand for access to space which is what has been driving the decision to build the Terran R. We are making all those intentional choices to help us capture that rapid growth as soon as possible.

**Question: What went wrong and what went right with the launch of Terran 1 and how has that experience informed the development of Terran R?**

**Josh Brost:** I would say a tremendous amount went right. When we set out to develop Terran 1, it was tough to say exactly how much work it was going to require or how long it would take to complete because we didn't have an integrated team and tools for the whole product development cycle. In the process, we developed many core in house capabilities from design tools, to manufacturing tools, to testing and launch capabilities. We were able to take all the different subcomponents of a total launch system and prove them out through a launch campaign and we learned a tremendous amount.

When we first put our engine on the test stand to do an integrated hot fire, we fired it for a few seconds. Then it took almost two months to get to a mission duty cycle because we had to absorb all that we learned from the test and figure out how to tweak our analysis of how to get from the test into a configuration that could support a mission duty cycle. In December of 2023, we tested the engine on Terran R, just like we had on Terran 1, but by the end of that week we were able to complete a mission duty cycle test. That's partially because it was a better engine design because of what we had learned with Terran 1, but the engine learnings were only part of it. It was also due to the test and data systems learnings and the operational kind of cadence we'd developed that unlocked that much swifter timetable.

With Terran 1, we proved our launch site capabilities and as you know, launch sites are very complicated systems that need to work together seamlessly. We proved our ability to validate our predictions on how the primary structures on the rocket would perform including our first stage engines which did work as expected. We were also able to prove our guidance, navigation, and control capabilities for first stage flight.

In addition, we were able to demonstrate that our novel manufacturing capabilities could survive flight



Photo courtesy Relativity Space ●●●

environments. Where you can replicate a lot of things on the ground, you cannot match flight environments one for one. When the rocket is on the ground, it is being held in place whereas when it launches, it accelerates so it's important to get that flight validation.

What didn't quite work? We didn't reach orbit because we had some challenges with getting the second-stage Aeon engine to ignite and therefore it didn't reach full power. Of course, you learn a ton from what didn't work, and you are able to feed that back into the equation so that the same thing doesn't happen again.

The exciting thing for us as a team was that we made it further than any other new liquid fueled rocket company has on their first outing.

**Question: Currently, there is a supply shortage in the launch industry which makes it tough for companies wishing to get their satellites into orbit. How do you see the launch side evolving to meet the demand?**

**Josh Brost:** Infrastructure is moving from Earth to space. It's not about connecting every house and business from space; it's about augmenting those systems to provide reliable broadband connectivity where it was not economically sensible to do so. There are several new rockets coming to market. The reason we're so excited about Terran R is that it is designed for the sweet spot of the market. It's big enough to give you great economics yet it's a simple enough architecture that we can bring it to market quickly.

As we look into the future, there is a very strong interest in ensuring that we have a robust, healthy launch industry which means having a diversity of supply with ample competition. You need multiple players that all have competitive economics and unique systems to make that happen.

**Question: When is Terran R set to launch and what makes this rocket such a perfect fit in today's market?**

**Josh Brost:** It is scheduled to enter service at the end of 2026. Customers want great economics. They want to know that you're going to have enough capacity when it matters. Building a launch system that can only launch a handful of times a year doesn't move the needle for the supply demand imbalance. That's why we are designing our whole operating system to support rapidly scaling our launch cadence within the first few years of operation. We've received significant validation from our customers already. We've signed many agreements where customers are putting down nonrefundable payments to lock in launch capacity in the future. There is a total backlog of about US\$1.8 billion just for Terran R two years in advance of actual flight.

**Question: Relativity Space has made public its intention to send a commercial mission to Mars in the not-too-distant future. Why is it so important to beat SpaceX to that particular finish line?**

**Josh Brost:** It's not a one for one competition. It is very much about the fact that we are dedicated to making this multiplanetary future a reality. A permanent presence on Mars isn't a one company challenge. It's not even a 100-



Photo courtesy of Relativity Space ●●●

company challenge. Many industries need to make innovations and investments to make it a reality and we are excited to be part of that.

By taking on ambitious projects, you expand the understanding of what's possible not just for your employees, but for society as a whole. I think that having that North star, making Mars possible, is great even for employees who are working on near term milestones on the Terran R rocket because they see how all this fits into a long-term vision that they can get excited about. It gives them one more reason to be passionate about solving challenging problems that open new markets in the future.

What's exciting to us is making a permanent presence on Mars possible. To do that you need large scale infrastructure that can support populations of people. That infrastructure can't be reliant on supply trains running from Earth. You need to be building independent capability at some point in time. 3D printing becomes a key to unlocking possibilities but there are many problems that need to be solved.

**Question: The company has a lot of investors, a lot of believers, and a lot of momentum. Where do you think Relativity Space will be five to ten years from now?**

**Josh Brost:** Everything we are doing is predicated on first being the next great commercial launch company. That's the flywheel that feeds all these other efforts that we're working on. In five years, I see Terran R helping close that supply demand gap that is growing and I see Relativity Space being a great partner to the commercial and US government segments as they do more things in space more efficiently.

It's difficult to pinpoint what space capabilities could exist in 5 or 10 years because we are at such an early point in the economics of access to space. Building satellites and the whole satellite connected to devices phenomenon is changing so rapidly that it is hard to envision just how big this could be. We are at the stage in this industry that is akin to the introduction of the iPhone, but way before the App Store and all the use cases that people think are fundamental to it today. ●

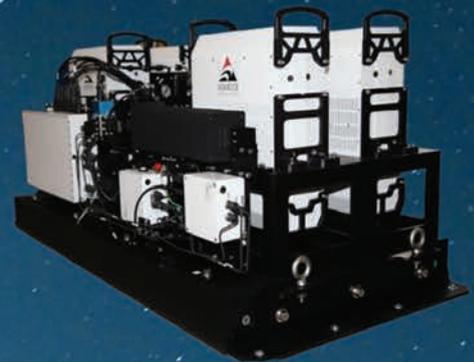
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## 2024 – Unpacking the defense spend in a year of budget increases

Multiple key trends will affect the defense sector in 2024, ranging from changes in defense budgets and the proliferation of swarm drones, to the two-pronged threat of ongoing worldwide conflict and cybersecurity.

*Matt Medley, Global Industry Director, A&D, IFS*

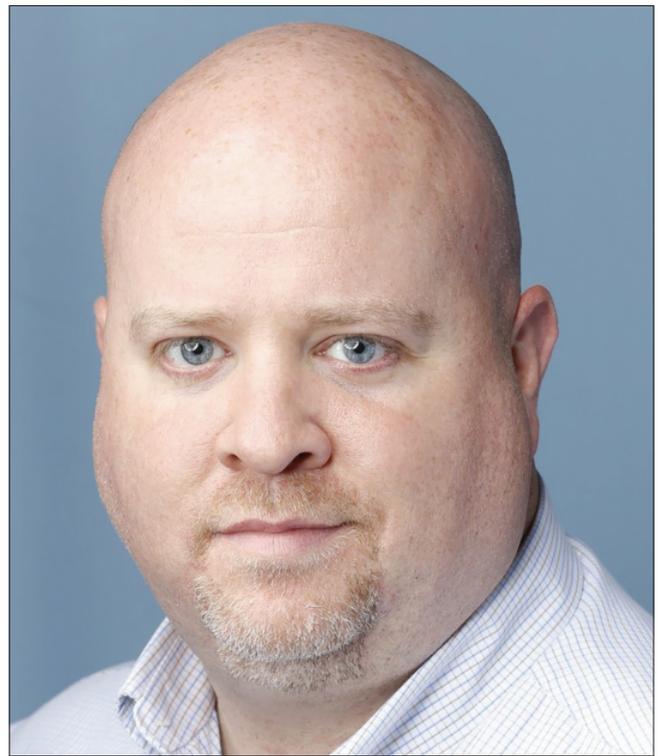
The defense agenda in 2024 looks complicated—how will defense organizations rethink budgets? As a result of numerous geopolitical events within 2023, disruptions to military supply chains have been plentiful, leaving inventories and resources sparse, and at times, unfit for combat. Unsurprisingly, global defense budgets are top of the priority list in 2024. Take the UK defense budget, set to increase by £5 billion and the US defense budget outlined to increase by 3.2 percent from US\$816 billion in 2023 to US\$842 billion in 2024. Growth is definitely on the agenda for the global defense market, as budgets center on increasing production and ensuring military forces regain control.

The Deloitte report on supply chain risk management identifies the real conundrum underlying the increase in defense budgets on the manufacturing sector too: "As most A&D suppliers are highly specialized with unique expertise and complex equipment, they struggle to make quick changes to production in response to varying demands. The challenge is accentuated as many suppliers serve both commercial aerospace and defense. Any spillover risk from commercial aerospace could leave defense OEMs vulnerable to sourcing critical parts for their programs and platforms." With rising budgets and increased procurement set to dominate the defense agenda throughout 2024—these are the four key areas I see large portions of these increased budgets being spent on.

### **PREDICTION 1: THE NEW ERA OF 'SWARM' DRONES: TAKING LAND, SEA, AND AIR BY STORM**

As evidenced by recent conflicts, drones will continue step up to the military plate and they are not alone, but in swarms. Drones can be produced quickly, cheaply, and have a range of features ranging from carrying out surveillance missions in dangerous areas to carrying out light attack missions without putting warfighters at risk. As a result, they are becoming more prominent in military fleets and adoption rates are rising.

Drones are also hugely desirable for defense forces as they can be deployed on air, land, and sea making them



*Matt Medley, Global Industry Director, A&D, IFS* ●●●

very versatile. Enter the drone carriers, such as the Royal Navy's HMS Prince of Wales, which aims to house drones on board so as to transfer assets and supplies to and from vessels without requiring manned vehicles. As an even cheaper alternative, some nations such as Turkey with their TCG Anadolu vessel and Iran with two old merchant container ships are converting previously manned vessels into drone carrying vessels.

The US DoD is also seeing the benefit of swarm drones. The Deputy Secretary of Defense, Kathleen Hicks, announced the 'Replicator' initiative at the 2023 Defense News Conference. The initiative intends to quickly build and field swarms of low-cost air, land, and sea drones or All-Domain Attributable Autonomy (ADA2) vehicles that are able to swarm hostile forces. The DoD plans to have these ready for deployment in the next 18-24 months. These ADA2 assets will help military forces overcome and overwhelm threats that are posed by large assets hosted by enemy forces. The drones will use Artificial Intelligence to autonomously "swarm" enemy forces.

Effective equipment alternatives such as a drones will be the way forward in 2024 as military powers seek to keep costs low and maximize budgets – while reimagining the concept of mass in the sea/air/land battlespace.

### **PREDICTION 2: TOTAL ASSET READINESS® BECOMES THE ESSENTIAL COMPONENT FOR DEALING WITH CONFLICT**

The last 12 months have given rise to a wider spectrum of conflict. The combat between Ukraine and Russia shows symmetric features, as it is between traditional Air, Military, and Naval forces on both sides trying to achieve dominance and territory. On the other end of the spectrum, a more modern asymmetric style of combat can be seen in the Israel and Hamas conflict which features combatants that are not typically a part of the military forces of a nation-state.

The difference in the features of warfare has made it clear that defense ministries and departments must



Photo courtesy TimeStopper69/Shutterstock ●●●

be consolidated with an all-encompassing solution to track Total Asset Readiness—giving commanders a clear real-time view of the assets at their disposal, in the context of the mission they need to complete, wherever and whenever they are deployed. From this we expect to see an 16.3 percent increase in total defense spending in the US alone, with the IT spend in defense contractors rising from three percent of revenue up to around five percent of revenue as they invest heavily in AI and automation to help pursue optimized asset management and other technology-driven priorities.

### PREDICTION 3: CONFLICT EMPHASIZES THE NEED FOR 'AT THE READY' FOR INVENTORY AND ASSETS – AT ALL TIMES

A radical re-think is required for Total Asset Readiness. The conflict between Ukraine and Russia has highlighted the lack of assets, ammunition, vehicles, and inventories available to military forces in combat despite the mass investments made in ammunition and inventories by supporting countries. Current defense industrial bases (DIB) do not have the facilities to match the increase in recent demand as production rates were set up on non-large scale conflict replenishment. DIB expansion has never been so important!

This has been recognized by defense forces and for the first time ever the DoD is set to release a defense industrial base policy. The policy outlines four key focus areas: building a resilient supply chain, improving workforce readiness, increasing flexible acquisitions, and economic deterrence. The US is not alone here. The UK military has also refreshed its defense strategy as it will reallocate £2.5 billion to bolster the ammunition stockpiles in a move to increase military power and agility.

New manufacturing principles are likely to play a key role. The US Army is already looking at logistics and readiness as the service examines more opportunities to boost those operations by using advanced manufacturing technologies such as Additive Manufacturing and 3D

prepare for a broader range of eventualities—from natural disasters to full scale theatre warfare. In addition, they will need to use a broad spectrum of military deployments ranging from high to low tech. Tanks, boats, and boots on the ground will be used along with parasailing and jet skis to reach remote locations versus heavily populated areas with schools and hospitals.

As highlighted in a recent Global Security Review essay entitled *The Changing Face of Conflict*, which paints a picture of the new challenges defense forces face: “The agile approach to hybrid warfare offers a promising framework for responding to these complex and evolving threats. It emphasizes flexibility, adaptability, and rapid decision-making and incorporates the impact of technological developments on warfare.”

This will also apply to the software infrastructure underpinning the military equipment supply chain where disparate reporting mechanisms and software systems can

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printing technology to improve and sustain readiness as highlighted in a recent Janes report. As we move forward in response to the US DoD policy that focuses on building a resilient supply chain, improving workforce readiness, increasing flexible acquisitions, and economic deterrence – I expect significant flow down requirements to begin quickly appearing in over 50 percent of all new defense contracts. Allied nations are following suit with their own similar directives, requiring DIB organizations to transparently demonstrate supply chain resilience for not only themselves, but their suppliers as well. Due to the current munitions shortages with allies supporting ongoing global conflicts, that number will approach 100 percent for munitions suppliers.

#### **PREDICTION 4: AI GROWS, BUT SO DO CYBERSECURITY THREATS: IT'S TIME FOR SYSTEMS TO BE ON HIGH ALERT**

The increase in use of autonomous vehicles and digital technologies comes with heightened vulnerabilities to cyberattacks across the military supply chain. As seen in a Deloitte report, "National security concerns elevate the importance of data security for defense manufacturers. They share and exchange covered defense information (CDI) and controlled unclassified information (CUI) on program specifications, technology, and equipment performance as they collaborate across research, design, development, and deployment of defense products."

The flip side of the AI boom has brought its own cyber threats, with AI-enabled hackers. AI has allowed for hackers to carry out cyberattacks at much larger scales, quicker with increase anonymity. AI accelerates malware and changing codes making it harder for threats to be detected.

We must fight AI with AI. An AI-enabled defense can enable cybersecurity to stay one step ahead of hackers.

Machine Learning (ML) technologies can be implemented by defense forces to boost threat detection accuracy and quickly automate responses to cyberattacks.

It is more important than ever for all organizations connected to the military supply chain to have penetration tested underlying cybersecurity software, which can react quickly to prevent data breaches. Many forces have already been deploying cyber defense tools as seen in a recent European Defense Matters report which reported that some autonomous cyber defense tools using intelligent agents already exist today, monitoring network activities and ready to trigger immediate action when anomalous behavior is detected. Early malware detection, crucial for cyber risk mitigation, is considered a high-potential activity in which autonomous systems could excel in the future.

In the year ahead I expect to see defense forces exponentially increasing their use of autonomous agents and specialized digital artifacts to enhance cyber defense, as seen with the Defense Information Systems Agency looking to immediately expand its use of AI-driven tools to automate penetration testing on defense networks.

#### **ADAPT AND REACT: THE KEY TO KEEPING PACE WITH CHANGING DEFENSE TRENDS**

There's no denying that 2024 looks to be a year of substantial growth, as global spending surpasses previous years in a bid to revolutionize military equipment and capabilities. The driver behind increased budgets cannot be put down to one, but numerous factors. From rises in new technology such as AI that will spur further cybersecurity concerns or equipment such as the use of 'swarm' drones to the ever-lurking threat of global conflict. The defense outlook for 2024 may look complicated, but with the right technology in place, it still looks positive. ●

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## ST Engineering iDirect appoints new Senior Vice President of Sales to Leadership Team

**ST Engineering iDirect has announced** the appointment of Tami Dias as Senior Vice President of Sales as part of the company's leadership renewal to sharpen focus on strategic partnerships, customer engagements and growth.

Dias, an accomplished sales executive with over 20 years of experience, will be responsible for leading the organization's global sales function to bring the company's solutions to global customers. She will partner with key stakeholders to develop and execute a comprehensive go-to-market strategy while forging strategic partnerships and ensuring customer satisfaction.

Previously Vice President of Global Sales at Aeris Communications, Dias has over a decade of experience in the IoT and space sectors, holding a variety of sales and sales leadership roles in companies including Verizon, Cobham, Marlink and RigNet. Dias excels in driving revenue growth, building high-performance sales teams and fostering customer relationships.

"As a proven change facilitator, I am excited to join a company with a track record of providing best-in-class technologies which underpin its offerings to many of the world's satcom networks. As we navigate the dynamic satcom landscape, my focus will be on go-to-market



Tami Dias as Senior Vice President of Sales ●●●

strategies to ensure we remain at the forefront of industry advancements, and the continued introduction of groundbreaking products that will not only meet but exceed the evolving needs of our customers," said Dias.

Don Claussen, CEO of ST Engineering iDirect, added, "Tami is joining at a pivotal moment for the company as we enter our next chapter of growth, focusing on pioneering interoperable solutions that integrate space and terrestrial based communications systems for our customers and, ultimately, make their day-to-day work easier. I've seen the strong sense of opportunity in the market alongside the sense of urgency to advance technology and update business models, and Tami's extensive experience will be invaluable to helping us and our customers lead the way." ●

## Sidus Space appoints Bill White as Chief Financial Officer

**Sidus Space announced the appointment** of Bill White as Chief Financial Officer, effective February 20, 2024.

Mr. White will oversee the Company's accounting, financial planning, capital raise, treasury, legal and regulatory functions. Mr. White has more than 30 years of experience in financial management, operations, and business development. He most recently served as Chief Financial Officer of ProPhase Labs, Inc. (Nasdaq: PRPH) and prior to ProPhase he was CFO, treasurer, and secretary of Intellicheck, Inc., a technology company listed on the NasdaqGM. Mr. White has broad domestic and international experience including managing rapid and significant growth, import/export, implementing tough cost management initiatives, exploiting new growth opportunities, mergers and acquisitions, strategic planning, resource allocation, tax compliance and organization development.

"Bill's deep experience as a public company executive alongside his remarkable proficiency in capital markets and M&A, aligns perfectly with the current stage of Sidus' growth," said Carol Craig, Chief Executive Officer of Sidus.

"I am honored to serve Sidus at this critical time in its growth and evolution and am excited to work with Carol and the management team to capitalize upon the growth opportunities ahead and deliver long-term value for shareholders," said Bill White, incoming Chief Financial Officer.

Teresa Burchfield has confirmed her intention to step down as Chief Financial Officer after two years with the Company. Burchfield will remain with the Company, serving in an advisory role, to assist White with the transition.

Craig added, "I have enjoyed working with Teresa and, during her tenure as chief financial officer at the Company, she has made innumerable and invaluable contributions to its success and growth. On behalf of the Board and the entire Sidus team, I'd like to thank Teresa for her valuable contributions and for laying the groundwork for our continued growth in the public and space sectors." ●



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