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April 2024



*Photo of the historic third launch of Starship.
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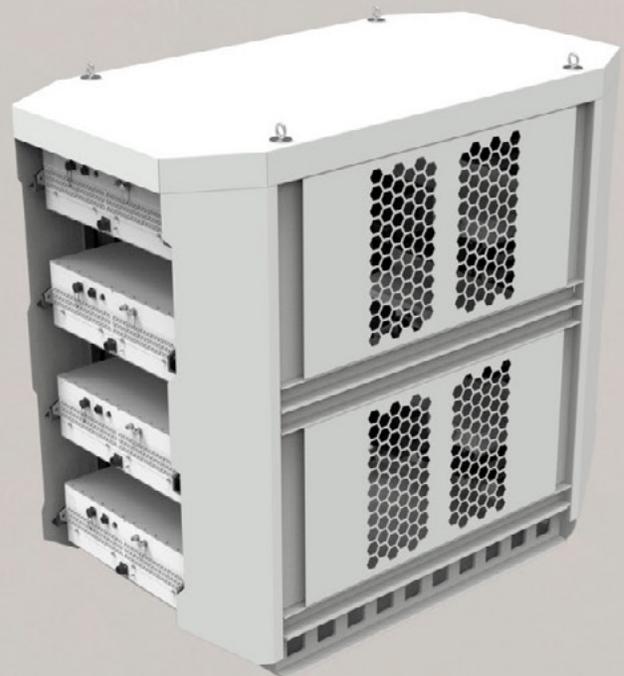


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The Forrester Report

SES: Owning a LEO system could be next.

A change in dividend policy will keep shareholders waiting, again...

Author: Chris Forrester, Senior Columnist

SES O3b mPOWER

For the better part of 20 years, under the tenure of successive CEO's **Romain Bausch**, **Karim Michel Sabbagh** and **Steve Collar**, the accepted mantra was that **SES** did not need a LEO fleet of satellites. That position might now be quite different under new CEO, **Adel Al-Salah**.

Al-Salah has been in the SES CEO post for one month but he admitted to analysts during the February 29th SES post-results discussion that the possibility of SES investing in a LEO constellation was no longer taboo.

Indeed, Al-Salah told analysts that SES was now in a fortunate position to be able to evaluate many different options.

"And we're looking at all of the different things we need to do to actually cement our value to the clients, whether it's scale, whether it's specific capabilities that we would like to accelerate through an inorganic acquisition or other areas to improve our overall positioning. That includes organic investments, big projects that potentially could give us an extension to our constellations, strengthening of our future networks, organic investments in particular technologies that we need in order to make sure that we are on the forefoot - forefront of having software-defined capabilities and AI and big data in our satellites."



Adel Al-Salah

While accepting that its **O3b mPOWER** Medium Earth Orbiting (MEO) fleet represented a much faster route to global coverage (once the fleet was fully populated) he stated that there were inevitable gaps in the sort of coverage SES could supply.

Inevitably — although unsaid — was the missed revenues from the rival LEO positions of **OneWeb** (owned by **Eutelsat**) as well as the threats from a half-dozen other operators, not the least of which is **Telesat's Lightspeed**.

However, investing in an SES-owned LEO system would be expensive. Working with **Starlink**, albeit with a reduced share of the revenue, might make more sense.

Al-Salah stressed that the relationship with Starlink was accretive to SES.

"Every partnership that we launch has to be accretive to us. So the partnership we described is very much accretive to us. With the philosophy, we drive with our sales force and our teams in front of the clients is not to have 'a war between us and our extended competitors'."

"There's no one solution that fits. Therefore, we want to see ourselves as all orbit operators. Of course, our focus is our own satellites. We always want to leverage the capacity that we have and deploy that and make sure that we have high utilisation of the assets that we have built. Therefore, GEO, MEO continues to be our key focus area."

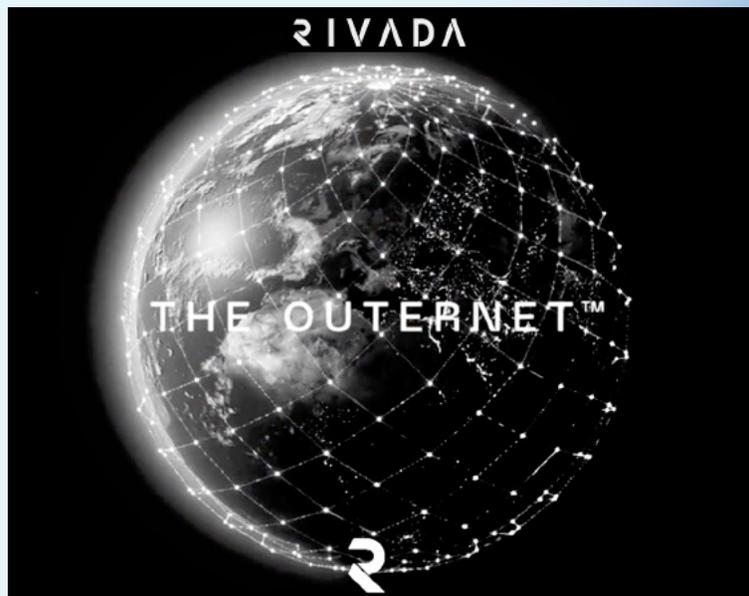
"We do see the need for LEOs, as well. However, we have not decided that we, as a company, should be going into LEO full force like we are in GEO and MEO. But that is something on the table, right? We are evaluating that."

SES key financial highlights

- Results exceeded expectations and delivered +1% YOY, reaching 2.03 billion euros.
- The SES Network business is now responsible for as much as 52% of the company's revenues.
- O3bmPOWER is on track to start service in Q2 2024 to deliver high-performance, low latency connectivity.
- The company's next-generation GEO satellite — ASTRA 1P — is set to launch in the summer of 2024.
- SES maintained a robust financial position with an industry-leading, investment grade balance sheet.

As if on cue, up popped **Declan Ganley**, CEO of **Rivada Networks**, based in Munich, saying (in a Tweet/X),

“If only there was already a European operator headquartered in, oh, say, Munich, with employees from all over Europe and that had the very top priority Ka Band LEO satellite spectrum and excellent polar orbital slots, had already raised (a lot) of private capital, had contracts in place to build and launch its constellation and would be ready to turn on service in say 2025...”



Rivada has their first batch of 300 satellites on order (with **Terran Orbital**) and another 300 in the pipeline.

SES uses capacity from Elon Musk's **Starlink** to fill some of those gaps. Al-Salah told analysts...

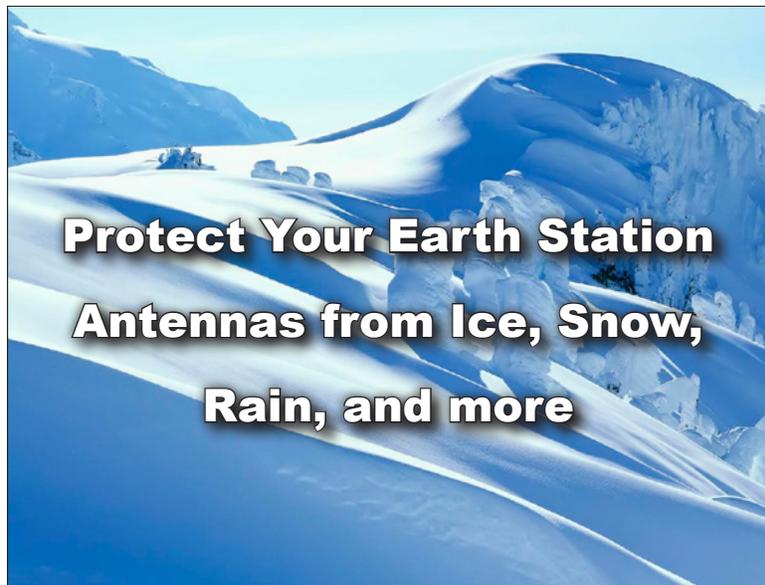
“Every partnership we launch has to be accretive to us. The idea is not to have a war between us and our competitors. We are focused on our clients and if a combination between us and a competitor makes a lot of sense for the client and gives a positive return to us, an accretive deal, then we will do it. We would not do a deal that takes away margin from us or abuses our opportunity with the client.

“[We] believe many aero customers, a lot of cruise customers, are looking at this real proven resilient solution that they want to offer both when they are in very vast places where there are not too many connectivity requirements on them, but also on there the very congested places, like ports or airports where one solution doesn't work, right? And it requires multiple solutions to enhance that capability. So the growth will come from all these areas rather than from one particular and one only solution.”

As to the numbers, SES is enjoying a decent trading year (at long last). The company's revenue for 2023 was 2,030 million euros, and ahead of expectations, despite the firm's Video division suffering a -4.4 percent fall in revenue (to 607 million euros). However, the **SES Networks division** continues to reveal solid growth (up 6.1 percent to 1.062 million euros).

But the headline news is that the company changing their dividend policy to half-yearly payouts. This means that “A” class shareholders will receive an extra 25 euro-cents this coming October, and starting next year, a payment “of at least” 25 cents in both April and October of 2025. The company's normal dividend of 50 cents per share will be paid in April of 2024.

However, while every penny counts to shareholders, this additional 25 cents is hardly a fortune— especially for those who acquired shares at 20 to 30 euros (or, for example, 2015 at 30 to 34 euros). What is frustrating for some patient investors is the frequent promises that shareholders would be rewarded with a portion of the 3 billion euros in **U.S. Federal Communication Commission (FCC)** compensation payment now safely received by SES.



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Indeed, the company has consistently promised shareholders a “*progressive dividend policy*,” but that progress is painfully slow.

Investment bank [Berenberg](#)’s UK media analyst, [Carl Murdock-Smith](#), mentioned the dilemma in his post-results note and said...

“Clear disappointment from analysts that SES didn’t say more on shareholder returns. CEO Al-Saleh said that SES is “currently evaluating multiple scenarios, including additional cash returns for shareholders. I would expect us to have substantially crystalized our thinking by this summer in time for the half-year results.”

He pushed back against disappointment that SES hadn’t announced more in payments, pointing to the fact that the company has already announced how 1.6 billion euros will be deployed (435 million euros for the acquisition of DRS GES, 150 million euros for share buyback, and 1 billion euros in debt repayments). On shareholder returns, management did comment that, at the upcoming AGM, the firm will be asking for a new mandate to allow for further share buybacks of up to 10% of its capital.

SES also reported that it is making an insurance claim of \$472 million due to problems with some of the mPOWER fleet of MEO satellites.

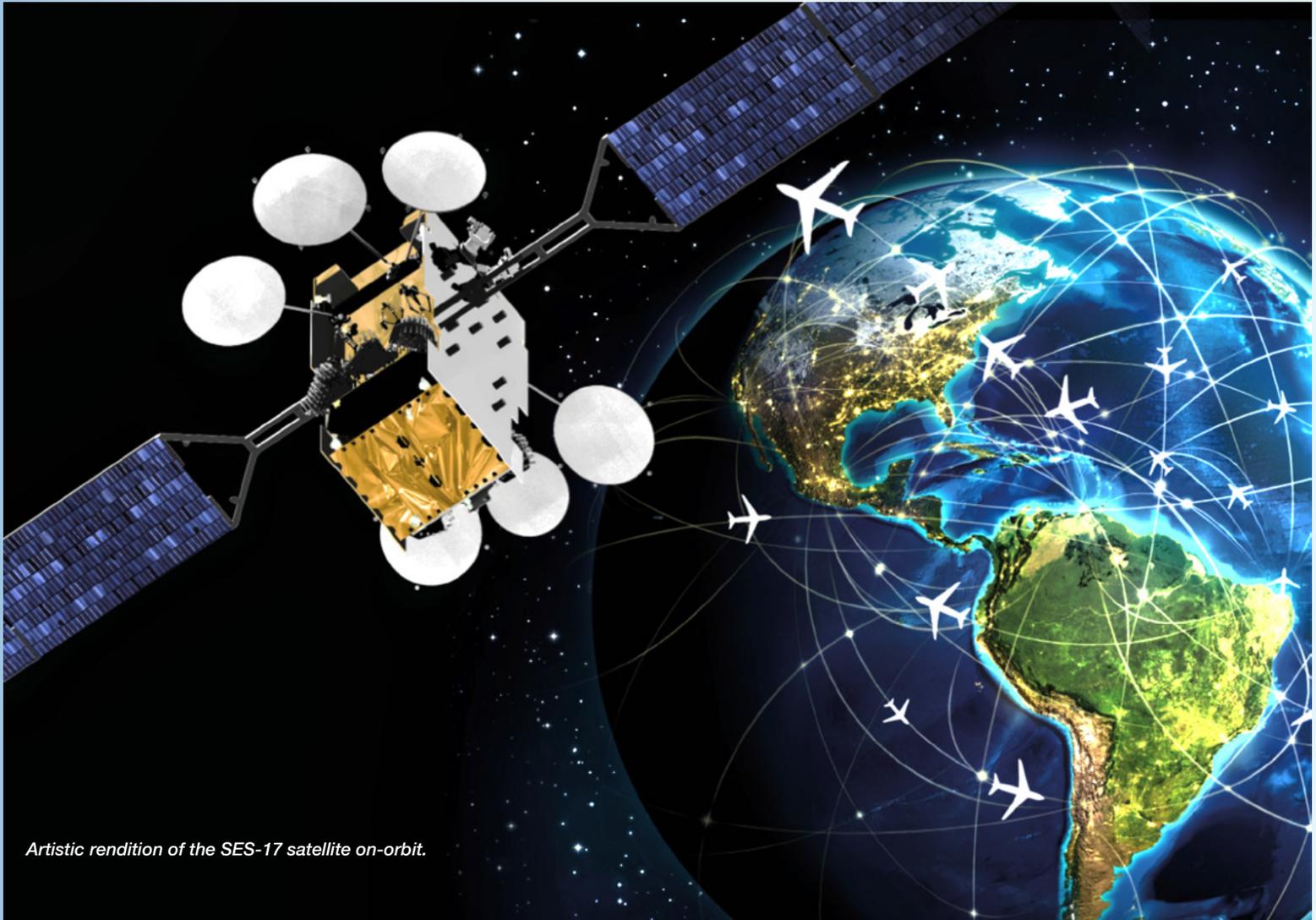
Contract backlog on December 31, 2023 was 4.3 billion euros (5.2 billion euros gross backlog, including backlog with contractual break clauses). This included more than \$850 million of fully protected contract backlog (\$1 billion gross backlog) for **SES-17** and **O3b mPOWER** combined.

For Full Year 2024, group revenue and Adjusted EBITDA (assuming an FX rate of €1=\$1.09, nominal satellite health, and nominal launch schedule) are expected to be in the range of 1,940 to 2,000 million euros and 950 to 1,000 million euros, respectively, with growth in Networks revenue expected to mostly offset lower year-on-year Video revenue.

Adel Al-Saleh, CEO of SES, said...

“It’s an exciting time to be joining SES and an honor to lead this established, world-class operator on the next phase of the journey. The 2023 results demonstrate the strong fundamentals of our business and attraction of our multi-orbit offering to a customer base of world-leading organizations, governments, and institutions. We delivered on all the financial objectives for 2023 including exceeding revenue expectations, secured 1.5 billion euros of new business and renewals across Networks and Video, and launched the first six O3b mPOWER satellites that will bring high-performance connectivity services to committed and prospective customers from early Q2 2024.

With the hard work of C-band clearing in the U.S. behind us, and cash proceeds received, we have strengthened our industry-leading investment grade balance sheet and unlocked important financial flexibility which creates the opportunity to expand our capabilities, enhance commercial offering, drive free cash flow, and deliver returns to our shareholders. While the competitive landscape in which we operate is evolving rapidly, SES is well positioned to succeed and grow as we continue to deliver differentiated and compelling solutions to our customers, underpinned by next-level execution and rigorous financial discipline.”



Artistic rendition of the SES-17 satellite on-orbit.

One of the analysts on the call was **Sami Kassab** of investment bank **BNPP**. He said...

“SES is not out of the woods yet, but its fundamentals are improving. Q4 revenues are ahead of expectations and the FY24 revenue outlook looks stronger too. EBITDA is guided in line with higher start up costs offset by a strong top line guidance. Management is striking the right balance between balance sheet protection and cash returns. mPOWER is guided to enter into service in early Q2 24 and has seen its backlog progress further in the last three months. SES offers an 8 percent dividend yield reflective of investor concern that it may fail to return to growth.”

SES expects trends in Video to remain consistent with recent history in FY24 (mid-single digit decline of c5% per annum). The firm also expects mPOWER (entry into service in April) to drive growth in SES Networks. This implies FY24 revenues in the mid to upper end of the guided range of 1940 to 2000 million euros. Management stated that the company’s target was to hit the top end of the revenue range.

Al-Salah also addressed SES’s position on the controversial **IRIS2** broadband by satellite scheme. March 1st was the deadline for the **SpaceRise** consortium to submit its ‘best and final offer’ (BAFO) to the **European Commission**. SES, along with Eutelsat and **Hispasat** are members of the consortium.



Catherine Kavvada, Director for secure and connected space at the Commissions’ **DG-DEFIS Directorate for Defense and Space**, said in a February 29th statement...S

“The deadline for the BAFO expires 1 March. Once the consortium submits its BAFO, it is up to the Tender Evaluation Board to evaluate its content in full autonomy. Hence, neither I nor others can either comment or speculate on progress or the outcome of such evaluation.”

However, there is no IRIS2 data on CapEx in the SES numbers. Al-Salah, said...

“It’s a sizable investment. It has its own business case that we’re working on. It has its own elements of IRR that we’re looking at. But it’s uncertain whether or not and how, because the phasing, exactly when it will start, depending on when the Commission decides to move forward.

We are fully committed to IRIS2. It is not easy because it includes many different partners within the programme, and we need to make sure that the program does deliver on what the European Union is looking for, which is a sovereign high-end latest technology constellation, which we support 100%. As you know, a lot of our business does sit in the overall government sovereign space, serving Luxembourg government, serving NATO, serving the United States and many other European nations. So, we believe in that project.”

Author **Chris Forrester** is a well-known broadcasting journalist, industry consultant and Senior Columnist for **SatNews Publishers**. He reports on all aspects of broadcasting with special emphasis on content, the business of television and emerging applications. He founded **Rapid TV News** and has edited **Interspace** and its successor **Inside Satellite TV** since 1996. He also files for **Advanced-Television.com**. In November of 1998, Chris was appointed an Associate (professor) of the prestigious **Adham Center for Television Journalism**, part of the **American University in Cairo (AUC)**, in recognition of his extensive coverage of the Arab media market.



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The Blake Brief

A Hitchhiker's Guide To Patent Law In Outer Space

Authors: Curt Blake, John Wehrli, Peter Bratton, Magnus Gan, James Dunlop, Matthew Fleming, Wilson Sonsini Goodrich & Rosati

Is space pharma the next big thing? In 2017, Merck demonstrated the value of conducting pharmaceutical R&D in space by growing crystals for its blockbuster Keytruda antibody drug on the International Space Station (ISS).

The “space crystals” grown in such microgravity conditions turned out to be far superior to their Earth-grown counterparts¹. In fact, Merck found that microgravity so suppressed the negative effects of sedimentation and convection that the space-grown Keytruda crystals were predominantly single-sized and exhibited lower viscosity (*in crystalline suspension*),² such that Keytruda could theoretically be formulated as an injection rather than intravenous infusion³. Such a breakthrough might not only permit patients to skip the IV center⁴ and conveniently administer from home, but might also benefit Merck’s bottom line.

While intravenous formulations of Keytruda are reportedly set to go off-patent in 2028⁵, injectable formulations of Keytruda could remain patented until 2036 and beyond⁶. Even taking into consideration the upfront-costs associated with launching experiments into orbit (*which costs are still high, but going down all the time*), the Keytruda success story suggests that space R&D could be more than worth the investment. Those astronomical projections, however, all take as their foundation the fundamental assumption that Merck (and others who would invest in space technology) will be able to own and commercialize their technology, regardless of whether such technology is developed and applied on Earth or in space. So, is intellectual property developed in space patentable?

In each of the 157 nations where patent protection is recognized⁷, an inventor may apply for (*and be granted*) a patent covering the use of a novel and inventive idea⁸, giving the inventor a temporary quasi-monopoly over the idea and the legal right to exclude others from using the invention in those nations where the patent issues.⁹ The modern patent regime stems from principles concerning possession and ownership articulated¹⁰ in a 19th century case about an English fox hunt,¹¹ which established the significance of recovery and capture in the determination of legal ownership on Earth. But what about above the atmosphere? Can one who discovers and captures (*i.e., by reducing to practice*) elusive technologies up in space legally own and exclusively commercialize such technologies?

The Outer Space Treaty of 1967 states that: (i) the “exploration and use of outer space ... shall be carried out for the benefit and in the interests of *all* countries ... and shall be the province of *all* mankind”; (ii) “there shall be freedom of scientific investigation in outer space”; (iii) “outer space ... is not subject to national appropriation by claim of sovereignty, by means of use or occupation,

or by any other means”; and (iv) “States Parties to the Treaty conducting activities in outer space . . . agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities.”¹²

On the surface, then, it would seem that the exclusionary nature of patents might be at odds with the Outer Space Treaty, since a patent, by definition, allows the patentee exclusive benefits, in this case benefits derived from the supposedly non-exclusive, communal properties of space (*microgravity, cosmic radiation, etc.*). The exclusive legal protections conferred by patents are, arguably, neither for the benefit and in the interests of *all* countries, nor the province of *all* mankind, and the traditional legal regime would seem to curtail the freedom of scientific investigation in the interest of protecting a patentee’s exclusive patent rights (*including the patent rights of the federal government*). Fortunately, Article VIII of the Outer Space Treaty provides that a state retains jurisdiction and control over any objects launched into outer space under that state’s registry. As further developed by the 1976 Convention on Registration of Objects Launched into Outer Space, such “registry” is simply a state-maintained document for each “launching state.”

A launching state is: (i) one that launches or procures the launching of a space object; or (ii) one from whose territory or facility a space object is launched.¹⁴ Thus, if a space object over which the U.S. originally has jurisdiction and control is launched into outer space on the U.S.’ registry, that space object would continue to fall under the jurisdiction and control of the U.S., and U.S. law (*including patent law*) would apply.

The **U.S. Patents in Space Act** provides that “*Any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used or sold within the United States for the purposes of this title, except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or with respect to any space object or component thereof that is carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space.*”¹⁵

The ISS is a unique conglomeration of modules under the registries of the various ISS partners (*Canada, the member states of the European Space Agency, ¹⁶ Japan, Russia, and the US,*¹⁷ including several laboratory modules. Article 21.2 of the 1998 ISS Intergovernmental Agreement (IGA) provides: “for

purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry."

Thus, inventions made in the *Destiny Laboratory Module* (U.S.) would be subject to U.S. patent law; the *Kibo Laboratory Module* to Japanese law; and the *Nauka Module* to Russian law¹⁸. Because the ESA comprises a plurality of member states, inventions made in the ESA's *Columbus Laboratory Module* are treated differently—any ESA member state may deem any activity (*i.e.*, *invention or infringement*) occurring in an ESA-registered module as occurring within such member state's territory¹⁹ (*so inventions made, or infringing activity occurring in the Columbus module could be deemed to have occurred concurrently in France, Italy, and Germany, if each nation so chooses*).

While the authors are unaware of any U.S. cases alleging patent infringement in or on the ISS, NASA was once sued (*unsuccessfully*) for infringing two U.S. patent²⁰ in the manufacture and use of robotic hands incorporated into NASA's *Robonaut* prototype,²¹ a production version of which was later brought aboard the ISS to conduct research in robotics technology.²²

The UN/ISS constructive allocation of territory to space-made inventions has many practical consequences, including, for example, implications for foreign filing licenses. What is considered "*foreign*" turns on the underlying legal principles of *jus soli*²³ or *jus in personam*.²⁴ Under the *jus soli regime* (*implemented by states such as the US,²⁵ Russia,²⁶ and China²⁷*), applications on inventions made or conceived in the *jus soli* state must be filed first in the *jus soli* state before they can be filed anywhere else, regardless of the citizenship or residency of the inventors.

Under the *jus in personam* regime (*implemented by states such as India,²⁸ France²⁹, and the UK³⁰*), applications or inventions made by a resident or citizen of such *in personam* state must first be filed in the *in personam* state before such applications or inventions can be filed anywhere else, regardless of where such inventions were made (*even if in the farthest reaches of outer space*). These disparate foreign filing requirements can conflict under the ISS regime, where if, *e.g.*, a French resident invents in the *Destiny Laboratory Module* (U.S.) a useful way to harness cosmic radiation to retard the otherwise accelerated proliferation of cancer cells in space,³¹ such French inventor technically must file first in both the U.S. and in France to comply with each country's foreign filing requirements.

Perhaps in recognition of the impossibility of filing first in multiple states, the ISS IGA requires partner states not to apply their laws concerning "*secrecy of inventions*" (*i.e.*, *foreign filing laws*) that would "*prevent the filing of a patent application (for example, by imposing a delay or requiring prior authorization)*" of inventions made aboard the ISS by a person who is not a national or resident of that partner state.³²

NASA and most of its foreign partners expect the ISS to be deorbited by 2030,³³ with private space stations primed to take the place of the ISS as the default destination for space R&D.³⁴ It will be virtually impossible for private space station operators to negotiate the same type of generally applicable, multi-state waivers that made the ISS arrangement work, including but not limited to the waiver of foreign filing requirements.

Yet the repercussions of failing to obtain a foreign filing license could be commercially dire. To mitigate such negative legal consequences, it will be necessary to navigate the foreign filing requirements on a state-by-state and case-by-case basis. For example, in the U.S., foreign filing is prohibited "[e]xcept when authorized by a license obtained from the Commissioner of Patents."³⁵ Thus, to the extent that a foreign resident is able to obtain such a license from the USPTO, such foreign resident would be able to comply with the foreign filing requirements of both her home state (*requiring such resident to file first in her home state*) and those of the U.S. (*requiring inventions made in the country to be first filed in the U.S.*).

Not all foreign filing regimes, however, are as permissive. For example, French law appears to absolutely prohibit any foreign filing by a French resident, *sans exception*.³⁶ If the USPTO makes it difficult for foreign residents to obtain a foreign filing license, and if foreign governments are inflexible in permitting their residents to file first outside of their home states, then private space station operators might be unable to attract inventors from those foreign states. Even apart from threshold issues of jurisdiction and territoriality, there are serious questions concerning enforcement. Under the ISS regime, even if a



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patentee successfully obtains a U.S. patent on an invention (which would only be enforceable against any persons practicing the patented invention both in earth-bound U.S. jurisdictions and applicable U.S. ISS modules), such invention would not be protected in other jurisdictions and modules (such as the Nauka Module (Russia) or the Kibo Laboratory Module (Japan)) except to the extent patents on such invention are also issued in such states.³⁷

Enforcement on the ESA modules of the ISS is even trickier. Before any infringement claim can be assessed in an ESA partner state, such ESA partner state must first “deem the activity to have occurred within its territory.”³⁸ The ISS IGA does not contemplate, and it is not clear whether such infringement claim could be maintained, if such ESA member state simply refused to make such determination (which refusal it could plausibly justify on the basis of judicial avoidance, especially if the alleged infringer is a private person).

Beyond the ISS, if infringement were to take place on a private space station launched on the registry of a state which has ratified or acceded to the Outer Space Treaty, such infringement would likely be treated as having occurred in the state on whose registry such station was launched.³⁹ So a patentee bringing an infringement claim would need to own or control patents issued in such state to bring suit. For example, enforcing patents on *Starlab* (which will most likely be launched on the U.S.’ registry) and the *Tiangong* space station (which was launched on China’s registry)⁴⁰ would be no different than enforcing patents on U.S. and Chinese soil, respectively.

Armed with this knowledge, it may make commercial sense for a private space station operators seeking to attract customers with large patent portfolios to launch such space stations on the registries of the major spacefaring nations offering the most sophisticated and robust intellectual property enforcement regimes. Regimes under which significant compensatory damages, punitive damages, and injunctions are routinely awarded.

Robust regulation is, however, a two-edged sword, and there may be some parties interested in operating in environments still ascendant in both gravity and regulation, which could in turn spur space-investment in nations where serious space programs,⁴¹ such as robust intellectual protections, have traditionally not been a focus.

Perhaps future commercial space treaties should be flexibly drafted with careful exceptions permitting private parties to contract around issues such as patent extraterritoriality, jurisdiction, liability waivers, allocation of risk, and order of precedence (in cases where international and national laws conflict). Such treaties could also elevate the normative hierarchy of such private contracts to at least the same level as existing U.N. space treaties, giving private space contracts the same normative effect as international law (albeit solely as between the contracting parties).

The certainty and flexibility engendered by such innovative treaties may incentivize greater private participation in the *Low Earth Orbit* (LEO) economy.⁴² With more than 500 ISS experiments on protein crystal growth and counting,⁴³ it is clear that the appetite for bold space pharmaceutical developments will outlast ISS, as will the appetite for robust yet creative patent protections.

Curt Blake, Senior Columnist to SatNews Publishers, is Senior Of Counsel for [Wilson Sonsini Goodrich & Rosati](#). He is an attorney and senior executive with more than 25 years of experience leading organizations in high-growth industries — and more than 10 years as the CEO of Spaceflight,

Inc. — at the forefront of the New Space revolution. Curt has extensive expertise in strategic planning, financial analysis, legal strategy, M&A, and space commercialization, with deep knowledge about the unique challenges of New Space growth and the roadmap to success in the that ecosystem.



Curt Blake

The views expressed in this article reflect those of the authors themselves and do not necessarily reflect the views of his employer or the firm’s clients.

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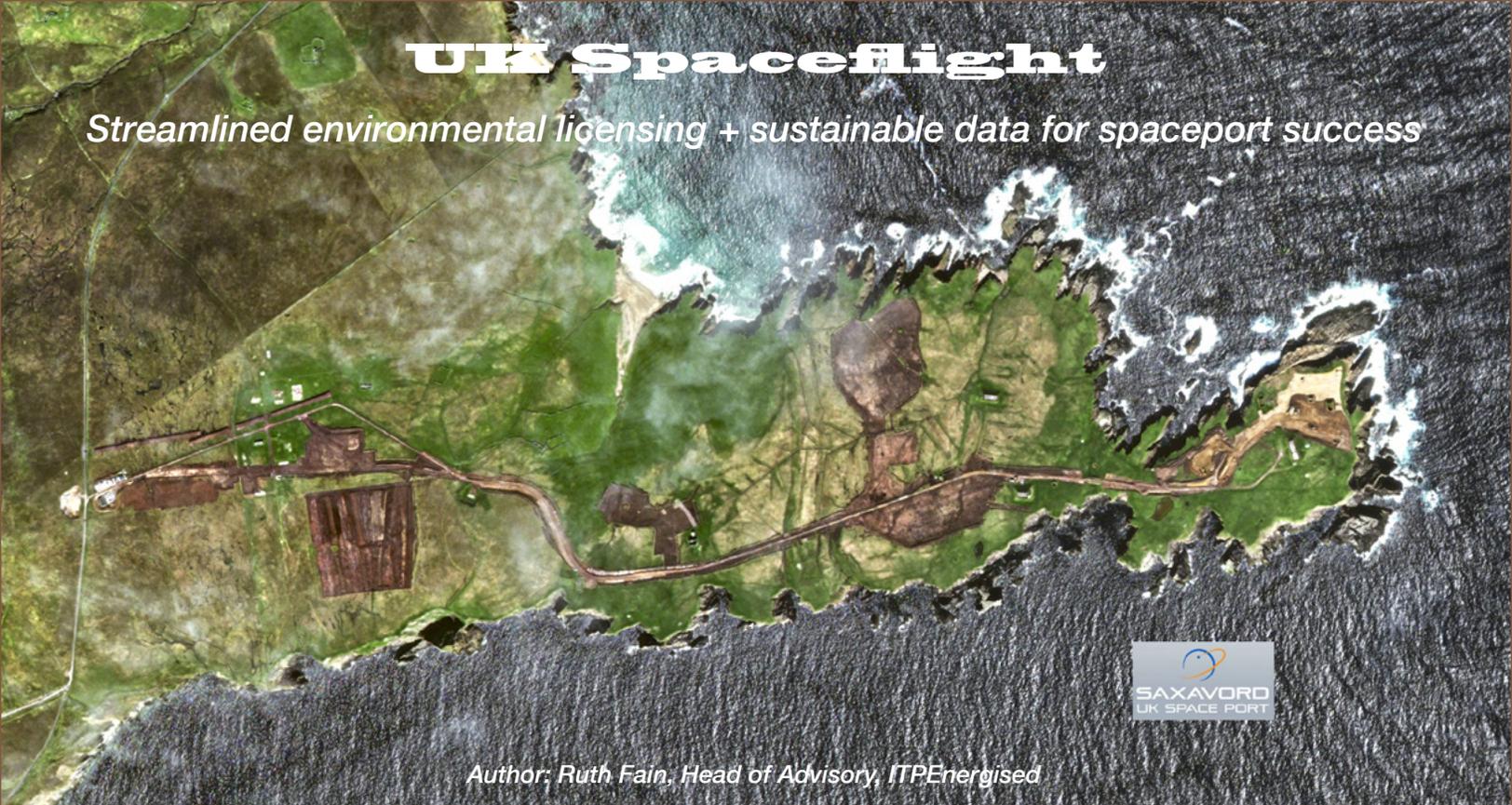
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Author: Ruth Fain, Head of Advisory, ITPowered

In December of 2023, [SaxaVord Spaceport](#) in Shetland became the UK's first, licensed, vertical launch spaceport. The spaceport license was granted only following rigorous safety, security, and environmental assessment by the UK's space regulator, the [UK Civil Aviation Authority \(CAA\)](#), and paves the way for vertical launch from UK soil later this year. The license permits SaxaVord Spaceport to host as many as 30 launches a year, allowing the spaceport to grow as the UK space sector continues to expand.

The [Space Industry Act 2018](#), with the associated [Space Industry Regulations 2021](#), provides the legal framework for the licensing of space, sub-orbital and associated terrestrial activities. Any organization seeking to operate a spaceport or launch vehicles from the UK is required to apply for the relevant license, which includes undertaking an [Assessment of Environmental Effects \(AEE\)](#). AEEs must consider the effects from space operations on population and human health, biodiversity, air quality, water, noise and vibration, the marine environment, climate, land, soils and peat, landscape and visual impact and material assets.

Though AEE is just one facet of the license application for a spaceport or space launch operation, due to the nature of the assessment it can become a consuming factor in terms of time and resources. In the case of the SaxaVord Spaceport license, the application was originally submitted to the CAA in November of 2021 and the license was issued in December of 2023.

However, it should be noted that the regulator had only previously issued one spaceport license in November of 2022 to [Spaceport Cornwall](#), for horizontal launches by the now-defunct [Virgin Orbit's LauncherOne](#) air-launch system. As such, the assessment and review process for vertical launch spaceports was entirely new to both applicant and regulator and a lot has been learned in the same timeframe regarding how to streamline the process for any future variations or new applications.

Neither is the spaceport license AEE the final piece of the environmental permitting puzzle. In order for launch, there must also be a corresponding launch operator license; issued to the launch vehicle (*rocket*) operator and assessing the specific environmental effects of each individual rocket. SaxaVord Spaceport is working with multiple launch partners, several of whom have license applications currently lodged and heading towards final determination with the CAA.

Streamlining The License Application Process

Working as one

The best spaceport license applications are those with breadth and depth enough to ensure that any associated launch operators need only submit specific information exclusive to their launch vehicle. Determining and assessing a 'representative launch vehicle' (or 'RepLV') to cover the majority of foreseeable launches should result in launch operators having only to submit additional assessments covering very specific elements of their operation, outside the envelope of the RepLV. Likewise, a good launch operator application should reflect the integration and combining of processes and systems with the spaceport, giving the regulator confidence that the two activities provide joint environmental control and mitigation.

Until December of 2023, both elements of this licensing process were being developed simultaneously and so the inter-knitting of the two application processes has been a work in progress. However, now that SaxaVord has secured its license, the RepLV is set and understood by the regulator. Launch operators using vehicles within the SaxaVord RepLV parameters now proceed with greater confidence, anticipating a streamlined AEE process due to the established precedent. While specifics like fuel composition and trajectory still require assessment, the previous evaluation significantly reduces the overall burden.

This is a currently a unique selling point for SaxaVord Spaceport, and a boost for the UK Space industry. As the industry grows and expands, spaceports that proactively review and update their licenses will be well-positioned for success. By offering launch operators the assurance of compliance and bolstering investor confidence, these forward-thinking spaceports will be well-equipped to navigate this dynamic landscape.

Appreciating the process

The CAA's AEE review process consists of several required stages including initial review (*potentially with requests for further information known as RFI*s), statutory and public consultation review periods as required, and full, detailed technical review. Each of these stages takes time and needs to occur in sequential order; albeit that RFI's from individual stages may overlap.

Keeping clear records of AEE responses and versions and responding to RFI's in a timely manner will expedite this process and allow the regulator to keep the application moving at pace along the required program..

Knowing your boundaries

While AEE involves the review and assessment of very detailed technical and commercially sensitive data; the process also requires statutory and public consultation and as such, publishing of the assessment findings and recommendations on publicly available websites. Finding the balance between developing a narrative and evidence sufficient to inform the public, and maintaining the commercial confidentiality of detailed design information, has been a key area of learning.

Spaceports and associated launch operators will be best placed when they set and agree clear boundaries on what is and isn't commercially sensitive at the outset of AEE. This collaborative approach enables the regulator to maintain transparent records throughout the process and everyone can be confident that the final AEE report contains only information suitable for public release.

Identifying + collecting (only!) the correct data for assessment

Each topic of environmental concern requires full and detailed assessment as part of AEE. The CAA has issued '*CAP 2215 Guidance for the assessment of environmental effects*' which explains the process for completing an AEE, including setting out what the regulator requires the AEE to include. It does not, however, give detailed instruction on the method or required depth of assessment of each individual aspect of the AEE.

From the work completed for the SaxaVord Spaceport and associated launch operator license applications, which has included hours of discussion with the CAA, I have been able to work with my team to develop a tried and tested methodology for UK AEE. However, acutely aware that industry standards should not be formed in isolation, we, in conjunction with the CAA (*in particular the Space Launch and Orbit Group*), are now looking to involve operators and consultants from across the UK space industry to generate an industry-led complementary suite of guidance to sit alongside CAP 2215 and provide a clear pathway to regulatory compliance. Work has begun on terms of reference for the guidance suite and it is hoped that it will be available to the wider industry group later in 2024.

Future-Proofing Data Collection For Mutual Benefit

As noted previously, spaceports that continuously engage in AEE management throughout their operation gain a distinct competitive advantage. This proactive approach translates to enhanced security during the licensing process, thus minimizing investment risks for launch operators, their supply chains, and ultimately, their payload clients.

The AEE process is rightly very detailed and requires a high level of data on population and human health, biodiversity, air quality, water, noise and vibration, the marine environment, climate, land, soils and peat, landscape and visual impact and material assets. Assuming no change to the RepLV and/or operation of the spaceport, most of these disciplines will stay largely static through the period of any given license. However, for some, continued data collection will undeniably be of benefit to both spaceport and launch operators alike. Ruth presents four key areas for consideration:

Ecology and Biodiversity

Chances are, wherever the location of a spaceport within the UK, there will be specific habitats and ecological receptors around it that will benefit from continued monitoring. Not necessarily due to the effects of space activities being significant; but rather because there is as yet no UK ecological dataset on the effects of space activities from UK soil at all. When developing the planning and licensing applications, SaxaVord Spaceport and its team looked to the USA for literary evidence in regards to conservation of mammals and, in particular, scheduled and breeding birds. In future, it would be much more beneficial — and efficient — to develop a UK-based dataset and associated literary evidence to support future planning and license applications.

In addition — and again mindful of commercial positioning of spaceports in particular — is the fact that the [Chartered Institute of Ecology and Environmental Management \(CIEEM\)](#) best practice guidance on bird surveying states that, *"to help ensure that bird data are reliable and not too dated we advise that it should have been collected within the last five years, or within three years if the populations of key species are believed to be changing rapidly."* As such, any spaceport which maintains a record of ornithological activity in its surrounding area will be better placed to discuss and advise potential future launch operators on the likely significance of any effects.

Debris and the marine environment

A requirement of the CAA spaceport and launch operator licenses issued so far is to record and submit details of actual debris amounts (*based on launch vehicle parameters*) reaching the marine environment and their fate for each launch.

While launch operators will likely be the primary source of this data, the inclusion of this condition in spaceport licenses is possibly to ensure the collation of data that may one day support policy decisions on whether spaceflight activities can be more loosely regulated in terms of marine impact within the UK exclusive economic zone, as is currently seen in New Zealand. Whichever way the UK chooses to go in the future on this; keeping and maintaining detailed records of the volume and nature of jettisoned material will be critical to maintaining space operator licenses.

Noise and Vibration

Launching rockets is inherently noisy; the source level of a rocket is higher than that of the engines of commercial and even military aircraft. However, in comparison to air traffic movements at civilian or military airports, rocket launches are very infrequent. In addition, timings are generally known well in advance such that local residents can be informed and prepare accordingly.

The community perception of noise impacts associated with the spaceport will depend on how favourably people view the spaceport, so good community relations will be essential. Gathering survey data on how people feel about noise from launches will be an important part of the environmental and social responsibilities of the spaceport operator.

For ecological receptors, while evidence from the US suggests species habituate to the temporary noise from launches, there is no equivalent dataset available in the UK. As such, collection of data (*likely via video evidence and noise monitoring*) of the reaction of different species to UK based launches would be beneficial. Data on the reactions of ecological receptors to different levels of noise could then be used to inform the likelihood of disturbance of ecological receptors associated with different scales of launch vehicle and/or at different times of year.

Greenhouse gas emissions

Requiring cooperation and input from both spaceport and launch operators, another standard monitoring condition requires submission of *"calculated actual greenhouse gas emissions for [each] launch."* Paying heed to the established agreement of handling commercially sensitive information, a spaceport-held and maintained database of launch vehicle emissions can support the spaceport's net zero carbon strategy as well as benefit terrestrial carbon accountancy. This data can further enable comparisons and facilitate scenario planning for future launches by both the spaceport and the regulator.

Following several years of dedicated work, the UK space industry is collectively well on the way to having a robust yet accessible regulatory assessment mechanism and has already identified many of the key areas of future study. UK space activity operators find themselves uniquely positioned to lead on environmental control and mitigation within this new and burgeoning industry and getting pragmatic, professional and trusted support from technical advisors, gives all parties the opportunity to work collectively to set the standard for safe, secure and sustainable practices.

On the basis of what has been achieved so far, there are no boundaries and the future — of both the industry and, through its dedicated custodianship, our planet — looks bright.

www.itpenergised.com



Ruth Fain

For the last five years, author Ruth Fain, head of advisory for environmental consultancy, [ITPEnergised](#) has worked with SaxaVord Spaceport, associated launch operators, local authorities, statutory consultees and the CAA to identify and navigate a pathway to environmental consenting through the (terrestrial) planning and space licensing processes. With SaxaVord Spaceport now licensed for launch and multiple launch operators' applications in the final stage of determination, much has been learned in terms of identifying best practice, streamlining application processes and minimizing impact on launch operation project programming.



Preserving The Wild

SATCOM and wildlife conservation

Author: Gavan Murphy, Director of Marketing EMEA and APAC, Globalstar



Animal tracking has long been at the heart of wildlife conservation strategies in Africa. With more and more species at the edge of extinction, technological innovation that embraces the Internet of Things (IoT) and satellite communications (SATCOM) means that today's wildlife monitoring systems are more advanced than ever before possible

Employing tracking technology has long been one of the most important ways to help the understanding and preserve endangered species. Thanks to animal trackers, researchers and conservationists have a far better understanding of the migration patterns of animals all over the world.

They can also gain granular knowledge of the regions where species have been rendered almost extinct due to human encroachment — in particular, illegal poaching continues to be widespread.

Conservationists are doubling down on their efforts to reduce and ideally eliminate poaching wherever possible.

IoT + Satellites Enable Ubiquitous, Reliable Tracking

Leading edge solutions built around IoT technology and SATCOM are increasingly helping conservationists. In Africa for example, these technologies help to monitor and protect diverse, near-extinct animals.

Tracking devices have greatly evolved over time. Thanks to worldwide efforts that bring scientists together with conservation agencies, governments and technology providers, the tracking devices now being used around the globe are smaller, far more rugged and versatile, and more economical than previously.

It's essential that the means by which animals are tracked does not interfere with their behaviour. At the same time, collars and tags fitted with tracking technology need to be robust enough to withstand all weather conditions, and the rough treatment a device might receive as a big cat, rhino or elephant herd makes their way across remote terrain.

Today, with IoT and advanced satellite technology, scientists and wildlife protection agencies around the world are benefiting from tiny, ultra-light devices that transmit location data reliably and ubiquitously.

Animal tracking has become a key growth area for [Globalstar](#). In addition to rapidly expanding deployments where the company's technology is helping farmers to manage their livestock, conservation agencies worldwide are employing tracking systems with Globalstar satellite technology at their heart to protect precious, endangered, wildlife.

Helping Protect Rhinos



White Rhino in the bush – Blue Canyon Conservancy in South Africa near Kruger national park – photo by Fokke Baarssen

Globalstar Value Added Reseller, Johannesburg-based [Wintec Solutions](#), is a specialist technology and solutions provider with extensive experience in animal tracking for wildlife conservation. The company's most recent wildlife animal

preservation deployment leverages the many features of [GSatSolar™](#), the latest addition to Globalstar's IoT satellite tracking solutions portfolio.

Rhinoceros are the subject of widespread illegal killing by poachers across Africa. Their horns are used in traditional Chinese medicines, products which today have a huge international market. Objects made from horn are also seen as status symbols among some communities.

Conservationists, including government-backed as well as privately owned wildlife reserves, are engaged in monitoring and safeguarding these animals.

Low-cost and simple to integrate, GSatSolar is a small and rugged satellite IoT tracker that is ideal for wildlife monitoring. Significant advantages of GSatSolar are the unit's small size and light weight, which means a collar or tag doesn't irritate the animal.

Also, the product's robust structure helps ensure it can withstand animals' day-to-day movements. Furthermore, the low cost makes the solution easily scalable for tracking large herds of wildlife and farm stock.



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*“GSatSolar is a game changer, and transforms the possibilities for wildlife conservation and livestock management,” said **Rene Winter**, Director of Wintec Solutions. “Its tough build and small size mean that it can be deployed on a variety of animals.”*

An inherent characteristic of these regions is that they have limited or even no coverage by conventional, terrestrial, telecom networks. Satellite technology as the network backbone for tracking systems means the data emanating from the transmitters carried by free-roaming animals is ubiquitous and transmissions uninterrupted, even when beyond GSM mobile networks’ reach.



Rhinos are fitted with the device via ear tagging or with a collar. Other novel ways of deploying the devices are also being explored, including painless attachment to the horn.

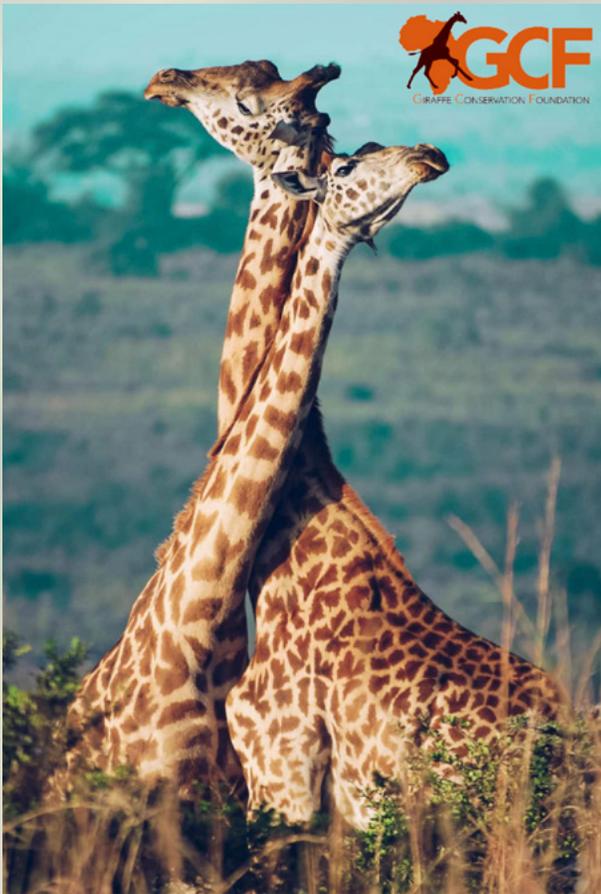
The technology innovation doesn’t stop there — the user interface of the tracking platform developed by Wintec Solutions includes an informative mapping portal that tracks the animals’ individual and group movements, with useful topographical information.

Monitoring the rhino, or other wildlife, helpfully informs as to their behaviours, including grazing habits and field locations that offer the best nutrition. The system also enlightens conservationists about seasonal breeding habits and provides a solid, ongoing picture of the animals’ general health and well-being.

Africa’s nature reserves are vast, some as large as 20,000 hectares (77.2 square miles). They are typically located in remote bush regions, as far away from human settlements as practical for the animals’ own protection.

Wintec Solutions is also playing a role in the preservation of other African species. With Wintec’s support, [Giraffe Conservation Foundation](#) researchers are successfully monitoring giraffe migration, and keeping safeguarding tabs on animals which have been reintroduced into the wild.

***Dr. Courtney Marneweck**, Science Data Coordinator at Giraffe Conservation Foundation said, “We’re currently trialling ear tags on giraffe in Namibia. The first units were deployed in June 2023 and, while field trials are ongoing, the data received so far are very promising. We’re looking forward to deploying more units in the future and testing them in different countries,” she added.*



Giraffes image acquire by GCF at the Masai Giraffe Conservation in Kenya, Africa.

Wintec Solutions is also deploying satellite-enabled animal tags in collaboration with veterinary authorities and research students for a wild buffalo protection program in [South Africa's Kruger National Park](#). The main goal of this project is to track migration patterns in order to understand and mitigate the spread of *bovine tuberculosis*.

"Our wildlife preservation activities take place well beyond the reach of GSM mobile; Globalstar's satellite network, with its ubiquitous reach and reliability, is a fundamental enabler in the operations being carried out to protect endangered species," said Winter.

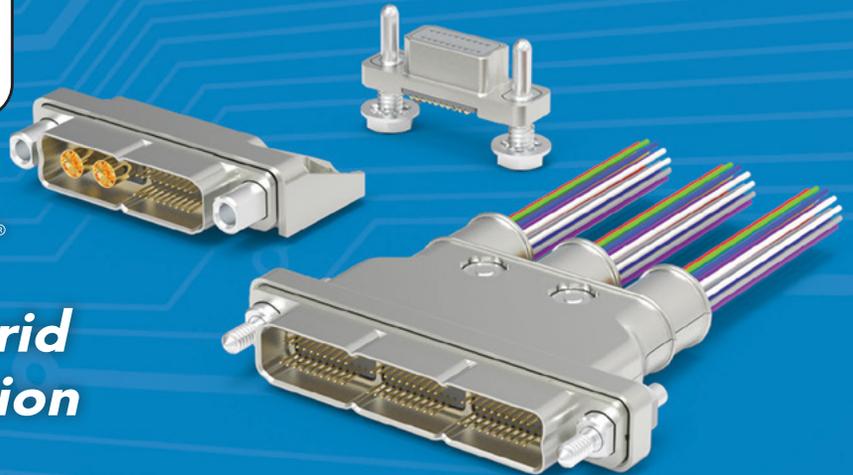
Globalstar's technology is being used elsewhere in Africa to track and monitor elephants and big cats. In another project, the application of trackers is being tested on [pangolins](#), yet another severely endangered species.



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Ear tagging a giraffe with GSatSolar

Only SATCOM can provide the always-on connectivity to enable uninterrupted monitoring of these animals.

SPOT's Role In Wildlife Conservation

The story of how satellite technology is helping preserve wildlife goes beyond tracking tags and collars. Security and anti-poaching staff on several African game reserves are using SPOT devices to help improve the efficiency of their safeguarding operations.

While rangers often carry a two-way radio for basic communications, if the team needs to rendezvous in the bush, or if a staff member goes missing, searching thick, unmarked terrain can take hours or days without knowing the missing parties' accurate GPS location.

With one touch of SPOT's SOS button, GPS co-ordinates are transmitted to rescuers who then immediately know where to deliver help. If the crew is in pursuit of a poacher, fellow members in the anti-poaching unit can keep close watch over their movements via SPOT's Google Maps interface.

If a crew member on patrol suspects an act of poaching is underway, they can alert the team, who can then track the personnel via SPOT as they carry out their investigations.

In another deployment, **SPOT Trace** is being used to simultaneously track lions and neighboring livestock. There are no fences in Botswana's wildlife reserves, whose inhabitants include both animals and people. In these areas, keeping farm cattle safe from wild predators is of the highest priority.

Villagers are using SPOT Trace as an early warning system to alert the local community when lions are getting too close to cattle or the village. This gives farmers a heads up, enabling them to relocate their herds if necessary.

Our natural wildlife is priceless.

It is critical that technology innovators work hand in hand with researchers and conservation agencies to do all that we can to safeguard the world's critically endangered species.

Globalstar is extremely proud that the company's technology, in partnership with the highly creative network of value added distributors, is playing such a key role in the preservation of wildlife, safeguarding the people working to protect endangered species as well as the environment in which they work and live.



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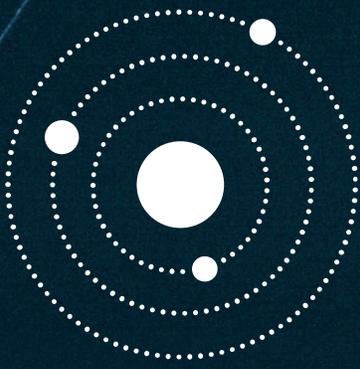
Globalstar

Author Gavan Murphy is the Director of Marketing EMEA and APAC, Globalstar. He is based in Globalstar's European HQ in Dublin and is responsible for the development and implementation of Globalstar's marketing strategy across the EMEA and APAC regions. He spearheads the marketing of Globalstar's consumer products including the SPOT satellite-enabled safety and tracking solutions portfolio as well as B2B marketing of data solutions for a range of vertical sectors including maritime, agriculture, energy, forestry, safety and security, transportation, logistics, as well as the burgeoning IoT sector. Prior to joining Globalstar in 2008, Gavan worked with Vodafone as Channel Development and Category Manager.



Gavan Murphy





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Ka-Band Dominating SATCOM TT&C

THE TRANSITION IS UNDERWAY

Author: Joakim Espeland, Chief Executive Officer, QuadSAT

Telemetry, Tracking, and Control (TT&C) has been transitioning from S- to Ka-band. This shift is impacting across the commercial and themilitary/ agency/government (MAG) market segments. Given the obvious robustness and legacy of S-band, can Ka-band, that is more susceptible to rain fade and mis-pointing errors, cope with such an important task?

Freeing Up Spectrum

While S-band is undeniably well-suited to the all-important functions of TT&C, it is clear that something needs to be done to free up spectrum.

Last year witnessed [the addition of 2,664 objects in space](#). During the next decade, there could reportedly be as many as 100,000 new commercial and MAG satellites launched and each new launch is placing more pressure on an already congested environment.

Simply put, the industry can not continue to manage all of these spacecraft using S-band — something has to change to free up much-needed spectrum.

There's certainly no surprise, then, that that the transition to other bands is underway. This transition has started with a definite move toward Ka-band.

| Band | Approx Percentage |
|-----------|-------------------|
| KA only | 35% |
| KA and KU | 31% |
| S only | 12% |
| UHF only | 12% |
| Other | 4% |

What might be unanticipated is that recent statistics suggest that, even a few years ago, Ka-band overtook S-band as the band of choice, with approximately 35% of satellites only using Ka-band for TT&C, with a further 30% applying a combination of Ka- and Ku-band.

Meanwhile, only 12% use S-band, with a few using S- in conjunction with another band. Also interesting is that S-band seems to be the choice for *Earth Observation (EO)* applications, whereas telecoms are almost exclusively using Ka-band.

However, it is obvious that the mega constellations are a large reason for this shift. If the constellations are removed from consideration, then S-band remains slightly ahead, as illustrated in the following chart...

| Band | Approx Percentage |
|-----------|-------------------|
| KA only | 25% |
| KA and KU | 2% |
| S only | 33% |
| UHF only | 33% |
| Other | 10% |

Can Ka-Band Cope?

When something goes wrong in any other type of satellite feed, the worst case scenario is loss of business due to an unhappy customer. This is, of course, something satellite operators take extremely seriously and strive to avoid.

However, the absolute worst case scenario for errors in a TT&C application is the loss of spacecraft, which could even lead to a collision in space which would impact the entire space environment.

S-band has always been the first choice for these systems due to its robustness and wide beam, and S-band will usually work even with a minor mispointing of an antenna.

Operators use expensive, but highly reliable, antennas to ensure seamless connectivity. Can Ka-band, then, actually cope with handling something as important as these operations?

There are numerous challenges with moving to Ka-band. Perhaps the most notable are those of accuracy and weather permeation.

With Ka-band, ensuring highly accurate pointing is vital. Unlike S-band, mispointing will lead to errors and the potentially loss of signal.

The challenges of weather permeation are well-documented, with many Ka-band services suffering in extreme weather conditions. This often needs to be managed by having back-up sites and reliable weather mapping in order to easily switch before an outage does occur.

However, while it brings challenges, Ka-band also brings a number of benefits. Aside from spectrum availability, Ka-band delivers much more capacity than S-band at the same spectral efficiency and use smaller antenna sizes.

Solving these challenges will certainly be advantageous for the entire industry.

The Switch To Ka-Band

The move to Ka-band is shifting the way in which TT&C is performed.

To make this work without causing risk to the space environment (*especially once this is experienced on a large scale*), means innovation is required as well as insights on network performance plus the ability to easily — and rapidly — switch when environmental conditions impact a given site. However, this move away from S-band is also leveling the playing field.

While S-band TT&C antennas have historically been developed by only a few companies, with Ka-band, there are numerous companies that make their mark in this domain.

This likely also means more innovation than ever before experienced will be seen, as these companies look to gain a competitive edge. These antennas will be under a great deal of scrutiny to ensure they offer the highest possible quality.

Insights on antenna performance are always important, especially for TT&C, because even in the most stable of environments, things can change.

This will be even more important in Ka-band, helping to ensure that these antennas are accurate all of the time, keeping that much needed link to the satellites. Also, more important than ever will be realtime knowledge of environmental conditions at any given site and how that will change.

New challenges with mitigating interference onsite will play a crucial role as operators now will have a much broader frequency spectrum to guard.

Another important concern to address will be that of security. Having TT&C handled on an isolated band makes it more secure. It is likely we will see operators continue to use dedicated antennas for TT&C, even if they are operating within Ka-band.

The Future Of TT&C

It will be interesting to note how this evolution plays out. Shifting to Ka-band opens up capacity and will likely lead to an increase in innovated products. This could ultimately lead to TT&C becoming more efficient and, perhaps in the long-run, even safer.

What is certain is that the transfer process is not without challenges — operators that are carefully planning networks ensure they remain error-free, thereby keeping the space environment safe for all concerned.

www.quadsat.com

QUADSAT

Author **Joakim Espeland** is the Chief Executive Officer and Co-Founder of the company. Joakim is an entrepreneur, electrical and mechanical engineer as well as a satellite field engineer and examiner. He developed QuadSAT from his initial idea to a start up company and upscaling the firm's global operations.



Joakim Espeland

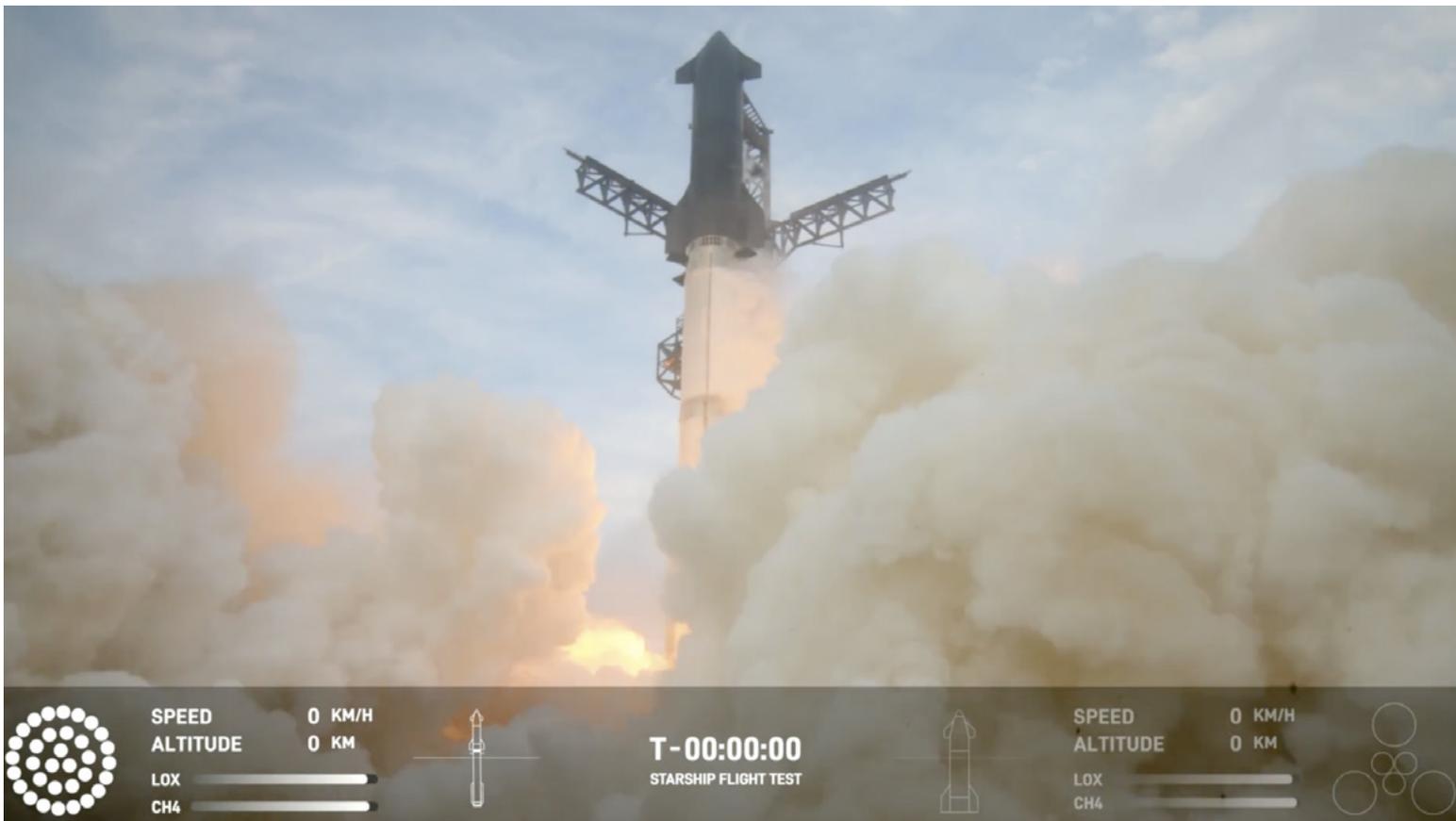
The QuadSAT system increases access to antenna diagnostics. The drone-based system enables data gathering when and where it is needed. In its hard case, the system is easily transported for use at a user's premises as well as in-field. Custom pre- and post-flight software ensures repeatability, control over UAS during measurements, ease of operation, and data delivery in a uniform format.



QuadSAT's newly expanded product family.

InfoBeam

The SpaceX Starship successfully launches



SpaceX launched its huge Starship rocket for the third time on Thursday, March 28th, from the company's launch site in South Texas at 9:25 a.m. ET. on a key test flight to demonstrate new technologies and techniques that will be crucial on future missions to the moon and beyond.

Three minutes into the flight, the spacecraft separated from its booster as planned and then traveled further than it had on its previous test flights.

SpaceX lost communication with the vehicle before it successfully arrived at its Starship stacked for flight



planned splashdown location in the Indian Ocean.

The company confirmed roughly 10 minutes in that the spacecraft successfully reached orbit.

In a post on X (which, like SpaceX, is owned by **Elon Musk**), the **Federal Aviation Administration (FAA)** said it has "determined SpaceX met all safety, environmental, policy and financial responsibility requirements."

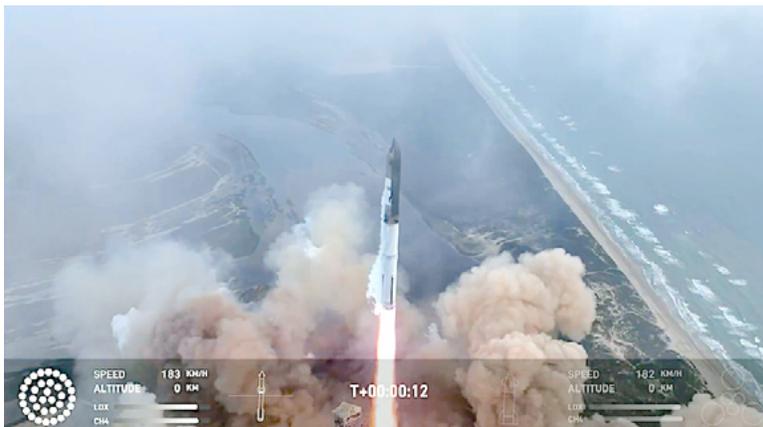
While both of the first two Starship launches took off and achieved some mission goals, both also ended explosively.

The first one caused significant damage not only to the launchpad, but also "left a 385-acre debris field that flung concrete chunks as far as 2,680 feet from the launchpad and sparked a 3.5-acre fire."

The FAA provided a list of 63 corrective actions for SpaceX to take to address issues such as leaking propellant before the second attempt last spring

The flight is the rocket's third and most ambitious such test, according to SpaceX.

The event was closely watched, as the nearly 400-foot-tall Starship, is expected to play an important part in NASA's return-to-the-moon program.



Advantech launches Edge Generative AI system

ADVANTECH

Generative AI At The Edge

Advantech MIC-733-AO with NVIDIA Generative AI Models

Quick Response

Offline AI

Information Security

Gen. AI

NVIDIA Elite Partner

Advantech has announced their successful Generative AI demo with the company's MIC-733-AO, based on NVIDIA® Jetson AGX Orin™.

This event shows AI developers how to benefit from greater immediacy, enhanced security, and reduced internet costs when compared to cloud-based generative AI. The Generative AI models from the Jetson AI lab offers a free foundational AI model, enabling customization and significantly reducing development time with the MIC-733-AO Edge Generative AI System.

Advantech's MIC-733-AO Edge Generative AI System, compatible with the NVIDIA Generative AI models from the Jetson AI lab, now efficiently runs *large language models* (LLMs), *vision language model* (VLM), *vision transformers* (ViT), and *image generation* and *Llamaspeak* at the edge, thanks to the inclusion of the NVIDIA® Jetson AGX Orin™.

The platform's offerings span multiple layers, including accelerated computing, vital AI software, and pre-trained models, facilitating the creation, customization, and deployment of generative AI models suitable for various applications and locations.

With Generative AI models from the Jetson AI lab, developers can leverage the *retrieval-augmented generation* (RAG) technique, connecting LLMs and VLMs to a company's knowledge base. This approach eliminates the need for traditional AI model training, allowing simple conversational interactions with the system to yield AI inferences, significantly shortening development time.

The Advantech MIC-733-AO offers high AI performance and multiple video interfaces, such as IP camera, USB/gigE industrial cameras, GMSL cameras, LiDAR, and more, enabling edge-based Generative AI model operation. Its exceptional thermal design prevents hot crashes, even when the NVIDIA® Jetson AGX Orin™ operates at full capacity.

Generative AI is revolutionizing human-computer interaction by creating new content from various inputs and outputs, such as text and images. The shift in demand from the cloud to the edge positions GenAI as ideal for high-responsiveness and low-latency environments.

Edge-based Generative AI offers several advantages over cloud-based solutions:

- **Immediate Response:** Edge computing systems, integrating data sources such as cameras and sensors, enable promote GenAI response without the delays associated with cloud uploads
- **Information Security:** Data remains within the edge system, avoiding the cybersecurity risks associated with cloud data transmission
- **Stable Network Connection:** Operable without a wireless network, the edge system stores data locally until network restoration, unlike cloud-based AI, which ceases function without a network
- **Low Transmission Costs:** Edge AI incurs no transmission costs if backend communication is unnecessary, needing only low-bandwidth transmission, more cost-effective than the higher bandwidth costs of cloud uploads.

Generative AI at the edge represents the future of the AI era. The MIC-733-AO Edge Generative AI System, integrated with the NVIDIA Generative AI models from the Jetson AI lab, offers a straightforward solution for AI developers and is now available on the market.

Cygnus cargo modules completed



Conceived in the 2000s, the first **Cygnus** pressurized cargo modules (PCM) were designed and built to ferry supplies to the International Space Station in the so-called standard version, with a payload capacity of 2,750 kg and a volume of 18 m³.

The Cygnus spacecraft comprises two main sections: a Service Module from **Northrop Grumman**, responsible for supplying the service to NASA, and a PCM developed and built by **Thales Alenia Space**.

Cygnus typically makes two trips a year to the International Space Station, ferrying food, water, spares, repairs and science experiments to the crew.

This initial configuration was the norm until the Cygnus developed for the OA-4 mission. From the fifth mission onward, the design and cargo capacity evolved significantly, with a larger version, able to hold 3,750 kg and a volume of 27 m³.

This enhanced configuration is the largest resupply capacity to the ISS, most recently used for the NG-20 mission at the end of January.

Inside Thales Alenia Space's clean rooms, engineers are currently completing the Cygnus for NG-21, where final system verification and testing are



underway to ready for delivery to Northrop Grumman in May of 2024.

In the meantime, work continues to complete PCM 22, already undergoing integration in the clean room.

Hawkeye 360 Advisory Board adds

HawkEye 360 Inc. has announced the new members of the firm's Advisory Board, forming the Class of 2024. Retired Generals **H. R. McMaster** and **David D. Thompson**, two individuals with unique perspectives and vast experience, join for the first time, while **Terry McAuliffe** and **Joan Dempsey** return for another term.

"HawkEye 360 is delighted to introduce a stellar group of advisors for 2024," said **John Serafini**, Chief Executive Officer of HawkEye 360. "Their wealth of experience and knowledge, spanning government, military, intelligence, and commercial sectors, is a testament to our unwavering commitment to excellence. Their invaluable contributions will propel our RF-sensing satellite network forward, a crucial step in providing the U.S. Government and our international allies with timely, critical data to combat illegal and unauthorized activities."

General David D. Thompson (Ret.) brings 38 years of experience in the Air and Space Forces to his role, highlighted by his service as the first Vice Chief of Space Operations for the United States Space Force. In this capacity, he contributed to creating the Space Force and represented the Chief of Space Operations in high-level meetings, including the Joint Chiefs of Staff. Thompson has commanded at squadron, group, and wing levels and has held senior positions at the National Reconnaissance Office, Air Force Warfare Center, and United States Strategic Command. His education includes a Master of Science in National Security Industrial Policy from the Industrial College of the Armed Forces, a Master of Science in Aeronautics and Astronautics from Purdue University, and a Bachelor of Science in Astronautical Engineering from the United States Air Force Academy. Thompson's career showcases his strategic planning and execution skills in national security and space operations.



David D. Thompson



H.R. McMaster

University, and a Distinguished Visiting Fellow at Arizona State University.

Lt. General H.R. McMaster (Ret.) is a soldier and scholar who brings a unique blend of strategic insights and global defense understanding to HawkEye 360. McMaster served in the US Army for thirty-four years and commanded forces in combat in Afghanistan and Iraq before serving as the 25th Assistant to the President for National Security Affairs. He holds a Ph.D. in history from the University of North Carolina and authored two bestselling books. He is a Senior Fellow at the Hoover Institution, a fellow at the Freeman Spogli Institute, a lecturer at the Graduate School of Business at Stanford

Joan Dempsey and **Terry McAuliffe** are welcomed back to the HawkEye 360 Advisory Board, each bringing a distinguished blend of experience and achievements to our team.

Joan offers unparalleled strategic insights with her extensive background in intelligence, security, and leadership roles at Booz Allen Hamilton and various high-level federal positions.

Terry, who was recognized for his dynamic tenure as the 72nd Governor of Virginia and his significant contributions to economic development and cybersecurity, brings a visionary approach to our mission. Together, their combined expertise and achievements will continue to guide HawkEye 360 in its strategic initiatives and further advancement in the industry.

These individuals, forming HawkEye 360 Advisory Board's Class of 2024, will join the board's 20 current members.

Globalsat Group's strategic alliance



Globalsat Group has signed a strategic alliance through which **Globalsat Central America and the Caribbean** becomes a member of **Globalsat Group**.

This agreement expands Globalsat Group's reach, the foremost provider of pan-American mobile satellite services, offering current and future satellite service clients enhanced local presence in Central America and the Caribbean region, thereby increasing the consortium's value in the field of mission-critical solutions and IoT.



Left to right, Globalsat Group executives: J. Alberto Palacios, Chairman & CEO, and Juan Ramón Porras, Managing Director for Central America & the Caribbean.

As part of this agreement, **Juan Ramón Porras**, General Manager of Globalsat Central America and the Caribbean, joins Globalsat Group and will lead the emerging division. With a career spanning more than two decades, Mr. Porras has been a key figure in the satellite industry since 1997 when he began as Director of Operations at Globalstar Operations in Central America. He next assumed the role of General Manager for Latin America at Globalstar Inc. in 2006, expanding his responsibilities to include Brazil in 2008 and the remainder of the region in 2012. Mr. Porras brings vast knowledge and experience to Globalsat Group, acquired through his prolonged tenure in various key positions within the satellite sector.

Additionally, the new affiliate, Globalsat Central America and the Caribbean, will play a vital role in extending Globalsat Group's reach and capabilities within these strategic regions. Leveraging local expertise and resources, the affiliate will spearhead initiatives to offer customized satellite solutions, particularly focusing on addressing the growing demands of IoT and mission-critical applications. This expansion marks a significant milestone in Globalsat Group's commitment to serving diverse markets with innovative and reliable satellite solutions.

*"By becoming part of Globalsat Group, we can now explore new opportunities with a broader portfolio of solutions, providing customers with the right tools to enhance their business productivity," said **Juan Ramón Porras**.*

J. Alberto Palacios, CEO of Globalsat Group, said, "We immediately realized that our shared vision and customer-oriented philosophy are a perfect match, and therefore, we are now taking this potential to the next level. By enhancing our operations, we continue to increase our global presence and enhance our overall value in the satellite industry."

Vast's new advisor



Vast has announced the appointment of **Clay Mowry** as the company's newest Advisor. Mowry's career spans more than two decades in the commercial launch, satellite, and space station sectors.

As President of the *International Astronautical Federation (IAF)*, Mowry is a globally recognized leader in the space community, within industry and government alike.

In his role as Advisor, Mowry will provide guidance and counsel on the growth of Vast's commercial space station business.

Vast is executing its strategy to build a robust pipeline of international commercial and government customers for **Haven-1**, the world's first commercial, free-flying, space station.

Vast is equally committed to increasing opportunities to collaborate with NASA on Private Astronaut Missions, **Commercial LEO Destinations (CLD)**, and other flight opportunities as its space station fleet evolves.

Mowry brings a wealth of experience to inform and help refine that execution. From his time at **Voyager** he has extensive expertise in the CLD market, with a track record of building international partnerships, and from his time at **Blue Origin** he has unique experience pioneering sales in the human suborbital spaceflight market as well.

Prior to joining Vast, Mowry held various leadership positions. In addition to the aforementioned Presidency of IAF, he was the Chief Revenue Officer at Voyager Space, Vice President for Global Sales at Blue Origin, and President and Chairman of Arianespace's U.S. subsidiary. His multifaceted career has established him as a respected leader in the space industry.

*"We are delighted to welcome Clay Mowry to Vast as an Advisor," said **Max Haot**, CEO of Vast. "Clay's experience and insight will be instrumental as we continue to push the boundaries of what's possible in space habitation. His contribution will play a key role in supporting Vast's strategic direction and driving our mission forward."*

*"I am excited to join Vast as an Advisor and contribute to the company's mission of advancing commercial space stations," said **Clay Mowry**. "Vast's commitment to execution is commendable, and I look forward to collaborating with the team to drive continued growth and success in the rapidly evolving space station market."*



Clayton Mowry

Global Beam Telecom joins Viasat's ELEVATE



Viasat, Inc. (NASDAQ: VSAT) has announced that Global Beam Telecom has joined the firm's ELEVATE program.

ELEVATE is a growth program, ecosystem and marketplace for ambitious IoT solution providers, connectivity wholesalers, enablers and OEMs who want to work with Viasat to use its network and footprint to scale new heights. Global Beam Telecom's portfolio of products and services covers the broad spectrum of secure satellite communications, including fixed and mobile turnkey solutions that enable customers to track, monitor, and control remote assets.

As part of the program, Global Beam Telecom will benefit from access to Viasat's global L-band network – amplifying its ability to provide *Internet of Things* (IoT) and satellite connectivity services. Through partnerships with the world's leading network providers, Global Beam Telecom delivers remote and mobile connectivity solutions to clients across the MENA region.

Founded in 2013, Global Beam Telecom is a satellite telecommunication solutions company based in Abu Dhabi — United Arab Emirates and led by a global team of professionals with extensive SATCOM skills and industry experience. As part of the program, Global Beam will gain access to Viasat's broader partner network, creating opportunities to collaborate on additional niche communications solutions for its customers.

Global Beam Telecom serves vertical markets that include...

- **Transport: advanced fuel auditing for enhanced efficiency and reduced costs**
- **Mining: remote monitoring and surveillance of mining facilities, with real-time data transfer, to improve decision-making**

- **Aid & NGO: environmental data acquisition and monitoring over satellite to aid disaster response**
- **Workforce: enhance worker safety, security and connectivity in remote locations**
- **Utility: monitor critical infrastructure and reduce unexpected downtime via intelligent alerts on crucial equipment**

ELEVATE's marketplace will help the company attract new customers in locations without reliable connectivity, or those which have mission-critical connectivity needs. For customers, it gives access to a broad choice of satellite connectivity and IoT solutions developed by a range of providers to enhance the efficiency, safety and sustainability of their businesses.

Simon Hawkins, Vice President, Enterprise Commercial & Innovation at Viasat, said, "**ELEVATE is the go-to destination for satellite IoT innovation. It's specifically aimed at helping our partners easily leverage the latest technology to meet some of the greatest challenges the planet faces today. By combining forces with forward thinking companies like Global Beam Telecom, we can work together to help meet our clients' mission-critical requirements across diverse industries.**"

Shabeer Mohammad, Founder and Managing Director at Global Beam Telecom, said, "**Our rich industry experience, regional knowledge, and world-class solutions have helped keep us a step ahead of clients' expectations to deliver reliable connectivity wherever needed. Now, as part of our business's strategic planning and growth, we've joined Viasat's ELEVATE program to collaborate with partners, solutions providers, integrators, and specialists who share our viewpoint on connecting the unconnected.**"



Viasat's ELEVATE program is open to new entrants, disruptors and established brands of any size who have developed an innovative digital product or service and want to access the power of satellite enabled IoT solutions.

Viasat provides dedicated technical guidance on how to integrate and support its highly reliable satellite services, go-to-market strategy planning and exposure to its distribution channel to enable access to new markets.

Providers working across a diverse range of industries, including, but not limited to, agriculture, aid and NGOs, energy, exploration and leisure, media, mining, transport and utilities, as well as agnostic technology providers, will be considered for membership.

Join the ELEVATE program [at this direct link...](#)

Apex completes first payload commissioning



The image was captured by a camera mounted on the satellite bus's payload deck and shows one of the deployed solar panels in the foreground, with the Azores Islands and Atlantic Ocean in the background. On the solar panel, Apex's logo and a picture of the team are visible.

Apex's selfie photo demonstrates end-to-end capabilities of the Aries platform.

All the major subsystems must be commissioned for the first camera payload to take this selfie: power, thermal, GNC, and communications all had to work together to acquire and downlink the photograph.

The Aries SN1 mission contains multiple customer payloads, and this first payload mission is a success.

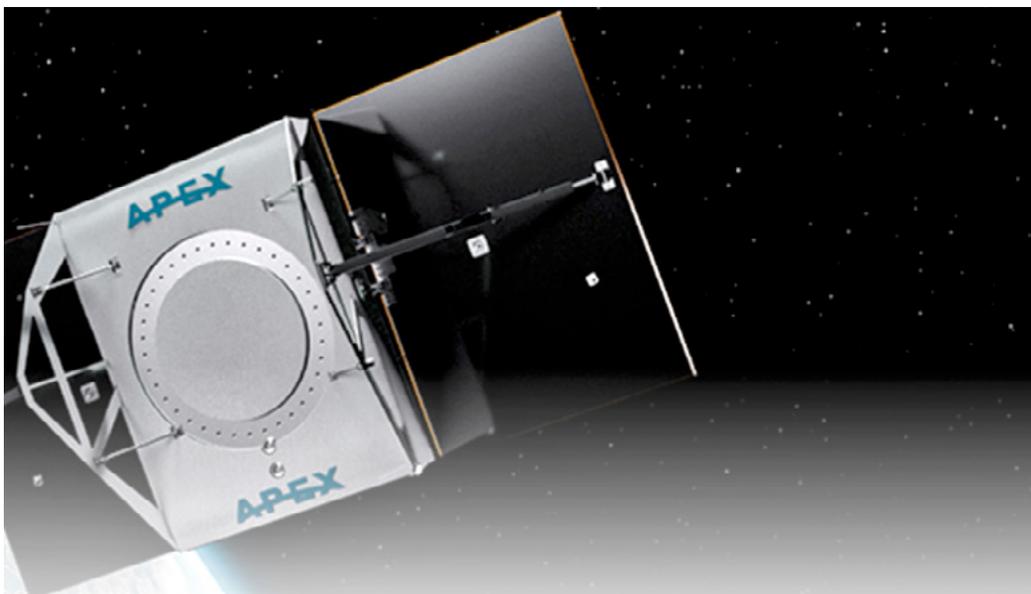
Apex has completed all basic subcomponent commissioning of Aries, and is now completing advanced commissioning of its GNC system over the coming days before turning over satellite access to the company's external customers for their payload missions.

Apex's first satellite set a historic record as the fastest design and build of any production smallsat. Typical manufacturers spend years designing and months building, while Apex completed the clean-sheet design,

engineering work, full assembly, integration, test, and launch in just 12 months of our 200 kg Aries.

Apex is currently producing additional Aries in 2024, with current lead times of a few months.

Apex has released its "satellite selfie," an image taken by its **Aries SN1** spacecraft — the photograph was taken by a payload owned by Apex, which recently completed commissioning.



"This selfie demonstrates that all our satellite's subsystems are working well both individually and together. Space is not easy, and I continue to be impressed by our world-class team for pulling this off on a record time frame. At Apex, we take care of the satellite buses for our customers, ensuring they can focus on payloads and overall mission," said **Ian Cinnamon**, Chief Executive Officer at Apex.

Max Benassi, Apex's Chief Technology Officer, said, *"Commissioning our first payload was a major milestone for our team, showing that we have successfully completed a full mission scope. We look forward to finishing bus-level commissioning before we help our customers achieve what they need from their payloads."*

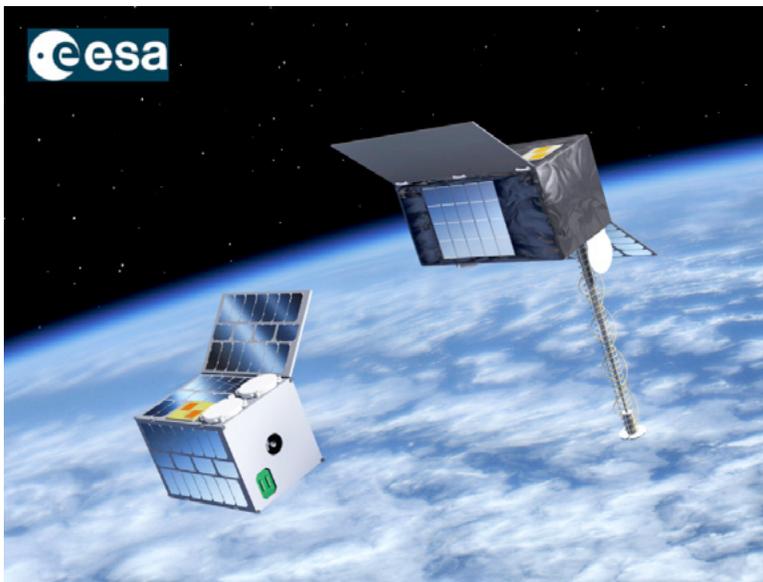
GMV to lead ESA's PNT end-to-end in-orbit demo mission



The aim of this mission is to demonstrate services and develop key technologies of LEO satellites for Positioning, Navigation and Timing (PNT) by launching a small constellation of five satellites. GMV will be responsible for the complete end-to-end space mission and will lead an industrial organization that includes key partners such as [OHB System AG](#), [Alén Space](#), [Beyond Gravity](#) and [Indra](#). This will open up a new way of using low orbit satellites in key markets and applications.

The [European Space Agency \(ESA\)](#) awarded the 78.4 million euros contract to GMV to develop key technologies and demonstrate the benefits of LEO satellites for [Positioning, Navigation and Timing \(PNT\)](#).

Satellite navigation has traditionally relied on satellites at MEO, but future navigation systems will adopt a multi-layer system of systems architecture employing satellites at different orbital altitudes. LEO can bring important benefits to users in terms of improved signal resiliency, robustness, and accuracy.



Artistic rendition of LEO-PNT smallsats on-orbit, courtesy of ESA.

The signed contract includes the design and development of satellites and payloads, the procurement of launch services, the provision of a [Ground-Segment-as-a-Service \(GSaaS\)](#), the development of a test user receiver, system operations, as well as experimentation and demonstration of LEO-PNT services with end users.

A total of five satellites will be developed and placed into orbit. The first satellite, an initial technology demonstrator based on a 12U cubesat architecture, will be launched within 20 months from kick-off to perform initial testing. Four additional smallsats will be launched to complete the demonstration constellation by 2027.

The LEO-PNT satellites developed in this contract will transmit new advanced signals in UHF, L-, S- and C-band complementing the signals currently transmitted by navigation satellites such as [Galileo](#) and [GPS](#). An innovative “LEO shield” integrity determination function, capable of assessing in real time the integrity of GNSS signals received onboard the LEO satellites and alert users in case of malfunctioning will be also demonstrated.

GMV will be responsible for the complete end-to-end space mission and will lead an industrial organization that includes [OHB System AG](#), [Alén Space](#), [Beyond Gravity](#) and [Indra](#) as core partners.

With a key role as space segment prime of the small satellites, [OHB System AG](#) will lead the development and manufacturing of four LEO satellites in Bremen, bringing to the project the company's key expertise in the production of 34 [Galileo](#) satellites.

[Alén Space](#), now part of GMV's group since mid-2023, will provide the first technology demonstrator cubesat platforms as well as important payload components. [Alén Space](#) will also bring to the project its key expertise in new space methodologies that are considered essential for the LEO-PNT mission.

[Beyond Gravity](#), a leading independent space equipment supplier to satellite and payload primes and launcher operators, will play a key role in the development of the PNT payloads onboard the satellites.

With strong expertise in GNSS applications in various markets, [Indra](#) will also play a key role in the project coordinating the experimentation and validation campaign that aims at demonstrating the benefits of LEO satellites for PNT for end-users' services.

The team is completed with 14 end-user representatives and key stakeholders from different parts of the LEO-PNT value chain and with presence in key potential LEO-PNT markets such as road, rail, maritime, navigation at high latitudes and in inland waterways, indoor positioning, fishing, precise timing, IoT/asset-tracking, critical infrastructures, location-based services and 5G/6G industries.

With the LEO PNT *in-orbit demonstrator (IOD)*, GMV is ushering in a new era that will open the door to a new generation of navigation systems. Leading a space mission from start to finish is a major commitment for GMV and represents the next logical step in consolidating the company's position as a leading player in the European aerospace industry.

SpaceX launches EUTELSAT 36D



On Saturday, March 30th. at 5:52 p.m., ET, the **EUTELSAT 36D** mission to GEO was launched by SpaceX from Launch Complex 39A (LC-39A) at the Kennedy Space Center in Florida.

This was the 12th launch of the first stage booster supporting this mission, which previously launched **CRS-26**, **OneWeb Launch 16**, **Intelsat IS-40e**, **O3b mPOWER**, **Ovzon 3**, and six **Starlink** missions.



The all-electric Eutelsat 36D satellite is prepared for transport to Florida from Toulouse, France. Image: Airbus

The payload for this mission is the Eutelsat 36D satellite, which measures 4m x 5m x 4m or the size of a small truck, according to the satellite's manufacturer, **Airbus**.

The geostationary telecommunications satellite arrived in Florida on Monday, March 11th, onboard Airbus' new **BelugaXL** plane, which is based on the A330-200 platform.

About 8.5 minutes after liftoff, B1076 landed on the SpaceX dronship '**Just Read the Instructions**' in the Atlantic Ocean. This was the 76th landing on JRTI and the 289th booster landing to date.

In addition to "delivering over 1,100 TV channels to millions of homes" in the areas of Africa and Eurasia, the satellite "has also been selected by Airbus Defense and Space to carry its latest Ultra High Frequency (UHF) payload to support communications over the EMEA region," Eutelsat said in a statement.



Eutelsat 36D, built by Airbus, will be replacing Eutelsat 36B at 36° East where it will provide more than 1,100 broadcast channels and other connectivity across Africa, Russia, and Europe. The satellite features 70 Ku-band transponders to enable a constant data flow to the ground. The satellite is expected to have an operational lifetime of 15 years.

Spire Space Services and HANCOM InSpace sign agreement



Spire Global, Inc. (NYSE: SPIR) has signed an agreement with HANCOM InSpace (“Hancom”) for Sejong-2 and Sejong-3, two additional satellites, with Spire Space Services.

Under this agreement, Spire will build and operate the satellites, expanding the capabilities of HANCOM-1 (Sejong-1). Together, these satellites will form a constellation for Korea’s first three-satellite remote sensing image data service.

Hancom specializes in commercial and government applications of image analysis, including detection of vehicles, aircraft and ships, changes in roads and buildings, and pine tree death detection. The missions are focused on collecting optical imagery for applications in the agriculture sector, including landscaping applications and the expansion of its existing image analysis portfolio offerings. Hancom plans to launch and operate a constellation of up to 50 satellites.

Sejong-1, a Spire satellite carrying an optical payload for Hancom, launched in May of 2022 on the SpaceX Transporter-5 Mission from Cape Canaveral Space Force Station. It was the first commercial satellite deployed for a private South Korean company.

“Collaborating with Hancom on the expansion of their satellite constellation is a testament to the innovative spirit driving advancements in the South Korean space industry,” **Frank Frulio**, general manager of Space Services at Spire. *“As a pioneer in deploying satellites, Hancom continues to demonstrate their*

leadership in the space industry, and we are thrilled to contribute to the growth of their constellation. Our Space Services team’s dedication and ingenuity shine through, ensuring an unparalleled experience for customers like Hancom, and reinforcing our commitment to delivering cutting-edge solutions in Earth Observation and beyond.”

“Collaborating with Spire Global underscores our commitment to advancing the capabilities of our satellite constellation. Sejong-2 and Sejong-3, alongside Sejong-1, mark a significant step forward in our mission to provide cutting-edge image analysis solutions. Sejong-2 will serve as an extension of Sejong-1, focusing on maritime, agricultural monitoring, and change detection, especially in urban areas, while Sejong-3, equipped with a hyperspectral imager, will leverage its spectral range advantages for applications such as calculating wildfire damage area, analyzing air pollution levels, and assessing river water quality,” said **Dr. Myungjin Choi**, the CEO of HANCOM InSpace. *“With the integration of images from our own multispectral and hyperspectral imagers, drones, and high-performance ground cameras, we are poised to expand our image utilization portfolio even further. We anticipate that the image quality of both Sejong-2 and Sejong-3 will be as exceptional as that of Sejong-1.”*

The WTA 2024 Teleport Award winners

The [World Teleport Association](#) congratulates the following winners of the organization's Teleport Awards...



Independent Teleport Operator of the Year

[du](#)

Founded in 2006, du is a premier telecommunications entity in the UAE, offering services such as fixed line, mobile telephony, internet and digital TV to a diverse clientele. Serving as a holistic service provider, du extends its services to premium DTH channels within the UAE and the broader Gulf Cooperation Council region, offering carrier, internet exchange, and pivotal satellite solutions for broadcasters.

With a strong emphasis on user experience, du delivers robust platforms across DTH/satellite, media fiber, digital asset management and OTT realms. Dedicated to fostering client growth, du champions advanced technological integration, process optimization and consistent viewer satisfaction. Utilizing its cutting-edge satellite and terrestrial capabilities, du promises unparalleled reach. By adeptly navigating the complexities of the dynamic broadcast and media landscape, du empowers broadcasters and content creators to adapt and excel in the face of evolving consumer trends.

In the past year, du's crowning achievement was being chosen by Eutelsat, a leading satellite operator, for broadcast services across the UAE. This collaboration resulted in a multi-transponder contract with Eutelsat's prominent 7/8° West orbital position, a primary broadcasting hub for the Middle East and North Africa, reaching approximately 60 million homes with over 1,000 channels. Eutelsat has since extended its alliance with du, enhancing Direct-to-Home satellite services throughout the MENA region.

Teleport Executive of the Year

[Sergey Raber](#), COO and Director of Operations, [AXESS Networks](#)

Sergey Raber has served as COO and Director of Operations at AXESS Networks' German office in Ruppichteroth for 16 years. He joined CeTel as a Project Manager in 2006 prior to its acquisition by AXESS Networks. In his current position, Mr. Raber is responsible for management of teleport operations, pre-sales and engineering, CRM system optimization and M&A assistance, in addition to expanding the company's maritime support and integration of new services as well as its automation and orchestration services in the NOC. He was responsible for developing AXESS Networks' in-house Monitoring System and its in-house Helpdesk System.



[Sergey Raber](#)

Before joining AXESS Networks, Mr. Raber worked as a scientist, conducting research in the field of Satellite Telecommunications at GMD/Fraunhofer FOKUS in St. Augustin, Germany. He participated in multiple international scientific projects during his 9 years as a researcher.

Mr. Raber began his career as an Engineer at Optima JSC in Moscow, Russia, while completing his studies at the Moscow State Institute for Electronics and Mathematics. He also later received a Masters of Business Administration from the University of Wales in 2013. Mr. Raber has provided his technical insights in several publications, including Satellite ISP Market, Future Mobile Communication Networks and multiple WTA research reports. He has also collaborated on training, certification, publication and study programs with multiple major industry players, including Newtec, SES, Arabsat, Eutelsat, Hispasat, Comtech, UHP, Vertex and Kratos.



Teleport Technology of the Year

[QuadSAT System](#)

QuadSAT's drone-based system provides users with flexible and accurate antenna testing and calibration. It delivers cost- and time-efficient testing and verification of RF equipment, without compromising on quality. The mobile system comprises a drone, a custom-designed payload and Quadsat's proprietary pre- and post-flight software. Using drones to perform these kinds of tests is drastically reducing complexity, making it possible to test satellite ground stations anywhere, all while ensuring a high level of accuracy, something not previously synonymous with on-site testing.

Tests are fully automated, flexible and location independent and a broad range of testing missions can be undertaken, anytime, anywhere, depending on user requirements. This is making high quality antenna testing and diagnostics accessible, helping the satellite industry deliver seamless connectivity, reduce the risk of interference and keep customers connected. The system ensures repeatability, control over the drone during measurements, ease of operation and data delivery in a uniform format.

The Quadsat solution allows teleports to quickly validate their antennas, optimize its performance and obtain uplink approval with satellite operators. Additionally, periodic monitoring of antenna performance can result in reduced power consumption and maximized throughput for antennas.



InfoBeam

Interstellar Technologies signs agreement with JAXA



Interstellar Technologies Inc. has established a basic agreement, signed on March, 2024, with the Japan Aerospace Exploration Agency (JAXA), regarding the procurement of launch transport services.



This agreement is designed to select private-sector entities capable of launching satellites developed under JAXA's small satellite missions, thereby advancing the commercialization of space transportation services by startups and other entities through launch contract procurement.

Notably, the Japanese government has proposed a policy initiative (*1) to secure approximately 30 domestic launch opportunities annually, using both government and private rockets, by the early 2030s. In light of this initiative, Interstellar will continue to further autonomous domestic space access through the ongoing development of the rocket ZERO, which integrates reliability and cost competitiveness.

This agreement is established in accordance with [JAXA-SMASH](#) (JAXA – Small Satellite Rush Program), a program aimed at expanding transportation and small satellite missions. Privately selected transport services under this program will launch small satellite missions publicly solicited by JAXA(*2). Interstellar has been designated as “Launch Operator A,” receiving priority for future procurement contracts.



In line with the new Space Basic Plan approved by the Japanese Cabinet in June 2023, the Japanese government targets the launching all domestic satellites, regardless if government or private, using Japan's flagship rockets or private rockets, starting from fiscal year 2028. This initiative also aims to capture overseas demand.

In September of 2023, Interstellar was selected for the “Small Business Innovation Research (SBIR Phase 3)” by the [Ministry of Education, Culture, Sports, Science and Technology](#), encouraging research and development by startups and others (*3), with governmental support to be provided for both research and development and launch contract procurement to achieve early realization of affordable, frequent private space transport services domestically.⁵

ZERO is a smallsat launch vehicle designed to target the growing market for small-sized satellites in recent years. Building on the knowledge gained from the successful launch of the private suborbital launch vehicle MOMO, the first of its kind in Japan's private sector, Interstellar is progressing toward the first launch of ZERO.

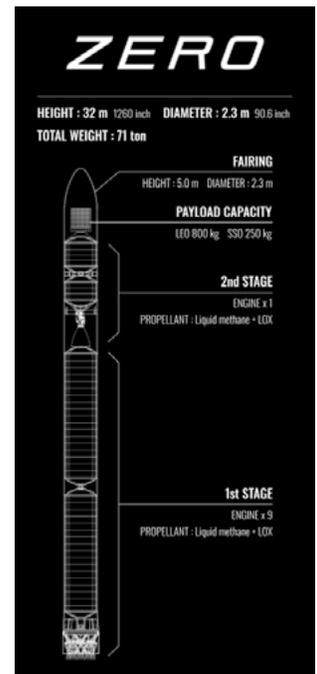
ZERO's space transportation service distinguishes itself with competitive pricing—at less than 800 million JPY per launch (in mass production)—made possible through an integrated development and manufacturing process. Another key strength is its flexibility to provide customized launches tailored to the rising needs of satellite companies. For satellite companies in Japan, Asia, and Oceania, proximity to the launch site ensures convenience, reducing launch-related time and costs and enhancing overall value.

With an eye on recent trends and the demand both locally and globally, ZERO is enhancing its capacity to launch satellites of up to 800 kilograms into LEO. This strategic contributes to the establishment of an independent domestic space transportation service. Simultaneously, it positions Interstellar to establish a firm presence in the Asia-Oceania and European markets.

Takahiro Inagawa, CEO of Interstellar Technologies, said, “Space technology's complexity and the limited opportunities for challenges have hindered the expansion of space utilization and industrial growth. JAXA-SMASH presents an innovative opportunity for demonstrating cutting-edge technology with satellites to break through these limitations. We are honored to be part of it, bringing our space transport services to the table. Looking ahead, we anticipate a substantial increase in space transport opportunities domestically. However, we're all hands on deck, pushing ahead with technology demonstration and business development, ready to seize the day in this new era.”

ZERO: Specifications

Height: 32m
Diameter: 2.3m
Wet mas: Weight: 71 ton
Propellant: Liquid Methane (Biomethane)
Oxidizer: Liquid Oxygen
Number of Engines: 1st Stage: 9, 2nd Stage: 1
Payload Capacity: LEO 800kg / SSO 250kg
(Future Maximum Capacity)



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