



# SATELLITE EVOLUTION

September 2023

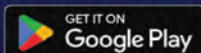
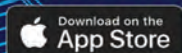
# GLOBAL

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## ManSat: Managing the regulatory heavy-lifting

### Plus:

- Bringing content to the masses: What role does technology play?
- Where there's a will, there's a way: Securing the future of broadcasting
- Hybrid connectivity, busting the failover myth

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Crispin Littlehales, Executive Editor ●●●

## History in the making

**History is defined as the systematic documentation** and study of the human past. These days we capture history as it happens, broadcasting images and commentary around the globe, thanks to satellite technology.

In 1945, Arthur C. Clarke, author of "2001: A Space Odyssey", wrote a technical paper establishing the feasibility of satellites being used for worldwide communications. It would be two decades before NASA launched Syncom 3, the first geostationary satellite which relayed pictures of the 1964 Olympic Games in Tokyo to viewers in the US. A mere five years later, 650 million people turned on their TV sets to watch Neil Armstrong and Buzz Aldrin step upon the surface of the moon.

This incredible feat of broadcasting took place with the aid of a small black and white camera that NASA contracted from Westinghouse for US\$2.9 million. The camera was stored in a compartment attached near the lander's ladder. Armstrong released the camera and Aldrin closed a circuit breaker inside the cabin. The image and sound signals were transmitted via a lightweight antenna, lined with 38 miles of gold-plated wire to reflect the signal 250,000 miles back to Earth where the transmission was received by the Honeysuckle Creek Tracking Station in Australia and Goldstone Observatory in California. The pictures were uploaded to satellites and transmitted back to NASA's Manned Spaceflight Center in Houston then, using additional satellite links, to TV receiving centers around the world.

Fast forward to today and the James Webb Space Telescope's (JWST) images which are being captured a million miles away from Earth and transmitted over the Ka-band of radio waves. Data is relayed through the Deep Space Network. The pictures we mere mortals see aren't what the telescope captures. According to the Webb team, the data

is "stretched" and made visible to us by means of a scientifically rigorous color-assignment method. Last month, NASA shared an image of the star, Earendel, observed 1 billion years after the Big Bang.

We are experiencing traumatic events and enormous challenges at this time in our history and our industry is poised to enable solutions. As Arthur Clarke noted not so very long ago, "The only way of discovering the limits of the possible is to venture a little way past them into the impossible."

In this issue of the magazine, we sit down with Katherine Gizinski, CEO of ManSat to unravel the regulatory challenges that lie ahead as more and more satellites orbit the Earth. We also explore the future of broadcasting from several different angles. An interview with Henrik Axelsson, President of KenCast, reveals the latest about the company's breakthrough technology and KenCast's plans for the future. Alex Beach, Head of Media and Broadcast at ST Engineering iDirect addresses the changing tide in the satellite broadcast industry and offers advice on how to secure the future of broadcasting through collaborative efforts. Andrew Bond, Sales and Marketing Director at ETL Systems, focuses on the new technology being deployed to meet customer demand and shares his thoughts on what the next 12 months might have in store. In addition, Tristan Wood, Managing Director of Livewire Digital discusses true hybrid connectivity. ●

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Satellite Evolution Global - September 2023 - Volume 2 No. 7. ISSN: 2755-1326



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# Dutch entrepreneur connects remote Greenland villages with the world

**EUROPE:** Walter van der Plas, owner of Skybrokers, has taken a significant step in connecting remote areas with the world. His organization, specializing in large satellite dish projects and services, has recently provided internet connectivity to three isolated villages in Greenland: Qaanaaq, Ittoqqortoormiit, and Tasilaq.

After months of logistical planning and a complex journey involving 14 stops, including helicopter and commercial flights and transfers, various Skybrokers teams have constructed one satellite dish and converted two others to a different frequency. These antennas are now aligned with a new satellite recently launched by SpaceX, operated by the Spanish satellite operator Hispasat. The installations will result in substantial cost savings for the local telecom provider Tusass and ensure internet connectivity for the small villages in Greenland.

The journey to Greenland was not without challenges, requiring precise logistical planning and intensive consultation with local authorities and partners. "What we

have achieved with our teams is a testament to Dutch innovation and entrepreneurship," says Walter. "It is an honor to play a role in connecting remote communities with the rest of the world. This project is something the Netherlands can be proud of."

Skybrokers, with over 25 years of experience, has built a global reputation for delivering solutions to telecom operators, satellite communication providers, and teleports. Walter's experience and determination have led to successful projects in various parts of the world, including Easter Island, Sri Lanka, French Guiana, Peru, and Chad in Africa. This mission in Greenland exemplifies how small entrepreneurs can have a significant impact, not only in the Netherlands but globally. ●

## Sidus Space acquires Edge Artificial Intelligence (AI) Company, Exo-Space

**NORTH AMERICA:** Sidus Space has announced its strategic acquisition of Exo-Space, a cutting-edge California-based firm specializing in Edge Artificial Intelligence (AI) software and hardware for space applications.

This transaction signals Sidus's determination to tap into the growing AI sector and expand its offerings in the Earth and Space Observations services market.

Pursuant to the terms of the acquisition agreement



Photo courtesy Skybrokers ●●●

Sidus has acquired Exo-Space's assets in a combination of cash, stock options, and performance bonus incentives in alignment with Sidus' growth into an AI-enabled space services company. Exo-Space brings a current revenue stream of commercial and government contracts extending through 2025, as well as a pipeline of potential clients. The deal is projected to have a positive impact on Sidus's earnings before interest, taxes, depreciation, and amortization (EBITDA).

"This accretive acquisition expands our talent, technology, and total addressable market. Along with sales contracts and existing AI technology, the transaction includes the acquisition of Exo-Space's collective experience in AI and machine learning," said Carol Craig, Founder and CEO of Sidus Space. "This transaction provides the opportunity for us to enhance our presence in the Earth and Space Observations markets by providing actionable solutions for our customers' needs as opposed to just raw data. The integration of Exo-Space EdgeAI technology with Sidus' sensors provides significant value and transformative potential across various domains."

Exo-Space occupies a unique niche in the realm of U.S. owned Edge AI computing, concentrating on both software and hardware solutions for space assets that utilize faster processing speeds. Exo-Space's current operations complement Sidus' established US DoD/Intelligence relationships.

Jared Novick, Senior Vice President of Strategy & Special Projects, added, "Exo-Space's combination of space hardened hardware and resilient software made this an attractive acquisition in creation of value to both our customers and shareholders." He also added, "The concept of offering customers a special "rideshare" opportunity with a software platform to upload, change, and improve analytics of payloads onboard is a forward-thinking and innovative approach. This idea aligns with the increasing demand for flexibility and customization in satellite missions and data collection."

Sidus believes the acquisition of Exo-Space will seamlessly integrate stand-alone AI and machine learning products into Sidus' business lines, with the ability to market the hardware for third-party purchase. A distinguishing feature of Exo-Space's solution is its adaptability, designed to smoothly integrate the latest processor advancements. Proprietary hardware-agnostic software allows this flexibility. The synergy between Sidus' satellite constellation, Edge Computing, and AI platform is expected to deliver substantial enhancements in leveraging space-based data.

Jeremy Allam, Chief Executive Officer of Exo-Space, commented, "By joining the Sidus team and integrating our AI capabilities into LizzieSat, we can now better deliver the benefits of space-based AI to more customers and on a shorter timeline than was previously possible."

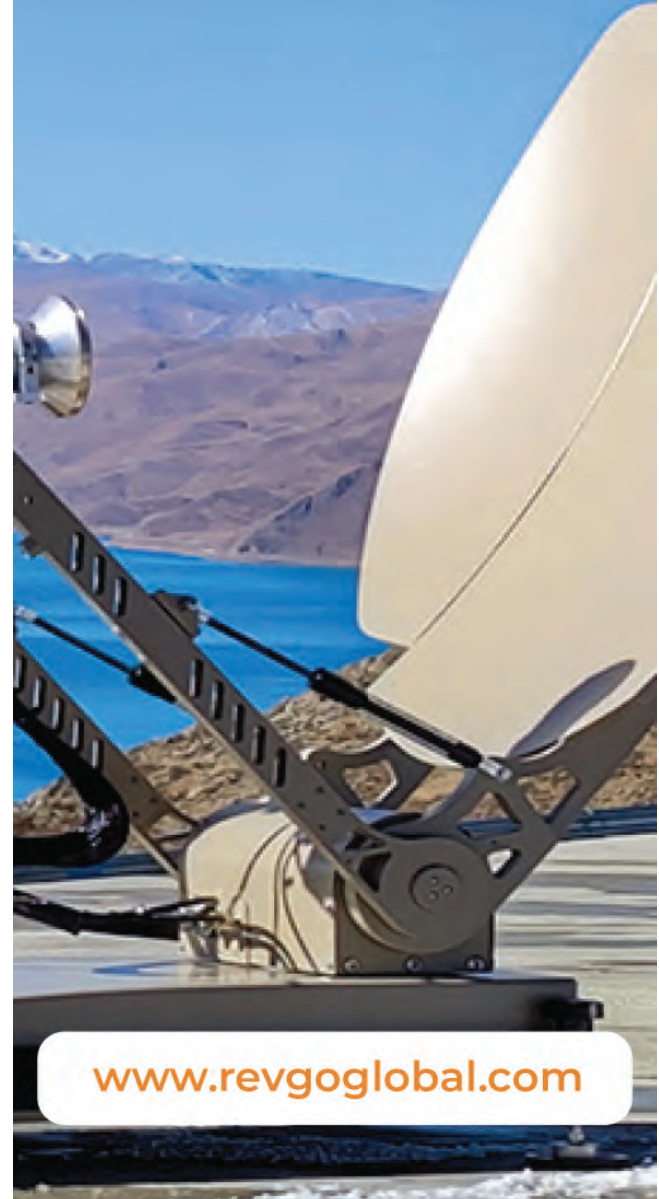
Sidus believes this strategic acquisition solidifies Sidus Space's position as a frontrunner in the space technology sector, poised to leverage AI advancements to revolutionize the acquisition and utilization of space-derived data.

Sidus has issued non-qualified stock option awards to purchase an aggregate of 3,955,212 shares of Class A



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common stock to certain former employees of Exo-Space. The stock options were granted as inducements material to the new employees becoming employees of Sidus in accordance with Nasdaq Listing Rule 5635(c)(4). The options have an exercise price of \$0.16 per share, which is equal to the closing price of Sidus' Class A common stock on August 21, 2023. Each option will vest over a four-year period, subject to the employee's continued employment with Sidus on such vesting dates. Notwithstanding the foregoing vesting conditions, no portion of the options shall be exercisable prior to the second (2nd) anniversary of the date of grant. ●

## IBC23 visitors set to discover innovative backhaul solutions

**EUROPE:** Just around the corner is the unmissable 2023 edition of IBC, with Amsterdam once again host to the global broadcast and satcom industries as they network, develop and learn.

Renowned for high-performing, versatile and reliable backhaul solutions, *ViaLite* Communications will be showcasing its world-leading RF over fiber equipment trusted by suppliers covering the most watched live events in the world. Visitors will have access to the unmatched technology on stand 1.C21, with the expert team on hand to help industry professionals transform their broadcast capabilities. IBC, the world's premier media, entertainment,

and technology exhibition on September 15th – 18th, cultivates the latest innovations and trends in the broadcast and satellite sectors, setting itself as the best place for the industry to stay up-to-date.

Showcased on *ViaLite's* stand at the event are the world-leading RF over fiber solutions giving broadcasters more freedom, lower running costs and unbeatable signal reliability. Explore the modules, which give the widest dynamic range on the market, extended range and portability for wireless equipment and transmit multiple cameras and audio signals on one cable, backed by *ViaLite's* industry-leading five year warranty.

For the satcom professionals, *ViaLite* will also be displaying industry-leading ground station signal transport systems, providing links and long distance solutions up to 600 km. Reliability, signal integrity and minimizing loss are at the forefront of *ViaLite's* product design process, resulting in unbeatable performance trusted by 75 percent of the biggest teleopt operators around the globe.

By attending IBC2023, broadcast and satcom professionals access world leading expertise, extensive networking opportunities with top decision-makers, and a firsthand look at the newest technologies driving the industry forward.

"We are thrilled to be back at IBC, engaging face-to-face with the broadcast and satcom industries once again," said David Downham, Global Sales Director at *ViaLite*. "Our team is eager to help professionals deliver a more reliable transmission for their broadcast and ground station applications." ●



ViaLite's 3U rack chassis with RF over fiber link rack chassis card ●●●



## Rocket Lab launches 40th electron mission, and successfully flies reused engine

**NORTH AMERICA:** Rocket Lab USA successfully launched a dedicated Electron mission for Capella Space (Capella). The mission demonstrated several significant milestones for Rocket Lab's reusability program, including an ocean splashdown of the Electron rocket's first stage and the successful flight of a previously flown Rutherford engine. The mission was also Rocket Lab's 40th Electron launch since the Company began launches in 2017, further cementing Electron's position as a leading commercial small launch vehicle. The 'We Love The Nightlife' mission lifted off on August 24th at 11:45 am NZST from Rocket Lab Launch Complex 1 on New Zealand's Mahia Peninsula, deploying Capella's next-generation Acadia satellite for its synthetic aperture radar (SAR) constellation to a 640km circular low Earth orbit.

As a recovery mission, Electron's first stage returned to Earth under a parachute after launch and splashed down in the Pacific Ocean several hundred kilometers down range from Launch Complex 1. Rocket Lab's marine recovery vessel will soon extract the stage from the ocean and transport it back to Rocket Lab's production complex for analysis and testing to inform future recovery efforts. In addition to recovering the booster, Rocket Lab launched a pre-flown 3D printed Rutherford engine for the first time. The engine previously flew on the first stage of the 'There and Back Again' mission, launched in May 2022. The engine performed on par with new Rutherford engines, completing a successful first stage burn.

The mission follows on from Rocket Lab's two previous launches for Capella, including the "Stronger Together" mission launched in March 2023 from Rocket Lab Launch Complex 2 in Virginia, and the "I Can't Believe It's Not Optical" mission in August 2020 from Launch Complex 1 in New Zealand, which deployed the first satellite in Capella's SAR constellation. 'We Love the Nightlife' was the first of four new dedicated launches on Electron for Capella, announced in February 2023, to deploy Capella's next-generation Acadia satellites.

Rocket Lab founder and CEO Peter Beck says: "We've been a trusted launch partner to Capella since 2020 and we're delighted to deliver mission success once again. Electron has played a crucial role in helping constellation operators like Capella deploy their spacecraft on time and on target, and we look forward to continuing building out Capella's constellation with more dedicated launches this year. Congratulations also to our team on delivering 40 Electron launches, completing another booster recovery, and proving Rutherford engines can be flown multiple times. One mission is an enormous achievement in this industry, but 40 is a rare achievement and testament to the relentless drive, innovation and dedication of the Rocket Lab team." ●



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## Bringing content to the masses: What role does technology play?

As broadcasters deploy new technology to meet customer demand, how can the cost implications be managed and what might the next 12 months have in-store?

*Andrew Bond, Sales and Marketing Director at ETL Systems*

Last year, while discussing the future of satellite broadcast and how the industry was changing, I wrote about the gradual shift from analogue to digital and how changing customer expectations were impacting the industry. With broadcasters and streaming giants still in a state of ongoing evolution and production crews constantly looking for "the next best" content source, the deployment of new technology certainly hasn't slowed over the past 12 months.

This idea of "enabling content anywhere" was a key talking point at the 2022 International Broadcasting Convention in Amsterdam and, just a few months later, the Qatar World Cup demonstrated how broadcasters can seamlessly stream content, filmed across eight different locations, to almost every corner of the globe.



*Andrew Bond, Sales and Marketing Director at ETL Systems* ●●●

Of course, this comes at huge cost and 2022 was the first year that we saw two of the biggest UK broadcasters, ITV and the BBC, join forces to deliver for those at home. As Phil Bigwood, executive producer, BBC TV Football said, "Neither broadcaster could have gone ahead with such an ambitious production plan without the other. It's been a major plus in enabling us to put more facilities in the UK and to share technical crew."

### GREATER COLLABORATION

In Qatar, we saw Timeline, ITV and the BBC's chosen facilities provider, fit-out the studios at each of the eight stadiums, as well as build production galleries at the International Broadcasting Centre in Doha, and at HQ3 in Dock10. With around 20 individual feeds captured by the



*Inside Lusail International Stadium in Qatar, the home of the 2022 FIFA World Cup final. Photo courtesy Colin McPhedran/Shutterstock* ●●●

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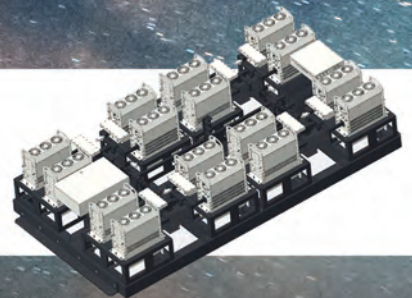
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Digitising the RF signal will enable greater speed and control of transmissions. Photo courtesy Blue Planet Studio/Shutterstock ●●●

host broadcaster at each stadium, Host Broadcast Services (HBS) were fed into the International Broadcast Centre and then routed to Salford, which is thousands of miles away, for either switching locally at MediaCity or back in Doha.

Both of the above scenarios made use of remote surface production technology. The hardware processing of the feeds was performed in Salford, while the production itself for sound, graphics, and vision was mixed remotely using control panel interfaces. There were two reasons for this approach. Firstly, the bigger, higher stakes match tended to be directed from Doha, where the production team was closer to the action and could make split second decisions. Secondly, there were a handful of back-to-back matches being played. Effectively managing two live broadcasts would have presented challenges, so the team swapped between the two methods to ensure reliability and good quality coverage.

#### THE ONGOING ROLE OF SATELLITE AND TERRESTRIAL NETWORKS

There's no doubt that technological advancements have enabled better service and greater collaboration. Satellite and terrestrial networks continue to deliver a reliable signal, with video travelling via satellite and then being distributed over fiber to be delivered to the viewer. Network architects continue to focus on how these signals can be converted from analogue to digital and vice versa.

At ETL, we have been collaborating with a working group of experts to create a standard with the goal of digitizing the RF spectrum. The Digital IF Interoperability (DIFI) consortium is working to create a standardized interoperable digital interface/Radio Frequency (IF/RF) based on the widely adopted VITA 49.2. Once established,

broadcasters can move an analogue signal from one place to another by satellite using a digital network. This breakthrough will decouple the network operation center from the antenna and unlock many benefits, including greater speed and control.

#### GREATER SPEED AND CONTROL

There are four main transmission links we can think about - from the camera to the control room; the control room to a local hub; international transit and then to viewers in the broadcasters' territory. All of these will have played an important role during the recent World Cup. At every terrestrial stage, the transmission is routed via switches which each cause a minuscule delay. However, the cumulative impact can result in latency and a poorer experience for viewers - especially those relying on a real-time link.

When broadcasting live sport, this is unacceptable and the biggest reason why many broadcasters choose to avoid terrestrial transmission links by using the satellite network.

Over time, the operational and capital costs associated with using the latest digitization technology will be reduced. That will enable broadcasters to provide better link availability and RF signal quality and will become accessible even to broadcasters with smaller budgets. At the same time, it will be possible to offer stronger digital encryption of analogue signals for increased security.

Regardless of the digital and analogue question, industry advancements and new technology continue to move forward at pace, assisting broadcasters in bringing high quality coverage to people's homes. ●

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● ● Katherine Gizinski, CEO of ManSat

Satellite Evolution Global

Q&A

## ManSat: Managing the regulatory heavy-lifting ● ●

The success of any satellite company is intertwined with adherence to the regulations maintained by the International Telecommunication Union. ManSat's longstanding international regulatory expertise enables its clients to move forward with technological innovation and not get bogged down with navigating the complexities of spectrum allocation and orbital positioning. We spoke with Katherine Gizinski, CEO of ManSat, to explore the challenges that lie ahead as more and more satellites orbit the Earth.

*Crispin Littlehales, Executive Editor, Satellite Evolution Group*

**Question: When did you first get involved in the satellite and space industry and what attracted you to your current position as CEO of ManSat?**

**Katherine Gizinski:** It all started with a college internship, which I strongly recommend to anyone considering a career in this industry. I absolutely fell in love with the mission, the people, and the complexity of it all. I remember getting a task from my director at the time that took me around the building. I went to the offices of the chief engineer and the production manager who talked about contracts and finance. I asked lots of questions and felt like I was trying to decipher what felt like alphabet soup. I found that no matter how much I learned, there was always another layer to unpack and to understand. I was hooked and the rest is history.

I connected with ManSat's founder and chairman, Chris Stott, six years ago. At that time, I was still on the user hardware and services side. As Chris shared ManSat's history with me, I found myself fascinated with yet another dimension to what we do in space—the regulatory piece.



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which is a critical determinant of success or failure when you're bringing any new satellite capability to market. I saw an opportunity to leverage my experience with collaborative solution design and building out a services business as ManSat expanded its consulting offerings.

**Question: How would you describe the role that ManSat plays in the industry?**

**Katherine Gizinski:** We are technology enablers which means we are blocking and tackling on the regulatory side to help new capabilities advance to market. From strategic planning through to ongoing commercial operations, our role is to advise, define, and execute on our clients' regulatory strategies. Practically speaking, we live at the intersection of technical, regulatory, and policy.

Innovation outpaces regulation by nature and our goal is to bridge that gap. Instead of taking a fixed view of what is or what can't be done, we want to lean forward to consider what could be and how we can work with the various stakeholders to drive toward that vision. Ultimately, we aim to advance the industry while we promote a specific client interest. There's more growth on the horizon for ManSat as we expand our global footprint and offerings.

**Question: How many regulatory entities are involved in the regulation and allocation of spectrum and how difficult is it to achieve harmony among these groups?**

**Katherine Gizinski:** To be frank, there are a staggering number of stakeholders, and it is exceptionally difficult to achieve harmony, but it is doable. The satellite industry has successfully operated for decades leveraging the existing fundamental framework. At ManSat, we support two key aspects. One is working within the International Telecommunication Union (ITU), and the other is country

by country market access to support commercial use of the spectrum.

The ITU is a standards body and the enforcing arm of the UN for international spectrum regulatory matters. Within that, there are 193 Member States across three regions. Each nation gets one vote and decisions are made by consensus every four years and then applied globally. So, it's a numbers game. There is also a piece at the regional level that can support harmonization to a certain extent, but it has its own level of complexity.

Market access is a country-by-country exercise because spectrum is a sovereign asset. Each country has its own policy priorities and those national interests overlay any global harmonization. It is all about relationships with those regulators, and we work together with regulators to enable new technologies to go forward to market. In addition, there are a couple of global operator associations that help to familiarize the regulators with capabilities that are coming forward and how those can bring value to their economies while aligning with their national policy priorities.

All this regulation flows from international treaties responsible for ensuring that any entity within their jurisdictions abide by these international rules. Governments, which have been doing this for a long time, are dealt with a little bit differently than commercial enterprises. However, as we look for commercial solutions to government applications, those worlds clash a bit.

We are living in an interconnected world, and it's critical to take the global regulatory landscape into consideration because there are not the same borders on operations in space. If you have a ground station on one side of a country's border and a ground station on the other side, the interference considerations don't care about where that line falls.

As we expand the scope of what's possible and the capabilities that we can offer, the regulatory landscape becomes increasingly complex but that doesn't mean the challenges are insurmountable.

**Question: Space is getting crowded. Is there enough frequency spectrum to accommodate all the current players and what about the future?**

**Katherine Gizinski:** The spectrum is a finite resource and as with any finite resource, we must think about long term sustainability. I am personally optimistic as we see advances in higher bands and more efficient use of the spectrum available. But we need be thoughtful about other interests or competing interests, not just within our industry, but outside of our industry.

As an industry, I think there is room to improve how we tell our story, how we share the meaningful impact our satellites have on people's daily lives, how they help in emergency situations, and everything in between. I would like to see the industry raise its profile, so that we not only use our resource more efficiently, but we also protect it. All things considered; I would say that the number of players in this space has been a positive because it's facilitated technological advancements. For example, many years ago, when we were talking about direct to home capability, Ku-band spectrum was just enough to



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support a couple of TV channels. Today the same spectrum carries thousands of HD channels. So far, having more players has driven the industry forward affording more efficient use and more advanced technological capabilities that expand the pie, so to speak, because we are forced to use that resource more efficiently.

**Question: Satellite technology is advancing at a rapid pace and there appears to be a growing number of satellites that are using more than one frequency. How are those trends affecting the regulation of spectrum?**

**Katherine Gizinski:** Filings and licenses characterize the communication services between transmitter and receiver. From a regulatory perspective it's the same level of difficulty, whether it's one satellite with two bands, or two satellites, each with one band, or satellites with multiple frequency bands. Additionally, I think there's potential there for satellites that are more capable, so you need fewer of them. From our perspective, that's a good thing. And again, more capable satellites mean you can do more with whatever platform you have in space.

**Question: LEO constellations are growing at a very swift pace; will it be possible to accommodate them all?**

**Katherine Gizinski:** I think that there are several players at the table that are defining that answer even as we speak. It's not an infinite number of players but it is a significant number. When working together in good faith and in accordance with international norms it is certainly possible to resolve interference concerns collaboratively. There's absolutely an opportunity for many systems to be supported. Where that tipping point is between "yes we can" and "no we can't", I don't think anybody knows. It'll come down to operators working together to ultimately advance the collective interests of the industry. What I do know is that there are organizations such as the Global Satellite Operators Association (GSOA) that are doing a tremendous job of bringing those parties to the table at the senior leadership level. It's all about getting those CEOs around the table to hash out these issues quietly and thoughtfully and to communicate the consensus to the broader stakeholders when it comes to spectrum regulation.

**Question: Do most of your clients have in-house regulatory expertise or do they depend entirely on ManSat to handle everything?**

**Katherine Gizinski:** We support a good mix of clients ranging from established global operators that you've heard of with a very robust internal regulatory staff, to startups that are just getting their arms around how the regulatory landscape tips the scales on whether they'll succeed or fail. And we handle everything in between. The fun thing about what we do is that no two projects are exactly alike, even if they're on the same agenda item at the WRC. The business case, the approach, the strategy—it differs for each of our clients.

**Question: Where do you see the company headed in the next five to ten years?**

**Katherine Gizinski:** We're continuing to expand our



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bespoke consultancy services and we walk alongside our clients from strategic planning to continuous operations. As part of that, we support clients around the world in technical, regulatory, and market access matters. Over the next five years, we'll continue offering those services and expanding our footprint as we build out our exceptional team of experts not only with the right skills and experience, but also the passion to stand shoulder to shoulder with our clients to enable them to succeed in whatever market they seek.

**Question: You mentor entrepreneurs through TechStars Starburst Space Accelerator program. What have you learned through that experience?**

**Katherine Gizinski:** In addition to TechStars, I've also had the opportunity to mentor through the Space Generation Advisory Council (SGAC). It's a partner organization of the Society of Satellite Professionals International (SSPI), for which I currently serve as chairwoman. I'm very bullish on the future of our industry, based on just how incredible and dynamic these young entrepreneurs and students are. A big takeaway for me is the optimism and the encouragement they instill because there are some very bright, capable, and innovative people coming into our industry.

There are two things that really stood out to me because of my experience with the two mentorship programs. First and foremost, passion and drive are invaluable. Anyone can learn a lot if they're curious and willing to learn. But you can't teach that fire in the belly. That's something a person has or doesn't have.

The second thing that stood out to me is how easy it is to forget how much we've learned when we're in it. Passing that knowledge on to the next generation highlights the breadth of knowledge and experience it takes to work and succeed in this industry. Throughout our organization and especially as we've brought in younger folks, we've tried to make sure that we are continually baselining our assumptions both internally on our teams and externally with our clients to make sure that we're all aligned. This is particularly important where we work at that intersection of technical, regulatory, and policy. One of my mentors early in my career shared with me that if you're ever in the room and feel like you don't know anything, you're just an expert in one less thing than the next guy (or gal). Because there are so many verticals of expertise in our industry, it's easy to forget how much you know that is completely foreign to someone that's an expert in another piece.

The advice I offer to all my mentees is to make sure you're passionate about what you do, because everything else comes easily if you've got that drive and desire to learn. But if that's not there, nothing else really matters. You can ride the wave, or you can be enveloped by it. If you're out there, trying to ride the wave is a lot more fun than having it wash over you. ●

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## Where there's a will, there's a way: Securing the future of broadcasting ●●

Looking specifically at the broadcast industry, not only have satellites enabled broadcasters to showcase live events to millions across the world, they have also allowed them to film and deliver breaking news from remote and often hostile locations, making satellite a highly reliable solution.

*Alex Beach, Head of Media and Broadcast at ST Engineering iDirect*

For decades, broadcasters – and the wider telecoms industry – have been reliant upon the use of satellites to help them deliver content to a rapidly growing global audience. With over three thousand communications satellites now operating in multiple orbits, this technology is relied upon by millions of people and plays a key role in a range of cellular, radio, television, broadband and military applications.

### A CHANGING TIDE

With the COVID-19 pandemic forcing production crews far from their native studios, broadcasters – like numerous other industries – sought new ways to ensure that they could continue to deliver for their customers who, at the same time, were consuming a record amount of IP-based content.

Almost three years after the pandemic began, and with little change to the reliance on streaming services, 90

percent of the world's broadcasters now claim to be adopting a multi-cloud infrastructure, citing its ability to offer greater scalability and flexibility at a lower cost.

For many content creators, a significant motivation for moving away from satellite has been its delivery cost and, of course, the reallocation of C-band to accommodate for 5G development and the rise in OTT (Over-The-Top) solutions. Predictions for satellite's slow decline have been forecasted frequently over recent years by analysts and operators, particularly as streaming subscriptions have continued to increase.

Streaming giants are investing heavily in original creations, as the demand for exclusive content—solely through streaming platforms—continues to rise. 85 percent of Netflix's new content spending is earmarked for original TV shows, films, and other productions, according to its chief content officer, Ted Sarandos. Amazon also increased its spending on originals, live sports programming, and licensed third-party video content, from US\$5 billion in 2021 to US\$7 billion in 2022.

It's not just streaming providers who are making big changes. News that major broadcasters like ITV and Channel 4 are committing their futures to the cloud is only adding to the ever-growing pressure on satellite.

Although a number of broadcasters are shifting away, the satellite industry itself is undergoing a technological transformation. As well as continuing to feed the rise in edge computing to manage the massive volume of space data, commercial satellite operators worldwide are planning to launch nearly 250 new constellations, enabling more intersatellite communication to transfer large data rapidly, demonstrating the industry's commitment to the solution.

**FROM THE CAMERA TO THE CLOUD**

Among experts within the broadcast and telecoms space, much discussion has centered around the need for technological developments within the traditional television space in order for it to survive—in particular, REMI (remote integration model) and the growing OTT market.

First, we must consider the importance of REMI and the use of satellite-based cloud solutions that enable effective collaboration between location, news crews, and film production houses or studios—a challenge they each faced during the pandemic. With COVID-19 pandemic now behind us, production crews are on the look-out for ever-more compelling locations to film their movies and binge-worthy series with the aim of pushing the limits of visual storytelling and, consequently, their technology. Having the capabilities to be able to film anywhere, yet collaborate with an entire geographically dispersed team, has become a necessity—one that cloud computing is helping to achieve.

Cloud computing is an extremely powerful tool in any producer’s toolbox, allowing sound or video editors that are working from home to pick the files from the cloud and process these at their location, wherever that may be. But the influx of activity via a cloud solution can lead to congested networks on the ground, giving space, and satellites that inhabit it, the edge.

Cloud access is such a powerful enabler of productivity that the demand for satellite connectivity as part of a blended all-IP solution is well-justified, especially in remote areas. An integrated satellite-based cloud solution can deliver content anywhere, far beyond the reaches of any terrestrial network. High Throughput Satellites (HTS), offer greater throughput at low-latency while also being



Alex Beach, Head of Media and Broadcast at ST Engineering iDirect ●●●

financially efficient and agile.

Agility is key to satellite performance in the broadcast space - especially in remote locations where equipment needs to be easy-to-operate and highly portable. Director Martin McDonagh faced this challenge when filming Banshees of Inisherin (2022) on a remote island in Ireland—

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a location which offered limited space and required the assistance of ferries to transport tech back and forth to the set.

It's also worth noting that being able to get to these remote locations isn't only guaranteed to benefit the production crews creating the content, but also those inhabiting the remote locations. Since the release of Banshees of Inisherin, Achill, home to 3,000 inhabitants and center for the film's narrative, has seen an economic boom with over euro1.7 million (US\$1.8 million) injected into the area and record footfall levels.

Of course, all of this wouldn't be achievable without the right equipment and production crews having the ability to blend different technologies including cellular, terrestrial, and satellite.

**BURGEONING OTT SPACE**

OTT services like Disney+, Netflix, and Amazon, saw exponential growth during the COVID-19 pandemic, when live sporting events—one of the key drivers of linear viewing—ceased. OTT is a rapidly growing space, and competition is fierce within the industry.

Let's look at the wider picture. There are 1.5 billion current OTT service subscribers. It is a market with a revenue expected to exceed US\$1billion by 2027. Headlines suggest it is already winning the battle against traditional content delivery: "Streaming outperforms both cable and broadcast TV for the first time ever" and "Britons will soon spend more on streaming than TV".

With information like that, it's not hard to see why many experts predict that OTT will eventually replace traditional media distribution channels. However, those remaining optimistic about how satellite can play a vital role in content delivery moving forward, view the OTT era differently.

Although the pandemic demonstrated a new-found reliance on OTT solutions, this period also demonstrated its disadvantages. During the government enforced lockdowns, we saw significant pressure globally on broadband networks because of the mass audiences around the world streaming OTT content. In an effort to give users continued access to the content, under the instruction of governments and network providers, the quality of video streams was downgraded with the aim of reducing bandwidth pressure. This solution only papered over the cracks.

More than three years later, in May 2023, Netflix experienced a black-out where users could not access the app. Although only lasting one hour, it impacted viewers in Northern Europe as well as larger parts of the US, causing mayhem and widespread criticism about the service's infrastructure. As subscriber numbers continue to increase across popular streaming sites, it's likely that OTT solutions will face the same issues again.

Streamed educational resources face similar challenges. According to Studentcrowd.com, while predominantly in use during the COVID-19 pandemic, some 68 percent of universities across the UK are predicted to retain some online element within their teaching resources, including online lectures. This finding suggests that OTT solutions will remain a prevalent feature within the educational space moving forward.

In many areas, broadband infrastructure is both available and adequate to meet this need, but in others it is not, and that is when organizations turn to satellite.

ST Engineering iDirect's recent project with DIVICAM, supporting the Peruvian government in its bid to enable residents in remote regions of Peru access to educational content, only highlights the growing demand for digital inclusivity. The first satellite OTT ecosystem, SKYflow, was created with these demands in mind. SKYflow defines satellite's role in OTT delivery by enabling service providers and telcos to deliver content to any device in any location.

Using technology developed by a group of companies, including ST Engineering iDirect, the SKYflow ecosystem will provide 100 percent of the Peruvian population with DTH content and access to live TV that can be recorded, providing them with invaluable education video and media content. In addition, its two-way broadcasting capabilities will expand the use cases available to the Peruvian government allowing them to take advantage of a plethora of broader applications. These include network offload, which enables mobile network operators to take advantage of satellite's inherent multi-casting functionality as well as its longer range to complement the build-out of 5G in remote areas.

Users will also benefit from its ability to deliver DVB-NIP so families can gain all-important telemedicine access



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as well as access to live content, VOD assets, and materials like e-books and exam papers. This is a critically important service to households that, without it, have limited options for education and growth.

**THE SOLUTION**

Today's competitive landscape has broadcasters vying for the most cost-effective solutions. We believe that to secure the future of broadcasting, we must all work together and towards a blended, modern solution, involving a combination of technologies.

As leaders within the satellite industry, ST Engineering iDirect must remain at the forefront of those changes in order to secure the future of satellite and its role in content delivery. That's why in 2022 we released the now award-winning MCX8000 Multi-Carrier Satellite Gateway which was designed to bring together the best of both worlds -

high density and high reliability - through robust design and redundancy solutions, enabling broadcasters to cater to every type of broadcast scenario.

The result is a future-proof system that combines video and IP multiservice capabilities to support the transport of today's and tomorrow's services, offering easy configuration; higher availability to broadcasters; and hot swappable design resulting in lower OPEX.

The demands across the world to bridge the gap between urban and rural connectivity, and provide digital connectivity for all, are testing the capabilities of today's satellite. Focusing on the need for an integrated, end-to-end solution that both bridges the digital divide and delivers the very best quality service to an expanding global audience, satellite will continue to be both necessary, relevant, and essential for key players in the broadcast and telecoms industry. ●

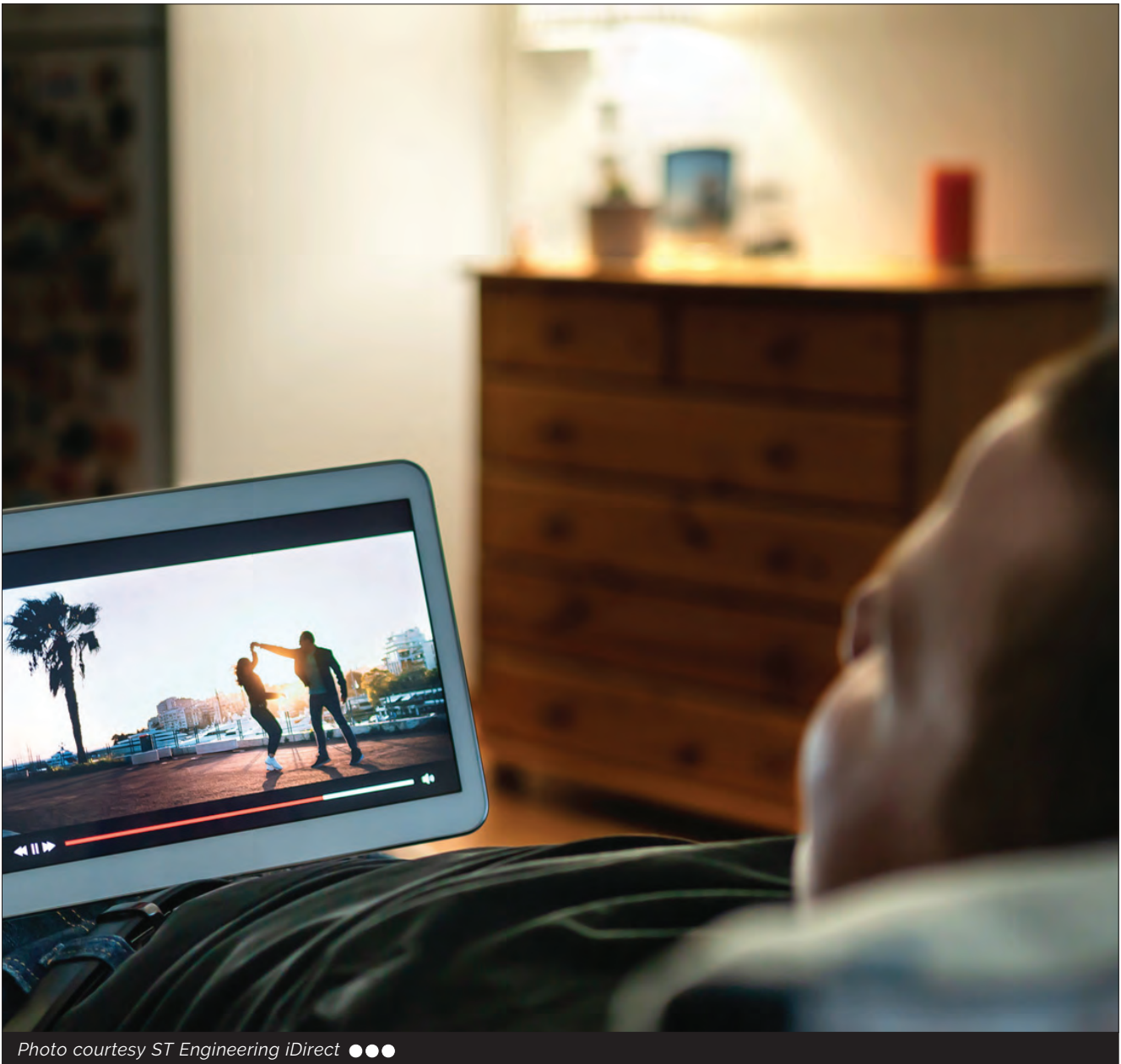


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● ● Henrik Axelsson, President of KenCast

Satellite Evolution Global

Q&A

## At the leading edge of content delivery ●●

Today KenCast serves the military as well as a growing number of global companies that distribute feature films, live sports events, concerts, digital signage, corporate content, news, educational content, and more. We spoke with Henrik Axelsson, President of KenCast, to find out more about the company's breakthrough technology and plans for the future.

*Crispin Littlehales, Executive Editor, Satellite Evolution Group*

**Question: When was KenCast established and how has the company evolved to meet the changing demands of its customers?**

**Henrik Axelsson:** Digital communications are prone to errors, with disruptions lasting from milliseconds to minutes. Missing or corrupt packets can cause the file or stream to be unavailable. Founded in 1993, KenCast's earliest patents were able to repair degraded data, re-ordered delayed data, and re-created deleted data. It was for these reasons that the US military became one of KenCast's earliest customers.

As the US Department of Defense (DoD) was building out a network called the Global Broadcast Service (GBS) to provide global connectivity via satellite to US joint forces in battle, issues quickly emerged. The DoD was unable to reliably send encrypted content to troops on the move and into areas where weather and atmospheric conditions were challenging.

This was compounded by the challenge of not permitting a backchannel to validate received data (as this backlink would risk exposing military installations and troops to revealing their position). Instead, in this one-way network, the military had little choice other than to "spray and pray," sending content multiple times in the hope that all content sent would be received.

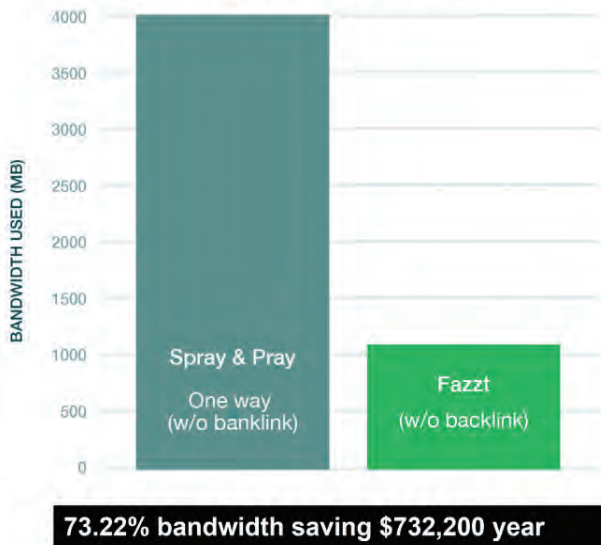
Carousel delivery, where data is sent again and again, can ultimately work, but it is unreliable, time-consuming, and inefficient. This is especially true in multicasting—point-to-multipoint—when the sender needs to



Photo courtesy KenCast ●●●



### Fazzt Savings vs Spray & Pray



Fazzt software is the culmination of decades of development work catering to a diverse set of customers and their wish list. ●●●

ensure 100 percent of the recipients each receive 100 percent of the file or stream. Inefficiency increases and costs rise. What was needed was a way of ensuring error free transmission the first time around to every recipient.<sup>1</sup> The DoD invited over a dozen major companies to address its need for secure and reliable delivery of critical content. KenCast already had a reputation within military circles for exceptional satellite error correction, based on its success in content delivery to globally dispersed naval ships via the Armed Forces Radio & Television.

KenCast offered its advanced form of Forward Error Correction (FEC) and, after exhaustive testing, successfully demonstrated efficiency, reliability, operational effectiveness, and cost savings. These innovations, plus KenCast's rich software suite of content delivery tools, impressed the DoD which then selected KenCast as the content delivery solution for GBS.

### Question: What are the major challenges facing content distributors and how does KenCast solve them?

**Henrik Axelsson:** In 2023, both the general public and businesses expect to receive an endless stream of content anywhere—whether in remote areas, in places with poor infrastructure, flying in a plane, at sea, or on the road. What's more, no one wants to pay much to receive it. Content distributors face steep technical and economic challenges to reliably meet these demands. To make matters worse, satellite, television, or 5G multicasting transmissions are often at the mercy of weather. Mobile receivers experience gaps in line-of-sight visibility as they pass through tunnels, overpasses, or behind obstacles. Moreover, the fact that transmitters (LEOs/ MEOs) and receivers are scattered across the globe and darting about at high speeds—on land, at sea, and in the air—heightens the likelihood of communications errors.

I previously mentioned FEC. In some ways, the algorithm behind FEC is like a Sudoku puzzle where, if a user receives enough numbers, they can figure out what's missing. Similarly, if an algorithm can solve all the missing pieces, it can complete the entire file or streaming video. With FEC, missing pieces are reconstructed using supplemental packets that were generated prior to transmission and broadcast with the original file or stream.

As an example, the premier movie distributors in the Americas use KenCast's Digital Cinema solutions to distribute their films to more than 5,000 cinemas in over 20 countries in the western hemisphere. To do so, they transmit their content through KenCast's headend software and hardware at a teleport, send signals to a satellite thousands of miles into the sky, and then transmit the data into KenCast's CinemaPro appliance in the exhibitors' projection booths. When they send that movie, they also add a small percentage of supplementary packets of our proprietary FEC. Movie files are amongst the largest files there are (with some over 1TB). When a film is received, different theaters will lose different parts in transit (rain in Florida, snowstorm in Alaska) but our software repairs any

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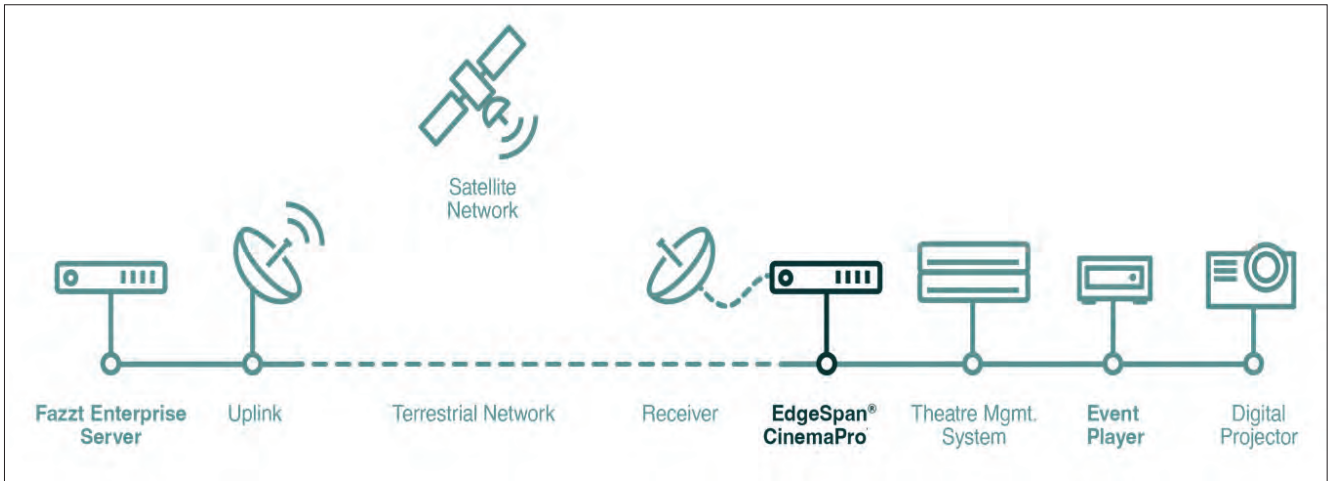


Figure 1 KenCast Digital Cinema Workflow ●●●

lost data. As a result, millions of theatrical releases have been digitally multicasted to thousands of cinemas and tens of millions of theater goers across the hemisphere, all without a hitch. The same is true for live events. In Central and South America, stretching for thousands of miles over mountainous terrain and challenged by terrestrial connectivity that is insufficiently fast and reliable enough to push feature films and live events, delivery via satellite is a must. In the past year, KenCast's cinema solutions enabled theaters across the region to stream the FIFA World Cup, UFC fights, and high-profile live music events from musical artists, including Coldplay and the K-Pop group BTS. Fans flocked to theaters to enjoy these events together. It would have been impermissible had any theater suffered an outage.

**Question: Who are your customers and what kinds of applications does your technology support?**

**Henrik Axelsson:** In the first two answers, I mentioned the US military and digital cinema. They are two of the larger sectors we serve. Here are how some other organizations that use our software.

- Retail and hotel chains use our signage solution to display ads or notices for particular locations and conditions.
- Educational institutions supply teaching and test materials to students across continents.
- Leading news networks rely on KenCast in over 99 countries to relay the latest stories.
- Maritime fleets provide media streaming services and



KenCast serves the US military sector. Photo courtesy KenCast ●●●

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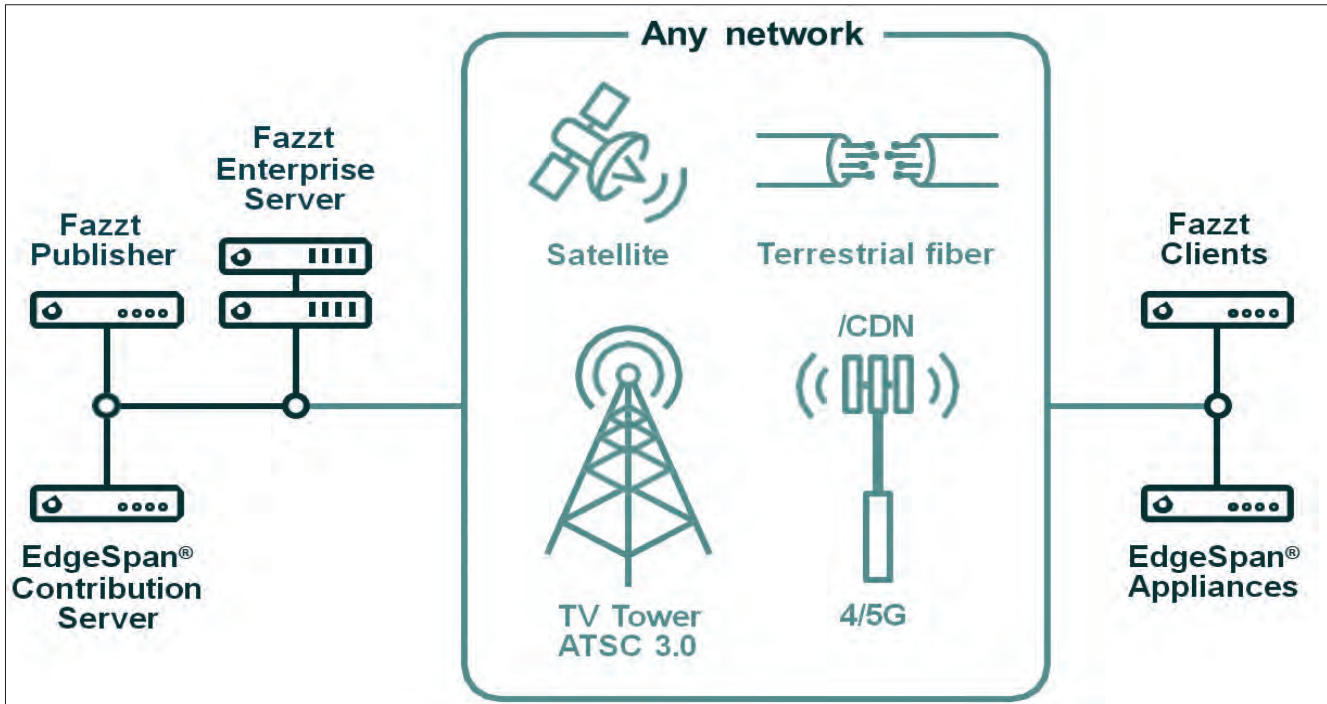


Figure 2 Network at a Glance ●●●

- crew welfare for thousands of ships around the globe.
- Air passengers view seamless video content on seat backs from a single transmission, even on planes banking between satellite beams at 575 miles per hour.
- Corporations deliver company-wide training programs.
- Humanitarian and military operations, space and scientific expeditions rely on Fazzt for secure reliable data collection from or content delivery to isolated places.
- Our technology will efficiently deliver updates to trucks and cars in real-time alongside entertainment packages.

What these markets have in common is the need to distribute valuable content reliably, swiftly, and securely.

**Question: How does KenCast’s proprietary Forward Error Correction (FEC) software suite—AL-FEC differ from other FEC algorithms?**

**Henrik Axelsson:** In digital communications protocols are used to specify how data is packetized, addressed, transmitted, routed, and received. This functionality is organized into several layers; the base level corresponds to the physical connection between devices – the link level. This is where some basic forms of FEC reside: DVB standard LDPC, RS, Viterbi. However, LL-FEC has very limited error correcting capabilities as it is unaware of the wider application. It can only correct errors in data transferred within tiny boundaries over tiny timeframes. This is generally sufficient for generic use cases, such as for voice calls, web browsing and small low resolution video streams. Beyond that, it starts to fail.

In contrast, KenCast’s PhD engineers developed patents for algorithms to work on the top application level

(AL), across the entire file. AL-FEC is aware and unrestricted, checking for errors and repairing data across different levels. As a result, KenCast can correct errors lasting from milliseconds to minutes, and sometimes cover extended outages.

I previously mentioned the challenges of successfully delivering content to moving vehicles while new satellite constellation transmitters crisscross overhead at high speeds. KenCast’s latest software release incorporates our newest patented FEC algorithm to provide a dedicated solution. Whereas the version described earlier works by sending source data and supplemental packets, the mobility-focused innovation sends only supplemental packets.

Imagine a movie file that is broken into 100 pieces and transmitted to cars within range of the transmitter. Blocked by tunnels, tree canopies, rain, etc., a car moving into and out of the reception will almost certainly receive a unique combination of pieces. Whereas one will receive “1-9, 17-35, 54-71, etc.” another will receive “5-15, 22-33, 40-65, etc.,” and so on. If the transmission is sent multiple times (carousel transmission), there is the possibility that, over time, the thousands of vehicle recipients in the area will get enough data to generate a complete file. That’s unreliable, inefficient, and expensive.

KenCast FEC does not need all the original file pieces— it will use supplemental FEC data to cover anything lost. In fact, it would typically be enough to receive any 102 packets of data to be able to complete the file.

In other words, an airline’s in-flight entertainment system will receive a complete delivery of the latest blockbuster even if it missed a whole hour of a twelve-hour transmission.

It is invaluable for streaming live events. Our FEC

delivers a perfect recreation of the original content in real time, without error, without delay and accessible only to its intended recipients.

**Question: You have another software suite called Fazzt. How does that work?**

**Henrik Axelsson:** Fazzt is a hub and spoke system of a server and clients. It has been deployed in many different settings (operating systems, hardware, environments) and can run on almost any piece of hardware. We refer to Fazzt as our software suite and the algorithms as the engine. KenCast has built a feature rich content delivery solution around our various algorithms. Through 30 years of development, KenCast has continuously added newly requested functionality from our diverse customer base. As a result, new customers are pleasantly surprised to find that Fazzt meets nearly all of their content delivery requirements out of the box. They do not have to reinvent the wheel and they get to market quicker.

**Question: Are your services customized or are these off-the-shelf solutions?**

**Henrik Axelsson:** It is both. Our Fazzt software is the culmination of decades of development work catering to our diverse set of customers and their wish lists. It allows customers to quickly deploy a proven versatile solution that easily works into their workflow to start sending content.

That said, there are certainly unique use cases and opportunities for customization. Unlike Fortune 500 bureaucracies with one-size-fits-all products, we pride ourselves on our dedicated catering to customer needs with support from testing through launch through operation. We're renowned for our approachability and agility. Our customers, many of which have been with us

for decades, know they'll talk to the people who actually wrote the software. Ultimately, whatever issue a customer is facing in order to deliver content to their end users, KenCast has almost certainly encountered it before, has developed a solution, and can integrate it into their workflow. We offer assured data delivery.

**Question: Can you give some examples of recent projects that you are partnering on?**

**Henrik Axelsson:** Certainly. In one, we are improving our theatrical terrestrial delivery solutions for live events and feature films to complement existing satellite distribution network in the most cost-effective way.

We also work with a digital signage hardware provider that is directly integrating our Fazzt client into their player to enable reliable satellite delivery of digital signage content for a financial services network.

We are challenging our software's effectiveness in the most adverse of network conditions. For example, are equipping a brave company with our content delivery solution so that they can collect weather data from the airplanes they fly into hurricanes (on behalf of a mutual customer, NOAA). In yet another scenario, we are collaborating with several companies utilizing ATSC 3.0 (new TV standard) to deliver content to vehicles roaming between television towers.

Three decades after pioneering content delivery solutions, we are still at the vanguard, continuously developing our algorithms and platform, working closely with our partners and customers through trials and evaluations of advanced technologies. ●

*<sup>1</sup> Assumptions: 99.9% success; uniform loss distribution; one-way S&P is carousel; Full (36 MHz) transponder at \$1M/Y; Packet size is 1000 bytes.*



Photo courtesy KenCast ●●●

## Hybrid connectivity, busting the failover myth

As technology continues to advance, especially in the realm of data transmission, hybrid connectivity has gained significant popularity as a strategy for optimizing communications. This approach promises a seamless integration of various network technologies, offering improved reliability, flexibility, and performance. However, upon closer scrutiny, it becomes evident that what is often believed to be hybrid connectivity does not truly meet the criteria.

*Tristan Wood, Managing Director of Livewire Digital*

Let's reconsider the traditional networking approach and examine how failover, although providing some resilience and redundancy, falls short of true hybrid connectivity. Despite its many advantages, failover alone does not embody the essence of hybrid connectivity. Failover refers to the ability of a system to switch to a backup connection when the primary connection fails - it does not fundamentally transform the underlying connectivity architecture. As a result, the level of resilience remains limited.

In a genuine hybrid, or "heterogeneous," network, multiple network technologies seamlessly bond, actively distributing the load and resources. This involves combining and merging different bearers such as cellular,



*Tristan Wood, Managing Director of Livewire Digital* ●●●

LTE, satellite, and WiFi into a single 'pipe'. Such an approach can deliver not only a faster, but more reliable service.

Furthermore, a true hybrid platform should go beyond that, adapting and configuring itself based on various factors, such as bearer performance and environmental conditions at any given moment.

When optimized in this way, a hybrid system can work through degradation and failure to ensure that single TCP connections are maintained and accelerated, regardless of the availability and performance of the underlying networks. This ability to optimize connectivity, even in the most challenging conditions, will deliver a truly consistent and uninterrupted user experience. In critical operations, where connectivity can be the difference between life and death, hybrid and resilience take on a whole new meaning.

Failover, on the other hand, relies primarily on a backup connection to take over in case of an outage, without actively utilizing the strengths and capabilities of both primary and secondary connections simultaneously.



*Photo courtesy LeoWolfert/Shutterstock* ●●●

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**RESILIENCE AND REDUNDANCY**

The importance of establishing connectivity in any environment, regardless of the availability or integrity of terrestrial infrastructure, has never been more crucial. Numerous sectors rely on live video streaming, data transfer, and voice calls as essential components of their operations.

In the defense sector, the ability to communicate through multiple channels with fallback options is essential. Emergency services require real-time access to ongoing incidents, even in remote or rural areas where cellular infrastructure may be absent. The ambulance service relies on reliable connectivity to access patient data or consult with clinicians while on the move or at the scene. The rapid development of telehealth triage further emphasizes the necessity of hybrid connectivity and the robust bonding of available networks.

Broadcasters increasingly depend on critical live streaming from any location worldwide. The marine industry utilizes the power of hybrid connectivity as yachts and commercial vessels navigate the seas. Even utilities require machine-to-machine (M2M) and IoT capability to monitor and control operations on wind farms, oil rigs, and other traditionally challenging environments.

While the relay of live video is no longer limited to news organizations and has become prevalent across various sectors and for consumers, the primary challenges lie not in transmitting footage but rather in managing the network and available bandwidth. The key to delivering high-quality video lies in bonding multiple networks to increase bandwidth, seamlessly correcting errors, and optimizing the connection.

Even our everyday vehicles and appliances increasingly rely on a combination of satellite, WiFi, and cellular communications. With the availability of low earth orbit (LEO) satellites growing, the applications and opportunities are endless.

However, factors such as latency, packet loss, and network congestion can impede the integration of networks, leading to suboptimal user experiences. Consequently, the intended performance improvements of hybrid connectivity are often overshadowed by the complexities and compromises introduced by the traditional approach. This calls for a shift in thinking to overcome these challenges.

Integrating different network technologies from diverse sources introduces additional security challenges and considerations across various network endpoints and connection points. The lack of a unified security framework can result in vulnerabilities and inconsistencies that make the overall network infrastructure more susceptible to cyber threats. Moreover, ensuring compliance with industry regulations and data protection standards becomes increasingly challenging in a fragmented network environment which incorporates public networks and the Internet.

When it comes to being efficient with cost-management, a key consideration is that with true hybrid, heterogeneous connectivity, different parameters can be configured to allow for cost efficiencies to be made. For example, with the transmission of voice calls, parameters

“Even our everyday vehicles and appliances increasingly rely on a combination of satellite, WiFi, and cellular communications. With the availability of low earth orbit (LEO) satellites growing, the applications and opportunities are endless.”

can be set to allow for the most cost-effective bearer to be used if it's good enough – i.e., cellular can take preference over satellite if it's 'stable enough', thus reducing the costs of always using satellite.

This also applies to the handling of Quality of Service (QoS), to ensure the performance of critical applications where there's limited network capacity or rapid variations in bandwidth and latency across each network. While security and compliance remain a network engineer's priority in many organizations, it should never be compromised by cost. In a true hybrid ecosystem, this compromise need never be a concern because factors such as priority, efficiency, and cost have formed part of the underlying design and are mirrored in the configuration settings.

**A PARADIGM SHIFT**

The old adage says that if you do what you've always done, you'll get what you always got. But that's not the case in networking. If you do what you've always done in a networking environment, where the explosion of tech, amount of data being transferred, and the sheer weight of traffic vying for space on our heavily congested networks, you will in fact get considerably less than you always got.

It is evident that a paradigm shift is necessary. Many systems claiming to be hybrid fall short of true hybrid connectivity as they merely offer backup options with switchover times measured in minutes. While this may be satisfactory for many, it fails to meet the evolving demands of industries that rely on constant, fail-safe connectivity as mentioned earlier.

To achieve true hybrid connectivity, Livewire Digital has developed *RazorLink*, an innovative Software Defined Networking (SDN) solution, as part of a European Space Agency (ESA) contract. *RazorLink* has the unique capability to seamlessly and dynamically bond various bearers, including satellite, cellular, Point to Point radio, Wi-Fi, and terrestrial services. It aligns with user-defined objectives and adapts to prevailing conditions.

This truly exemplifies hybrid connectivity, creating a Wide Area Network (WAN) that efficiently combines high latency VSAT with low latency cellular and a multitude of other bearers in-between. The result is an aggregate service with optimized and configurable bandwidth. In contrast, failover mechanisms do not achieve these capabilities.

Livewire Digital's *RazorLink* presents a game-changing solution, enabling industries to achieve the full potential of hybrid connectivity and address the ever-increasing demand for reliable and high-performance networks. ●





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● ● Mahdi Nazari Mehrabi, Group Chief Technology Officer, Northtelecom

Satellite Evolution Global

Q&A

## Is satellite broadcasting still relevant? ●●

Satellite broadcast services have bridged many gaps by facilitating access to real-time global information worldwide, including in remote and underserved areas. Despite these undeniable advancements, satellite broadcasting faces unprecedented challenges in keeping up with rapidly emerging technologies that transcend latency, distance, cost, scalability, and bandwidth limitations to broadcast information more efficiently and extensively. This begs the question, is satellite broadcasting technology becoming obsolete, and what does the future hold for the industry? We asked Northtelecom's Group Chief Technology and Information Officer, Mr. Mahdi Mehrabi, to answer this question.

**The satellite broadcasting industry has evolved** exponentially since the first television signals were relayed between the United States and Europe by Telstar 1 satellite in 1962. The world has witnessed historic events such as the Apollo 11 Moon Landing in 1969, several life-changing concerts, and global sports tournaments through satellite broadcasting.

Groundbreaking innovations have been birthed through satellite broadcasts, including major television network launches, the transition from analog to digital television through HDTV, and video-on-demand and live streaming services.

Indeed, satellite broadcast services have bridged many gaps by facilitating access to real-time global information worldwide, including in remote and underserved areas.

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**Question: Satellite Broadcasting has come a long way; what are the main changes you have witnessed recently?**

**Mahdi Nazari Mehrabi:** The satellite broadcasting industry is facing an enormous challenge, likewise many other technological domains. The emergence of the internet and the subsequent birth of social media and nonlinear television, such as OTT Platforms, is an immense threat to long-dominating satellite televisions worldwide.

In addition to the technological evolution, there are some other factors, such as the change in the consumers' appetite, most especially in the new generation, Z&X, as they are growing up with their mobile and tablet and spending the majority of their time interacting with those non-linear media than legacy linear TVs. In the satellite industry, we must acknowledge the trends; however, it doesn't mean the satellites will be entirely obsolete or redundant anytime soon for many reasons.



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**Question: Do you believe that satellite broadcasting can still remain relevant?**

**Mahdi Nazari Mehrabi:** We often neglect that more than half of the world's population don't have access to very minimum connectivity, and the other big majorities are inhabiting the areas with very minimum or very expensive broadband capacities. That means those non-linear technologies are, in reality, out of their reach or would be considered luxuries.

Apart from that, the very nature of broadcasting technology over satellite makes it the easiest and cost effective way to target a significant population scattered over vast geographical areas for any single government/entity. As such, a satellite is still the most accessible and feasible way to close the digital and information gaps, especially in underserved areas and remote locations, no matter where they are.

Another note is the vulnerability of no satellite infrastructure in many natural disasters and harsh conditions, making them out of reach or hard to deploy and maintain. Specific domains, such as maritime and aviation sectors, will only be served through satellite connectivity.

These are all reasons for the importance of keeping satellite technology still relevant; however, we must proactively navigate and embrace some none disruptive areas and applications.

There are many new trends in the world in which satellite broadcasting can play a significant role, subject to the proper presentation and business model. One area is sustainability and ESG.

Satellite broadcasters play a considerable role in raising awareness about environmental issues, thus encouraging sustainable behaviors among their viewers. By airing campaigns, documentaries, and educational content, they contribute to a broader understanding of the importance of sustainability and inspire eco-conscious changes in consumer habits.

**Question: Do you see the media/technology as a killer or immediate threat for satellite;**

**Mahdi Nazari Mehrabi:** Firstly, it is a broad and generic question and view that we often hear even from experts in our industry; however, it does neglect the very fact of segmentation which is the bedrock of any commercial business.

Without a doubt, satellite technology was substituted and pushed away from some areas; however, that is a very nature of any technological advancement and could and did happen not only for satellites but for many other technologies.

At Northtelecom, we still see considerable opportunities in the area where we operate; however, we don't close our eyes to the market trends and customers' needs. Satellite broadcasting is still the top priority for many content producers in the middle east as the other infrastructures are not well placed.

Although the substitute media are pushing the boundaries and making it harder for the broadcaster to maintain their market share and monetize their content, we are witnessing the crowd's turn to standard television for major events such as the World Cup.

**Question: How do you see the future of satellite broadcasting in the next five years?**

**Mahdi Nazari Mehrabi:** I am optimistic; however, it is hard to generalize and give a one-size-fits-all answer. Some segments will move and invest more in other communications and platforms than satellites. Especially

the advanced countries with good internet infrastructures; however, there would still be many underdeveloped countries and underserved spots, even in developed countries, that need satellite to reach out.

We need some non-disruptive moves in the market to embrace new ideas and work hand in hand to promote the uniqueness and ubiquity of satellite technology to our esteemed clients and partners.

**Question: How does Northtelecom helps its clients and partners in this challenging environment?**

**Mahdi Nazari Mehrabi:** We look at satellite broadcasting and our partners as an ecosystem with specific needs and trends. Although satellite remains the final destination of our clients, it is not their only need and application.

In today's complex market environment, the needs of a business go beyond one or two single applications, and you can only serve your client with cross-functional expertise and solutions.

Northtelecom has heavily invested in many domains to increase the reliability of the broadcasting services and our customer's satisfaction and happiness, including advancement in our RF and network infrastructures and offering many value-add and custom-made solutions upon our client requests. Recently we invested in new firewalls and cyber security measures to give our customers more protection and peace of mind. We continue our effort, keep our communication channels open with our partners, and closely monitor and follow our partners' needs to serve them the best. ●

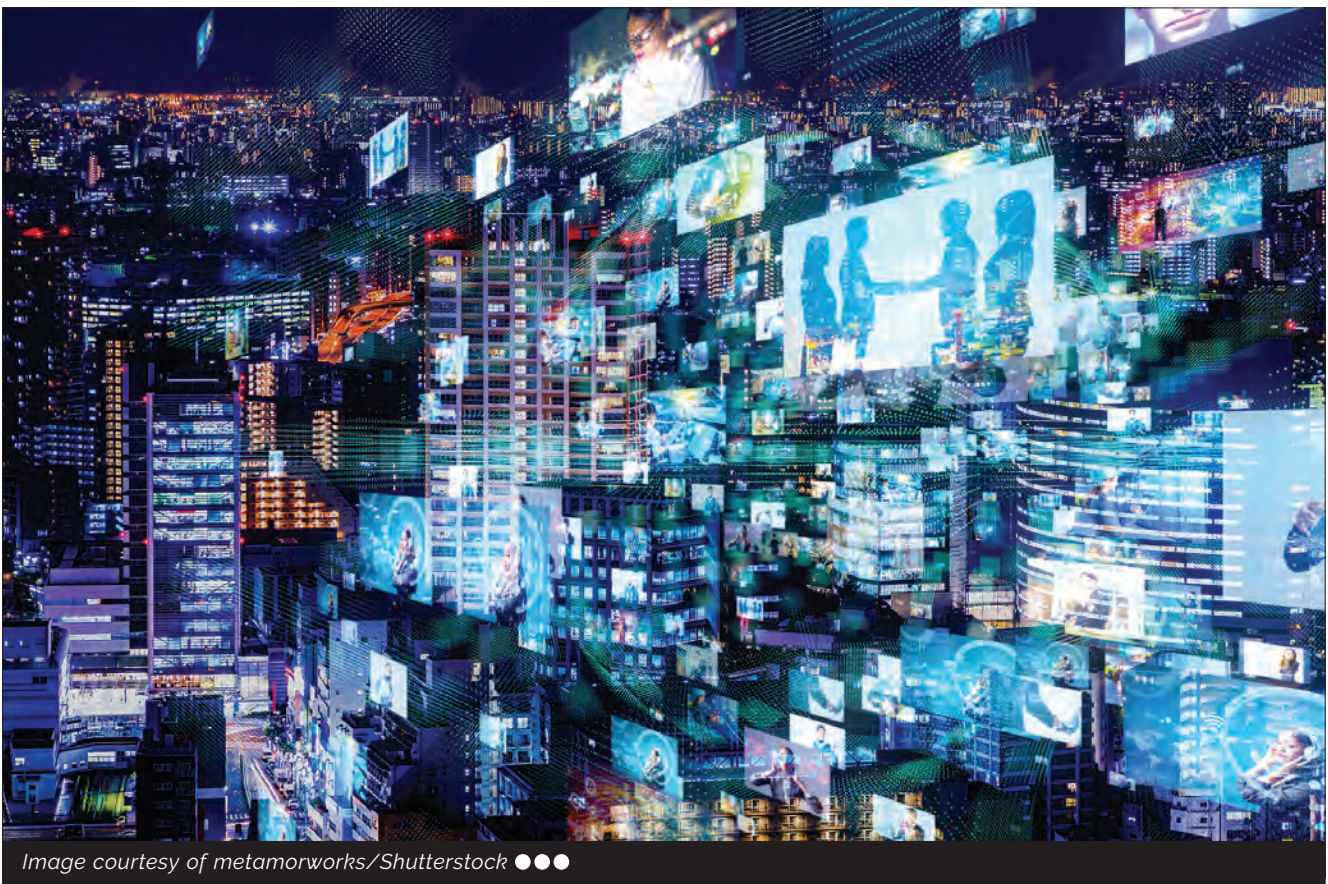


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# Cosmonova Broadcast and its push to deliver innovation

**Cosmonova Broadcast is a reliable supplier** of innovative products and a partner of a significant number of providers, operators and TV channels in Ukraine and a number of other countries. Every day millions of people watch impressive video content prepared, processed, streamed, delivered and broadcast through Cosmonova Broadcast's services.

Cosmonova Broadcast is geographically located in Ukraine, and its technical facilities are located in Poland, Germany and the Baltic countries, which enables the company to deliver a flexible and uninterrupted service.

Its main activity is the development and implementation of innovative solutions in the field of information technologies for the media. It specializes in the development of software for TV channel broadcast automation, TV signal delivery and broadcasting of large-scale events, such as Eurovision, the Olympics and Paralympic Games. Cosmonova currently has clients in more than 40 countries around the world.

## INNOVATIVE PRODUCTS

Cosmonova works to create innovative products that help customers improve their work flow. One of the key areas

of activity is the development of software for TV channel broadcast automation - COSMO|PLAYOUT.

COSMO|PLAYOUT is a cloud-based solution that allows the customer to deploy and launch a TV channel in a short period of time and without capital investments.

The service can be used by both classicTV and by corporate TV channels. Classic TV channels are delivered to satellite, IPTV, OTT and cable networks. Corporate TV channels are used by business for broadcasting on internal and external screens.

COSMO|PLAYOUT allows you to plan the program schedule of the television broadcast taking into account the time of broadcast, the duration of programs and the assignment of channels.

Main functions of COSMO|PLAYOUT are:

- **Animation and rendering effects:** provides the ability to apply a variety of animation effects and visual enhancements to broadcast media content;
- **Channel management:** allows you to configure the parameters of television channels, such as audio and video parameters, volume settings, etc.;
- **Live broadcast management:** allows operators to manage live broadcasts, to control their duration, switch cameras and manage other aspects of live broadcasts;
- **Ad replacement:** allows clients to automatically replace advertising blocks on the air with specified commercials according to the broadcast plan; and
- **EPG editor:** availability to create and edit information about TV programs displayed on subscribers' TV screens, including program details, broadcast time and other additional information.



Cosmonova Broadcast team. Meet them at IBC2023 ●●●

To date, more than 70 TV channels use the COSMO|PLAYOUT service to manage and automate their broadcast and fill it with different content including live stream.

The IP delivery solution, developed for television signal delivery is very popular among clients.

### IP DELIVERY

IP delivery is a very reliable terrestrial television signal delivery for TV channels, operators and providers. Signal transmission is carried out using UDP, UDP Multicast, HTTP, SRT and other protocols with transcoding into several popular formats (HD, SD, MPEG-4 and MPEG-2).

TV signal delivery includes:

- Signal reception in SDI or IP format from the TV channel studio;
- Signal transcoding, conversion of video and audio signals into the necessary formats;
- Delivery of the signal or versions of the signal to the addressees: cable providers, IPTV, OTT services, satellite and digital TV channel broadcast platforms;
- Performance monitoring and technical support; and
- Effective troubleshooting.

In addition, the system provides the functionality of managing channels, searching for providers, viewing the history of applications and their status. It is also possible to process incoming requests from operators and providers to provide or disable channels. In addition, the system saves the history for monitoring and analysis.

System monitoring allows you to manage the quality and parameters of input and output signals, detect errors and monitor the bitrate level. The use of filters and the visual display of data in the form of graphs facilitate the analysis of signal quality indicators over time. This service has more than 1,000 customers worldwide.

### STREAM ONLINE

Cosmonova also makes available to clients a service for streaming video in real time - Stream online.

Stream online is a technical solution for video streaming in real time to websites or social media such as YouTube and Facebook with CDN transcoding, which can withstand high loads for mass events.

Main sections of Stream Online solution are:

- Storage - it is available to upload files, check preview and to assign tags;
- CDN (Content Delivery Network) provides locations for efficient delivery of content in different parts of the world, ensuring stable broadcasting to a large number of viewers and optimal distribution of the load on servers, as well as the possibility of authorization and geoblocking;
- VOD (Video on Demand) has a storage function for storing video files and the ability to schedule viewing, which allows users to choose and adjust the viewing time in a way that is convenient for them;
- Custom Broadcast supports RTMP broadcasts and social media broadcasts, allowing users to easily broadcast live content on their social media pages;

- The advertising module includes pre-roll, mid-roll and post-roll ads, and also provides the ability to set individual rules for displaying ads and obtain statistics, as well as integration with advertising agencies; and
- Transcoding is used to adapt content to Custom Broadcast, VOD and CDN systems, ensuring optimal video quality and compatibility.

This service has been tested with heavy loads and was able to hold 200,000 simultaneous views of the online stream.

### CORE VALUES

The company is built on the core values of innovation, quality and safety - following industry trends, and creating unique products that exceed expectations. Its team put all their efforts into ensuring high-quality work, starting from the analysis of the client's needs and ending with the final implementation of the project.

The Cosmonova Broadcast brand is trusted by thousands of customers around the world and its products are constantly being improved to meet the growing needs of the market. Its competitive advantages are a combination of the best technologies, a talented team and high quality products, providing customers with reliable solutions that help them optimize their business processes, increase productivity and innovation level.

The Cosmonova Broadcast company is a vivid example of how effective small companies can be while adopting innovative developments in their activities and dynamic development thanks to the effectiveness of the core team. ●



Photo courtesy Bruce Rolff/Shutterstock ●●●

## Leo Basola joins Spire Global as Chief Financial Officer

**Spire Global has appointed Leo Basola** as its new Chief Financial Officer, replacing Thomas Krywe who held the title of CFO for nearly five years and had previously served as a financial consultant. Mr. Basola is a seasoned global finance executive, having held senior leadership roles in large public and multinational companies across multiple industries for more than two decades.

As Spire's new CFO, Mr. Basola will be focused on supporting Spire's growth and leading the Company on its path to profitability as it anticipates to be free cash flow positive in the second or third quarter of 2024.

Mr. Basola joins Spire after serving as Senior Finance Officer of Equifax International for more than four years, where he provided financial oversight for 23 countries, led two acquisitions, and played a strategic role in growing data and analytics sales and improving margins. Prior to that, he was CFO at ChemTreat, a Danaher Operating Company, for five years. Leo also spent 16 years at General



Leo Basola joins Spire Global as Chief Financial Officer ●●●

Electric and Genworth Financial (GE's Insurance spin off). A Corporate Audit Staff and Financial Management Program graduate, he held CFO and Acting CFO titles at GE Intelligent Platforms, GE Consumer and Industrial in EMEA, and Genworth's Retirement and Protection Long Term Care and Mortgage Insurance Europe divisions.

"We're excited to add Leo to our deep bench of leadership talent. Leo's track record of working with public

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companies and, in his most recent role, financial oversight of operations in more than 20 countries across five regions tees us up for success during our next stage of growth. We are thrilled that Leo has chosen Spire to bring that experience," said Peter Platzer, Spire CEO.

"We are grateful to Tom for his stewardship and role in leading our high-growth business and wish him well. Tom's been an integral part of our team as we grew our business from \$1 million to more than \$100 million in revenue during his nearly six-year tenure," Mr. Platzer added.

A Certified Public Accountant (CPA), Mr. Basola received a Master of Business Administration from the University of Virginia's Darden School of Business and a bachelor's

degree in Accounting from the Argentine Catholic University in Buenos Aires. He is fluent in English and Spanish and proficient in conversational German, Italian and Portuguese.

"What drew me to Spire are the people and their mission to use space-based data to improve life on Earth by making it cleaner, safer and more sustainable. Spire's footprint in the stars and around the globe is massive – a truly great asset – and my hope is that a decades-long history of working with multinational companies will prove beneficial in helping Peter and the leadership team build an even stronger business during this important inflection point in the company's growth," said Mr. Basola.

## Ansi Arumeel to join Milrem Robotics' team as COO

**Ansi Arumeel, who has held several** leadership positions in logistics and e-commerce companies, will join Milrem Robotics' team as Chief Operating Officer and member of the board as of September 2023.

Arumeel has extensive leadership experience, most notably from the Estonian state-owned post and logistics company Omniva where he worked in different roles for 14 year, last two as the CEO.

Since leaving Omniva, Arumeel has been the Deputy Managing Director of the Polish Retail Robotics, the largest Automated Parcel Machine manufacturer in Europe with ca 500 employees.

His role was keeping the focus on strategy, aligning organization to targets and creating an environment for the talents to succeed. He was also working with values and culture improvements, communication, KPI structure and visualizations, processes and improvement and business development.

Arumeel has a BSc. in Mechanical Engineering, Transportation Technology from TalTech – Tallinn University of Technology and a MSc. with distinction in Management of Transportation & Logistics from the Chalmers University of Technology.

"Ansi's responsibility will be organizational development and the efficiency of operations," said Kuldar Väärssi, CEO of Milrem Robotics. "We are significantly growing our team in the coming years and building a strong organization focused on competitiveness on the international market and providing a motivating and inspiring environment for Estonian and international talents. Ansi brings onboard excellent leadership skills and a vast experience which are very well fit to face the challenges on this path," Väärssi added.

"I'm excited to join Milrem Robotics now, when the organization has entered a new stage, to be scaled and prepared for future growth. I, as a true believer in autonomous and automated systems, see great potential in the products and concepts that the company is developing. My role will be to develop the organization and make sure that we get the best out of the opportunities and talents that the company has," said Arumeel.

Milrem Robotics is the leading European robotics and



Ansi Arumeel to join Milrem Robotics' team as COO ●●●

autonomous systems developer and systems integrator, with more than 200 talented specialists working in offices in Estonia, Finland, Sweden, the Netherlands, and the US. The company is known for their THeMIS and Multiscope UGVs, the Type-X Robotic Combat Vehicle and the MIFIK autonomy kit.

## Orbit Fab appoints Chief Operating Officer

**Orbit Fab has named** industry veteran Shawn Hendricks as the company's first Chief Operating Officer. Hendricks will lead the ramp up of Orbit Fab's internal production and testing capabilities to meet growing demand for the RAFTI™ refueling port and other in-space fueling systems designed to enable dynamic space operations and sustain the bustling space economy.

"As we intensify our laser focus on the mission of in-space fuel supply that will revolutionize the space industry, Orbit Fab is thrilled to have Shawn Hendricks, with his rare skillset, join our team as we ramp up production. We will lean on his expertise in both big and small space system architectures and nearly two decades of leading manufacturing and production quality processes and aircraft development with the Navy," said Daniel Faber, Orbit Fab CEO.

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