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Q&A NPC SYSTEM -
page 14...



Will analog ever die? We
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The true potential of
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Celebrating the future of the industry

September brings with it another bustling International Broadcasting Convention (IBC) from Amsterdam, serving the world's premiere entertainment distribution partners to celebrate the future of the industry.

From its prestigious origins sharing high-profile television, satellites have remained an essential pillar of broadcast, now poised to offer LEO broadband worldwide, enabling speedy connectivity for streaming, gaming, and even cloud computing.

While the broadcast boom of the pandemic is well and truly over, and the world has ventured back outside, new challenges and innovations crest our collective horizon.

The nebulous "Metaverse" continues to loom ahead of us, set to descend at some uncertain juncture, as rumors of a new wave of augmented reality peripherals circulate industry back channels.

Streaming services continue to expand, further fragmenting the on-demand entertainment landscape as the proverbial golden goose, Netflix, truly falters for its first year since its creation, and meteoric rise to success.

Esports have kept growing in notoriety, informed by resounding popularity in the East. In step with the steady normalization of gaming as a common entertainment medium, esports athletes have become household names among younger generations. Someday soon, city sports bars could be playing Apex Legends tournaments with internet celebrity commentary streamed live across the planet.

Satellite Evolution Group has a long history of covering satellites in broadcast, emblematic in our attendance of IBC, which we've attended for decades. As broadcast enters a new era of post-pandemic, always-online entertainment, we hope you'll join us for a top-down tour of the industry.

In this month's issue, Alan Crisp rounds up the important moves across the video industry that have culminated to inform the culture of IBC 2022, across huge names like Eutelsat, Intelsat and SES.

We also look at the opportunities of embracing the C-band spectrum with Tim Pearson, investigating the challenges to engaging with that bit of spectrum, what we can do to reclaim it and make it productive, and keep it secure.

We're not only looking at the metropolitan conversations though. Connectivity has always been a holistic conversation, rendering who is and isn't up to speed with global communication. With constellations of powerful LEO satellites available to bring modern broadband to rural and remote areas, and support backhaul for areas with terrestrial options, satellites can even out the connected world, bridging the digital divide, and widening the scope of our online communities.

But it's not all about looking forward, Andrew Bond asks the prescient question, "Will analog ever die?" investigating the space for legacy technologies amid the din of innovation that the modern world has been suffused with.

We also take a deeper dive into a long-standing developer of satellite communications technology, NPC SYSTEM. In conversation with their CEO, we discuss the history of the company, its client-focused approach to business, and how their strategies today inform their future.



Laurence Russell,
Associate Editor ●●●



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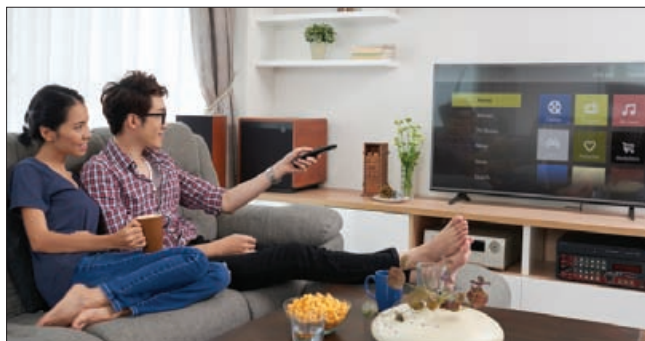
What does the future hold for satellite broadcasting? 18

Will analog ever die? We don't think so 22

Tomorrow's viewers tell broadcasters what they would like to see 24

The C-band spectrum opportunity: defining the future of satellite distribution 30

The true potential of connecting the rurally unconnected 34



Executive Q&As

6 Chris Stott, Founder and CEO of ManSat and NewSpace startup, Lonestar 10

38 Guy Ferraro, Chief Executive Officer at NPC SYSTEM 14



Satellite Evolution Global – September 2022 – Volume 1. No. 9... ISSN: 2755-1326

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Sierra Space completes successful NASA test readiness review

NORTH AMERICA: Sierra Space has announced the successful completion of its \$3 million Small Business Innovation Research (SBIR) Phase III Test Readiness Review (TRR) with NASA for its carbothermal reduction technology.

The Sierra Space system, developed over multiple contracts with NASA, processes and extracts oxygen from minerals in lunar regolith (soil) for use as astronaut life support and in propellant manufacturing in space. Producing oxygen on the moon is a key component for a sustained presence in space and reduces costs by not having to transport the critical element to space on launch.

Sierra Space CEO Tom Vice said, "By providing a source of oxygen on the moon, this technology will ultimately be used to sustain life support and enable rocket refueling, therefore greatly reducing the costs associated with spaceflight beyond low-Earth orbit. As we seek to open affordable access to space for all, today's progress brings us closer to that possibility through the promise of potential cost-saving and alternative-processing technologies."

Successful completion of this review is a proof point for the maturation of the system – a critical milestone on the path toward flying on a future NASA Commercial Lunar Payload Services (CLPS) demo mission. Sierra Space can now proceed with physical hardware testing to show autonomous operation of the company's carbothermal reactor. This testing will include a demonstration of automatically feeding lunar regolith into the reactor, extracting oxygen-containing gasses from the regolith that can later be converted into pure oxygen, and autonomous removal of the processed regolith.

"The successful completion of the Test Readiness

Review is a very important milestone for Sierra Space, as we continue to develop and execute on the many ongoing projects we are working on in coordination with NASA," said Tom Crabb, SVP & GM Space Applications, Sierra Space. "Today's accomplishment helps to expand Sierra Space's in-space capabilities that will make life in space possible for extended amounts of time.

Additionally, today is another step forward on our path to provide and utilize advanced technologies that are necessary to deliver on Sierra Space's mission to develop and create lasting impacts on the commercial space economy."

Elements of the technology developed for this effort may also be applied in other lunar systems such as regolith tolerant seals, regolith tolerant mechanisms and automated lunar manufacturing.

Virgin Orbit earns AS9100 certification, building on its perfect satellite launch record

NORTH AMERICA: The Performance Review Institute (PRI) Registrar recently certified Virgin Orbit (Nasdaq: VORB) as having met stringent international standards. This achievement promotes Virgin Orbit's ongoing commitment to satisfying stakeholders, and the Company's dedication to continual improvement of its quality management system.

The globally recognized AS9100 standard builds upon the ISO 9000 family of quality management systems, incorporating critical requirements established by the aerospace industry. These combined factors collectively satisfy US Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and Federal Aviation Administration (FAA) quality requirements.

"With 33 satellites delivered to space and each positioned precisely in their chosen orbit, we have shown the capability and quality of our launch system," said Virgin Orbit CEO Dan Hart. "Our focus now is building on that track record even as we scale up production at our factory and as we bring our launch operations to new facilities like Spaceport Cornwall. Through this AS9100 certification we've formalized and tested our system to ensure our customers can trust us to deliver their satellites safely and precisely to the orbit they need."

The AS9100 certification was announced after PRI conducted audits at all Virgin Orbit sites, including the Company's global headquarters and payload processing facilities located in Long Beach, California and at the Mojave Air and Space Port. The scope of the audit included a review of the Company's design, development, production, testing, and launch of its LauncherOne orbital space launch system.

"Virgin Orbit has demonstrated its commitment to world class information security management by implementing and becoming certified to the AS9100 standards," said Randy Daugharthy, Vice President of Business Development and Vice President of PRI Registrar and



Photo courtesy Sierra Space ●●●

Transportation and Power Generation (TPG). "They have joined an elite number of organizations worldwide that have achieved certification to this globally recognized information security standard. PRI Registrar is proud to partner with Virgin Orbit in this accomplishment and looks forward to continued support of its objective of excellence."

PRI wrote in its final report that the scope of the audit reviewed the following criteria: the presence of an effective internal audit program and the conduct of effective management reviews of the QMS (Quality Management System) and its performance; a verification of the organization's headcount; an evaluation of the organization's response to any adverse customer feedback information; the presence and effectiveness of the organization's internal audit; and an assessment of the organization's flow down of specific requirements mandated by standards and/or customers.

Smart, Omnispace team-up to explore space-based 5G technologies

SOUTHEAST ASIA: Leading Philippine telco company PLDT's wireless subsidiary Smart Communications, Inc. (Smart) is collaborating with US-based Omnispace to explore and demonstrate the capabilities of space-based 5G communications using low earth orbit (LEO) satellites.

"This collaboration with Omnispace will allow our companies to work together to define use cases for the Philippine market," said Arvin L. Siena, Head of PLDT's Technology Strategy and Transformation Office, adding that possible use cases include enabling 5G connectivity in remote areas, incorporating IoT and sensors for use in monitoring weather disturbances and natural calamities, and augmenting network coverage for disaster relief, maritime and telematics for vessels and equipment.

"This is also part of PLDT's broader initiatives to future-proof our services, including Smart 5G. This includes exploring opportunities to team up with companies like Omnispace, to test the interoperability of our network with their 3GPP-compliant 5G non-terrestrial network (NTN), which will support the 5G ecosystem of the future," Siena added.

Having launched Omnispace Spark-1 and Spark-2 in April and May, respectively, the company recently completed the deployment phase of "Omnispace Spark™." This program is the initial phase in the company's development and delivery of the world's first global 5G-capable satellite network.

The Omnispace 5G NTN global network will interconnect with terrestrial or land-based mobile networks to serve mobile subscribers utilizing the

company's 2 GHz mobile satellite spectrum allocation and operating in 3GPP band n256. As the world's first 3GPP-compliant 5G NTN system, the Omnispace network is expected to deliver the power of 5G directly to billions of devices everywhere, extending the reach of mobile connectivity to enable people and assets to communicate in real-time through a single, seamless global service.

"We are excited to announce this collaborative agreement with Smart Communications, which shares our vision of delivering reliable mobile connectivity to consumer, government and enterprise users, everywhere," said Brian Pemberton, Omnispace. "Together with Smart, we seek to bridge the digital divide, while also providing the communications infrastructure to power the development of the Filipino economy of the future."

PLDT and Smart's pioneering foray into satellite-powered communication is part of a broader initiative to deliver world-class customer services across the country, complementing the nationwide rollout of their fiber infrastructure, and wireless networks based on 4G and 5G technologies.



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AXESS Networks selects SpaceBridge to enable high-speed broadband connectivity in Galápagos, Ecuador

SOUTH AMERICA: AXESS Networks, a global leading provider of encompassing connectivity solutions via satellite, has selected SpaceBridge technology to provide a high-speed broadband trunk for community Internet access distribution in Santa Cruz Island in Galápagos, Ecuador.

The SpaceBridge SBM-90X extreme broadband high-speed modem was chosen for this mission as it provides unparalleled performance of Single Channel per Carrier (SCPC), for the implementation of a dedicated bandwidth. SpaceBridge provided its infrastructure to build a PTP SCPC link with the SBM-90X. This solution offers affordable traffic licenses and the highest spectral efficiency: DVB-S2X, five percent Roll-off, and 256APSK. Additionally, the link can grow up to 1.4Gbps of aggregated throughput.

"This implementation was a great challenge but also a great satisfaction. Being able to provide this service with stability, with a new design of the access mode and with wide operating margins, required all our experience and knowledge. From AXESS we hope that this new node will allow us to continue growing and helping to connect in the Galapagos Islands," said German Perez, Product and Solution Design Director of AXESS Americas.

"We are pleased that Axess has selected the SpaceBridge High Throughput SCPC modems for

implementation of highly visible and important communication between the Galapagos Islands and the rest of the world", said David Gelerman, President and CEO of SpaceBridge. He continued: "The challenging implementation of the link required the utilization of the full transponders' bandwidth with limited available power. Our SBM-90X modems were able to meet the availability challenge, providing the high throughput at the cost-effective price."

This project will provide a better internet service and connectivity to the hundreds of thousands of tourists who visit the islands every year and reduce the digital gap for its population. ●

Marlink expands network portfolio with flexible, cost-effective Sealink 60 VSAT service

EUROPE: Marlink has unveiled Sealink 60, a new Ku-band VSAT service designed to meet the needs of smaller merchant, offshore and fishing vessels.

Created in response to the growing demand for regional VSAT coverage requiring a smaller antenna, Sealink 60 is designed to provide flexible, regional connectivity to vessels seeking to upgrade from L-band services.

Sealink 60 offers users a choice of two lightweight and easy-to-install industry standard 60cm antennas and is available with different service plans, with or without guaranteed bandwidth. It can be provided to vessels in



Santa Cruz island. RPBaiao/Shutterstock ●●●

several regional coverage areas as well as during transits between areas.

The service is offered with unlimited usage, data speeds up to 5 Mbps and a choice of Maximum Information Rate (MIR)-only or combined MIR/Committed Information Rate (CIR) plans. Designed with maximum flexibility in mind, the service can be upgraded from regional to global coverage, with short term bandwidth upgrades and up to six months of lay-up per year also available.

As part of Marlink's 'smart' approach to network solutions, maritime customers benefit from Sealink 60 being hybrid-ready, combining the VSAT service with low-latency, high-bandwidth terrestrial technologies (including 4G) to create a resilient hybrid network solution.

Network management for crew and corporate connectivity is managed by Marlink's digital XChange server onboard, with prepaid 'crew calling' options for voice, email and web browsing on their own devices. This variety of options allows shipping companies to choose the right package to meet business and crew communication needs on board their vessels.

"The introduction of Sealink 60 marks a further evolution of Marlink's VSAT services, since it will exclusively cater for vessels requiring reduced antenna size and maximum flexibility in terms of coverage and throughput," says Tore Morten Olsen, President, Maritime, Marlink. "We understand that these smaller ships may regularly switch areas of operation or spend planned time in lay-up and we have designed our plans to deliver maximum value to our customers in these markets."

Intellian signs multi-year partnership agreement with Speedcast

EAST ASIA: Intellian has announced a multi-year partnership agreement with Speedcast. The partnership builds upon the success of the existing relationship between the two organizations in the energy, commercial maritime and cruise industries, and comes at a promising time for the industry, which has been experiencing a recent explosion in demand. Intellian will continue to provide equipment to Speedcast as a preferred supplier, ensuring delivery to meet customer needs, despite volatile supply chain constraints. Specifically, this equipment encompasses the full range of Intellian's maritime portfolio, from the C700 up to v240M/MT models, as well as LEO antenna systems and the inclusion of future land antennas, enabling Speedcast to serve every market. Additionally, Intellian will support continued equipment upgrades across Speedcast's existing customer sites. Intellian's expanding product portfolio, from the industry-leading v240MT Tri-band antenna, NX Maritime VSAT Series to the recently announced range of Enterprise terminals, will enable Speedcast to meet increasing customer demand amidst growth in the satellite communications sector. The upcoming launch of another factory in Pyeongtaek, South Korea will boost production and supercharge capacity, enabling Intellian to deliver optimized logistics and warehousing capabilities to Speedcast.



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● ● Chris Stott, Founder and CEO of ManSat and NewSpace startup, Lonestar

Satellite Evolution Global

Q&A

Lonestar aims to protect humanity's future by storing mission-critical data on the Moon ● ●

Chris Stott, Founder and CEO of ManSat and NewSpace startup, Lonestar, believes the Moon will be one of our greatest ports of scientific, engineering, and commercial activity. His plan is to establish secure smart data centers on the Moon to ensure the safety of data generated here on Earth and ultimately bring the Lonestar cloud to Mars. We spoke with Stott to find out more about his company's ambitious trajectory.

Crispin Littlehales, Executive Editor, Satellite Evolution Group

Question: The name "Lonestar" has a kind of superhero mystique to it. What prompted you to use this moniker for your company and what did it take to go from the first inkling of a concept to where you are now?

Chris Stott: When I look at Lonestar, I think about the history of America, and I look at everything that this country has brought to the world. However imperfect we are as a nation; we're always striving to redefine ourselves and become better. I wanted to do that with Lonestar. I wanted young men and women around the world, especially in these dark times, to be able to look up at the Moon and say, "Wow, there is a shining city on a hill; there is a beacon of entrepreneurialism and hope."

Humanity is so amazing. We are at an age where things are starting, finally, to break loose. We are moving away from a scarcity economy to



Big data storage. Photo courtesy whiteMocca/Shutterstock ● ● ●

an abundance economy. We're getting the tools to make the tools and it's opening a whole new wealth of opportunities for us as a technological civilization. This digital society in which we are living is lifting people up. Capitalism has reduced poverty faster than any other procedural economic method that we've ever had, but everything we're doing as a species is dependent now on data.

That's where the idea for Lonestar came from. I was at the Technology, Entertainment, Design (TED) conference in April 2018 having breakfast. Three gentlemen from different backgrounds approached me with a problem: they needed a place to store their most important data safely and securely. They were very worried about leaving it on Earth where tsunamis, fires, and climate change are very real threats.

That got me thinking, how do we keep that data where it's still alive and can be used? This is not about data centers in low Earth orbit where satellites are performing data transfer and transactions, this is about smart storage and disaster recovery as a service. But how do we do that?

Then, we started looking at the Moon, Earth's largest satellite. Not only does the Moon give us line of sight communications access to the Earth and every nation on it, but it is also safe, secure, stable, and far enough away. Furthermore, I knew we could take advantage of NASA's Commercial Lunar Payload Services (CLPS) Program which uses multiple commercial providers to take science instruments, technology experiments, and other things to the Moon. The spare capacity is put into the marketplace making it available to companies like ours.

So Lonestar emerged from stealth in April 2022 and what we are doing is offering to store mission-critical, premium data 400,000 kilometers away where there is no weather, no atmosphere, and no climate change. What's more, the processing time to retrieve that data anywhere on our planet is less than five seconds in total. We're creating a lunar cloud and providing edge processing to people who are literally at the edge with us on Earth. Because of the latency, it's better to process your data there and then send the results back home.

Question: How are you going to establish the data storage and disaster recovery center on the Moon and how long do you think it will take?

Chris Stott: We are modeled after the satellite operator structure. Our goal is to buy things from other people, put them together and offer a service just like you do with satellite communications. NASA's CLPS is enabling all of this to create a marketplace for the benefit of us all.

We're working with some excellent beta customers on a whole bunch of tests, proof of concept, and more. We are using Intuitive Machines for our first two missions. One is on IM-1 which is scheduled to go to the Moon at the end of this year. We are going to do a "refresh and restore" meaning we're going to send some data up, pull some back, leave some there, and check a few things. This time next year IM-2 will carry our first physical payload and that's going to be a smart data center—16 terabytes of storage and a radiation tolerant chip to allow us to do processing on a device. From there we plan to grow just as fast as we can get storage up there.

The first couple of CLPS missions will be self-contained, like sending boxes of avionics. We use their power and their communications but eventually, we want to be able to buy entire CLPS missions. Then, when Starship is available, we want to take a lot of things up to the Moon and leverage the surface and subsurface. We plan to put an array of antennas up there and have solar power



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batteries and build physical buildings so that we can do really good science.

On Earth, it can cost as much in electricity to cool down the electronics in a large data center cluster for one year as it did in capital expenditures to build the entire facility. We will be leveraging the natural vacuum and cold to flip the equation on how much it takes to power and run a smart storage center up there.

By this time next year, we will be up and running. By December 2023 we will have revenue and further proof of concept. Three years after that we will have a 50-petabyte facility up there and seven years from now, we want to have the first big facilities.

Question: You look at the Moon as the world's biggest satellite. Does this idea resonate with a lot of other people in our industry, or do they look at the Moon in a different way?

Chris Stott: Customers instantly get it because the customers we're talking to are the people who oversee the protection of their data. They ask, "How soon can we do this?" People in the satellite communications business also understand. They see a great business for themselves because we will have to transport data. The regulators have been fantastic too. Some people are a bit shocked by the "M" word, but they come around once we talk them through it.

This is an interesting time to go back to the Moon and we're only able to do this because so many people are doing just that. The Chinese are already there. They've had five missions and Chang'e 4 is still operational at the South Pole-Aitken Basin. There are no people, just robots and they're doing good science. What's interesting is that they are de-risking a lot of technologies for us. The Chinese just published a patent for lunar data centers as well.

India is getting ready to go to the Moon and the Arab Emirates is sending rovers and more up there. There are already 130 scheduled lunar missions. The West has committed US\$93 billion to explore and settle and do great things. All these incredible scientists and engineers from

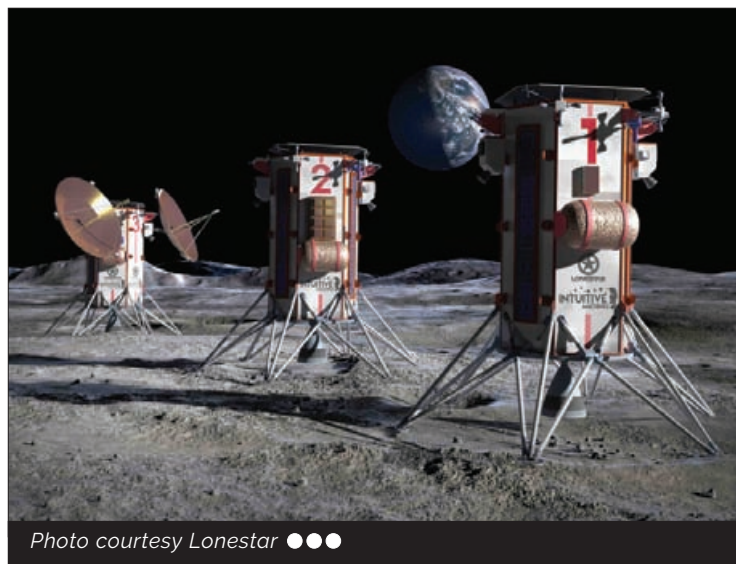


Photo courtesy Lonestar ●●●

all these different companies and agencies are focusing on the Moon and we can hitch a ride and focus our beams back on Earth.

We can serve a terrestrial market that does incredible good and store that data off-planet. This is epoch changing. Every day, corporations and governments will be able to back up their data through Lonestar. Every day humans create 2.5 quintillion bytes of data and there have been 14 million cyber-attacks since January. For us as a technological civilization, having the ability to back ourselves up and not lose that critical data cannot happen fast enough.

Question: What are the biggest challenges to operating on the Moon's surface?

Chris Stott: The biggest challenge is surviving the night, which is two weeks of darkness. But we did it during Apollo and the Chinese are doing it today. It is a matter of applying and improving existing technologies and there are many people working to solve that problem here in the West.

The next big challenge is radiation. You're outside the Earth's magnetosphere. We are looking to fly a radiation sensor on our first mission to double-check the situation. However, we can use radiation as we are already doing on Mars. There we have radiation-driven power packs, and radio thermoelectric generators (RTGs). There's a bunch of them driving around in American rovers built by Caltech and JPL. So, we've already solved it and now we simply need to apply that technology to the Moon.

Another issue is that the Moon's gravity is 1/6 that of Earth which means you have a different kind of thermal management. There is no air to move around and cool things down, but there is conduction so you can radiate away the excess heat. Of course, when working with equipment, you need to be aware that conductive heat will rise. It's not like the Moon is an unknown environment, but we do continue to learn more about it which means we are bound to discover more things up there that we can use to our advantage.

Question: Are there other challenges here on Earth that are looming on the horizon?

Chris Stott: An economic collapse or a major war—those are the two things that would hold us back. When it comes to physics, we know we can do this. We've got computers running LINEX on Mars. Then, too, we have a ready market. Lonestar is a demand-pull business, not a technology push.

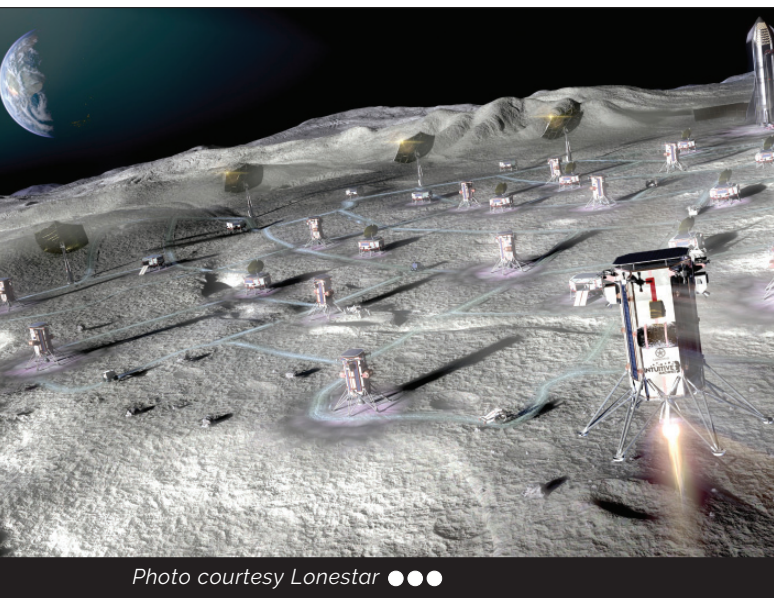


Photo courtesy Lonestar ●●●

We don't have some new fancy technology that demands lots of money to invent. We are integrators. We will buy the technology we need, and we are already working with customers.

Now it is down to us to execute and that's why I put an amazing team of people around me. There is our COO, Dr. Mark Matossian, former US CEO of ICEYE who ran data centers at Google; Carol Goldstein, our CFO, and Strategic Advisor, Broadband & Space, who put together the satellite finance unit at Morgan Stanley; Will Hawkins one of the best technicians in the Disaster Recovery as a Service industry (DRaaS) who is handling our Terrestrial & Lunar Data Protection; and Dr. Del Smith, a former senior space business counsel at law firm Dentons, is our Chief Space Policy Advisor. We've also got our spectrum filing with the ITU from ManSat and the Isle of Man and have made sure that our approach to data sovereignty is legal and within the regulatory framework. In fact, we just published a peer-reviewed article on lunar sovereignty for the American Bar Association.

Question: Do you worry at all about whether there will someday be conflict over the "ownership" and therefore the security of the Moon?

Chris Stott: One of the prime tenets of the UN Outer Space Treaty is that the Moon and other celestial bodies cannot be claimed by any nation. Space is the most regulated activity ever in human history whether it involves human spaceflight, medical safety, national rescue, or a spectrum licensing from the ITU which has more members than the UN. The ITU controls all spectrum to the Moon and back as well as satellites and cell phones and everything else to prevent conflict.

What the treaty says is that you can land on the Moon, and you can establish a base, but no military activities. There is a whole list but basically, it's like having a little embassy. It was Neil Armstrong who triggered that into action when he landed on the Moon. His first words were: "Houston, Tranquility Base, here. The Eagle has landed." All the other landing sites have bases, including the Chinese, so the rule of law is intact. The Artemis Accords, which currently has 20 signatories, including the Isle of Man, is a reaffirmation of what the existing treaties already state. So, you can't just go willy-nilly and do whatever you want. There are rules to keep you safe and to do the right thing and not start wars.

Question: You know our industry so well; what advice do you have for companies that have been around for a long time and what advice do you have for those who are just starting out?

Chris Stott: Talk to each other. I love the satellite industry. It is so pure. If there is a need, we fulfill it. It is pure commerce on a global scale and there is very little politics. I say to people in the satellite and space industries, we need to bring both sides

together. To all those people in NewSpace companies or startups, I say, come and talk to those of us in the satellite business because many of the problems they are now facing are those we have already faced and overcome whether it's insurance, financing, regulations or launching. The satellite industry was valued at US\$440 billion last year and NASA's budget was US\$23 billion. NASA does amazing and incredible things with that money, but it's easy to see NASA and it's hard to see the satellites.

Space went from being a political tool to something that serves the entirety of humanity. Because of Earth observation satellites, we can measure the world and if you can measure it, you can change it. So now we are monitoring the environment; we're catching where we've made mistakes; we're improving the way we do things. Space is fueling our technological civilization to great heights and will be lifting more and more people out of poverty. That's the goal—to make everybody equal so it doesn't matter where you are on the planet. ●

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● ● Guy Ferraro, Chief Executive Officer
at NPC SYSTEM

Satellite Evolution Global

Q&A

Why NPC SYSTEM insists on working with their clients onsite ● ●

NPC SYSTEM is a legacy brand in France, whose NEYRPIC technology has been a part of satellite communication history since the 1960s. Guy Ferraro, Chief Executive Officer at NPC SYSTEM spoke to us about what it takes to keep such a long-lived developer running, and how he plans to propel the company into the future.

Laurence Russell, Associate Editor, Satellite Evolution Group

Question: NPC SYSTEM is based on NEYRPIC technology, a 50-year-old brand. Could you summarise that history and how it's driven you forward?

Guy Ferraro: The NEYRPIC brand was created by the company of the same name in the early 1960s. NEYRPIC was a French industrial group specialising in hydropower that was approached by the French government to develop satellite communication antennas. NEYRPIC was subsequently involved in the first transatlantic satellite communication during the TELSTAR project initiated by AT&T and Bell Labs and successfully received data from Andover in the American state of Maine.

Multiple stations were built to take part in this first satellite broadcast. The National PTT in France installed NEYRPIC antennas and systems in Pleumer Bedou; the General Post Office in the UK built Goonhilly station in Cornwall; Canada created the Charleston site in Nova Scotia; the Germans developed a ground station in Bavaria; and Fucino Space Center was the Italian ground station. French National PTT became France Telecom, now known as Orange SA. NEYRPIC systems are installed in all big dish antennas in Orange Teleports in Bercenay and are now maintained by NPC SYSTEM.

Alstom Group took over NEYRPIC in 1967 and ran the satellite tracking business for over 45 years until it sold its energy division to General Electric in 2015. Over four decades, Alstom developed and installed NEYRPIC tracking systems all over the world to major integrators like Thales Alenia Space, Airbus Defence and Space, INEO Defence (Equans group), Metracom, and satellite and teleport operators such as Eutelsat, Arabsat,



NEYRPIC ACU 550 ● ● ●



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A 32m antenna at Orange Bercenay teleport controlled by NEYRPIC tracking technology ●●●

Yahsat, Telenor, Altice, Telespazio, CNESS, Orange, and Globecast, to name a few.

When General Electric announced its restructuring plan in 2017, I made an offer to buy the business. After 23 months of negotiation, the management buyout was completed in January 2019. I left with three other General Electric employees, and we started operating the satellite tracking business under the name of NPC SYSTEM – NPC is a selective acronym for NeyrPiC. Every year we've been hiring new engineers to keep up with our orders, and it looks like we will keep on doing so for the next two years at least.

Question: You don't describe yourself as integrators, but instead developers who install directly with end-users. Why have you found that approach superior?

Guy Ferraro: Indeed, developing products has always been part of NEYRPIC culture. NEYRPIC engineers started developing the first monopulse system in the late 60s, and across multiple mergers and acquisitions, they released several generations of tracking systems.

When NPC took over the business, we wanted to

perpetuate the savoir-faire anchored in the company's DNA. The tracking algorithms implanted in the first antenna controllers have been tested and improved upon for many years by industry leaders. Besides developing satellite products, we also install them with end-users, benefiting from their user experience and making sure our products are perfectly aligned with their operational needs. Their feedback allows us to modify and improve our systems quickly to better fit customer applications.

Over the past four decades, we've installed over 1,000 systems, many in different situations with many different antennas, all with specific behaviours. We had the opportunity to experience all types of tracking situations which fuelled our expertise and helped us improve our knowledge base. Recently, we took advantage of these customer relationships in the development of our digital tracking receiver, NEYRPIC DTR500.

Tracking receivers convert beacon signals from the satellite to an analogue signal sent to the ACU to base its tracking algorithms upon. It is a critical component in satellite tracking which has a simple task in step-track applications, but a more complex and crucial one in monopulse tracking. For years, we've offered tracking systems to critical missions like TT&C or LEOP, where we've had to rely on a third-party tracking receiver, meaning we couldn't control the signal coming into our ACU, which presented a certain risk.

I always wanted to minimise this risk. As the hydroelectric industry was the core business of ALSTOM/GE, developing a product for a niche market like our satellite tracking business did not make a lot of business sense for the management team. When we took over the business as NPC SYSTEM we quickly started staffing and investing in equipment to develop our own tracking receiver.

We involved some customers in the early phase of the development to guide our design, so hardware and software features were implemented to improve their user experience with the other tracking receivers on the market. I think staying in the field to install our tracking systems, staying in contact with our customers, and exchanging directly with satellite field users allows us to offer the best possible products and systems across tracking applications.

Question: You pride yourself on your close relationship with customers, which allows you to hear and follow up on qualitative feedback. What are some of the things you've been hearing about your technology?

Guy Ferraro: We've been doing field installations for decades. This allows us to stay in close contact with system users who know how a tracking system should operate. They are the knowledge base we have been listening to when designing and improving our products and systems. They are in direct contact with our engineering team, letting us know what needs to be added or modified to make their experience better.

For 50 years, we've adapted to several generations of antenna designs, improving our algorithms to stay competitive and reliable. Organisations that have started using our systems know that they can deploy them to their

antennas, new or used, regardless of brand or capability. That is what our customers have been reporting. Once they experience and see what our system can do, they appreciate its versatility and capacity to adapt to different applications.

Feedback from our customers is also a crucial indicator of market trends. They let us know about their needs ahead of time, so we can anticipate the development of new solutions. For instance, we've recently been asked to look into Q/V monopulse tracking systems, which has led to our work designing a Q/V RF monopulse plate to be ready when Q/V bands become mainstream.

Question: You currently boast functionality and expertise that allows you to work across multiple systems. What is the key to such flexibility?

Guy Ferraro: Our systems can fit any antenna equipped with any possible configuration of motors—from single AC, DC, or brushless motor per axis, to dual precise DC motors for tracking and fast AC motors for satellite transfer on a single axis. We've had to accommodate for slow motors, AC system, transmission horn/light, heating element, harsh environment, X/Y antennas, and LEO application on satellite with a zenithal pass using antennas equipped with XEL axis.

We've had to implement software parameters to accommodate any tracking situation on any type of fixed or transportable antennas. Any features you can think of

we have set parameters for it. Such high flexibility of our NEYRPIC tracking systems has been obtained and improved from decades of feedback from customers.

Question: What can we expect from NPC System in the future?

Guy Ferraro: With the release of our digital tracking receiver, we now offer a fully integrated solution for any tracking application, which will continue to see maintenance and real-time upgrades. We are also developing a 1.8m antenna on a trailer, which will be used to demo the field test of our DTR500. We have also had our engineering team develop an indoor monopulse tracking demo with our ACU550—yet another flexibility demonstration of our ACU550.

We have been in close contact with the space centre of our local university in Grenoble (CSUG – Centre Spatial Universitaire de Grenoble) which has been developing payloads for nanosatellites. This has informed the testing of our newly developed transportable antenna for ground stations and nanosatellites.

We've seen several players showing interest in our systems and have many new orders in the works, which means we will keep on staffing our engineering team and field crew to keep up with demand. NPC SYSTEM's goals always have been to satisfy our users by always upgrading systems. We hope to keep excelling them for another 50 years!

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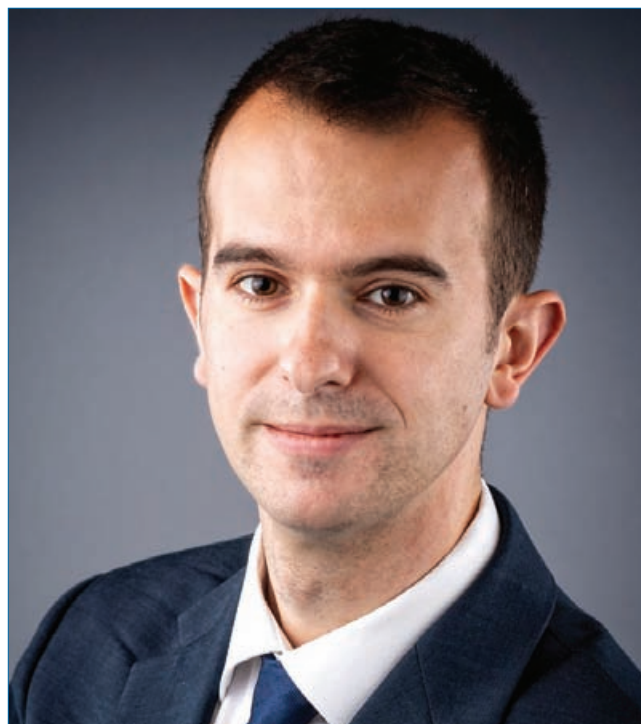
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What does the future hold for satellite broadcasting?

Broadcasting has been the bread and butter of the satellite industry since the beginning of time, with the earliest commercial communication satellites having been launched largely for direct-to-home broadcast or the carriage of live video content from one part of the world to the other, starting with the 1964 Summer Olympics in Tokyo. Overall, broadcast remains a major part of the satellite industry. But this has been changing, due to factors inside and outside of the satellite industry's control.

Alan Crisp, Senior Analyst, NSR (an Analysys Mason Company)

In these early days of the broadcast industry, satellites were relatively well-positioned. Broadcasters were few, and content was precious. Devices (television sets) were relatively "dumb" and could only receive and decode a finite amount of information at any given time. As many countries got their own direct-to-home (DTH) platforms, and in many cases multiple platforms per country, satellite saw strong growth, as an increasing number of households in regions like Southeast Asia and Latin America wanted



Alan Crisp, Senior Analyst, NSR (an Analysys Mason Company) ●●●

more content, and as consumers in North America, Europe, and East Asia upgraded to HDTVs.

By the late 2000s and into the early 2010s, hundreds of millions of households around the world were receiving some TV signals at least partly thanks to satellite. Today, a small number of top orbital hotspots have tens of millions of dishes pointed toward them, while a larger number of hotspots command smaller, but still significant TV neighborhoods.

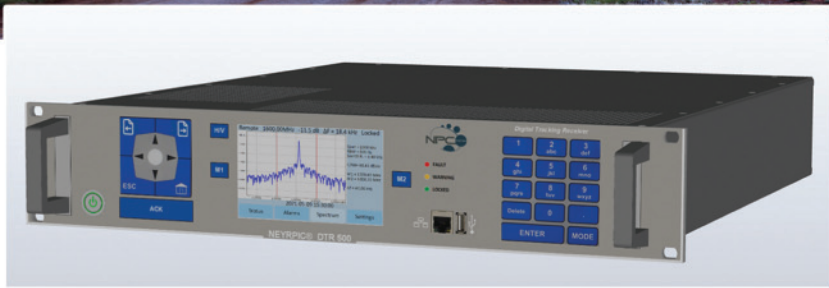
THE YOUTUBE EFFECT: BROADCAST'S MOVE TO PERSONALIZED CONTENT

The rise of the internet has upended many industries, and



Photo courtesy Shutterstock ●●●

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With the release of the **NEYRPIC DTR500**, NPC SYSTEM can now offer a fully integrated tracking solution

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For a detailed datasheet and prices contact NPC SYSTEM at contact@npcsystem.com



Photo courtesy of Shutterstock ●●●

content production and delivery is no exception. Compared to the aforementioned good old days of broadcast, when there were a handful of broadcasters sending out some dozens or hundreds of channels to the entire known media universe, content today is a multiverse of options. From a plethora of niche bouquets being broadcast on satellite or cable, to the dozens of OTT and streaming platforms being brought to market, there is more content available today than ever before.

Short-form video apps like TikTok, Instagram, and others, as well as dedicated video platforms like YouTube, have created a way for anyone to create and distribute content to anyone else, as long as both sides have an internet connection.

Everyone is a creator, and the potential market for your content creation is anyone with an internet connection. This has changed the traditional broadcast industry markedly, and while satellite absolutely still has a place, its place is evolving with the rest of the sector.

SATELLITE IN THE AGE OF THE YOUTUBE EFFECT

How should satellite operators position themselves at a time when their bread-and-butter customer base is changing so rapidly? Different operators have taken different approaches, but almost all involve going deeper into content generation, and moving towards selling Mbps rather than MHz.

Being based here in Hong Kong, I would be remiss if I did not first mention the very relevant efforts of local satellite operator AsiaSat. At the end of 2021, AsiaSat took a strategic stake in One Click Go Live, a company that films, develops, and broadcasts live events. One Click Go Live is quite local and niche in its content production. They recently partnered with AsiaSat to live broadcast Dragon Boat Races from Hong Kong, for example, but they are in

a fast-growing part of the broadcast sector and have a clear overlap with satellite's value proposition. In this case, AsiaSat can broadcast certain One Click Go Live content using its satellite network, or potentially in the future, using other (NGSO) satellite networks (One Click Go Live does, after all, offer a "customized low latency live streaming solution").

A bit further from here in Hong Kong, satellite operator Eutelsat has discussed a multi-orbit future, even for satellite video. The company is noteworthy for two things in this context: 1) their large existing video business, and 2) their entry into satellite internet, first via GEO-HTS, and more recently via a proposed merger with OneWeb.

At a conference in Paris last year, Eutelsat's Chief Strategy and Resources Officer Jean-Hubert Lenotte noted that among Eutelsat's broadband subscribers, peak demand is in the evening, coming from streaming video services. Lenotte pointed out that for streaming services, "latency doesn't matter, meaning that you have strong efficiency between GEO and LEO". What might this mean in practice? Conceivably, it would mean Eutelsat offering home internet via either GEO or LEO, with latency-sensitive applications moving over LEO, and with non-latency sensitive applications, including video streaming, potentially being broadcast over GEO.

Finally, we recently saw several executives from Intelsat being interviewed about, among other things, the company's strategy in the video business. Bill O'Hara, General Manager of Media at Intelsat, discussed Intelsat's vision of integrating their content broadcast business with their in-flight connectivity business, potentially connecting viewers on airplanes with content being broadcast on Intelsat satellites, either through standard multicast (i.e. video signal being broadcast to both cable headends and airplanes, for example) or over IP (airplanes being



Photo courtesy Shutterstock ●●●

connected to OTT services using Intelsat's satellite fleet). At the same time, Intelsat Regional VP for Asia Pacific Terry Bleakley noted that at a macro level, video and data demand are converging, with more data consumption being driven by video transmission.

THE INDUSTRY MOVING FORWARD

This last point about video and data converging creates an inherent challenge for satellite operators. Video hotspots are some of the last vestiges of high cost per MHz for the satellite industry. In a world where the price per MHz is almost always sub-\$1,000 per month, as it is today, there remain a few hotspots that can command several times that amount and more. These hotspots have helped to finance, among other things, SES's massive O3b mPOWER investment, Eutelsat's purchase of a couple of very large HTS, and to a lesser extent the rollout of Intelsat's EpicNG HTS constellation. Moving forward, following the recently announced Eutelsat/OneWeb merger, it appears these video hotspots will also help pay for a second-generation OneWeb constellation.

With that being the case, if the video is converging with data, and if data pricing is much lower than hotspot pricing, doesn't something have to give? It would seem, in the short-medium term, perhaps not. In their recent Q2 2022 earnings call, SES reported that their video pricing is "stable to increasing", albeit while reporting video revenue declines. Eutelsat has reported continued declines in video revenues but broadcast still makes up some 61 percent of revenues as of FY 2022 financials.

All this is to say that we should expect satellite operators to continue to milk their

#OTT #OneWeb #DTH #SkyUK #SES #Spacecom

cash cow orbital slots for as long as possible, and "as long as possible" could mean longer than many might expect. The imminent death of linear TV has been predicted for many years, and yet linear TV remains. Recent years have seen DTH platforms renew leases on satellite, albeit for a shorter time than has historically been the case (Deutsche Telekom in Hungary with Spacecom, and Sky UK and SES being two examples), and it seems linear video is going to stick around for a while.

But moving forward, we should expect continued convergence by satellite operators, video broadcasters, and content producers. In the long-term, most video will become reduced to Mbps, and most broadcast will be point-to-point using the internet, rather than point-to-multipoint using radio waves. The broadcast markets have changed markedly over the past 10 years. The next 10 might be even more disruptive.



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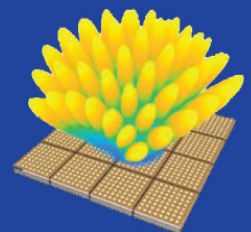
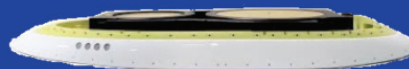
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Couple choosing channel on their smart TV. Photo courtesy Dragon Images/Shutterstock ●●●

Will analog ever die? We don't think so ●●

What are the challenges broadcasters will be facing in the future and how can new technology help? ETL believes that the digitization of the RF spectrum will play a critical role by enabling broadcasters to move an analog signal from one place to another using a digital network.

Andrew Bond, Sales, and Marketing Director for ETL Systems

A few decades ago viewers had a very limited choice when it came to TV. They were only able to access a handful of channels transmitted via an analog signal directly into their homes. There were live sporting events to watch, but they were few and far between. Move on to 2022 and think about the upcoming World Cup in Qatar - matches will be played in eight different locations and viewers will be able to pick and choose. Even this is nothing compared to the broadcasting scale of the postponed Summer Olympics held last year in Japan.

WILL BROADCASTERS GO FULLY DIGITAL IN 2023?

Satellite and terrestrial networks will continue to work together, with video traveling via satellite and then distributed over fiber to be delivered to the viewer. These links will continue to be relied upon by broadcasters to deliver content to and from a significant number of locations and network architects are currently focusing on how these signals can be converted from analog to digital and vice versa.

ETL has been collaborating with a working group of experts to create a standard with the goal of digitizing the RF spectrum. As part of the Digital IF Interoperability (DIFI) consortium, we are working towards creating a standardized interoperable digital interface/Radio

Frequency (IF/RF) based on the widely adopted VITA 49.2. Once established, this will enable a step change for broadcasters. They'll be able to move an analog signal from one place to another using a digital network. This breakthrough will decouple the network operation center from the antenna, leading to many benefits for broadcasters.

THE NEED FOR SPEED AND CONTROL

There are four main transmission links we can think about: from the camera to the control room; from the control room to a local hub; then to international transit and finally to the viewers in the broadcasters' territories. At every terrestrial stage, the transmission is routed via switches each of which causes delay. The cumulative impact can result in latency and a less than optimal experience for viewers—especially those relying on a real-time link.

For this reason, broadcasters often choose to skip many of these transmission links by using a satellite network which not only speeds up delivery but also enables them to retain control by not relying on networks operated by third-party countries.

MEETING CUSTOMER EXPECTATIONS

Retaining control also means delivering a better experience for customers. Many broadcasters would like to move to digital as soon as possible. The challenge though is that



Andrew Bond, Sales, and Marketing Director for ETL Systems ●●●

delivering this level of service to customers living in remote locations is just not possible. Customers want and expect the same experience and service from their broadcasters that they get digitally. While many customers likely take their high-speed digital connections for granted, there is a significant minority that doesn't yet have what many are coming to call a human right— access to the internet.

Data from the Federal Communications Commission shows that around 25 million Americans do not have access to a broadband connection. This is something President Biden has been working hard to fix, providing more than US\$30 billion of funding to bridge this digital divide during his tenure. This gives an indication of the scale of the challenge in the US, let alone the rest of the world.

#ETL #Analog #RF #Broadcasting

In Germany, eight percent of households did not have access to the internet in 2021 and there are an estimated 1.5 million homes in the UK without a connection.

DOING MORE WITH THE SAME OR LESS

During mega-events like the World Cup, broadcasters will be getting a feed from the event organizer, but they will also want their own piece-to-camera shots and to get their own take on the action, live. Yet, covering the ever-increasing variety of locations is a growing challenge both practically and financially. For example, in November and December, broadcast crews in Qatar will have to cover more, using only the finite resources they have.

Then too, niche sports like cycling are becoming more popular. This is generating demand for news crews to be sent to a greater variety of locations, but without the expanding budgets to mirror the expanding event footprint.

In the next few years, we expect to see broadcasters using new digital technology to provide even better link availability and RF signal quality, plus greater operational flexibility in switching and routing. Over time operational and capital costs will be reduced, making digital technology accessible to broadcasters with smaller budgets. At the same time, it will be possible to offer stronger digital encryption of analog signals.

All that said, even a digitized RF spectrum is really about moving an analog signal over a digital network. Regardless of the digital and analog question, technology moves forward at a pace to assist broadcasters as they continue to look to do more with the same or less. The sector is adopting digital technologies wherever it makes sense. But it's also clear that they will always need satellites and RF signals. ●

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Beacon on Hambledon Hill. Photo courtesy Martin Coleman ●●●

Tomorrow's viewers tell broadcasters what they would like to see ●●

We asked satellite industry veteran, Martin Coleman, to write us an opinion piece on the future of broadcasting. To get to the bleeding edge of the question, he reached out to students aged 13 to 15 and put the question to them. Fresh from the minds of Generation Z, here are the results.

Martin Coleman, Partner, COLEM Engineering

I started to think about the beginnings of broadcast and was reminded of our recent celebrations here in the UK for our Queen's 70th Jubilee in June of this year. Beacons were lit across the country to celebrate the moment. So, on top of Hambledon Hill where I live in Dorset, ours was lit! It was a big event and amazing to see out across the various counties that surround us, all those other beacons lit. That is perhaps thinking a bit too early about broadcast, mind you, we have been using beacons before the Spanish Armada and that was 1588!

Let's get more up to date. Sensibly you could say that the real innovation for broadcast was the printed word, followed by photography and film. Then, the big breakthrough was the radio! Radio really started the broadcast moment as we know it today. Of course, with

technology development at a pace, it wasn't long before television hit the streets, then that next "big moment"—the Internet.

NOW TO MY POINT

Instead of me thinking about the future of broadcast, I decided to take this question to my local school in Shaftesbury where I have been a part of their STEM program for the past four years. They are a beacon in themselves (excuse the pun) as being one of a handful of schools within the UK to develop the concept of a "Future Classroom" and what a fun ride that is.

Why a school? I think understanding how young people, the next generation of parents and workers, innovators, and leaders see the future of broadcast is where our focus must be. No point listening to an old man stuck in his ways. So here is a snapshot of what Broadcast means to these young people today and what they want tomorrow, all in 40 minutes! And remember, these are *their* views, not mine.

...AND SOME GREAT COMMENTS THAT NEED TO BE TAKEN SERIOUSLY!

First, let's look at what is happening today (Table 1) and look at the students' suggestions for tomorrow (Table2). Let's also take a look at the general feedback that the students shared (Table 3)

And finally, this brief excerpt from an essay written by



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one student is a great summation of how they were all thinking about the subject:

"Radio only requires a single sense to process. If one can multitask, then workload can be reduced significantly, and media is consumed at the same rate – arguably both a benefit and a drawback. Whatever type of broadcast medium is used, whilst useful, is often worthless compared to the original intention of the news item itself. For example, the news in America is often biased and designed to obtain maximum views. Most news is, of course, biased but one could argue that the news is intended to 'scaremonger' by presenting false or excessive information to disturb or provoke concern within the audience. The more views the channel gets, the more that it is paid. And so, by dramatizing an article it gains more views as consumers become concerned and wish to better comprehend the situation by increased viewing. A few news articles are paid for by the government or leading authority. They have no cause to dramatize the situation, as regardless of how many viewers they have, they will be paid the same."

HOW TO SUM UP?

My first impression raises more questions:

- Are we close to delivering what the future generations want?
- Do we really understand our future audience?

Overall, I think the answer to these points right now is an emphatic "No!"

I think what really surprised me was the students'

thoughts around news, especially fake news. They need balanced, creditable, and condensed input better presented and ultimately, safely online. When you get words like "scaremongering", "unreliable", "biased", and "harm" from the majority, that alone should make our broadcast industry take serious note.

SOME FACTS

In the US, Gen Z is the age group 1 to 21. Statistics tell us that Gen Z is now the largest generation in the US and that the undercurrent of relatively insignificant behavioural changes often creates serious cultural shifts. The social media effect, both the US and UK confirm this notion.

In the US, Tik-Tok is the most addictive social app based on user time spent per month! In the UK, teenagers get their news from Instagram, TikTok, and YouTube. Then you find this headline from the UK... 19 million Brits check out social media on the toilet!

WHAT CAN YOU SAY

I find it interesting that the subject of news was on everyone's mind. With world politics, health, environment, and climate at their most complex, these young people really want news programming sorted. With thoughts such as a super-safe news channel for the bad news and support from a learning news channel or news app that has fake news filters. Such insight, yet I see none of this innovative thought being reported.

Something else that caught my attention when introducing the subject of broadcast to this student group is that both radio and podcasts were surprisingly popular.



Study group. Photo courtesy Martin Coleman ●●●

TODAY

- **Apps:** Tik-Tok, Snapchat, Instagram, Twitter, Facebook, YouTube, Discord, Twitch TV, BBC, TV, Film, Radio, Streaming Services, Netflix, Amazon Prime
- **Consoles:** Xbox, PlayStation, Nintendo Switch, Wii & Wii U
- **Search Engines:** Google, Bing, etc.
- **High Tech:** Phones, Smart Glasses & Speakers, Computers
- **Low Tech:** Newspapers, Other People, Billboards,
- **Games:** Mario & Luigi and a whole lot more
- **Influencers!!!!**

Table 1 ●●●

I thought the radio was just for old people. But the students thought that without the visuals, the listener concentrated on what was said and could be working on a separate task at the same time, picking up on statements or information that naturally interested them. They also thought that real facts could be better presented by using technology such as VR and that if we went one step further using the Metaverse would allow people to be immersed in the news itself and get a real feeling for what was really happening on the ground. What a concept...

Of course, news aside, there were all the usual suspects in the mix for today and tomorrow, social media being at the top. But my take was cautious optimism as these young people understood the hidden problems behind each and every platform.

On the video front they also want more concise and high-quality short videos but equally realise that, and I quote, "Short videos are having an effect on this generation's attention span."

We talk about apps all the time, but this quote struck

TOMORROW AND BEYOND

- Easily Accessible Short Videos
- Immersive Short News
- Customised TV Accounts
- VR/AR - on a new level
- AI: a new method of "socialising", robots, the Metaverse, brain chips, gaming, news games
- New Tech: next-generation consoles and computers, smarter phones/glasses/watches/wearables
- Attention Catching: educational, specialized methods of communication
- Programming: positive & negative news, fake news filters, local news that relates to you, , super safe news channel for the bad news, learning news channel or news app without mobile ads, interactive entertainment, free access to foreign TV shows - some cost but must be small, add top channels to make people happier

Table 2 ●●●

me: "Avoid creating addictive and time-consuming apps". The word 'addictive' also reminds us of another worrying trend these days.

One interesting outcome of this exercise is that not one student or group mentioned sports. I thought that sports would have been at the top of their list. Perhaps it depends on the group of people you ask. Perhaps it is not seen as "broadcast". I think this needs to be looked at further as sports are a critical part of the broadcast industry income stream. Maybe an in-depth look will uncover further revelations that the industry needs to hear.

LISTEN TO THE FUTURE

The real problems as seen by this generation are fake or unreliable news, online safety, effects on attention span, addictive apps, and too many adverts. To sum up: "Our generation is so used to social media and when false information occurs, they can be so oblivious to it!"

If I were at the forefront of broadcast and its current offering, I would listen to these ideas and eliminate the worry, reduce the number of adverts, and ensure apps are useful and not just for fun. I would create better content by being truthful and ensuring it is clear what is fact and what is fiction or fake.

Start with our young people, work with them, and learn from them. They are a substantial force to be reckoned with. We cannot just assume the industry knows best. By taking input from our young people, we can then better assess the state of broadcasting today which will certainly lead to creating better programming for all in the future.

Bringing more honesty back into the broadcast trade would go a long way to moving in the right direction and the answer to the question, "what is the future of broadcasting" is simple: listen to young people, they know what they want. ●

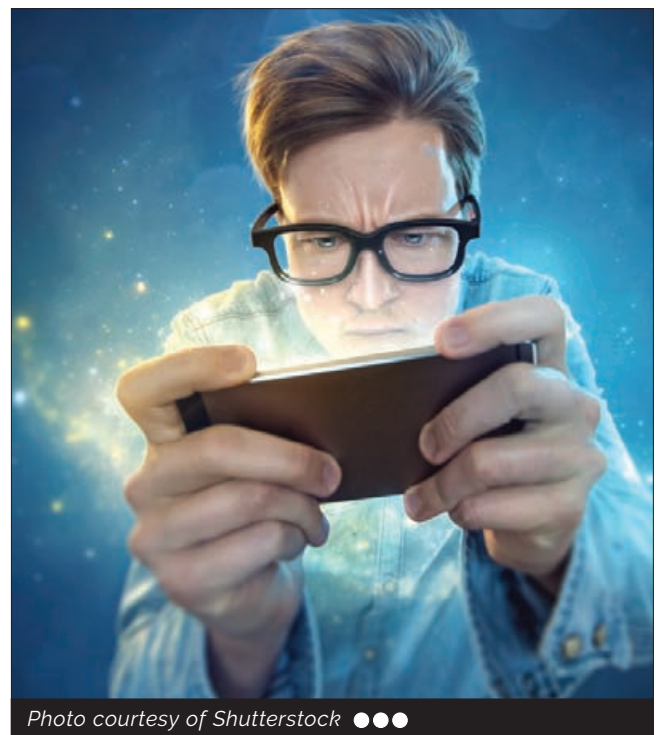


Photo courtesy of Shutterstock ●●●

GENERAL FEEDBACK

- Factual, unbiased news that is trustworthy.
- No scaremongering or over-exaggeration.
- One streaming platform with everything in place so that you don't need to subscribe.
- Right now, there are too many different platforms to watch, often with repeated information.
- More focus on quality rather than quantity when creating shows.
- Fewer ads and no really outdated channels.
- Avoid creating addictive and time-consuming apps.
- More filters on media for children to avoid young people's exposure to harm!
- No use of children for entertainment when they are unwilling!
- More focus on longer videos to promote better attention spans, especially compared with the plethora of short, meaningless videos we all often see!
- Short videos are influencing this generation's attention span.
- Good/bad and informatic news and different stations for different news types.
- The problem is people might stop learning about the bad things.
- Summary news that explains news in a shorter version.
- We Want Balance.
- We don't want to be bombarded with false or too much information, but we still want to be involved.
- You need more than one source so you can choose what things you want to listen to.
- Certain broadcasting makes it difficult to believe the News.
- Our generation believes most of the Tik-Tok news instead of newspapers.
- Our generation uses social media and when false information occurs, we can be so oblivious to it.
- Broadcasting today does fit our needs but not all the time.
- Social media and all other broadcasting sites are taken for granted or seen as standard. The moment it's gone everyone will want it back.

Table 3 ●●●



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The C-band spectrum opportunity: defining the future of satellite distribution

From consumer to business applications, the rollout of 5G is bringing new connectivity capabilities to support the continued demand for data that is showing no signs of slowing. Now that the C-band deployments are in progress in the US, being at the forefront and innovating in the ever-changing media landscape is key to continued success.

Tim Pearson, Senior Director, Product Marketing, NAGRA

The conversations around C-band spectrum reallocation strategies are going strong. With the C-band reclamation, all satellite services in 3.7-4.0 GHz are relocated to 4.0-4.2 GHz in phases to allow for 5G cellular in the cleared portion of the C-band (Figure 1 C-band Reclaim Explanation).

The driving force behind the C-band reclamation is that 3G and 4G cellular capacity has reached its limit. At the



Tim Pearson, Senior Director, Product Marketing, NAGRA ●●●

same time, it has never been ideal for low-latency, high-bandwidth applications, such as streaming video, VR, and immersive gaming. To address this issue, there needs to be a way to support more bandwidth-intensive applications in the long term. This is where 5G comes into play.

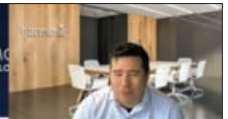
The 500 MHz spectrum (part of the C-band spectrum) is a perfect fit for bandwidth-intensive applications. However, this created a new challenge. With the ideal spectrum in sight for 5G needs, the need to determine the best way to relinquish and utilize something new to meet current and future customer demands arose.

Fortunately, the FCC was able to work with industry

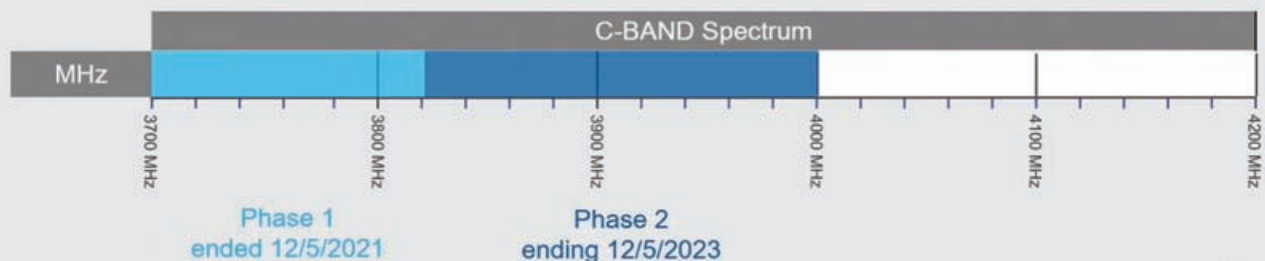
WHAT IS C-BAND RECLAIM

NAGRA
RUDELSKI

COMC
TECHNOLOGIES



All **satellite** services in 3.7-4.0 GHz are relocated to 4.0-4.2 GHz in 2 phases to allow for 5G cellular in the cleared portion of the C-band



SES selected Managed Satellite Distribution as part of the Phase-1 migration

Relocation from SES-11 to AMC-11.
From 11 to 5.5 transponders

Figure 1 C-band Reclaim Explanation. Image courtesy NAGRA ●●●

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players, new technologies, and compression techniques to reclaim and optimize the C-band spectrum, helping US providers use satellite frequencies for the primary distribution of video content.

COMCAST TECHNOLOGY SOLUTIONS' NEED TO ADAPT

Many companies are looking for efficient ways to make this transition seamless. Comcast Technology Solutions (CTS), for example, has taken on this challenge head-on – and with great success. Their managed satellite distribution platform, formerly HITS (Headend in the Sky), provides simplified, single-source access to more than 250 channels.

HITS moved to C-band in 2008, but with the recent C-band reclamation happening in a two-phase approach with the final in December 2023, Comcast needed to evolve with a solution to adapt to this shift.

In addition, the company wanted a solution that was able to think out of the box and do things differently to deliver new and scalable solutions. Comcast was looking for a solution that delivered on five specific requirements (Figure 2 CTS Key Requirements):

- 1) Delivers the same services for each of its affiliates.
- 2) Offers the same or even better video quality at each affiliate.
- 3) Ensures full content protection is managed over the air.
- 4) Provides a turnkey, plug-and-play solution to the affiliates, working with them to facilitate the transition from the legacy system to the new system.
- 5) Adheres to a strict deadline to complete the project, to seamlessly transition 350 affiliates before the satellite filter installation in May 2021.

DELIVERING SUCCESS WITH A FUTURE-READY SOLUTION

This future-ready solution has been facilitated through a partnership between Harmonic and NAGRA. The companies worked together to address Comcast Technology Solutions' unique challenges. This meant transitioning an entire business that has been in the market for many years with something flexible that could meet all their operational needs and security requirements.

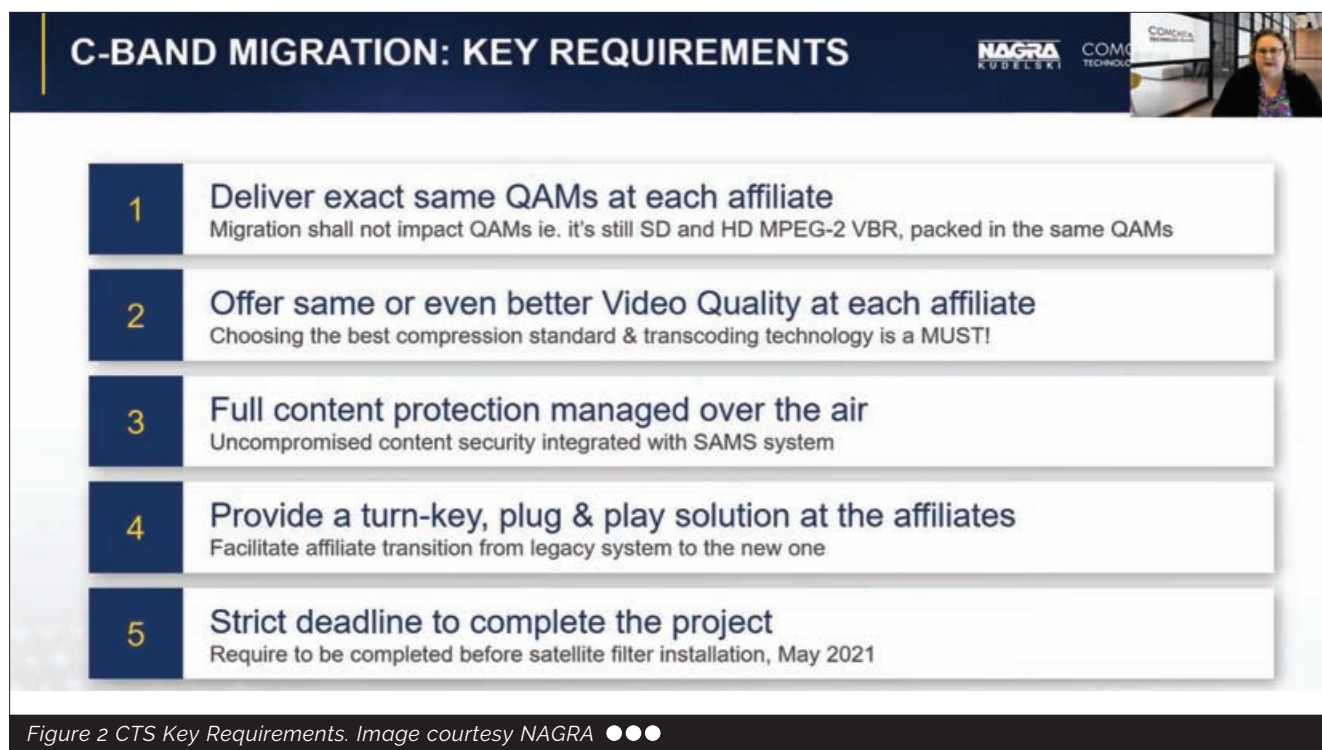
NAGRA and Harmonic created a unique satellite delivery network that seamlessly and securely distributes video services with optimized bandwidth, improved quality, and premium content protection – all within an incredibly fast time-to-market.

Comcast Technology Solutions leveraged the new technologies to clear the C-band spectrum successfully while maintaining the quality and resilience of critical video services for their affiliate partners.

By exploiting their long-time experience in working together the engineering teams of each company were able to provide unique content protection on the software-based COTS server.

The new system meets today's demands and will be able to quickly evolve in the future. "We were working under an extremely tight deadline and needed to find tried and tested expertise in content protection," said Eric Ferrell, Account Manager of Strategic Accounts at Harmonic. "Working together with NAGRA made the process ten times easier."

Core to the solution was a holistic security approach that included meeting content owners' demands as the market matures to a more IP-based environment. Several countermeasures and enforcement techniques ensure the system can adapt efficiently as needs change within the industry thus ensuring a lifetime of solutions that are known



to be kept in operation for a long time once deployed.

The comprehensive security approach includes the following pillars:

- **Secure** – Provides the right software and hardware for client needs now and in the future.
- **Mark** – Watermarking techniques from the service side to the network side to the subscriber side enable content tracing when a leak occurs.
- **Monitor and Qualify** – Know what is happening in the market with information on specific localities and understand the dynamics, the analytics, and the level of piracy risks.
- **Identify** – Recognize the source of the leak so action can be taken.
- **Act** – Weaken pirate services by disrupting service to illicit subscribers and bringing bad actors to justice via investigation and legal support services.

The partnership is continuing with the next steps already in progress to support the Comcast Technology Solution as the industry continues to evolve. With the existing platform in place, Comcast can easily adapt to the various situations that will likely come. The solution has opened the door to additional and ongoing opportunities with video programmers for edge distribution of secured video content.

While Comcast Technology Solutions could tackle the challenge head-on with the right system in place, the current transformation of satellite services to free up the C-band spectrum represents a massive change for many in the industry. Comcast Technology Solutions is one example of a successful effort to address the transformation of the C-Band spectrum and define the future of satellite distribution. The partner solution delivered on all fronts with great results and laid a foundation for what's to come. ●



iStock photo courtesy of NAGRA ●●●

The true potential of connecting the rurally unconnected ●●

Connectivity is a popular buzzword in the modern satellite industry, but outside of the business' cultural bubble, the real work of bringing about a comprehensively and qualitatively connected planet is rather more daunting. With the rollout of LEO networks, effective worldwide rural connectivity has become a lot more tangible, but how great is the problem we're seeing, and how much value can we derive from solving it?

Laurence Russell, Associate Editor, Satellite Evolution Group

In early August, Gilat Satellite Networks announced the expansion of its contract in Peru with Internet para Todos (IPT) – literally, Internet for All. The global collective aims to bridge the digital divide in Latin America and widen the scope of 4G cellular backhaul over the internet that the two companies plan to provide in the region.

The news came just months after IPT welcomed Eutelsat's major role in another connectivity programme aimed at connecting Mexican rural schools in June, through the installation of internet access points, alongside Globalsat and Apco Networks.

Juan Pablo Cofino, Chief Executive Officer of Eutelsat Americas said of the initiative, "Connectivity has become a basic human need, and we are honored to be a key part in the solution to assist the Mexican government in its mission to get all Mexicans online. Once again, satellite is proving a robust, readily available, and cost-effective solution for governments everywhere looking to fulfill their global service objectives."

RESEARCHING THE CONNECTION DEFICIT IN THE UK

Whilst most of the work to be done in bridging the digital divide remains in the global south, the unconnected and underserved can be found almost everywhere on the planet.

According to a report released in late June that documented research conducted by Three UK in partnership with YouGov and Development Economics, covering over 1,000 micro and SME businesses in the UK between 10-249 employees, poor connectivity costs British SMEs £18.77 billion a year.

Areas hit hardest included two of the largest sectors under the UK GDP—retail and service industries—specifically legal, accounting, and media businesses. At a

time of such acute economic scrutiny, amid rampant industrial downsizing, price inflation, and labor contention, the news comes as quite a shock but also represents a valuable opportunity for rejuvenation.

Craig Beaumont, Chief of External Affairs from the Federation of Small Businesses (FSB), attaches his reactions to the data attesting, "It shines a new light on just how poor connectivity can hold UK small businesses back. It echoes FSB's own research which shows 45 percent of small businesses experience unreliable voice connectivity, rising to 57 percent in rural areas."

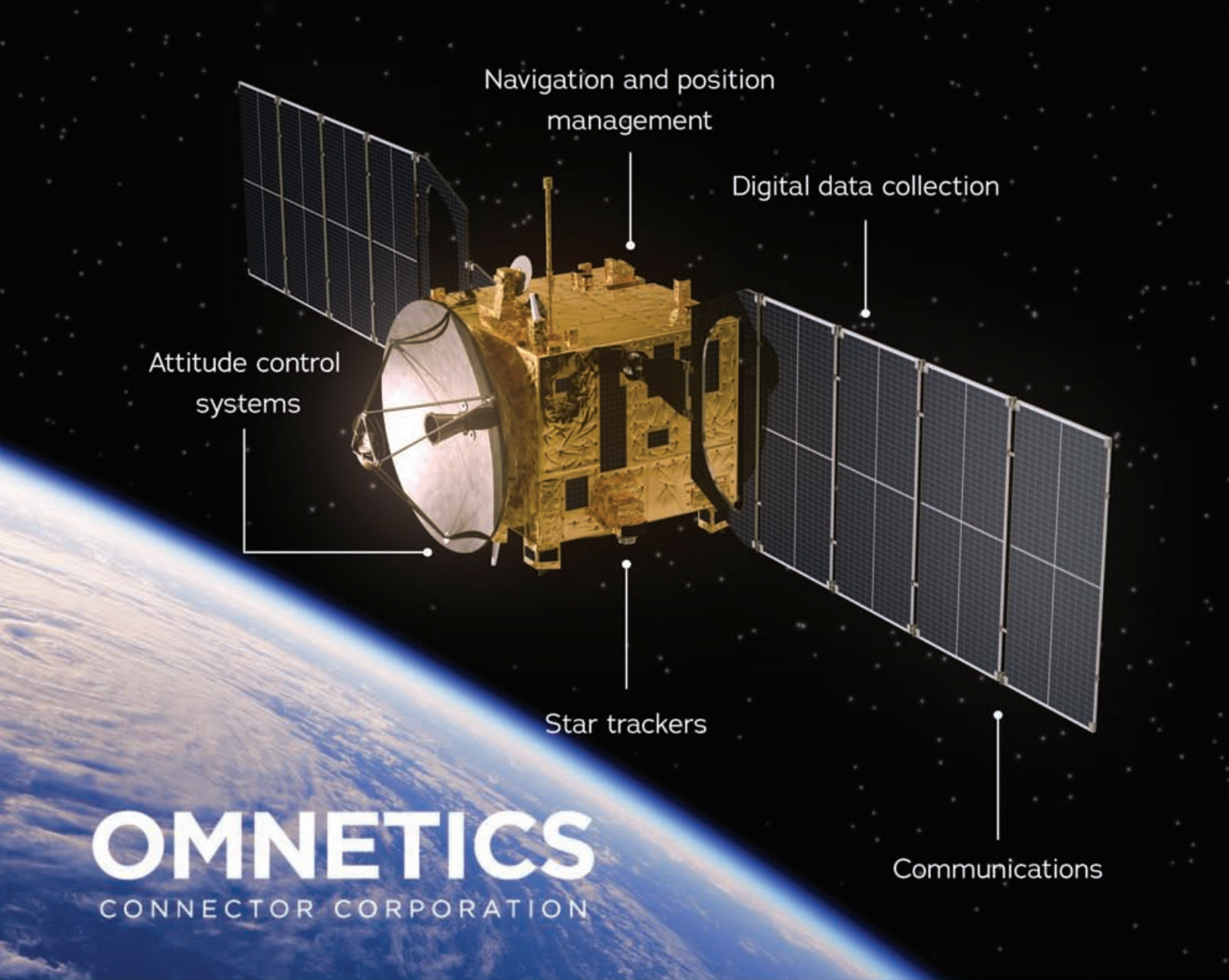
He goes on to insist, "We need economic growth and productivity right across the UK, and that rests on world-class digital, mobile, and vocal connectivity – 4G and 5G must be inclusive for everyone. After incredibly tough times, small businesses can use this to innovate, find new customers, and drive the recovery – but they can't do this if they are battling with poor connectivity."

In recent years UK politicians have entertained notions of nationalized telecoms, with several initiatives coming forward to aspire to the success such programs have earned abroad, but ultimately the country and advanced economies like it will almost certainly remain wedded to the private models that make connectivity imprecision so inevitable.

Snehal Bhudia, Director of Business Propositions at Three UK believes the research will help the company address the failures of former providers. "Many technology propositions are aimed at larger corporate structures and fail to meet the needs of smaller businesses cost-effectively," she acknowledges. "At Three, we are investing more than £2 billion in network technology to become the



Ramesh Ramaswamy, EVP and GM for Hughes' International Division ●●●



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UK's fastest 5G network and have recently launched Three Business Adapt to directly tackle these connectivity problems for SMEs."

While the UK is a very specific economic model, the qualitative research done there documents the proverbial tip of the iceberg when it comes to the cost of unconnected peoples and organizations. The potential for optimization there is dwarfed by the capacity for explosive growth in the developing world.

BRIDGING THE DIVIDE IN THE GLOBAL SOUTH

With the global south set to experience the brunt of the wave of natural disasters caused by climate change, damage to terrestrial connectivity structures seems inevitable. Satellite solutions provide an important lifeline in the event of such tragedies, and work as a backup in the meantime. We spoke to Steven Tompkins, Director of Market Development at Inmarsat about how his company addresses the issue.

"Not all satellite service is created equal. The L-band frequency is an incredibly reliable option, as shown by the majority of satellite IoT use cases being delivered through it. L-band services delivered over a network like Inmarsat's ELERA will even work when the weather – which may have destroyed the terrestrial infrastructure – is bad."

Ramesh Ramaswamy, EVP, and GM for Hughes' International Division, speaks to a more macroscopic approach. "Cost-effective broadband has a great potential for shoring up stability as we work to bridge the digital divide via projects in places like Indonesia with BAKTI, where our equipment powers 10,000 internet and community Wi-Fi sites; Mexico, where our equipment is in use at more than 7,200 sites in support of the Comisión Federal de Electricidad (CFE) Telecomunicaciones e Internet para Todos initiative; and India, where we connect 5,000 remote gram panchayats, or government offices, to the internet."

Ramaswamy went on to insist upon the logic of using satellite connectivity in concert with terrestrial options to create hybrid solutions. Hughes' newly debuted multi-transport GEO provides low-latency service to customers at the edge of mobile network coverage which is perfect for augmenting a GEO connection with extra power.

"In our demonstration of the technology at the SATELLITE show earlier this year, we achieved a consistent latency of 40 milliseconds, a snappy response for web browsing, and we even played a triple-A multiplayer online game. It is innovations like these that are going to help create a more reliable, connected ecosystem for everyone – including those in remote and rural areas."

SECURITY, RAIL, AND AGRICULTURE

While home broadband makes up a large portion of the market share, remote industry and enterprise provision have their own prescient demands, some of which have already been solved by satellites for decades. In the new era of the Industrial Internet of Things (IIoT), satellites are enabling unprecedented efficiencies that experts widely associate with the fourth industrial revolution.

Agriculture and rail are two of the fastest-growing markets for industrial IoT connectivity. As Tompkins

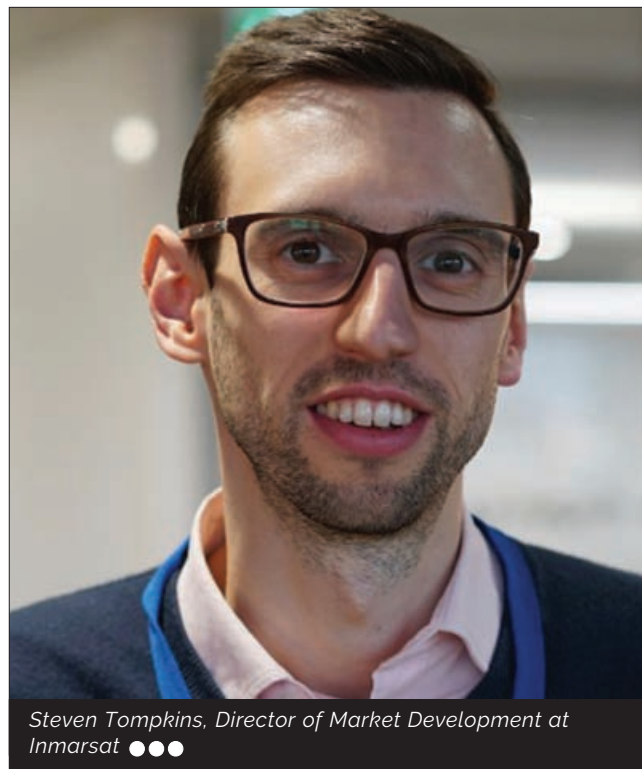
explains, "In agriculture, soil and weather conditions can be monitored, irrigation can be automated, and produce can be stored optimally, before being tracked from the point of production to the point of sale, with its provenance and origin traced. For rail operators, satellite IoT is enabling the tracking of tracks and train locations as they travel vast distances, even through remote areas that lack any reliable connectivity.

"The safe and efficient running of these operations can save across fuel economy, enhance productivity, and ensure safety in the face of incidents across the massive geographies involved with these industries," he states. "Inmarsat works with a number of logistics companies operating train lines, such as Rumo S.A. in Brazil, to track trains and enable communication with their drivers and control rooms."

Tompkins also advocates for the power of hybrid satellite/terrestrial networks. "The future is a network of networks approach where the right connectivity method is applied to the appropriate use case," he explains. "Often, we see satellite being combined with other networks to provide Low Power Wide Area Networks (LPWAN) demonstrating this move toward network interoperability.

"Inmarsat's ORCHESTRA solution allows for this kind of seamless network hybridization, which leverages GEO and LEO satellite, cellular, and mesh networks to support reliable connectivity wherever our customers need it. The next frontier for satellite connectivity is its mass adoption across other sectors embracing industrial IoT for increased profitability, safety, and sustainability. These include agriculture, mining, transport, and energy."

The unparalleled efficiency of Industry 4.0 that experts predict will be delivered with the swift connectivity of IoT, for which satellites will be increasingly crucial. ●



Steven Tompkins, Director of Market Development at Inmarsat ●●●

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Space tech entrepreneur joins ground segment specialist

Space technology entrepreneur and former CEO of Clearbox Systems, Jeremy Hallett, has been appointed by Av-Comm Space and Defence to the role of Strategic Advisor to empower Av-Comm's aspiration to support and sustain Australia's existing ground station assets and the company's major expansion into sovereign manufacturing of satellite ground systems.

In his 14-year career at the satellite control system integrator, Clearbox Systems, Mr Hallett led strategy and business development before taking over as CEO in 2021. He has a wealth of space industry experience to bring to his work with Av-Comm including helping found Quasar Satellite Technologies, a CSIRO spin-out company which is commercialising CSIRO's proprietary phased array technology.

Headquartered at Brookvale, Av-Comm has a multi-decade history as a specialist ground segment hardware supplier and provider of field engineering, design and technical services for installation and sustainment, particularly for government and defence assets. As global satellite communications become more ubiquitous, &Z(SQ Q MKVS MK XL SYKL WEX KIG EQUIMMER LM also harnessing its expertise to develop Australia's first sovereign-manufactured satellite ground system.



Jeremy Hallett, has been appointed by Av-Comm Space and Defence to the role of Strategic Advisor ●●●

Av-Comm Space and Defence Managing Director Michael Cratt said: "Jeremy Hallett's understanding of Australia's space ecosystem, as well as his deep technical and commercial expertise, will be invaluable to our growing

acquisition of STEP Electronics, and a highly skilled workforce that has been part of Australia's space evolution at every turn, Av-Comm Space and Defence is about to write a new chapter in its history, as a ground segment sovereign manufacturer. There couldn't be a better time for Australia to develop this capability and stop relying on foreign made systems when we have the talent and know-how here to support our space industry," he said. ●

Experienced corporate leader Joan Amble joins Board of Directors of Spire Global, Inc.

Spire Global, Inc., a leading global provider of space-based data, analytics, and space services has appointed Joan Amble to the Company's board of directors. In her role, Ms. Amble will work with Spire's leadership team to implement best practices as the business continues to quickly scale.

"Joan embodies the very relentless, unbounded, and collaborative spirit that we value at Spire. Her valuable perspective from what has been a tremendous career in finance will be immensely impactful as we continue to scale the business and strive towards being the best we can be," said Peter Platzer, CEO of Spire. "Joan's commitment to women in business and mentoring the next generation is inspiring and having her counsel will only further strengthen Spire's position as a company that cultivates top talent. I am pleased to welcome her to our board of directors."

Ms. Amble has had a storied career in finance, most recently serving as Executive Vice President, Finance, and Comptroller for American Express. Prior to holding senior leadership positions at American Express, Ms. Amble spent more than a decade at General Electric, most recently serving as Chief Operating Officer and Chief Financial Officer for GE Capital Markets, overseeing securitizations, debt placement, and syndication, as well as structured equity transactions.

She has extensive experience in corporate governance, having served on the Board of Directors of Broadcom Corp, Brown-Forman, Sirius XM Holdings Inc., and as an independent Advisor to the Executive Committee of the US affiliate of Société Générale S.A.

Ms. Amble currently serves on the Board of Directors of Zurich Insurance Group AG, BuzzFeed and Booz Allen Hamilton Inc. She is currently the president of JCA Consulting, LLC.

"Spire is a company operating in the most future-oriented industry there is - space, bringing data solutions to market with broad applications across sectors, public and commercial. What is particularly exciting to me is the fact that these solutions are addressing needs that aren't nearly fully understood or appreciated yet," said Ms. Amble. "Spire has just begun scratching the surface of what is possible when utilizing its unique vantage point, and I look forward to working closely with the management team as the company continues to grow and increase adoption of its solutions, globally." ●



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