



Telco

Sustainability Forum

KEY FINDINGS REPORT

OPERATORS ARE FINDING THE BALANCE
BETWEEN ENERGY EFFICIENCY AND NETWORK
PERFORMANCE

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INTRODUCTION

As a world and as an industry, we are at an inflection point in terms of generational wireless technology, amid increasing demand by both governments and end-users for better energy efficiency and overall sustainability. Many telecom companies have responded to those pressures by beginning to measure their environmental impact and take steps to reduce it, including adopting net-zero emissions goals, optimizing their vehicle fleets, increasing their use of renewable energy sources, and more.

Overall, communications service providers account for about 2-3% of global energy demand. According to GMSA, energy consumption constitutes between 20 – 40% of network OPEX. Roughly two-thirds of network power consumption happens in the Radio Access Network, so many operators and vendors are focused on how to make the RAN more efficient -- because it eats up a lot of power, and in the 5G era, that is generally expected to increase as data traffic continues to rise, and sites proliferate.

The GSMA has estimated that even in a best case scenario, mobile networks will at least double their power consumption between 2020 and 2025. This isn't a sustainable situation for power use or operators' bottom lines, either, given increasing energy prices and the increased cost of capital due to higher interest rates -- reducing energy use is an economic imperative, as much as it is a corporate responsibility.

The Telco Sustainability Forum took place while two other major global conferences were being held in Dubai: The United Nations climate summit and the World Radiotelecommunications Conference. As the member nations of the UN debated how to ensure that human beings can preserve a liveable planet, ITU Secretary-General Doreen Bogdan Martin pointed out in her opening remarks at WRC 2023 that even as telecom conversations around spectrum and the future of wireless are happening at WRC, ITU was simultaneously

spearheading a "Green Digital Action" track at the climate summit that focused on both industry-wide commitments to addressing climate challenges, and putting digital solutions at the forefront of climate action.

Bogdan-Martin noted that energy efficiency and environmental sustainability are being made part of the specifications for IMT-2030, otherwise known as 6G. She said: "Let's not pit digital technology against sustainable development. The case is clear: we need both. ... Let's choose universal connectivity and sustainable digital transformation."

This report recaps discussions from Telco Sustainability Forum on how the telecom ecosystem is trying to balance those objectives.



(Image courtesy of 123.RF)

ENERGY CONSUMPTION VS. EFFICIENCY—5G SUSTAINABILITY REQUIRES A NEW MINDSET



Monica Paolini
Founder & Principal
Senza Fili

In both the contexts of driving global demand for energy and facilitating the reduction of consumption and attendant

AS OPERATORS INVEST IN 5G SUSTAINABILITY, ENERGY EFFICIENCY AS A STANDALONE TARGET ISN'T ENOUGH TO FOSTER LONG-TERM

greenhouse gas emissions (GHG), the Information and Communications Technology (ICT) sector has a very important role to play. Senza Fili Principal Monica Paolini talked through 5G sustainability efforts, and drew an important distinction between a focus on reducing energy consumption and becoming more energy efficient while optimizing mobile networks to meet real

world service demand.

By the numbers, ICT accounts for about 4% of global energy use and generates 1.4% of global GHG emissions. Mobile networks as a subset of ICT accounts for about 0.7% of global consumption with the radio access network (RAN) drawing at least more than 50% of that power. Comparing 4G with 5G on a per-bit basis at max capacity, 5G

is clearly, and by design, more efficient than its predecessor. And, finally, the International Telecommunication Union (ITU) reckons that ICT, mobile network operators included, needs to cut GHG by 45% by the end of the decade to meet climate change goals laid out by its parent organization, the United Nations.

With that, back to Paolini: “To be energy efficient is actually not that hard,” she said. “What is really hard about it is to be energy efficient in the big context of optimizing your network...So the challenge is not to reduce energy consumption but to do so in a way that makes sense.” She made the point that mobile network power consumption has increased dramatically along with surging traffic demand—including from new types of internet of things (IoT) and enterprise networks as well as in service of nascent use cases—but not on a one-for-one basis. But, “That doesn't mean we should just sit down and relax.”

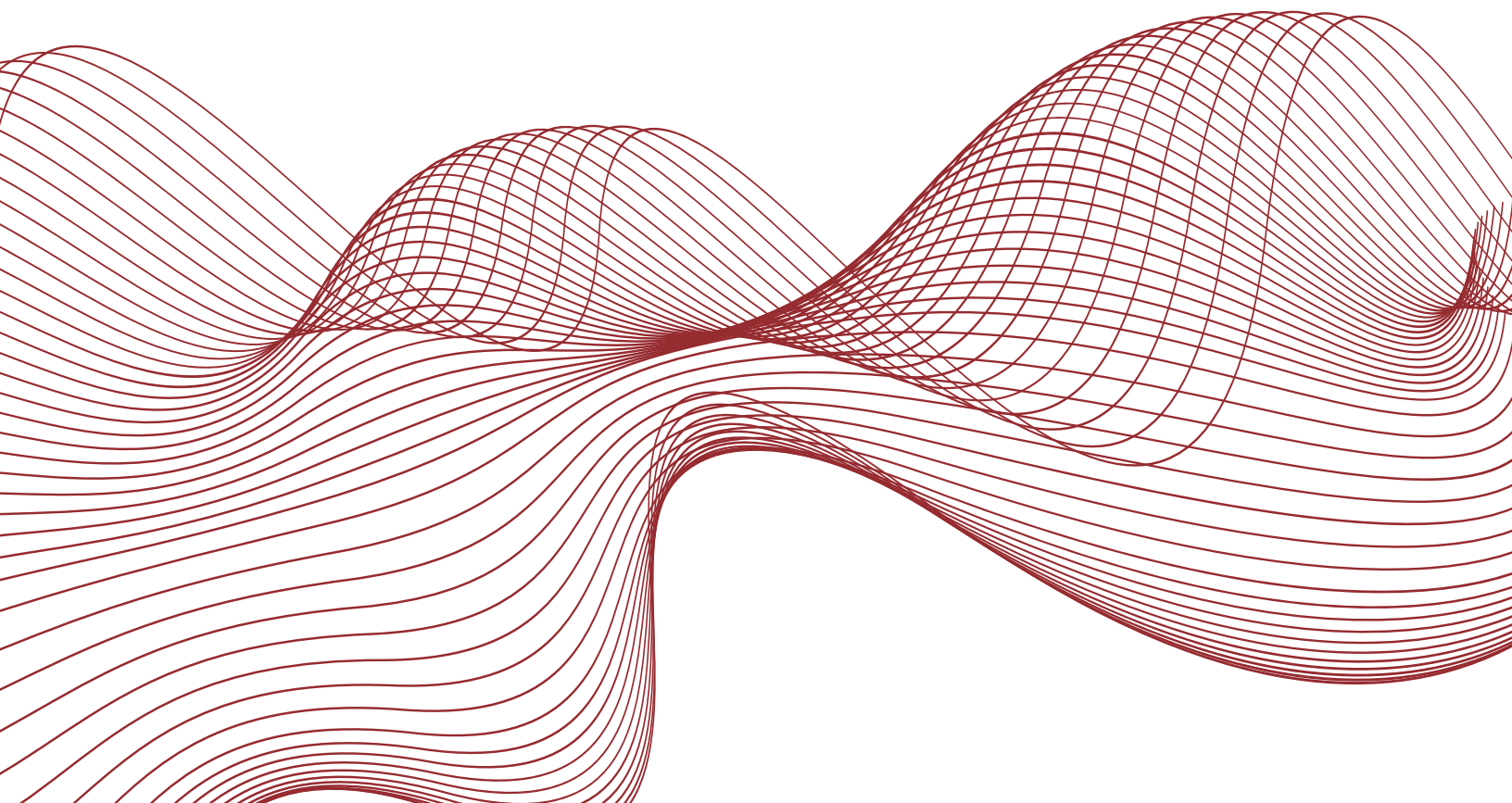
Focusing in on the RAN where the bulk of power is consumed, Paolini noted that energy draw in the RAN is a function of end-to-end draw that begins in the core, traverses the transport network, then hits the RAN. In the RAN and system-wide, energy efficiencies are being had based on ongoing component evolution, disaggregation offering operations more supplier optionality, the move to cloud-native bringing resource pooling gains, and centralized/distributed RAN topologies offering more power management flexibility.

“When we look at energy efficiency, it's tempting to think like 5G is more efficient than 4G and that is absolutely true... But in real networks that might or might not be the case,” Paolini said. She cited research from Ofcom and CommScope that delineated how variables like which spectrum is being used or how many transmit/receive elements are in a massive MIMO antenna array as influencing real

world power consumption. It's not as simple as 4G vs. 5G or vendor A vs. vendor B, she said. “We need a new approach to plan, test and monitor the network.”

Energy efficiency as a standalone target is not enough to achieve long-term sustainability, Paolini concluded. “Long-term sustainability is driven by a different and new way to approach energy efficiency which is not just simply reduced consumption. Although that's always a good thing...in a vertical like wireless... we want to focus on energy efficiency, and that's a long-term type of play. It requires a new mindset. We need to keep the two separate—consumption and efficiency. Efficiency is really where sustainability comes from.”

For 5G sustainability to be a durable, achievable goal, “We need to have a wider and more comprehensive view on how we build, manage and monitor, and optimize wireless networks.”



A 'REAL, DELICATE BALANCE': SUSTAINABILITY, NETWORK DATA AND ACHIEVING ROI



(Image courtesy of 123.RF)

Saving energy, in a network context, ultimately means that somewhere along the line, user experience could be impacted. Perhaps coverage or throughput ticks downward, or users are shifted from one cell to another.

In a session at the recent Telco Sustainability Forum virtual event (available on-demand [here](#)), Jen Hawes-Hewitt, head of strategic programs and solutions

for the global telecom industry at Google Cloud, and Yannick Martel, VP and data and AI lead for the telecommunications industry at Capgemini, discussed the balance that operators need to strike between competing interests of reducing their energy usage when user experience expectations are high.

"It's not a simple case of, how do we simply reduce energy spend," Hawes-Hewitt said.

"There's a real, delicate balance that has to be struck constantly with the quality of customer experience and the ability to stay competitive. Because one of the real challenges that our CSP customers see is, if they compromise on customer experience and have network drops, call drops, have lower throughputs, et cetera, then they are going to have churn," she continued, adding that network operators

need to “retain just enough power in the network so you’re able to have a fantastic customer experience, but do that in the most effective way” using real-time data feeds. Hawes-Hewitt said that, given that the Radio Access Network consumes roughly 70%+ of network energy costs, the RAN is the focus as the first place to apply cutting-edge techniques driven by artificial intelligence and machine learning, in order to save energy.



Jen Hawes-Hewitt
Head of Strategic Programs and Solutions, Global Telecom Industry
Google Cloud

That means saving on OpEx cost as well. Energy costs are “not just a big part of the spend, it’s also an increasingly volatile part of the spend,” Hawes-Hewitt said. Operators don’t just want to reduce overall costs, they also want to reduce the volatility in their energy bills. One of the major challenges, however, is dealing with the existing, data (and power) hungry legacy tech stacks, and data siloes between different technologies, vendors and domains that prevent holistic

configuration changes that could better optimize networks.

Generally, when the industry talks about achieving energy savings, they are often referring to doing so in 5G and future 6G systems, said Martel of Capgemini. “But indeed, we want to achieve savings now, with the networks we have today,” he added. CTOs first turn to network equipment manufacturers to help with optimization. “We feel that really, you can go beyond [that],” he said. To do so, “you need to get data out of the network and to get data into an open environment where you can really understand the way the network is working, the way customers are using it, and how the consumption is distributed—and then, you can really find levels to activate and to change configuration, maybe, and to save electricity.”

The first phase of identifying such opportunities is by using historical network data for simulation purposes, which can help identify and prove out changes that could be made for energy savings without actually touching the network. Updated data can come from the network itself. Telecom networks are incredibly complex, and there are many ways they could be mis-configured. Understanding patterns of activity and usage is crucial, Martel pointed out, and simulations can enable operators to identify changes and savings and build a business case for those changes. “You really need the simulation to build a business case for the project,” Martel continued. “One the business case

is sold, you know how much can save, you understand where you want to play. And then you can decide whether the savings is enough and decide for the investment.” The idea is that eventually, operators could eventually progress to live data feeds from the network to make optimizations in a more real-time manner.

Bringing network data into simulations to demonstrate energy savings opens up the possibility of exploring that data for other uses, Hawes-Hewitt pointed out. “When you see the operational savings you can make with RAN energy savings, you also look at maybe service assurance, or some of those additional important use cases that are also reliant on increasingly more AI/ML, more automation,” she added. “At this stage, we’re still seeing a fair amount of human interaction to validate the configurations, to validate what [are] the appropriate fixes to put into the network. But that’s also a really interesting progression over time to an increasing autonomous network.”



Yannick Martel
Data & AI lead for Telecommunications Industry
CapGemini



(Image courtesy of 123.RF)

BALANCING NETWORK EFFICIENCY, COST AND PERFORMANCE

AT&T IS LOOKING AT TURNING DOWN CIRCUITS AS USERS MIGRATE FROM LEGACY TECH LIKE DSL TO FIBER

Operators are facing the challenge of having to deploy more hardware to meet the appetite of users for more data while at the same time they need to try to take out as much equipment as they can in terms of a per user, said Chris Hristov, AVP of network engineering and automation at AT&T.

“We’re almost constantly fighting the battle of having to deploy more hardware which consumes more energy, and at the same time you have to try to take out as much as you can in terms of a per-user. So we went down the road of putting radio heads to sleep. That was pretty controversial a few years ago, because from a competitive perspective, people make the argument you’re taking spectrum off-air, saving on power, but at the same time are you

impacting your performance. But we found that we can do that and manage that in a way that was pretty effective,” Hristov said during a panel session at the recent RCR Wireless News’s Telco Sustainability Forum (available on demand here).

The executive also noted that AT&T and traditional legacy telcos are also always looking at trying to “groom” some circuits down as users migrate from legacy technologies such as DSL to fiber. “Grooming users onto fewer elements and then removing network elements out of the footprint are some of the things that we’ve been doing, and pretty successfully actually. We had a pretty aggressive [decommissioning] effort to do that over the last few years,” he said.

“You can very easily figure out how much is each network element consuming per user that it supports. And we have that all mapped out, and so we’re able to predict, if I shut down this particular element and move all the users onto another one, this is how much I’ll actually save every year,” the executive added.

Michael Wolfe, CTO of outdoor wireless networks at CommScope, noted that base station antennas may not be top of mind when operators start to think about reducing network power consumption. “But if you think about where some of the key power-consuming parts of the network reside, they are in that RF transmission path that lives at each site. So if you think about the losses that occur in the path between those radios and the antennas that actually transmit the signals, there is a lot that can be gained by improving the overall efficiency of those antennas,” he said. “That’s what we’ve been focused on for the past few years within CommScope, looking at how we reduce losses in the antennas.”

Wolfe also noted that a lot of the passive antennas that are used in lower-frequencies spectrum bands mainly for coverage purposes, are the ones that CommScope is currently trying to optimize for future higher spatial efficiency.

“I think infrastructure obviously is the primary consumer of power here and so a significant contributor, and there’s a lot of opportunities here, especially as carriers migrate from 4G to 5G and network functionalization to cloud-native,” said Chandresh Ruparel, senior director of the 5G/wireless core infrastructure segment at Intel.

Ruparel said that Intel has been working with carriers and other players in the ecosystem over the last years and has identified several opportunities in the application level to better utilize infrastructure capabilities as well as just optimize how the applications are being deployed.

“Another area that we found to be a low-hanging fruit here is runtime power savers. When you have the workload running, you are not requiring the server to run at peak capacity all the time because if you look at the traffic patterns over a 24-hour period, it varies. If the silicon technology has the capability for granular controls and it’s able to manage transitions with near zero latency, you can actually achieve significant power savings without compromising the key performance indicators,” the Intel executive said.

Meanwhile, Jen Hawes-Hewitt, head of strategic programs and solutions of global telecom industry at Google Cloud, said that CSP customers globally are coming to Google Cloud and its partner ecosystem



Patrick Kelly
Founder, Partner, and
Principal Analyst
Appledore Research



Jen Hawes-Hewitt
Head of Strategic Programs and
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Google Cloud



Chris Hristov
AVP of Network Engineering
and Automation
AT&TSolutions

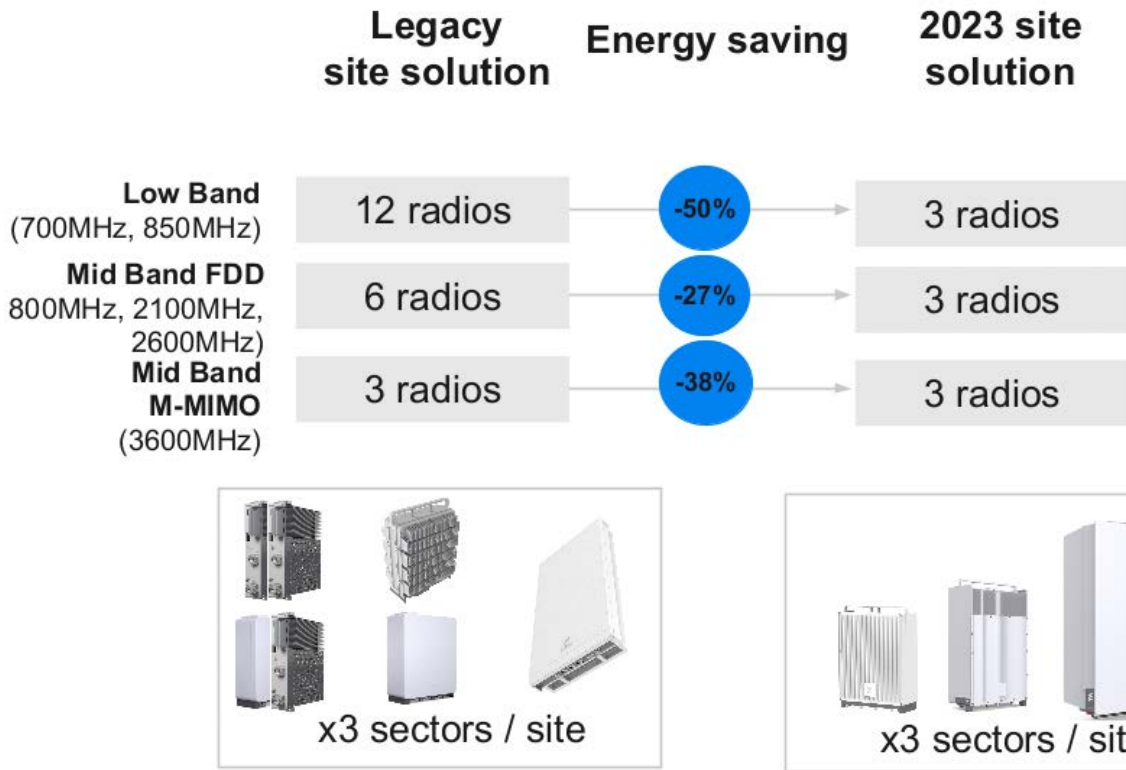


Michael Wolfe
CTO,
Outdoor Wireless Networks
CommScope

to see how they can apply AIML at scale using the scalability flexibility of public cloud to help them drive energy savings. “So some of the work we’ve been doing with some of our tier one operators in EMEA has been really creating a hybrid deployment structure where you’re able to build a simulation. So doing that predictive understanding where you foresee there’s going to be opportunities for energy saving,” she said.



Chandresh Ruparel
Sr. Director, 5G and Wireless Core
Infrastructure, Network and
Edge Solutions Group
Intel



(Image courtesy of Ericsson)

A THREE-STEP APPROACH TO 5G SUSTAINABILITY

ERICSSON ON HOW OPERATORS CAN WORK TOWARDS NET-ZERO GOALS AND DELIVER 5G SUSTAINABILITY WITHOUT COMPROMISING PERFORMANCE



Sibel Tombaz
Head of Product Line 5G Radio Access Network
Ericsson

"Our target as an industry, as a society, is

very clear," Ericsson Head of Product Line 5G Sibel Tombaz said during a talk on 5G sustainability strategies. "We need to leave a good future for our grandchildren." In the context of demand for mobile-enabled services continuing to grow without signs of slowing, Tombaz laid out a three-step approach to re-visioning network KPIs with sustainability top-of-mind, and doing so in a way that doesn't sacrifice performance.

Tombaz counted some 250 commercial 5G networks around the world (60% of which are powered by Ericsson), and noted the firm's own goal of reducing the energy consumption of its products by

40% between 2021 and 2025, and getting to net-zero by 2040. Related to its supply chain, Ericsson wants to cut emissions by 36% by 2025.

She characterized the larger transitions as from the “network machine” to the “network organism” The former is characterized as configuration-based, semi-static and algorithmic and the latter as intent-based, energy and user experience conscious, and a key enabler for societal digitalization. “We believe the next wave of 5G will enable taking the first steps towards this target.”

The high-level steps—all geared around “doing more with less”—as laid out by Tombaz are:

- **Bringing sustainability to the center of network planning**
- **Expand and modernize the existing network while scaling up 5G**
- **And use AI/ML and automation for intelligent operations that boost energy savings**

To bring 5G sustainability more meaningfully into the network planning process, Tombaz emphasis multi-faceted measurements of energy efficiency, including energy consumed by equipment measure in kWh, energy consumed per

data volume measured in kWh/GB, and user experience metrics like uplink/downlink speeds. These measurements, taken as a whole, will inform “What is the best way to provide more with less,” she said. “We are really looking into providing the insights from multiple KPIs at the same time, so we are actually making the right input for our network design and optimization.”

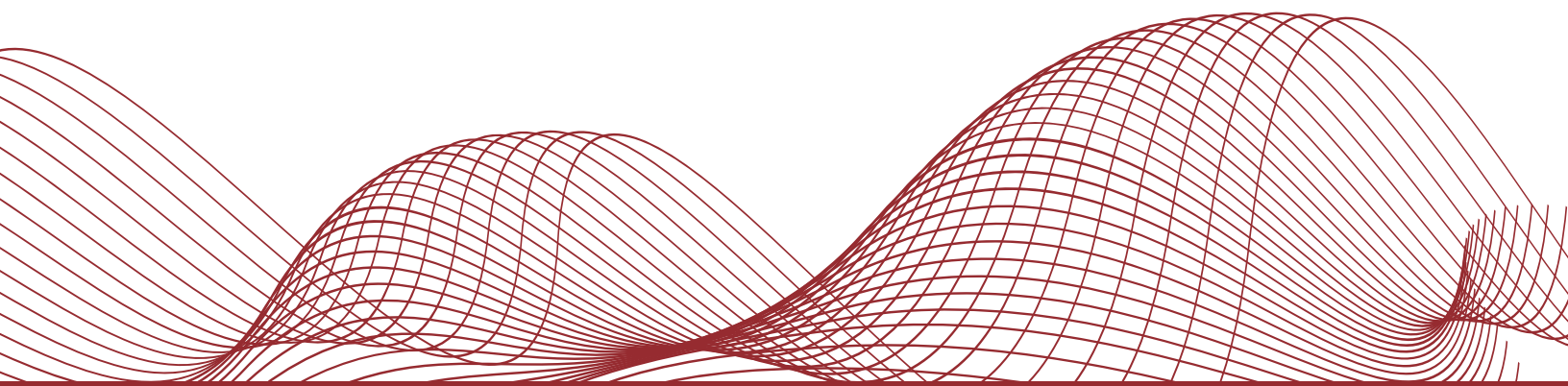
The next is modernizing existing network infrastructure while scaling up the deployment of 5G; the focus here is “when we look into our network, and if you’re going to optimize the capacity and user performance while minimizing the energy consumption, we cannot look at one component only...We need to look at the whole site.” This will inform a deeper understanding of which site elements consume what amount of energy and provide what type of user value. In the real world, this would mean an operator is rolling trucks to deploy mid-band spectrum using massive MIMO radios. In that process, they can also replace legacy radios with leaner, more performant, more efficient equipment. This one-touch approach can boost site performance in a very material way while also delivering a near-50% decrease in embodied carbon emissions.

The third step, AI-ML based automation and energy-smart operations, involves leveraging advanced radio technologies

that can determine existing (and predict future) network traffic loads and essentially put various radio elements into sleep mode when not needed. While a user would not notice any sort of degradation in performance, operators would certainly notice material reductions in power consumption and the associated boost in system-level energy efficiency.

Giving a real-world example, Tombaz called out Ericsson’s work with Telstra which, again, revolves around the theme of “doing more with less.” Specifically on a per-site basis, Telstra swapped out 12 legacy radios supporting low-band frequencies with three tri-sector radios for a 50% energy savings; six radios supporting mid-band FDD were replaced with three radios for a 27% energy savings; and legacy massive MIMO arrays were replaced with modern equipment for a 38% energy savings—so from 21 radios to nine radios. With the addition of energy saving software, including micro sleep for transmit and cell sleep mode, and future plans for MIMO sleep mode, AI MIMO sleep mode and baseband power saving. Network-wide, what Ericsson and Telstra put in place resulted in a 37MWh daily energy savings.

“The key focus here is that with the latest hardware and software features, we can have a huge impact to energy savings,” Tombaz concluded.





(Image courtesy of 123.RF)

HOW DOES RAN MODERNIZATION FOSTER SUSTAINABILITY?

THE SUSTAINABILITY NORTH STAR— “ZERO TRAFFIC, ZERO WATT”

As has been established, the RAN is the biggest energy draw in a mobile network. Because of this, network infrastructure vendors and operators are primarily

focused on reducing power consumption in the radio domain. Doing this successfully has the potential to reduce power bills in what is, generally speaking, a time of increasing energy costs, and it another facet of longer-term net-zero ambitions. To understand how operators should begin reducing RAN-related energy consumption, we convened a group of experts; the big takeaway was that RAN modernization, from both hardware and software perspectives, is the path forward.

Beyond just installing new radio equipment that's more energy efficient, panelists also called out the importance of using automated software tools to understand where and when network traffic is being generated so that resources can be more dynamically tuned to meet demand while optimizing power consumption.

Dell's Manish Singh, chief technology officer for the Telecom Systems business, spelled it out: “These networks are getting dimensioned for peak traffic and still



Tomas Sandin
Head of Radio Portfolio
Management, Product Line Radio
Ericsson

your peak traffic is not running 24 hours a day. You have coverage bands, you have capacity bands which are all transmitting. Yes, we are talking about energy saving features and all, but in reality when we are talking to the service providers, this is a burning issue for them to really, really drive the energy consumptions down on their network because we are an energy inflationary environment. It's a P&L issue; it's the right thing to do. And so the opportunity is massive in terms of how do you get these radio networks, whether you think from a turning off the carriers to actually doing symbol blanking, to actually improving the PA efficiencies, turning off MIMO branches when you are on off-peak hours and more, to how do we get to these intelligent cognitive radio systems that really are flexing depending on what the traffic needs are and do so without any KPI degradation."

While everything Singh mentioned there is firmly on the roadmap—if not available today—from vendors, he encouraged the industry to think big. "If you really think about it from a North Star perspective—and I know we'll never get there—but zero

traffic, zero watt. How about that?...We've got to really think big in terms of what the opportunity is and how we are going to achieve it...There's a lot of work that lies ahead and I'm really, really excited about the opportunity here in this space."

ERICSSON'S THREE-STEP RAN MODERNIZATION RECIPE

Ericsson has emerged as a thought leader around RAN modernization with early messaging around how to break the energy curve in the upgrade to 5G and how to integrate clean energy sources into the RAN. The company's Tomas Sandin, head of radio portfolio management for Product Line Radio, laid out a three-step RAN modernization recipe in a way that supports traffic growth without driving up energy consumption and integrating renewables.

For the purposes of making the recipe readily applicable to the real world, assume a radio site with a massive MIMO radio and two multi-band radios for low- and mid-band FDD spectrum. Step one, "Bring massive MIMO to the sites because massive MIMO TDD is the most energy efficient technology there is when it comes to gigabytes per watt. That's fundamental." Step two is around maximizing the impact of the site visit associated with massive MIMO deployment by modernizing existing single-band radios to multi-band units. "We can provide 10-times more capacity and, at the same time, both reduce weight, size and energy." The third step is using software-based energy saving features

at new sites and throughout the installed base. "That's really the way we approach... breaking the energy curve."

The big picture, Sandin said, is, "We have a very large site reuse opportunity here." To recap, that includes massive MIMO deployment, legacy radio modernization, introduction of energy smart operational software, integration of renewables and even adding gear for millimeter wave and fixed wireless access as needed. "We are not massively increasing the number of sites, but we are instead reusing the sites."



Femi Adeyemi
Head of the Wireless Business Unit
and Chief Wireless
Solutions Architect
Fujitsu



Manish Singh
CTO, Telecom Systems Business
Dell Technologies

IMPLEMENTING SUSTAINABLE RAN ISN'T JUST A VENDOR ISSUE

To the earlier point that many software tools that allow dynamic resource scaling to reduce RAN energy draw are available today—"That's already something that we've developed," Fujitsu EVP and Head of Global Networks Business Femi Adeymi said. "So those are things that we're already doing, but...a deployment strategy is also important from an operational point of view."

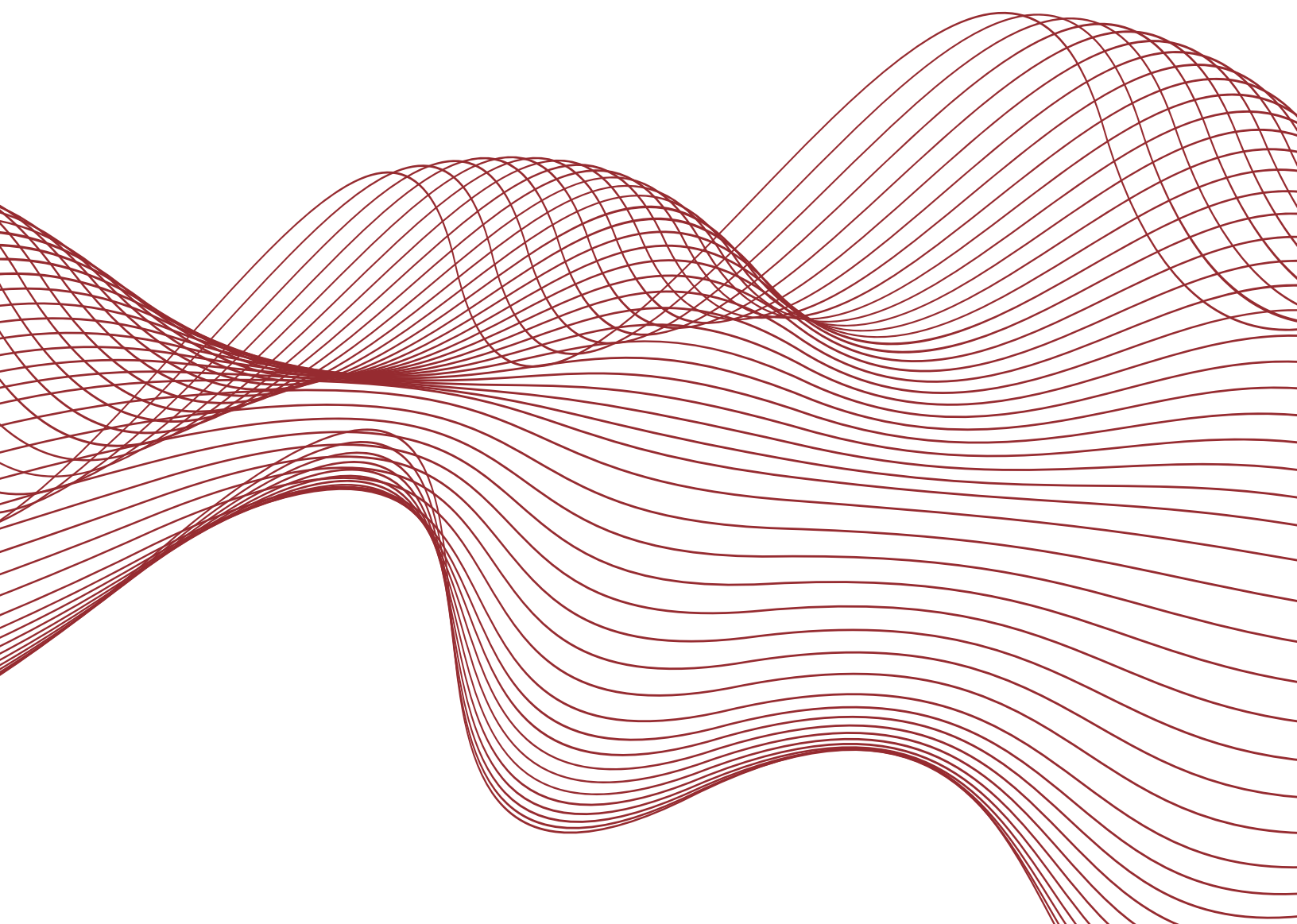
Adeymi continued: "I don't want to leave the audience today where the equipment provider needs to solve all the problems. Utilizing the technologies that we have today...is also important. So how do you deploy your network to take advantage of the cloud so that you're not putting base stations at the bottom of every site?"

THE ROLE OF THE RIC

With Adeymi making the case for cloud RAN, the conversation turned to the role of the RAN Intelligent Controller (RIC) and associated applications in realizing

network energy efficiencies. This isn't just an exploratory topic as early RIC apps and strategies have focused on optimizing energy consumption as a function of network traffic load.

Singh said the moves toward cloudified and open RAN interfaces "is critical to enabling these pathways for RIC, xApps, more innovation...What we really, really need to think about is this tremendous amount of data that is sitting in the operator's data lakes. And there is a need to unlock the value of that data from an energy efficiency perspective, from a network performance perspective and more."



FOUR WAYS THAT BT IS REDUCING ITS ENVIRONMENTAL IMPACT



(Image courtesy of BT)



Sarwar Khan
Global Head of Sustainability
BT

BT Group has set itself a 2023 goal for being a net-zero and circular business and in a recent interview, Sarwar Khan, BT's global head of sustainability business, laid out some of the strategic efforts that BT is pursuing in order to reach that goal.

Ultimately, he said, BT's efforts encompass both supporting its customers in achieving their sustainability goals through technology, as well as reducing its own environmental footprint so that its customers can rely on it as a low-carbon part of their supply chain. "The more we can do to reduce the impact of our global infrastructure, as a sector, by continuing to

innovate and drive energy efficiency and carbon efficiency through our networks, then there is a benefit to our customers, because we reduce our carbon footprint, so that they're able to consume our networks with a lower Scope 3 impact," Khan said.

BT's efforts include:

Managing its fleet emissions. BT has a fleet of about 30,000 vehicles, and its plan is to transition them to low-carbon alternatives. He said the company already has more than 2,500 electric vehicles on the roads as part of its Open Reach broadband service.

Working with its supply chain. Most of BT's emissions actually sit in its own supply chain, which is typical for many organizations, particularly in telecom, Khan explained. He said that the company is working closely with key suppliers—who are also prioritizing their own carbon footprints. "The good thing is that many of the large suppliers—and we share them across the telco sector—have similar targets to BT, and they're actively working on reducing their emissions," Khan said.

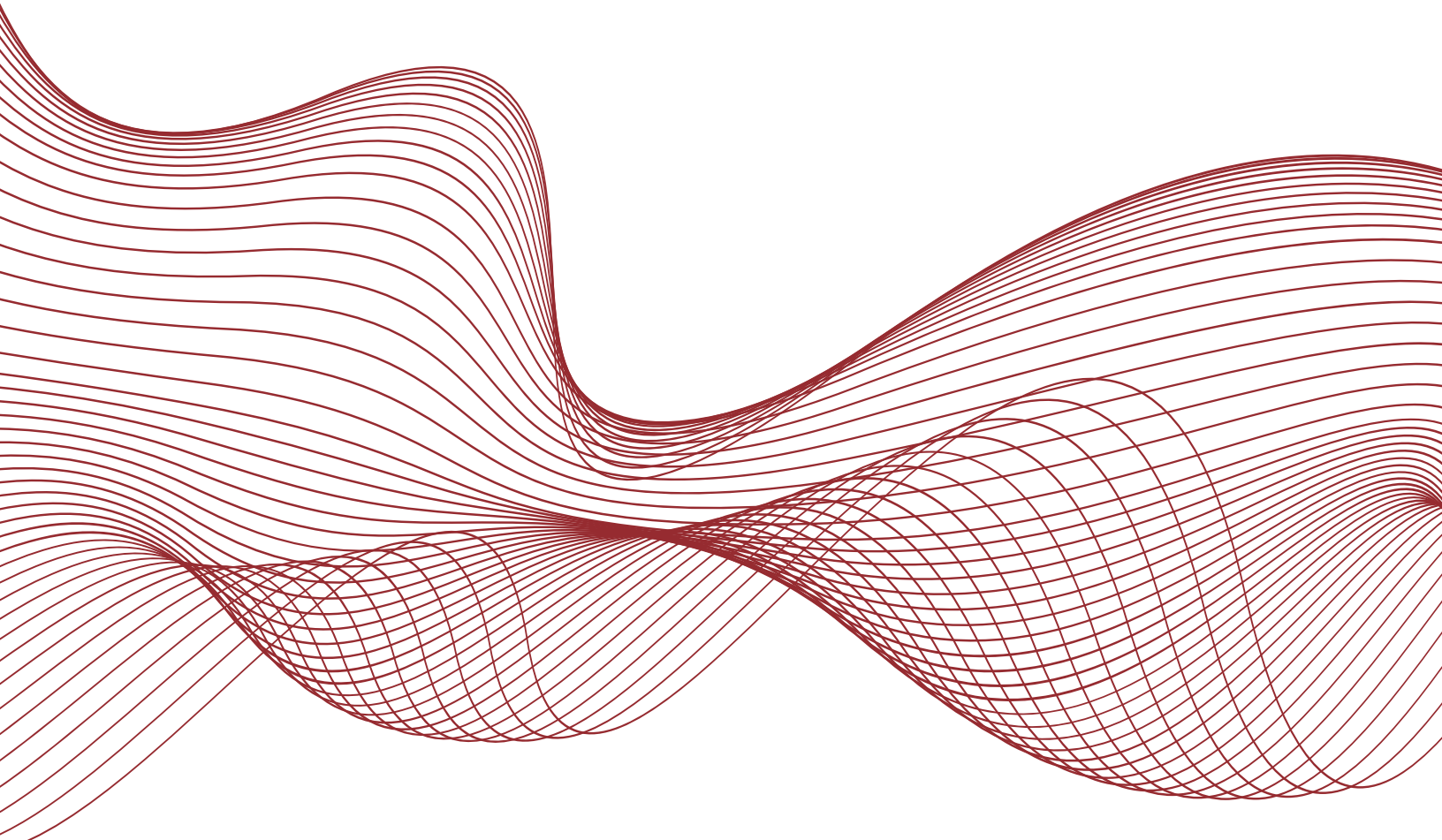
Migrating its networks to fiber-to-the-premise and 5G. Khan said that when considering the full life-cycle of the network, about 20% of emissions are accounted for in what it takes to build and

deploy the network equipment, as well as end-of-life factors. Roughly 80% of the network-related emissions are accounted for when devices are actively deployed and consuming energy. Therefore, improving efficiency of the network represents the biggest gains, he pointed out. That means selecting modern infrastructure that provides high energy efficiency—and powering high-efficiency 5G and fiber networks with renewable energy sources improves the equation even more, Khan added.

Focusing on product life-cycle circularity. As a provider of a range of home internet and telecom services, BT manages a range of devices. Khan said that BT customers

have returned about 1.8 million set-top boxes and in-home hubs, and that BT recycles around 83% of what is returned. In terms of mobile devices, he said that BT has collected close to 200,000 mobile devices through its consumer and enterprise units, which are either recycled or reused. Within its enterprise segment, Khan said that BT is also working with key partners like Cisco to build in end-of-service recycling options for enterprise equipment.

"The objective here is really to reduce what's ending up in landfills," Khan said, adding, "We think there's opportunities through new propositions [and] new servicing models that can help accelerate circularity, both for BT and for our customers."





(Image courtesy of Turkcell)

HOW IS TURKCELL REDUCING NETWORK ENERGY CONSUMPTION?



Mustafa Karakoç
Access Network
Capabilities Director
Turkcell

What are some realistic ways that operators can increase the sustainability of their mobile networks, while reducing operational expenditures related to energy usage? Turkcell Director of Access Network Mustafa Karakoc provided an in-depth view of how the carrier is implementing changes in its network that are reducing its energy use and emissions.

Turkcell has more than 30,000 base stations across Turkey, and those base stations collectively consume around 900 gigawatt-hours (GWh) annually, Karakoc said—roughly the same amount of power

consumption as a mid-sized city. It is also clear, he added, that across 3G, 4G and even 5G, “the power consumption of these technologies are increasing, and complexities are also increasing.”

The company has a stated goal of using 100% renewable energy sources by 2030 and to be carbon-neutral by 2050. Turkcell is focusing on a number of areas in order to combat support its goals of decreasing its carbon dioxide emissions and decreasing operational expenditures related to energy use.

Those include:

- **A massive research and development effort.** Karakoc said that Turkcell is placing a priority on R&D related to improving its operations across a variety of domains. The company has more than 850 R&D projects and more than a thousand researchers focused on sharpening its capabilities, including energy efficiency.

One such project, which took place last year, was Turkcell's A++ project that focused on six different aspects of its network technologies, with numerous sub-studies that delved into details of operations across site equipment, the transport network, core network and various air-conditioning capabilities across the network. The changes that were implemented as a result of that project are saving the company about 63.2 million kilowatt-hours, or the equivalent of about 2,000 sites' energy consumption per year, Karakoc said—which translates to about \$12-15 million dollars in annual savings.

- **Focusing on green sites** by deploying solar panels as complementary power

for base stations, as part of a yearly deployment plan. Karakoc said that Turkcell is using this strategy to reduce its overall grid power consumption and has a “long roadmap” to increase such sites by about 5,000 sites per year.

- **Using solar plant-based energy.** Turkcell has a three-year plan that will culminate in 2025 to have activated 300 megawatts of peak installed capacity, with 54 megawatts of capacity already active. Turkcell plans to eventually have more than half of its power sourced from solar plants. “This is really [a] very important step for us, to go on this journey for the zero-carbon and the renewable energy sources,” said Karakoc. “All these capabilities, that’s very critical for us.”

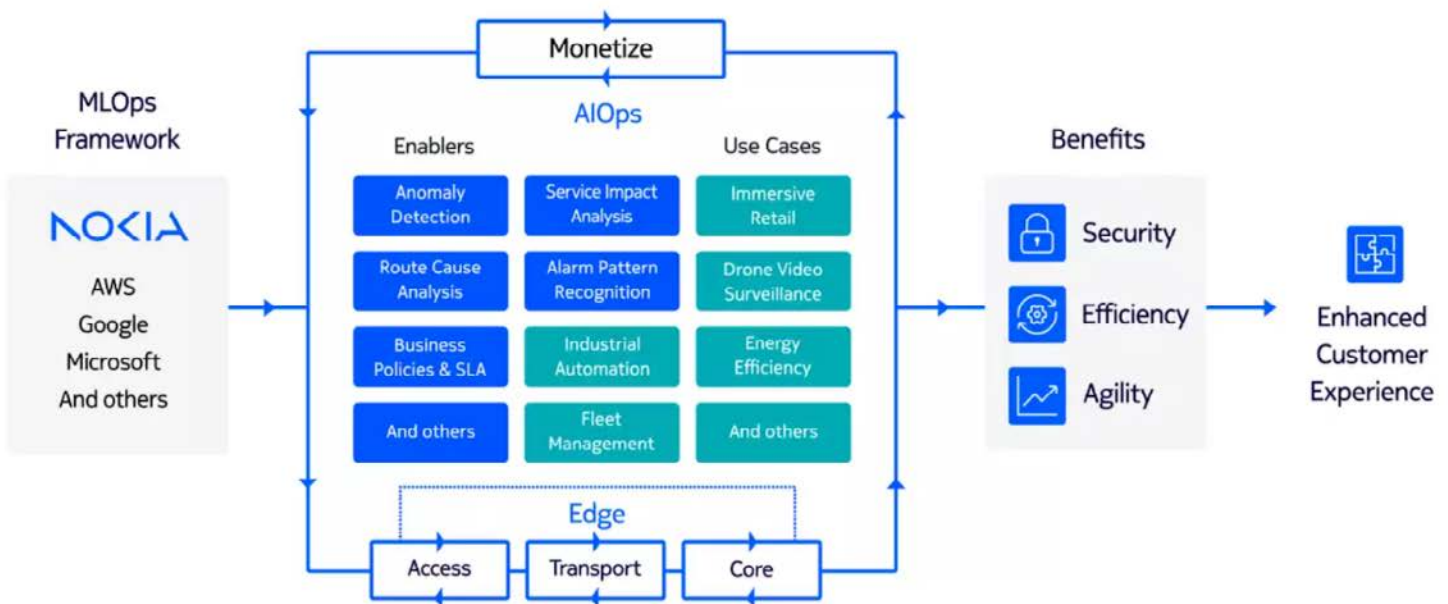
- **Implementing AI-driven energy saving technology.** Turkcell has also been exploring the use of artificial intelligence-enabled energy saving software capabilities within its network, Karakoc said, and has deployed that capability to sites. At night, when traffic is “almost zero”, then the system will deactivate sites, but can also automatically reactive them as daytime

usage resumes, he explained. He said that this is in use in Istanbul, where Turkcell has many base stations and turning some of them down during the night does not result in a loss of coverage. This is helping Turkcell to gain around 10% increased power efficiency, he said.

Turkcell also put together a project called AI-assisted Robust and Resilient Energy Saving, because of the critical need for resiliency in Turkcell's network amid natural disasters. Working with Ericsson, Karakoc said that Turkcell focused on its power supply units and base station utilization, so that during the night, some power supply units are dynamically deactivated based on the number of subscribers being served; it resulted in energy savings of around 2% without changing any hardware, Karakoc said—an important factor when operators seek to reduce power consumption not only across new networks, but legacy infrastructure.

“Step by step, we are going to work for [a] more smarter and greener network, and this is our very important motivation for the features,” said Karakoc.

IN THE MOVE TO AI-ENABLED NETWORK AUTOMATION, AIOPS IS CRITICAL



(Image courtesy of Nokia)

OPERATORS CAN GAIN ENERGY EFFICIENCIES BY USING AI TECHNOLOGY, BUT HAVE TO HOLISTICALLY CONSIDER AI AND AIOPS

While the focus of the Telco Sustainability Forum is obviously around the technology and business strategies operators can use to drive energy efficiency, this is part of a bigger whole. Many emerging tools that help operators reduce power consumption and realize system-level energy efficiencies hinge on the use of artificial intelligence (AI) and closed-loop automation; and any strategy that involves the adoption of AI in pursuit of closed-loop automation should include sustainability targets, it should also be comprehensive and mindful of that bigger picture.

Nokia's Nabil Lahyani Hamidi, head of analytics delivery services and care in the Cloud and Network Services unit, emphasized the importance of an aligned AI technology and operationalization strategy (AIOps) in a conversation with RCR Wireless News. "It's very easy to claim that we have AI, we have [machine learning], bringing it into the picture, but actually most operators or customers who I'm working with...the most tricky aspect is the organizational/cultural shift because that requires a change in terms of processes, in terms of tools and in terms of also the capabilities we have in our organization."

He described three waves that operators will have to navigate in pursuit of network automation:

- **The adoption of business intelligence tools that use data analytics to feed into dashboards and reporting and result in a new type of insight—“You cannot be blind.”**
- **AI models drawing from data lakes enabling different use cases, albeit use cases that perhaps exist in silos.**
- **And, third, shifting from using data insight to facilitate more efficient manual operations to automating those operations.**

“All that requires this AIOps concept in order to operationalize it,” Hamidi said. And, he added, there needs to be an unwavering focus on tying these technological and operational changes to clear business objectives.

Specific to the energy efficiency and sustainability angles, Hamidi noted that energy consumption is between 15% and 30% of operator opex in mature markets, and up to 50% of opex in developing

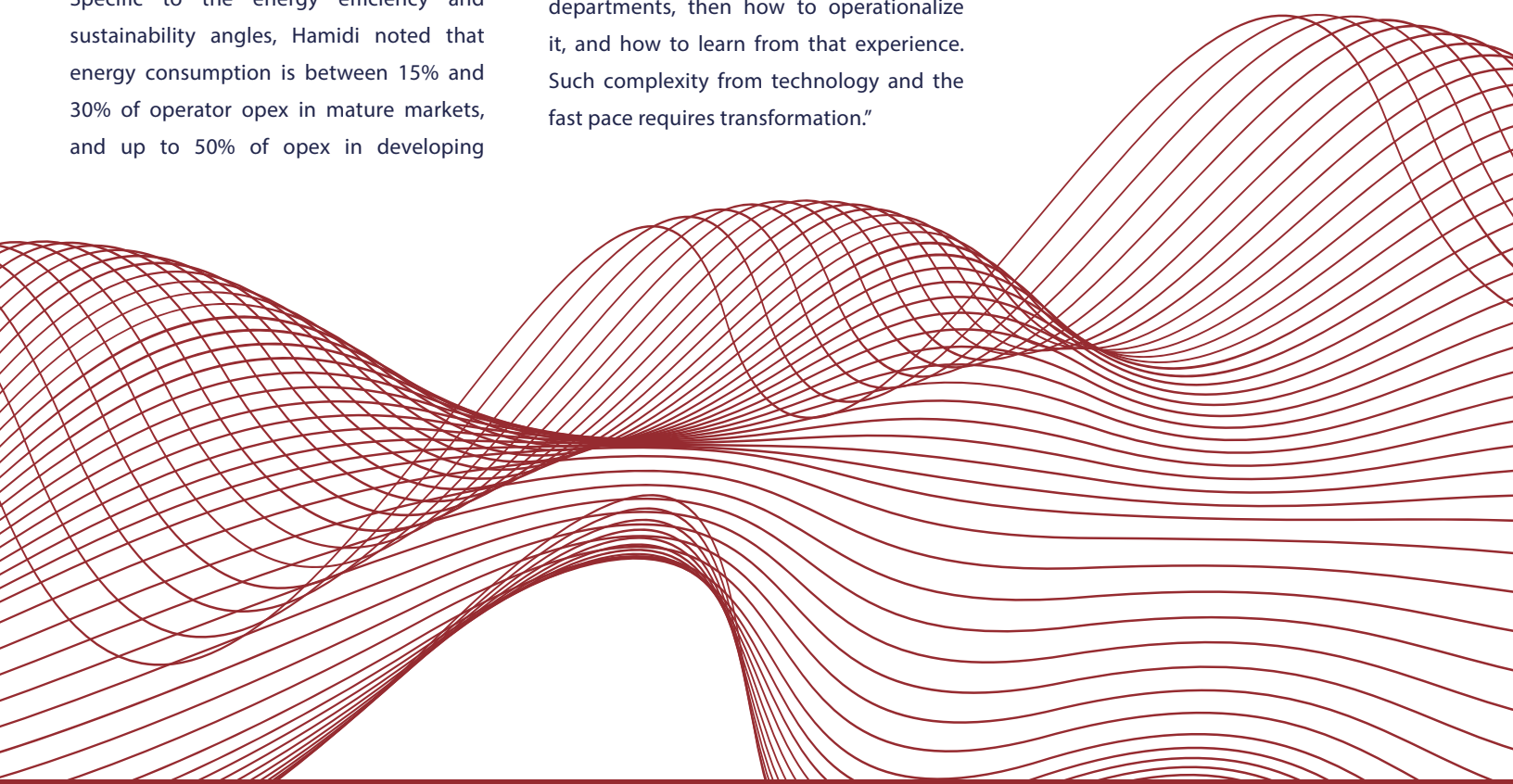
markets. With the proliferation of 5G—which is more energy efficient than 4G on a one-to-one basis—“the reality is different. Due to the high degree of density of 5G networks, without any intervention, it will be really hard to act and bring energy efficiency. It will require an end-to-end approach starting by bringing an AI-driven network design and solutions. And, afterwards, AI-driven equipment control.”

Hamidi also made the point that investments in sustainability do not equate to compromising traditional network performance KPIs. In fact, he said, “It’s one of our differentiators because we do care about network quality. We do care about how people are experiencing or using their services.”

In terms of takeaways, Hamidi emphasized operators need an end-to-end strategy, and they need to understand that AI technology has to be implemented along with an AIOps structure. “We need to have a clear strategy that is aligning different departments, then how to operationalize it, and how to learn from that experience. Such complexity from technology and the fast pace requires transformation.”



Nabil Lahyani Hamidi
Head of Analytics Delivery
Services and Care,
Cloud & Network Services
Nokia



FIVE FACTORS IN THE PRIVATE IOT NETWORK PUSH ON CORPORATE SUSTAINABILITY

A session at Telco Sustainability Forum considered how private networks are a driver for enterprises to realize efficiency and productivity, and reduce their carbon emissions along the way. The panel comprised Amit Kohli, senior solution director and sustainability lead at Orange Business, and Stuart Holyoak, director of DAS and small cell development at CommScope; questions were asked by Yesmean Luk, private networks lead and principal consultant at STL Partners. It was an important and engaging discussion; here are the big five takeaways.

BETTER TECH (AND MORE PRESSURE) MEANS BETTER RESULTS

The first point, in response to a question from Luk at STL Partners about how enterprises are approaching the “whole topic of sustainability”, is that corporate environmentalism is a boardroom issue – which is considered with ever greater, and ever graver, concern. This is forcing IoT-related technologies into the mainstream. Kohli, full of quotes during the session, raised a variation of the IoT adage that ‘you can’t manage what you can’t measure’.

He said: “It’s like this (other) saying, that ‘the unknown now has to be known’. Period. Gone are the [days] of greenwashing.

Things are getting more serious in terms of reporting... [It’s a less] casual outlook [than] in the past.” Holyoak at CommScope said the same: “For sure, [greenwashing] is not acceptable anymore.” Indeed, he noted that RFPs and RFQs across the CommScope desk in 2023 have requested deep granularity about the itemised impact of installing new networking and computing equipment.

More than this, enterprises want to know about the total and dynamic impact of their digital-change projects, he said. “Previously, you put a cursory power [measure] against every piece [of equipment] at the bottom [of an RFP]. [Now you are] asked to design whole buildings and work out... [the] amount of power. You get different scenarios – a train station, stadium, enterprise building... They then roll that back into their solutions – the air conditioning solutions, [say]... It’s very important [and] very, very granular.

He went on: “As an equipment vendor, we are at the sharp end of making sure technology delivers on the ESG promise... All [customers] now... [seek] to define your ESG credentials as a vendor – in terms of the equipment you’re putting into a building. They don’t want equipment that’s going to... destroy the hard work they’ve put in... to reduce energy consumption [with] a power hungry cellular solution.... It is an absolute step-change in the industry’s approach to delivering sustainable technology.”

5G IS A PLATFORM (NOT SOLUTION) FOR SUSTAINABILITY

Luk quizzed the duo about how trendy private LTE and 5G technologies are considered in the context of this heightened corporate pressure and demand for sustainable energy management. “Are you asking if private networks are an enabler for sustainability?,” responded Kohli, before going on to pitch them as “innovation playgrounds” for the whole customer-and-supplier market to plot net-negative energy usage. “It’s like testing out your curry before inviting your neighbours over,” he joked.

He had another quote, on the same theme: “It’s like the French say: ‘We drink our own champagne.’” The point, here, is that his employer, France-based telecoms outfit Orange, has run the rule over its own energy footprint, and deployed IoT sensors and correlated IoT data, and taken its findings to market. “The result has been fantastic, [and] gave us the confidence that this is real [and] possible. We have started to approach our customers... to help them on their ESG journey. So private networks [represent] the best innovation playground anybody could have,” he said.



Yesmean Luk
Principal Consultant
STL Partners

But the question was really about how private networks are considered by enterprises, at this stage; whether as an enabling technology or a solution in their own right. The answer is plain, of course; but the perception is important. Holyoak explained the sales-side thinking, at least: “We want to [sell] a private network to enable a more efficient business – which results in power savings every day.... It’s not about just delivering a private network. It has to [be about the] end-result. And IoT sensors in a building... can turn lights off or shut-down a cellular service [when there’s nobody home]. Which saves power – and requires [a network] of some sort.”

PRIVATE CELLULAR IS JUST A SUB-SECTOR OF GREEN IOT

This last comment, about the IoT apps on top of the network, makes clear how the discussion / journey to more sustainable enterprise operations develops – after a private network (“of some sort”) is installed. Luk asked about “specific examples of applications to drive sustainability”, and

Kohli listed a bunch of traditional-sounding low-power IoT (practically M2M) scenarios: smart buildings, typically involving dynamic HVAC and lighting controls, plus room occupancy and (post-Covid-19) access solutions; old-school M2M-style fleet tracking, also advancing in the era of AI; and industrial IoT for predictive maintenance and remote collaboration.

The thing is, as Luk appeared to acknowledge in her questions, that few of these IoT applications are of the kind of high-end order that most of the 5G marketing promises. This is partly because those use cases – for connecting and orchestrating high-powered vehicles and machinery – are nascent and expensive, and waiting on future 5G (and 6G?) releases. But the point, as well, is that this is all, or mostly, about IoT – that broad technology discipline that has somehow become unloved and unfashionable in 2023.

Luk asked, specifically: how many of these sustainability oriented use cases are predominantly IoT based? Kohli responded: “Eighty percent of the solutions we are looking at are IoT-based; 20 percent



Amit Kohli
Sr. Solution Director and
Sustainability lead – Europe
Orange Business



Stuart Holyoak
Director, DAS & Small Cells Business
Development
CommScope

use a different application landscape.” Again, it comes back to the fundamental requirement to be able to measure, which is the IoT’s raison d’être (the meaning and action is all about AI, or analytics, at least). He said: “You can’t improve unless you measure.... You have to have the data [in the first place]... to understand where and how to optimise... [And] IoT has become very mature... There are a lot of [sensor] options available.”

Speaking later, in discussion about city-wide private and neutral-host networks, Holyoak listed a bunch of smart-city cases, as deployed by CommScope with civic authorities in the UK. “In the UK we have some wide-area metro applications... and you really see... massive benefits – things like refuse management [with IoT sensors for] bin weights [to schedule collections], and bus route optimisation [to schedule public transport]. All sorts of things like that are... about sustainability, and it’s private networks that are delivering that.”

CHOOSING THE RIGHT MODEL HAS SUSTAINABILITY BENEFITS

Holyoak was good on the different connectivity models available to enterprises seeking to drive efficiency and productivity, and to chart and slash energy usage in the process. The calculation, for enterprises, unfolds in three dimensions, he argued; questions and choices around spectrum (public, private, shared; licensed or unlicensed), network (cellular, non-cellular; public, private, hybrid; edge, cloud), and equipment (micro, macro; open, closed). These are all interlinked, clearly, and all hinge on local availability, ultimately.

The discipline, in the end, is to run the calculation about availability of these three functions with a calculation about existing and future enterprise requirements, of course. Which is what makes the sale of private networks – as part of IoT, as part of digital transformation, as part of energy transition – such an involved process. Holyoak said: “It’s all really about how you deploy these networks to improve the business case, and ultimately to reduce power. Because by that, you’ll improve the business case anyway. Right? So that’s the key point.”

In certain large multi-use sites, shared neutral-hose infrastructure makes good green sense. He explained: “Putting in multiple radio head-ends for both private and public is always going to be inefficient from a cost perspective, from a power perspective, from a space perspective.

So you’ve got to really combine those together... [to] improve the business case for both applications, which will only result in more adoption of these services... It’s a no-brainer to reduce your power consumption and be more sustainable.”

Interestingly, as an aside, Luk asked, as well, about how the in-cloud hyperscale model is faring against the more-established on-premise version of private cellular, as commonly employed for hard-nosed Industry 4.0 purposes. Have you seen any interest or demand from enterprises on cloud-based private network solutions? Holyoak responded: “We see a transatlantic split... Europe has tended to focus on non-cloud – not exclusively, but private networks have tended to be private. In the US, with CBRS requiring a connection to a SAS server, you have a greater reliance on the internet anyway.”

He went on: “So it has perhaps been more-accepted [in the US] that some of your infrastructure is in the cloud. But even in Europe, I can think of private networks we have with customers where small cells have been deployed in care homes and hospitals with a centralised core network – so you have shared resources there. It’s very possible that some RAN applications can be centralised and shared as well. It tends to be in a customer cloud at the moment, but there’s no reason it can’t be in a hyperscaler cloud. But we see this split... [even though there are] variants on both sides of the Atlantic.

TELECOMS HAS TO WORK HARDER ON EDUCATION (AND SOLUTIONS)

The final point, which came through in the session, was about how to communicate all of the options, and the intricacies of them, with enterprise customers – and, in turn, about their understanding of the architectural considerations of more sustainable operations. Holyoak said CommScope deferred, in the main, to its service provider partners, ‘priming’ the Industry 4.0 pumps with customers. “We work with a neutral host vendor or operator... That’s who would navigate [that relationship]. [But] I would [also] sell the notion of a low-power solution [to be deployed in the] most efficient way – [to consider] sharing infrastructure, maybe spectrum.”

He passed the question to Kohli, who summed up: “It depends on the customer. Some are ahead of the game, some are nascent. Some are looking at a complete sustainability strategy. Some are looking at quick wins, and some are... just looking to get the regulatory paperwork done. It depends where they are on their journey.” Holyoak rejoined: “We have large corporate entities that are all over private networks... [and we have] smaller businesses using Wi-Fi... [which might find] a Wi-Fi 7 upgrade... delivers 80 percent of their benefits.”

Luk changed the approach, to ask about the challenges to marry private and shared network infrastructure with corporate sustainability efforts, and Kohli noted that enterprises are hard-pressed just to keep

the lights on. He commented: “They lack a lot of information – because they’re busy in their own worlds... [and] their internal priorities are not aligned to the vision. That is the gap on sustainability because... the traditional mindset... takes time to evolve. That’s where the gap is.”

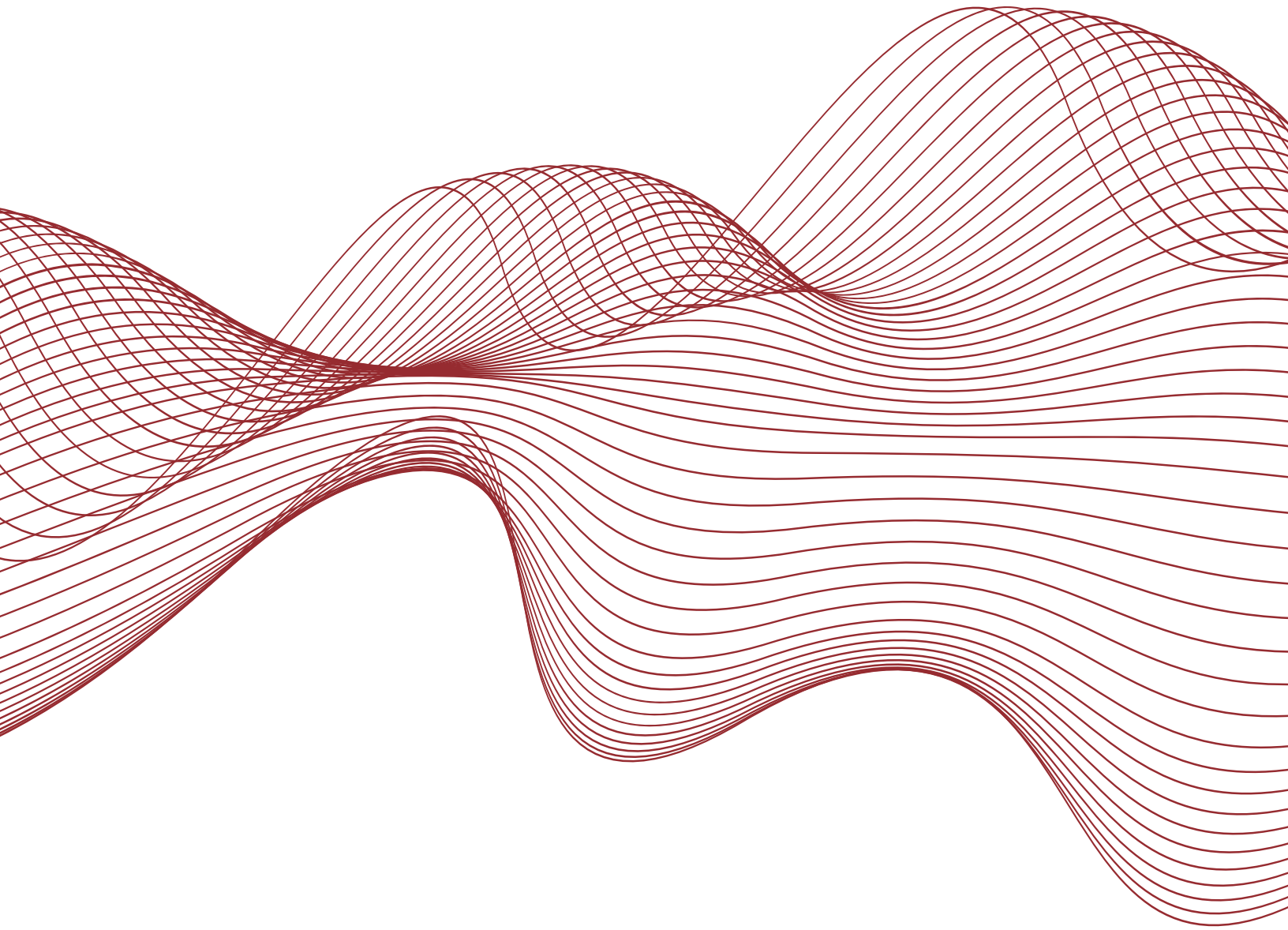
And this was, perhaps, the big takeaway at the end. Holyoak added: “The key challenge at the moment is the knowledge of end-customers. Do they know about private networks? ... It’s all about us getting the message out there... [about] how these applications and solutions are delivered. Actually delivering the solution

is fairly straightforward. But this message has to be delivered so they understand the sustainability implications – on the power consumption in buildings, and getting it right. So that, yes, sustainability is part of the package.”

He added, to qualify the statement, that the onus is on the supplier community to provide the impetus to make private 5G – or private LoRaWAN or private Wi-Fi, or, more importantly, the applications these various networking technologies support – easily understandable and consumable for enterprises. He said: “A lot is about the ecosystem, which is somewhat missing...

at the moment... I can deliver... a private network, no problem. I can make it as efficient as possible. But if the customer doesn’t understand the applications [on top].... [to] be more sustainable, then we’re not going anywhere.”

In other words, and again: the network is not the solution; and the solution, to all of these digital-change obstacles, is... more solutions. “The ecosystem needs to accelerate and catch-up and deliver the applications that can sit on top [of the private network],” said Holyoak.





(Image courtesy of Vodafone)

VODAFONE MARKING TOWARD NET-ZERO IN 2030

Vodafone UK is implementing a number of actions in order to meet its sustainability goals, according to Erik Kling, president and head of IoT Americas at Vodafone Business. He explained that the company has been upgrading its complete fleet in Europe to electric vehicles and is powering its European networks via renewable sources, among other efforts that also include a switch to renewables and network modernization investments.

He said that Vodafone aims to fully use renewable sources to power its networks by 2025, adding that the carrier also aims to eliminate carbon emissions by 2030.

“By 2040, we expect ... complete net-zero across the whole Vodafone value chain, which is also including our suppliers. So we are not looking at ourselves, we are also taking our suppliers with us to join us into sustainability efforts. And I think this is a very important element of Vodafone’s structure as well—not to do it just alone,



Erik Kling
President & Head of IoT Americas
Vodafone Business

because I think it's not just an effort from one company alone or one person alone. It's got to be all of us," the executive said.

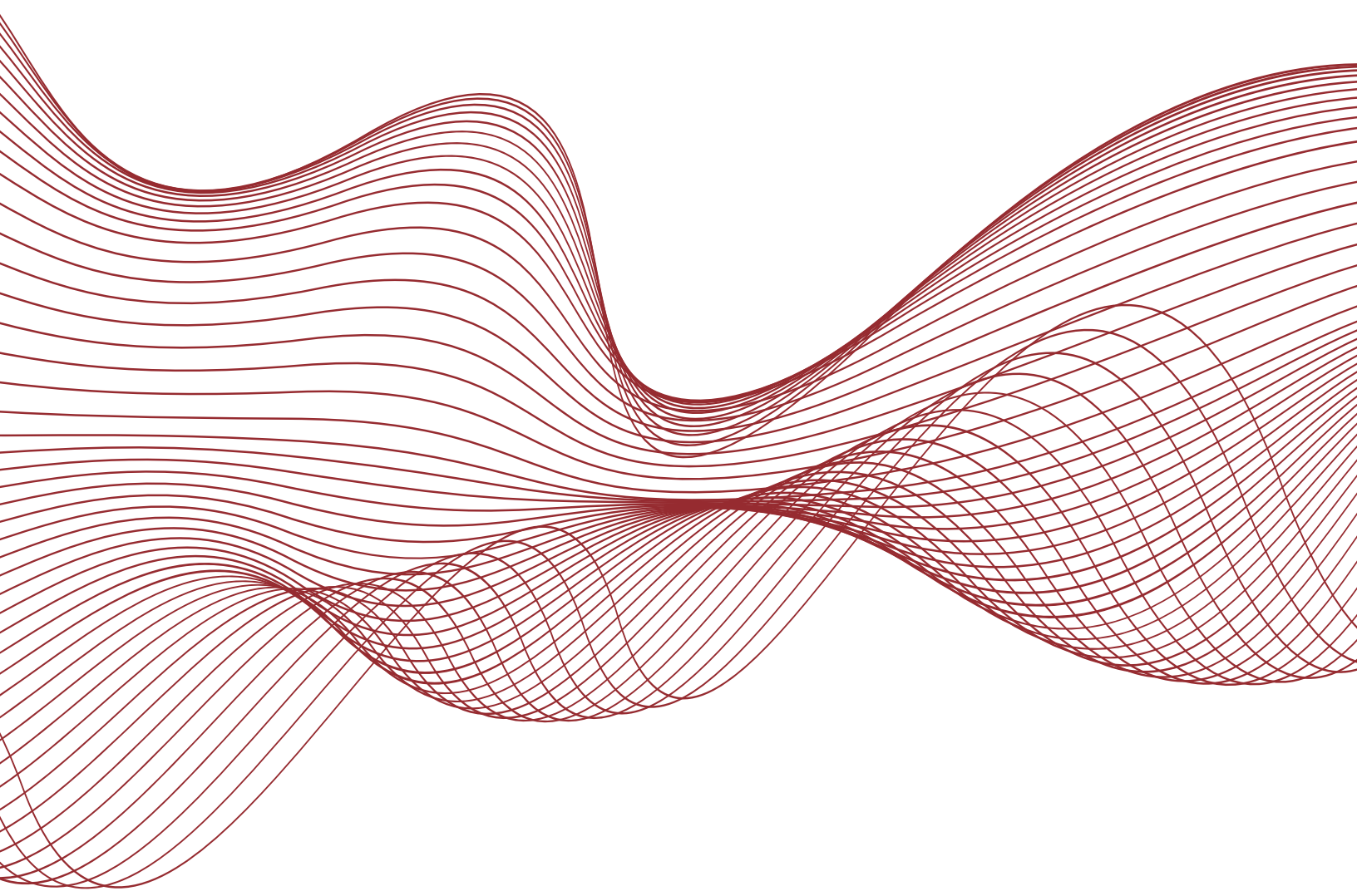
Commenting on network-specific efforts carried out by Vodafone, Kling said that the company's decision to move forward with an infrastructure modernization strategy is also related to efforts to reduce carbon emissions. He said that the company's networks across its entire footprint are currently powered via renewable sources such as wind and solar. Kling also noted that Vodafone has been installing wind turbines to power its telecommunications

networks in Germany and the United Kingdom.

In addition to making its own business more sustainable, Vodafone Business is also enabling other sectors to reduce their overall environmental impact or improve their energy efficiency. One of these initiatives is an urban lighting management project called "Light as you Need" (LayN), in which Vodafone is working with Serveo to promote the efficient management of public lighting by optimizing energy resources and analyzing mobility patterns using data analytics and IoT-type sensors. Vodafone said that the LayN initiative aims to provide light to users based

on their needs, determined by large volumes of anonymized data from the Vodafone network, which analyzes citizen mobility in a very granular way.

Kling said that this initiative results in improved public lighting that allows energy savings of up to 30%. "This is a very simple program but also very effective. And I think with 30% energy savings, the cities really see that it has also an economic impact for the city, because they don't need to spend all this energy to light up the streets while the sun is still up," he added.





(Image courtesy of 123.RF)

A TRULY GREEN FUTURE? GAZING INTO THE CRYSTAL BALL - 6G, AI, ML, DATA SUFFICIENCY...

WEAVER LABS SAID IT IS CURRENTLY WORKING ON A 6G PROJECT FUNDED BY THE U.K. GOVERNMENT WITH UNIVERSITIES AND VENDORS

The telecommunications industry is on a good track to deliver its really ambitious objective of reaching sustainability in the whole sector, according to Maria Lema, Co-founder and CEO of Weaver Labs.

Lema recalled asking chatGPT what is sustainability in telecommunications. “The

answer that I got was practices, strategies and considerations aimed at minimizing environmental impact while maximizing resource efficiency, promoting social responsibility, ensuring long term economic viability, and all of that, while providing connectivity and technology advancement. So it seems like a very, very difficult task, the

one that we have ahead of us, building networks that actually deliver all of this,” Lema said.

Weaver Labs is working to create an open and shared marketplace of connectivity assets, with an extensive focus on security, with the aim of accelerating innovation

by enabling connectivity. Its innovative software layer called Cell-Stack aggregates all the necessary components to build networks and access connectivity on-demand, according to Weaver Labs.

“There is a large number of applications that are demanding a lot from networks. And that means that those charged with the very demanding task of building networks need to invest in new hardware and spectrum. And also, operators need to multiply the revenues at the same time. So we’re building these networks, we need to create a business case out of it. And each operator, at least in the U.K. is required to invest close to £20 billion (\$25 billion) only in equipment. That is a lot. And we ended up over building in some areas, and we end up under building in some other areas. So this is, this is a very big challenge that we have,” Lema said.

“But fortunately, there is a lot being done in the context of 5G already. We all know that the most energy hungry part of the network is the radio access network and it is responsible for almost 80% of the energy consumed there. And the fact that 5G has allowed us to migrate into open

architectures allow us to bring in new technology and the ability to solve some of the biggest issues we had with hardware but also brings new challenges in terms of how can we run this very demanding network component which is a radio access network in commercial off the shelf hardware,” the executive added.

However, Lema noted that companies like Dell, Intel, and Qualcomm are actually looking at how they can provide better frequency alignment, better processing efficiency as well as performance improvement in their chipsets.

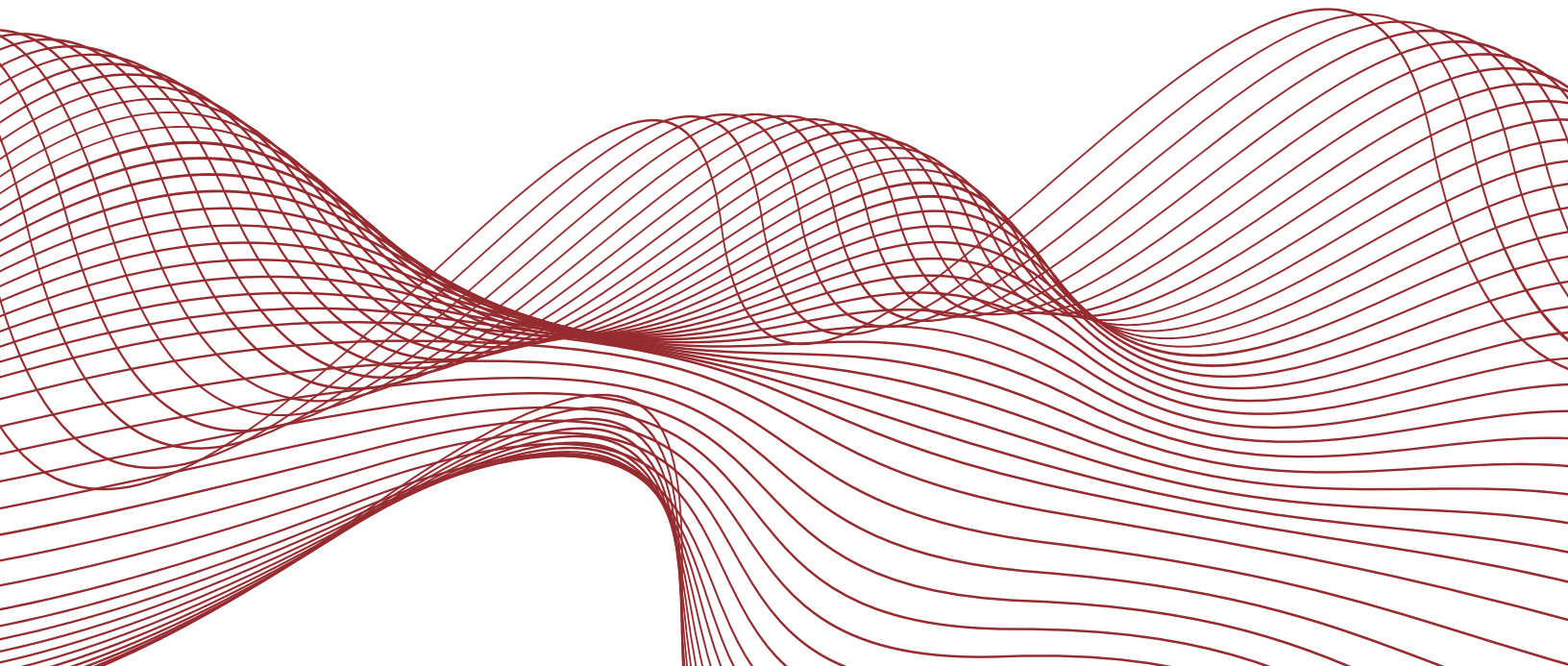
“And then the other element that I believe has opened the door to what is the game changer in 5G has been virtualization and the fact that now, we are no longer bound to be a vertically integrated network,” she said.

Lema also highlighted that some of the technology advancements already seen in the 5G era have been specifically in the context of virtualization but also in the context of Open RAN. “And the fact that all these open interfaces are sharing information with each other, we are able

to put intelligence in the network and that intelligence can be used in order to reduce the power consumption of some of the components such as the radio access network,” said Lema.

Commenting on future 6G systems, Lema said that Weaver Labs is currently working on a 6G project funded by the U.K. government with partners including universities and vendors such as Ericsson, Nokia, Samsung and Parallel Wireless, among others.

“We are creating a blueprint architecture of what 6G is going to be. And the good news is that based on all of these technologies that allow us to be a lot more sustainable in the telecoms industry, I’m much more aware of the efficiency of our network, because it is based on open and disaggregated architectures, which is what allows us to actually share information and be more aware of where we can take action,” Lema said, adding that the main aim would be to build an end-to-end architecture, that that can change based on the use case. “So we build a platform, not a vertically integrated network,” she added.





(Image courtesy of 123.RF)

THE BIG SCOPE 3 CHALLENGE— HOW TO TACKLE INDIRECT EMISSIONS IN THE SUPPLY CHAIN

TELSTRA TALKS MANAGING EMISSIONS FROM ITS SUPPLY CHAIN

Telecoms companies are currently facing challenges when measuring scope 3 emissions, according to Alessandro Gropelli, deputy director general at European Telecoms Association (ETNO) and board member of the Global Enabling Sustainability Initiative (GeSI). Scope 3 emissions are considered to be indirect emissions that are generated as part of a company's supply chain.

“The first difficulty of scope 3 emissions is that you don't have control over the data and the monitoring of those emissions directly inside your company. So the first big thing that comes up is how you collaborate upstream and downstream in your supply chain in order to get the right data. And that's why data gathering and transparency is one of the key issues when it comes to scope 3 emissions,” Gropelli said

during a recent interview with RCR Wireless News.

“Now, our general line when it comes to this challenge is the concept of ‘better together’. We notice that many different actors in the industry have been trying to understand what is the best way to measure [scope 3 emissions]. The suggestion that we give them is to find a harmonized way of looking at that. This is why at GeSi, we decided to work together with the members, but also with the ITU and the GSMA, to try to come up with some joint practical guidance,” he added.

According to Gropelli, a suggestion to telecom operators aiming to measure and reduce scope 3 emissions is to prioritize those areas where most of the emissions are likely to be. “And there are four areas that we have identified in this guidance. One is of course purchased goods, capital goods, fuel and energy and the use of solar products.”

He also highlighted that it’s important that for all those operators that are approaching this task of measuring and reducing scope 3 emissions is to be ready to accept that the first attempt will not be the final one, adding that companies can improve accuracy over time.

Simon Antony, program manager of sustainability and responsible procurement at Australian operator Telstra, said the telco’s target is to reduce absolute scopes 1, 2 and 3 emissions by at least 50% by 2030. “The bulk of our Scope 3 emissions relate to our supply chain. And that’s one of the reasons why our scope 3 program sits within our procurement function. And so my job on a daily basis is to work with

our procurement team to help influence the way that our 30,000 employees interact with our 5,000 suppliers, including some of the world’s largest organizations,” Antony said.

The Telstra executive said that telco measures its emissions per individual supplier. “The best approach to measure supplier emissions really depends on the individual supplier. Measuring supply chain emissions can be at three different levels. So it can be at the industry level, it can be then at the supplier level or at the product level. And by far, the most detailed and specific approach is at that product level. But we know this is incredibly rich and helpful data. But at the same time, this approach is not very efficient, it is difficult to scale. It is very resource intensive and requires specialist skills,” he said.

Commenting on the actions implemented by Telstra to reduce scope 3 emissions, Antony said Telstra is currently working with its suppliers to tackle this task.

“This requires us to really understand where our suppliers are in their own decarbonization journey. We have suppliers that were very mature and we are working with them to understand how can reduce these emissions. We also have suppliers that were significantly less mature, and the conversation was around about how can we help and educate them in their business to measure and reduce emissions,” he said.



Miran Gilmore
Senior Consultant
STL Partners



Alessandro Gropelli
Director General, ETNO and
Board Member
GeSI



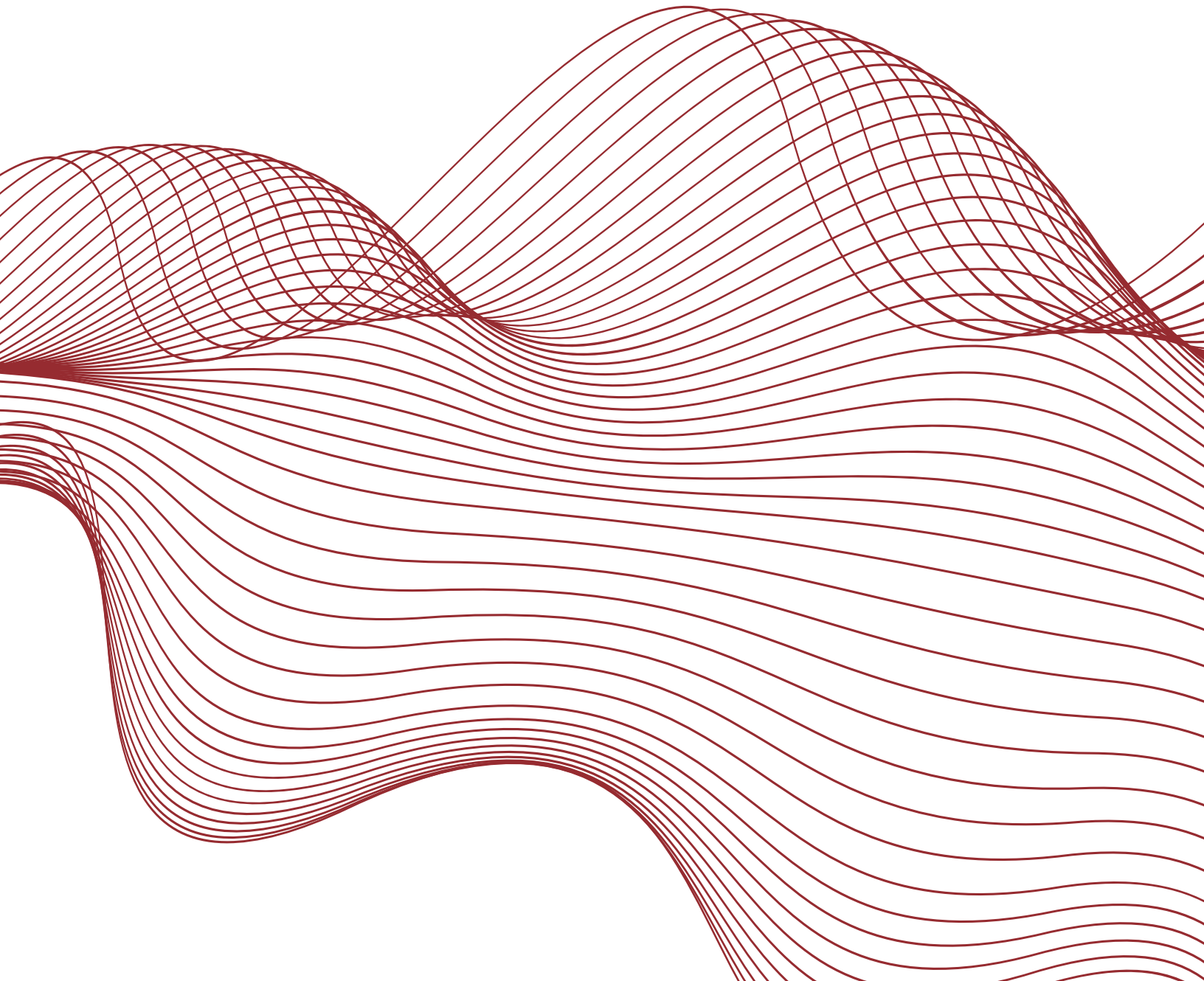
Simon Antony
Program Manager,
Sustainability and Responsible
Procurement
Telstra

CONCLUSION

The telecoms industry has to both offer accountability and innovation in its own operations as well as answers for other sectors who ultimately depend on telecom in order to reach their own ESG targets in an intelligent manner. This is an enormous challenge, but one that the industry is

attempting to address, that balances the needs of the present and the future. At WRC 2023, there is a “Museum of the Future” set up that imagines what the world might look like through 2071. ITU Secretary-General Doreen Bogdan-Martin referenced that museum in her opening remarks at WRC. She said:

“Reimagining the future, as the future does, begins with opening to new possibilities to shape today’s world for a better tomorrow...What we do next, what we do together—will matter for generations to come.”



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