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INTELLIGENCE ON ALL THINGS WIRELESS

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TELCO AI FORUM

KEY FINDINGS REPORT

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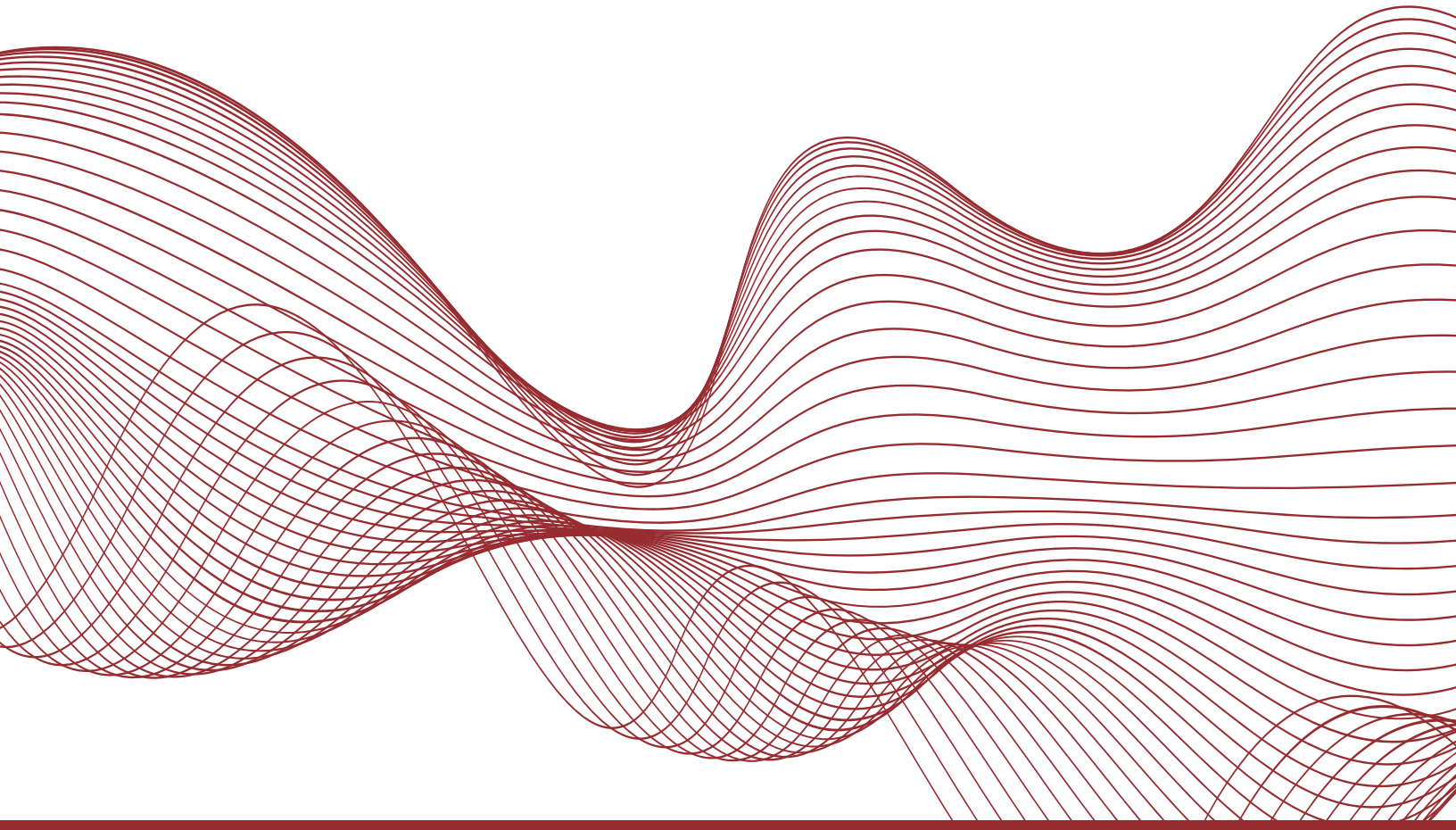
INTRODUCTION

Artificial intelligence (AI) is all the rage—billions are being spent by enterprises of all stripes in an effort to leverage AI, both more traditional and generative (gen AI), to fully automate repetitive manual processes and augment human intelligence to achieve new levels of productivity. While it's still early in what looks to be a long cycle of investment and innovation, the telecoms industry is also seemingly all-in on AI. To fully understand the opportunities (and challenges) that will impact adoption, *RCR Wireless News* convened a range of industry experts for our inaugural Telco AI Forum.

Throughout the conversations, which are covered in detail in these pages, there were a number of recurring themes that will guide the adoption and, likely, success or failure, of telco AI-enabled outcomes. First things first, any AI strategy requires a strong data strategy--garbage in, garbage out as it were. This means operators need to break down data silos and modernize underlying data platforms before any AI strategy can progress in a meaningful, comprehensive manner. With sound data and AI strategies in place, there's also a significant data center modernization investment cycle that needs to happen. AI workloads at scale will require new and more servers, new and more CPUs and GPUs, and new interconnect fabrics.

Beyond all of the technological work that needs to happen for operators to get AI right, there's a perhaps more difficult transformation that needs to happen within operator organizations. Data often exists in silos because the organization itself exists in silos. And if you think of the long-term vision, a successful telco AI strategy will result in a very different way of working—reskilling and upskilling are already taking place, so expect that to continue. But operators will also need to onboard new, expensive talent.

The Telco AI Forum was supported by our partners at AMD, Blue Planet, Dell Technologies, Keysight Technologies, Kore Wireless, NVIDIA, Red Hat, Spirent, Viavi Solutions and VMware by Broadcom. Look out for expert commentary from leaders at those firms, as well as input from operators, including e&, Orange, Proximus and Three UK on lessons learned from doing this transformational work.



WITH THE RISE OF AI, THE TELECOMS ECOSYSTEM IS EXPANDING (EVEN MORE)

ANTONIETTA MASTROIANNI
Chief Digital and IT Officer,
Proximus

It's still early days for advanced AI and gen AI with the telecoms set, but the big idea is that customer-facing and internal automation, enabled by AI, could (hopefully) fundamentally change the value proposition operators can put into the market. And that's market in the sense that new products and services would help expand addressable market specifically within the enterprise space, and potentially convince financial markets that AI-powered operators are a going concern rather than a safe dividend with flat growth prospects. But before any of that happens, a lot of other things need to happen and, given the scale and complexity, doing those things will require an even bigger ecosystem than already services the sector.

The rise of gen AI comes at a time when communications service providers were already going through major technological and operating model overhauls. The transition to multi-cloud network operations environments, and the reskilling needed to manage the new pace of change that cloud necessitates, and the move towards hardware/software disaggregation in the radio access network (RAN) were already heavy lifts. And now AI.

Some key trend lines that speak to the expanding ecosystem operators need around them to get AI right are the changing nature of customer interaction, the organizational changes needed for humans to work effectively alongside AI-enabled solutions to boost productivity, on-device AI setting the stage for a sort of hybrid processing paradigm, a potential network re-architecture that considers where compute is (or needs to be) in order to support AI use cases and, underlying it all, the people and skills needed to make it all work.

Blue Planet Vice President of Products, Alliances and Architectures Gabriele Di Piazza, formerly of Google Cloud and VMware, rightly called out that new players are becoming increasingly relevant to telecoms--the hyperscalers with the money to stand up GPU clusters at global scale and the companies that develop large language models (LLMs), for instance. There will need to be a good bit of ecosystem-level dialogue to "try to understand what can be done to tune an LLM specific for the telco industry," he said. And he likened the necessary shift in operating model to the advent of DevOps alongside cloud-native--which is still far from complete for operators. "I think the same dynamic is at play right now in terms of management of AI, in terms of supervision, operations, and so I think it will be a big skills transformation happening as well."

Looking more narrowly at the RAN, Keysight Technologies' Balaji Raghothaman said gen AI for customer care type applications is fairly well established but, "When it comes to the network itself, it's very much a work in progress." AI can improve processes like network planning, traffic shaping, mobility management, etc… "But I think the challenge and focus for me is really on energy efficiency because, as we blow up our capacity expectations, we are having to add…more and more antennas to our radios and then blast at higher power."

The radio, he said, is the "ultimate bottleneck" in the network and requires the majority of compute and the energy needed for that compute. "The radio is where the action is. There are laws of physics-types of limits that have to be conquered and AI can play an important role." From an ecosystem perspective, Raghothaman said early attempts leaned toward the proprietary, black box end of the spectrum whereas the movement now is towards collaborative, multi-vendor implementations and emerging standardization.

"This is really opening up the space," he said, "but also leading into new and interesting areas of how different vendors collaborate and exchange models, but still keep their innovative edge to themselves. This is going to be the emerging big area of…struggle as we accept AI into this wireless network space."

Expanding from the network out to the actual end user, KORE Wireless Vice President of Engineering Jorrit Kronjee looked at the rise of powerful chipsets that can run multi-billion parameter LLMs on-device, meaning no edge or central cloud is needed to deliver an AI-enabled outcome to a user. Thinking about that opportunity, he said, "I think when we really start re-imagining what will it look like with AI, we may come up with a whole new suite of products that can really benefit the customer in terms of reliability and always-on…Next to that, I think there are more and more devices that are coming into the market that can run AI models locally…which will open up a whole new set of use cases for customers."

GABRIELE DI PIAZZA
Vice President of Products, Alliances and Architectures,
Blue Planet

BALAJI RAGHOTHAMAN
Chief Technologist, 6G,
Keysight Technologies

Back to the earlier conversation around where compute should go in a network based on the need to run various AI workloads, Kronjee said, "We can now start running AI at the edge," meaning the far, far edge--the device. "You can have these models make decisions locally which would reduce your latency, so you can make much quicker decisions compared to having an AI model run in the cloud somewhere." Another big piece here is the transport cost (or lack thereof) associated with a roundtrip from a device to run an AI workload vs. running that workload right there on the device.

More on the architectural point, Di Piazza said, "If you start thinking both of moving AI to the edge or even the data center, I think this actually starts to change the compute architecture that has existed for the last 30 years." With CPU-centric approaches giving way to more distributed offloading and acceleration, "I think we'll see a major change in the next maybe two to five years." But, he said, "Not necessarily everything means changing the location of compute. In fact, it's important to understand the application profile to be delivered." He noted that while AR/VR could well be served from central data centers and still meet latency requirements, another maybe sleeper consideration is data residency requirements. Regardless, "Compute will be much more distributed."

Thinking beyond 5G and onto 6G, Raghothaman highlighted the opportunity around AI-enabled network digital twins. He said a country-scale digital twin of a network would be a "vital" tool for experimentation. He described a digital replica "where they can run simulations of new scenarios overnight or in a day where that would have literally taken a year to run in the past…I think is going to be very interesting."

From the operator perspective, Antonietta Mastroianna, chief digital and IT officer for Belgian service provider Proximus, focused her comments on how the move from "isolated use cases" using AI to broad deployment is "an essential shift" that "is changing completely the organizing model…We have moved from improvements here and there into completely revolutionizing the operating model, the skills of the people, the landscape not only in terms of technologies but also…how the organization is designed. It's unbelievable the shift that is happening…The opportunity is immense."

JORRIT KRONJEE
Vice President of Engineering,
KORE Wireless

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TWO FACTORS HINDERING TELCO AI ADOPTION AS OPERATORS WORK TO BUILD THE BUSINESS CASE

The telecoms industry is anxious to figure out artificial intelligence, particularly generative AI, and how it can be applied to their businesses and either create new revenues or reduce costs. The will is there, but the way to do it with clear return on investment isn't quite as clear at this early juncture.

Reece Hayden, principal analyst with ABI Research, is part of ABI's strategic technologies team and leads on artificial intelligence and machine learning. "From a telco perspective, the challenges around AI implementation are enormous," he said. Why? Because telecom providers are operationally complex with huge data silos, huge footprints, lots of legacy infrastructure and systems and don't necessarily have the talent or capital to organize and integrate all of those things into a coherent and holistic foundation for AI, with an available and consistent data set on which to train foundational models or otherwise fine-tune AI for specific use cases. On the flip side, however, there are plenty of potential opportunities for telcos to apply AI, Hayden said. Some of the use cases that ABI has identified include customer or internal-facing chatbots, workforce scheduling, summarization of internal documentation, regulatory monitoring and summarization, and fraud detection, eventually escalating to automated capacity planning and automated customer ticket handling.

So what are the barriers to telco AI adoption? He identified two major factors: Is the technology ready for the way the telco wants to use it? And is the telco ready for the use of AI? In many cases, at this point, neither one of those is true.

REECE HAYDEN
Principal Analyst,
ABI Research

"Generative AI is not there yet — it's not ready for high-risk use cases," Hayden said. He went on to add: "A lot of the conversations I have within the industry at the moment are around generative AI, generative AI — how can we implement it, how can we make money from it, how can we improve upon it? But when you take a step back and recognize that generative AI is one of many different options in terms of deployment, I think it's important to recognize that it's not always right. And generative AI has a huge cost profile, it's a probabilistic model, so it lacks a fair degree of accuracy. It has limited reliability in certain use cases. The data availability [required] to train generative AI models is much higher. Time to value is much longer. When we take all of those in and look at the available telco AI use cases, we realize that generative AI is not always the best fit. And it's not always going to deliver that great ROI that you're looking for," he concluded.

Hayden pointed out that if, say, generative AI can provide 80% accuracy, telcos should expect it to fail 20% of the time at an assigned task. So while there are uses for gen AI, building an AI strategy means matching both the business' readiness, the technology's readiness and the telco's willingness to take on risk when any given AI model gets things wrong.

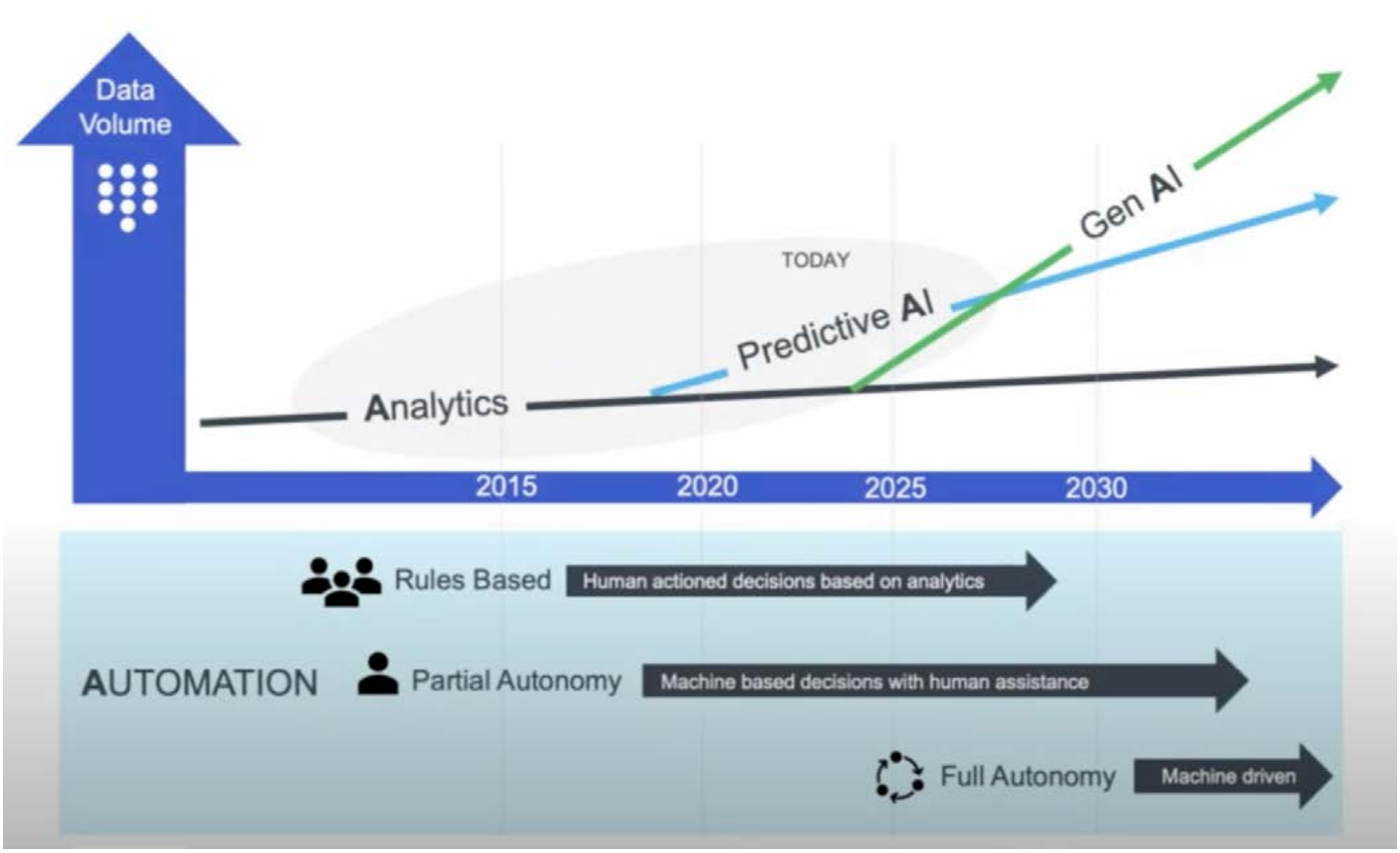
"We're still in a very early phase of adoption, where there are high ROI use cases such as customer chatbots, which have been implemented effectively," Hayden said. "Those use cases are, yes, impactful, but they still have a huge element of human interaction." Most AI use cases at the moment are more about augmenting human employees and making them more effective, and thereby reducing costs, than about creating new value or revenue. "When you add human oversight into that generative AI model, it can become a very powerful tool," Hayden said.

A SOUND AI STRATEGY REQUIRES A SOUND DATA STRATEGY

The second factor hindering telco AI adoption is the telco's readiness — and that primarily means data readiness. "One key area that implementation will hinge on within telcos and other enterprise verticals is definitely the data strategy, and it's realistically the foundation for AI/ML from the base up," said Hayden. "You're only going to get as good a model, and as good an ROI and outcome, as the data you train the models on, fine-tune the models on."

Telcos face especially daunting data challenges around data reliability, availability and regulation, he added: They have a massive amount of data coming in, often unstructured and sometimes suspect; data silos across their different business units; and shifting data regulations and required regionalization and privacy laws, which can translate to data mismatches across the telco's business. Hayden pointed to five data areas within any business, but particularly telcos, which need to be addressed in order to put in place a successful AI strategy: OSS/BSS data; public and synthetic data (such as data used for testing); data standardization and sharing; centralized data governance and anonymous data.

While the challenges associated with getting telco data in order and using it as a basis for AI are substantial, Hayden remained optimistic that they will ultimately be worth it. But, he also added that a successful AI strategy won't look at gen AI alone. "AI implementation is not just generative AI, and it can't be about generative AI. It's about blending different AI models depending on a range of factors," he said.



(Image courtesy of Spirent Communications.)

FOUR WAYS TELCO AI WILL EVOLVE OVER THE NEXT DECADE

SPIRENT COMMUNICATIONS LOOKS AT THE FUTURE OF TELCO AI ACROSS THE RAN, DEVICES, DATA CENTERS AND OPERATING MODELS

In its position as a provider of test, measurement and service assurance solutions to operators worldwide, Spirent Communications has a unique view on where operators are directing investments and on what time scales. As it relates to AI, Spirent's Stephen Douglas, head of market strategy, sees a present focus on AI as moving "from a tactical point solution to strategic implementation across all our business domains and the lifecycle which could unlock tremendous value."

Focusing his commentary on the use of AI in the network, Douglas said that "incredible benefits could be achieved from driving new efficiencies in capital spending to optimize the peaks and the troughs, capital intensity periods, to delighting customers with new experiences and services, while creating those elusive new revenue streams."

STEPHEN DOUGLAS
Head of Market Strategy,
Spirent Communications

Generally speaking, Douglas said, operators will implement AI across customer service, marketing and sales, the network, IT and support; the goals here, also generally speaking, are to reduce operational and capital costs, enhance customer experience and increase revenue. In terms of specific high-priority applications/use cases, Douglas delineated:

- Network management tasks like network design, traffic prediction, capacity planning and radio map generation.
- Operations and management, including network optimization, predictive maintenance, fault prediction, anomaly detection and root cause analysis.
- For security, AI could assist with threat prediction, fraud detection and resiliency planning.
- In the 5G RAN, AI focuses will be around energy optimization, spectral efficiency, traffic steering, load balancing and mobility optimization.
- And for user equipment, think about AI and machine learning in the 5G air interface, and on-device gen AI.

THE THREE As OF TELCO AI—ANALYTICS, AUTOMATION AND AI

"I think a key thing is really that this direction of travel," Douglas said, " which is going to outline my predictions, it's being set by ongoing advancements unlocked really through three interweaving functions over time: you have analytics, you have automation, and of course you have AI, both predictive and generative… Analytics and insights have been the network mainstay for…management for many years. And with the growth in data volume and our growing ability to actually harvest and access that data, both in real-real time and also historically, has allowed us to unlock the potential initially of predictive AI, but now also for generative AI."

Specific to gen AI, Douglas highlighted its role in helping operators with content creation like troubleshooting guides, incident reports, network topologies and coverage maps, configuration scripts and test traffic generation for adversarial scenarios; querying documentation for field and support teams, and consulting historical data for similar issues and resolutions; and supporting predictive models for anomaly detection, augmenting data sets and preventing overfitting.

He gave the example of AT&T's internal Ask AT&T gen AI tool being used by engineers for document interrogation and faster, more precise root cause analysis. "Traditionally root cause analysis has been a very manual and human-intensive process," Douglas said, "sort of looking for a needle in a haystack of data and within lots and lots of network-oriented documents and guides. The use of generative AI is not only helping the AT&T teams act and resolve issues quicker. It's actually freeing up engineering teams' time…It's also aiding them to move to become a more proactive organization rather than reactive. So these are substantial benefits that are already being demonstrated today."

Some other factors Douglas called out that serve as a backdrop to his predictions are an explosion in data center capex, reckoned by Dell'Oro Group to go from $260 billion in 2023 to more than $500 billion 2027. The LLMs that support gen AI will expand from billions of parameters to more than 1 trillion parameters. GPU cluster sizes will commensurately grow which will impact the data center interconnect fabrics needed to support lossless communications between GPUs and GPU clusters.

More on that data/data center point, Douglas said, "You simply can't have AI without data…And it's the data center which is becoming the evolving workhorse for AI…This is requiring a complete re-architecting of the physical design and the network fabric of the data centers today."

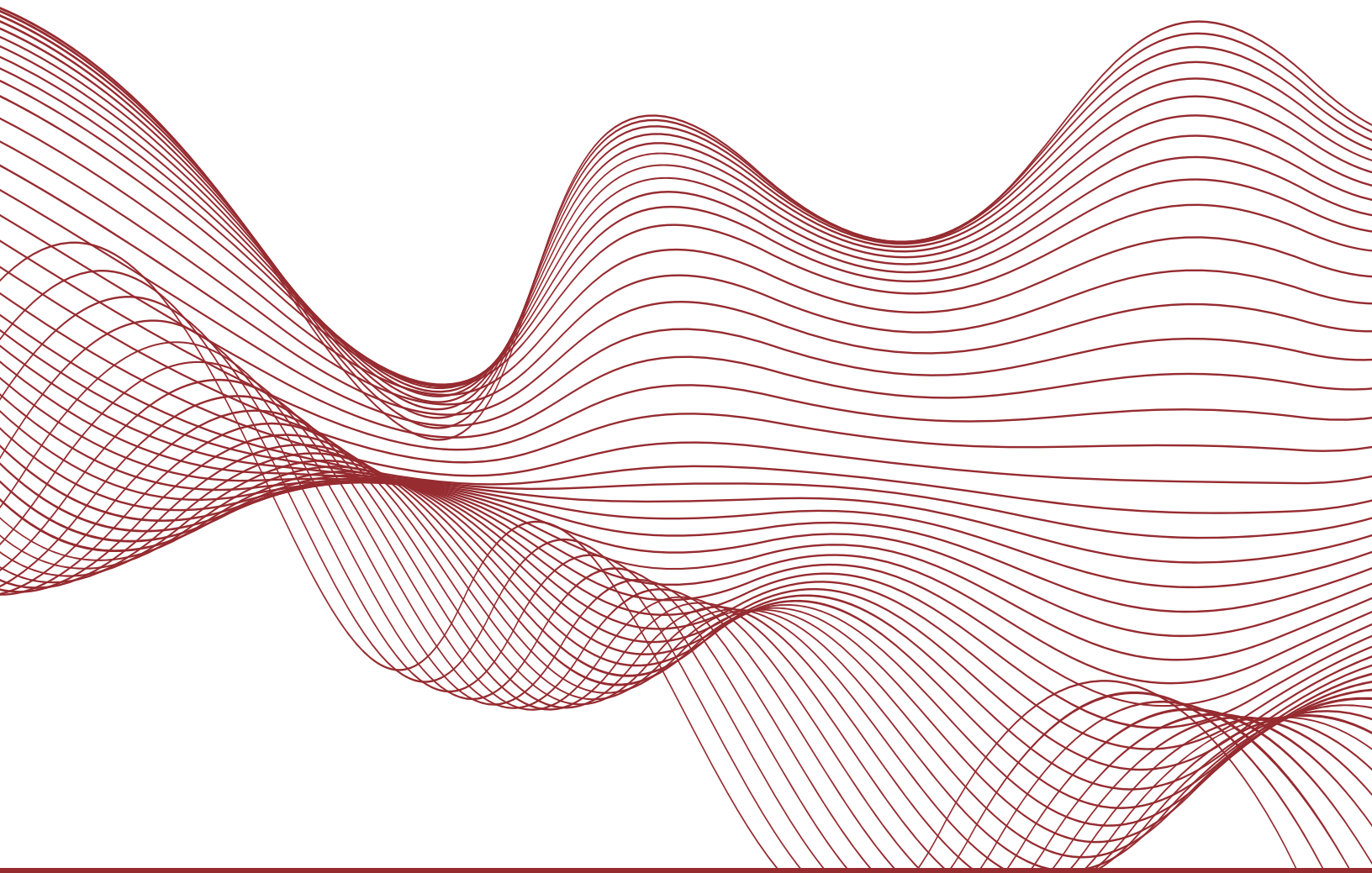
FOR OPERATORS EYEING TELCO AI, "THE TIME FOR TALKING IS PAST"

Now for the predictions. Douglas sees AI in the RAN being marked by continued advancements in AI/ML-based energy efficiency then, further out, gen AI supporting semantic communications, reducing the need to transmit raw data in full. For devices, we'll see an expansion of on-device gen AI across modalities supported by power efficient neural processing units (NPUs), then longer-term the emergence of a hybrid AI architecture bringing together on-device and cloud/edge processing. In the data center, Douglas sees growing use of Ethernet alongside InfiniBand for backend AI networking, followed by mass adoption of Ultra Ethernet Transport. And from an operating perspective, increasing propagation of automation frameworks and the use of AIOps will give way to full autonomy enabled by network digital twins for reinforcement learning and AI transparency.

Expanding on some of those predictions, Douglas said semantic communications could "revolutionize" telecoms "by reducing the need to transmit raw data in full. Imagine a world where you only needed to send 5% of a message and yet 100% could be accurately regenerated at the other end. This could be transformational."

On full autonomy and transparency, he said, "I believe you may see full autonomy but it's not going to be in the dark. We humans struggle with black boxes and AI needs to be explainable. Hence I predict full autonomy is going to be governed by network digital twins used to continuously test, to reinforce with learning and, most importantly, to provide AI transparency and understandability."

Final thoughts from Douglas: "I don't think telco should stop because other industries are moving so fast in this regard. I think the time for talking is past. We need to just move forward with it because the actual benefits are substantial…It would be, I think, detrimental to telco to wait until it's got the most holistic, perfect sort of end-to-end architecture in place for it."




(Image courtesy of 123.RF)

IMPLEMENTING TELCO AI: FIVE PRIMARY CHALLENGES

Artificial intelligence isn't entirely new—although its manifestation as generative AI certainly is—and the telecom industry has been pursuing it in one way or another for some time. So why is it difficult to fully realize AI for telecommunications providers' businesses? Industry experts offered up a number of perspectives on this, particularly through the lens of challenges for implementing telco AI across operators' businesses.

Here are five of the main challenges that they identified for implementing telco AI.

-The scale and pace of data generation. From the carrier perspective, said Ankush Saikia, senior manager of network strategy and architecture at Three UK, the scale and speed of incoming data is a massive hurdle. "Three is a very data-driven network. So although we are the fourth largest operator in the country, we almost carry 30% of the nation's data. Which means we have the challenge of the handling of the data—because at the end of the day, to generate any type of analytics ... to improve the customer experience in the network, you need to digest the metadata, and many carrier networks get generating terabytes of metadata," he explained. "Handling of the data at scale and at pace is a major challenge," Saikia continued, adding that people in operations or engineering need to see the data in near-real-time rather than be alerted when customers start reporting problems. One of the key challenges there, he said, is getting "good, quality data" so that data scientists don't have to spend most of their time cleansing the data in order for it to be useful.

-The cost associated with processing large amounts of data to implement AI. "When you talk about handling that kind of data at scale, that brings the second challenge, around cost," Saikia said. "As you handle more and more data, you're incorporating more and more cost. And telecom, like many other industries, is very much cost-sensitive at the moment. So building the business case [for AI] is a challenge—so we need to show efficiency in handling this kind of data and bring value out of that."

-Lack of clarity on AI's business value. Fatih Nar, distinguished architect at Red Hat, reminded the audience that ultimately, telcos are businesses with the goal of making money, either via generating new revenues or lowering costs. When it comes to AI implementation, this foundational truth has to shape implementation. "Everything has to tie into, what are you going to do with AI in the name of business? There has to be a really solid, clear definition of it and what we are seeing in the market is, we are lacking a lot of it yet," he said. While organizations are jumping straight to wanting to use AI, they first have to answer the questions of why, and how it ties into value for the business, as well as the how of implementation in terms of data governance, ethics, which model to use and what data will feed into it, for what business case, and put time and effort into calculating the total cost of ownerships as well as potential return on investment. There is a great deal of engineering that goes into the use of AI, but it has to be tightly tied to a telco's business strategy. "Most of the AI projects are failing because of these: no clear use case, no clear ownership, no clear dependencies and needs, and no clear success story," he said.

-The human and cultural element of telecom companies. "Telecom companies are traditionally made of up of people who are network experts. They are not developers. They are not debuggers. So you don't find that kind of skill set in-house readily to bring about an AI kind of capability," said Saikia, adding that it is therefore important for telcos to strike partnerships with AI tech companies.Three UK, he noted, took this approach and struck a partnership with Microsoft in 2023 to leverage the tech company's Azure Operator Insights to implement AIOps and collect, organize, and process its large datasets. Jorri Kronjee of KORE Wireless, pointed out that there are various skill sets that are needed in the stages of AI implementation. "Building a model and rolling it out is one thing, but verifying its performance and making sure that it does what you intend it to, is another skill altogether," he added —and for telecom companies, data experts who understand both AI and telecom are particularly difficult to find.

-The state of telco data. Many telcos are finding that their data, while plentiful, isn't in a condition that can easily and quickly utilize AI, especially generative AI. That means there is a fairly high (and expensive) effort that telcos need to make in order to put together the hardware and storage necessary to support AI, and make sure their data is in a format that is usable by the desired AI model in order to train or fine-tune it. "A lot of telcos may have a lot of data, but if you don't have it labeled, if you don't have it formatted in a way that you can feed it into a model, it is no use," said Kronjee. "And that's also what all of your expenses will go into, in creating those models."

Stephen Douglas of Spirent Communications summed it up neatly. "To be honest, we've had AI/machine learning in telco for years," said Douglas, explaining that AI/ML has been part of security gateways and firewalls for a decade and in recent years, in radios to improve energy efficiency. "It's not absolutely new, and there have been demonstrable and proven benefits from it," he said. The difference and new challenge, Douglas continued, is that now the industry wants to scale out its use of AI to realize even bigger benefits. In the midst of telecom's journey through 5G and toward more disaggregated, software-based cloud-native networks, AI is seen as part of the industry's ambition to one day achieve fully automated networks—a step that could be taken today toward such a future, even if zero-touch is actually many years away.

ANKUSH SAIKIA
Senior Manager, Network Strategy,
Three UK

FATIH E. NAR
Distinguished Architect,
Red Hat

Douglas said: "We're stuck in this sort of trap a little bit at the moment, because we'd like to get to Point B faster than we realistically are able to get there," because of all the factors that were already mentioned—and because in Spirent's experience, he added, telcos often start out looking to use AI and realizing that they actually need automation instead. But overall, Douglas said, "I think that it really goes does go back to, what is the business value you are trying to achieve, and what are the KPIs I need to get to that business case?"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(Image courtesy of NVIDIA.)

NVIDIA ON HOW THE EMERGING GEN AI ECOSYSTEM FOR TELCOS IS TAKING SHAPE

An expanded AI ecosystem is rapidly emerging and shifting, with the goal of making it easier for telecommunications companies to consume and leverage generative AI. Lilac Ilan, Nvidia's global head of business development for the telecom industry, described the various players in that ecosystem and their roles.

The foundation of the emerging AI ecosystem is data providers, Ilan said; hyperscalers also play an important role, because they are where telcos can find both hardware and software solutions to assist with their generative AI endeavors; as do original equipment manufacturers (OEMs) and original design manufacturers (ODMs) such as Dell Technologies, Lenovo and HPE. "Now, you have a little bit of a new player in that ecosystem, which is the model suppliers, the OpenAI, the Anthropic, and Meta with Llama—that ecosystem has come in. You have your data management layer, so now you have the companies like Snowflake and Databricks. … And now on top of it, there is a full, flourishing ecosystem of application providers or application builders that are using generative AI for the telco, and developing generative AI applications for the telco space.

LILAC ILAN
Global Head of Business Development, Telco AI Powered Operations,
NVIDIA

She laid out two examples of how that AI ecosystem is working. One part of the AI ecosystem is working to embed generative AI in their native applications for telecom, so that telcos can consume gen AI easily without having to necessarily worry about GPUs, which cloud or model is being used or how it's being customized—the vendors are working those things out, so that telcos can have gen AI as an "on-off co-pilot" option within applications, Ilan said. She pointed to examples such as ServiceNow, SAP and Amdocs who are taking this approach.

The other part of the ecosystem is seeking to support telcos who want to build their own generative AI solutions outside of vendor-specific applications; an example here is AT&T's AskAT&T. That ecosystem consists of global systems integrators (GSIs) and others building bespoke solutions or bespoke applications for telcos.

Whether the AI ecosystem players aim to support embedded gen AI or bespoke gen AI, Ilan said, they are all focused on one thing.

"That whole ecosystem … is coming together … for one major goal, and that goal is to make generative AI more accessible for the telco, so it's going to be easier for them to drive value of it," she said.

(Image courtesy of Orange.)

WHAT? WHY? HOW? WHO? ORANGE EXAMINES FOUR FUNDAMENTAL ASPECTS OF TELCO AI

France-based operator Orange shared hands-on experience of bringing AI into its network operations in an interview last month. Alexis Koalla, director of operations strategy and transformation at the firm, explained the logic (the what and why) to apply AI to network operations, to modernize base-level telecoms infrastructure in time for the AI age, and also the techniques (the how and who) to both remove humans from the management chain, where AI performs better, and reposition and recruit them to extend how AI-enabled networks serve and exploit the top-level explosion in digital services.

RCR Wireless News could write around Koalla's responses in the interview session, but there is really no point; his answers, edited below for language and brevity, explain these points very well, and do not require further editorial input. His point about the cultural mindset and issue of trust is, arguably, the most profound. "[The] challenge for ops teams is to understand... the power of AI, and where it is better, and to really understand [its logic, too], and to [trust its] decision – so it is not just blind trust in AI," he says. The other opportunities and challenges with so-called AIOps in telecoms seem plain, and are well-presented below; all the quotes are from Koalla

ALEXIS KOALLA
Director of Operations Strategy and Transformation,
Orange

1 | What? Networks and culture

"Orange is setting up a telco as-a-platform strategy, based on cloud-native [principles]... Cloud-native is the present and the future – because we are moving from a vertical integration… with our vendors to a horizontal one… today with 5G rollout, and because… AI is coming, [and] almost here, [and] we need to consider [its] impact… [This] cloud-native... platform-ization [is] to expose APIs to enable customers to use [the network features]... GitOps is... the foundation of [this] – the... source of truth [for] lifecycle management of [network] assets and… functions. With Kubernetes and CI/CD… we are able to deploy, test, integrate network functions from vendors... to accelerate 5G rollout… What we are doing is new but it's [also] not-quite new, because we are… applying what we've achieved in IT to networks. [It] is not just a technology, [but] a cultural mindset shift."

2 | Why? Efficiency and innovation

"The first [objective] is cost reduction, mainly around opex. AI will enable significant benefits for that... The second is... to create new value. [Because] otherwise you're just building a strategy to reduce cost... AI [can] open the business to think about new services, solutions, functionalities, and so on... What we are doing today is ensuring the efficiency of AI on two processes related to the operational part: building new functionalities… [and enabling] fault management… Concrete use cases for AI... are root cause analysis, anomaly detection, auto healing, fault management, service fulfillment, and service assurance; and also, on top, network optimization… [of] energy consumption, bandwidth [usage], and server / equipment [usage]."

3 | How? Humans and machines

"[With] closed-loop [automation] we [want] to reduce or remove human bottlenecks in our processes – [so we can] be faster... [We will] leverage AI… with the right tools and right partners – because we'll not build everything internally – to [ingest data], extract data [about] an issue, interpret and ... filter alarms to analyze and make the right decision… [The] challenge for ops teams is to understand... the power of AI, and where it is better, and to really understand [its logic, too], and to [trust its] decision – so it is not just blind trust in AI. Animal detection, say, is something AI will beat humans at; the same with root cause analysis. Because AI is able, with machine learning, to analyze big data and make decisions faster. AI will not replace people, but it will augment people – so they move faster to get insights and take decisions."

4 | Who? Training and recruitment

"You can try to upskill your internal experts – and Orange has a lot of them – but it could take time to upskill everybody to reach a certain level with AI. You can also recruit experts from outside. But then you have the culture of the company [to contend with]. So even if you are an expert in AI, it could be a challenge to join a new corporate culture. So at Orange, we are trying to do both – to upskill our current experts... and to upskill [new hires] on the culture of the company. We are starting to see the first outcomes [of that] – to have a kind of continuous learning strategy, to train the right people just enough [and] just in time so... In this way, we'll be able to keep our experts and make them grow for the company needs for the challenge we are embracing."

A FUTURE-READY AI ECOSYSTEM

Powering today's Telecom data centers now for tomorrow's AI possibilities.

Dell Technologies and **AMD** are helping Communication Service Providers across the globe accelerate AI workload outcomes with Telecom data centers that increases inferencing capacity, using fewer servers, to set developers up for success.

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For more information, check out the content below.

A Future-Ready AI Ecosystem

AI is transforming how businesses across industries operate, offering the ability to enhance efficiency, drive decision-making and accelerate innovation. Explore Dell Technologies and AMD's AI solutions for the telecom industry.

Five Ways Data Centers Accelerate AI Innovation for CSPs

With an increasing number of AI workloads, CSPs face a choice: host them with costly cloud service providers or develop their own telecom data center for control, value and the potential to monetize their private cloud investment.

DELL Technologies

AMD

(Image courtesy of 123.RF)

E& PLAYING 4-D CHESS WITH ITS 'AI-FORWARD, AI-FIRST STRATEGY'

HARRISON LUNG
Group Chief Strategy Officer,
e&

In February 2022, Etisalat rebranded to e&; the UAE-headquartered multinational was early in doing the hard work of reinventing from a telco to a tech-co to borrow from industry discourse. Two years in, Group Chief Strategy Officer Harrison Lung provided an overview of the company's strategy with an emphasis on the fundamental role AI plays.

Lung laid out e&'s "4-D" strategy:

- "Doubling down on our core telco business."
- "Diversifying our portfolio of revenue both geographically as well as into technology areas."
- "Digitizing our operations…We can only digitize our operations, both consumer-facing as well as our internal operation, leveraging many of the digital technologies out there, including AI."
- "Driving sustainability across our brand…and people and communities that we operate in."

AI, Lung said, "is really the heart of our innovation efforts." The goal is to build an "AI-empowered and an AI-first organization" focused on delivering innovation and driving productivity. "We think AI is going to be transformational to our business," he said, calling out improvements to customer experience, internal operations, cost structure, and revenue expansion.

He also talked through how e& evaluates the applicability of AI to different parts of the business both existing and aspirational. "Use cases [are] at the core of AI and AI implementation…Use cases [are] what the end customer will see and use as well as our internal employees or frontline staff. We think about how we assess AI use cases across a couple of different lenses," primarily impact and feasibility. Impact covers everything from Net Promoter Score (NPS) to cost/return.

Feasibility considers how easy, or difficult, implementation would be, availability/maturity of tech, the readiness of e&'s own tech stack, and governance across its portfolio of majority- and minority-owned businesses.

AI FOR ENERGY EFFICIENCY AND NETWORK OPTIMIZATION

In April e& published a white paper that takes a deep dive into how it is now and plans to use AI with an emphasis on driving sustainability in resource allocation and energy efficiency and network optimizations. This covers a range of areas, including the use of robotics to streamline and otherwise reduce manual tasks and AI-infused sales, marketing and retail experiences.

Lung expanded on these focus areas: "From an overall capex intensity and spend perspective, the network is by far the largest cost category…for a telecom operator," he said. "If you're actually able, through AI, to enhance and optimize your network even by 1% and improving this capex band, or even in some cases the opex band, in terms of the network efficiency, how you roll out the network, how you run the network, there's significant financial impact to the bottomline."

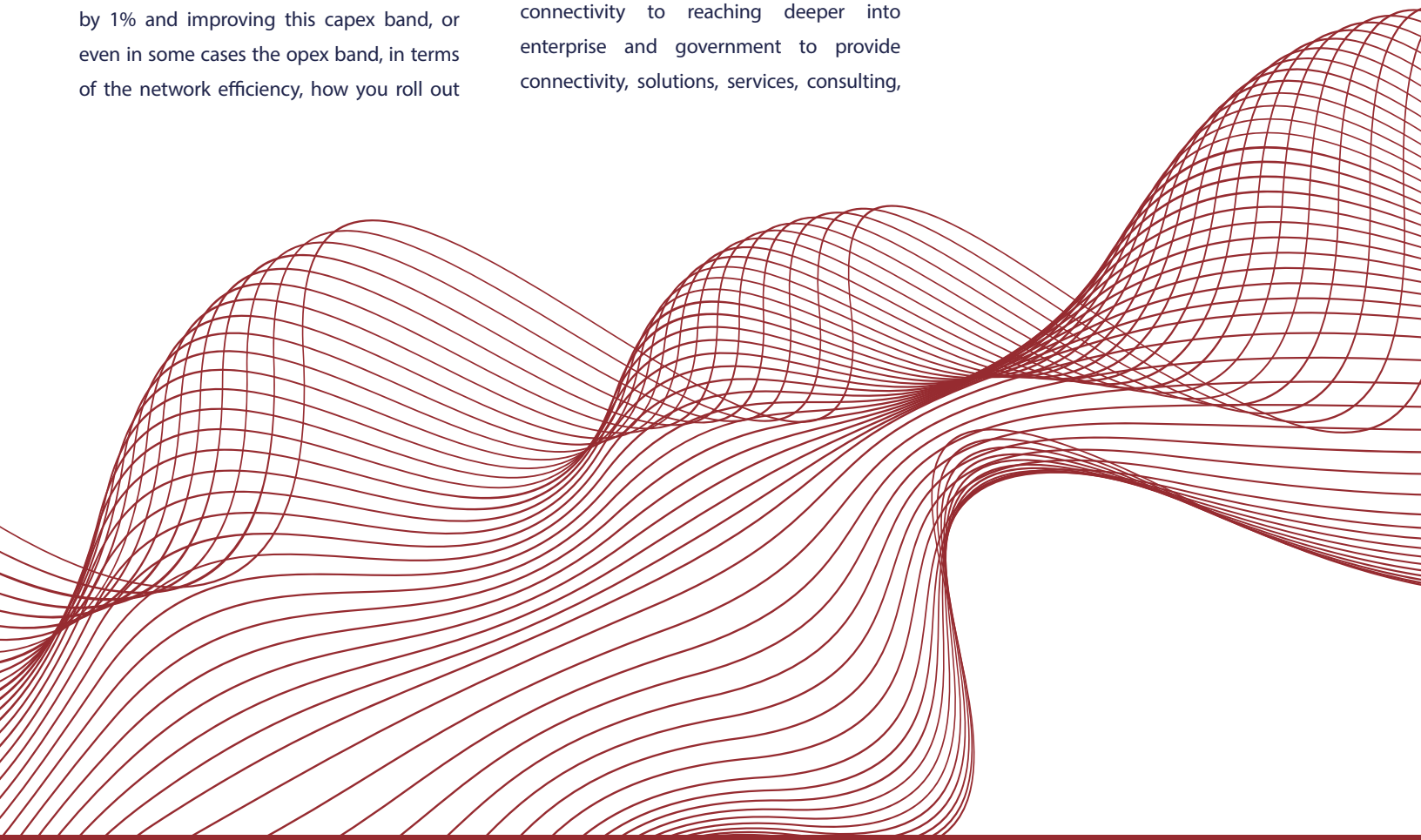
He also referenced a joint venture e& has engaged in alongside Deutsche Telekom, Singtel, SK Telecom, and SoftBank. Announced during the most recent Mobile World Congress in Barcelona, the JV's goal is to develop a telco-specific large language model (LLM) based on the companies' data stores. "We cannot do AI alone," Lung said. "We feel like this JV really has tremendous upside opportunity because now we're able to use this proprietary data to really enhance the current, I'll call it more generic, large language models and really turbocharge it to make it super relevant and tailored for our customers."

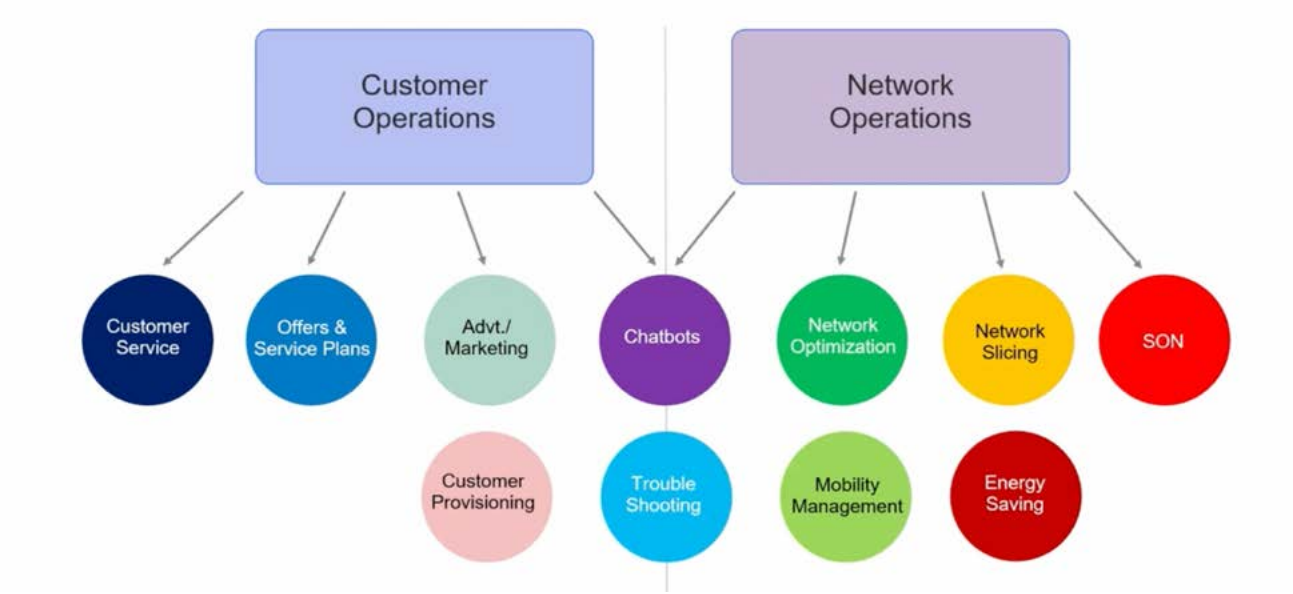
AI-AS-A-SERVICE

Recall e&'s rebrand and the point of it which was to expand beyond providing connectivity to reaching deeper into enterprise and government to provide connectivity, solutions, services, consulting, and more; e& more if you like.

Part of this was establishing its technology services organization e& Enterprise which sells, among other things, AI-as-a-service. "This is where I think the crux and the growth opportunity is for us to be a market-leading not just telecom operator but a technology company globally," Lung said. "We've been at the forefront of providing this robust, reliable connectivity for close to 50 years…With AI, our connectivity services can actually do more than deliver just speed and bandwidth. They enable smart, data-driven decisions that can improve efficiencies and outcomes."

"We feel like with the integrated offering we can be having the top of the house conversation as well as being [enterprises and governments] core partner," he said.





(Image courtesy of Tantra Analyst.)

THE THREE BIG TELCO AI USE CASES—AND A LOT MORE SUB-USE CASES

PRAKASH SANGAM
Founder and Principal,
Tantra Analyst

TELCO AI FORECASTED TO BECOME A $42 BILLION BUSINESS BY 2033

While AI hype is running rampant, AI is also bringing real benefits to real businesses and the future seems relatively bright. Focusing in on telco AI use cases, Tantra Analyst Principal Prakash Sangam broke things out into three broad categories of use cases: network planning and dimensioning, customer and network operations, and radio link management.

Sangam also shared an important reminder that, in this particular case, what's old is new again. "AI is not new to telecom as such," he said. "We've been doing smart things in the network, on the devices, in the connectivity, for a very long time. More than a decade, I'd say." He described self-organizing network (SON) technologies as something of a precursor to AI. As for what's changed, "We are actually using [generative] AI and the newer models and newer concepts to improve the utility and performance even further."

RIGHT-SIZED NETWORKS AND AI-DRIVEN DIGITAL TWINS

For network planning and dimensioning, Sangam said the broad goal is to right-size networks so they're not under- or over-provisioned. AI can be used for site and coverage planning, capacity planning, forecasting growth in traffic demand, and better understanding spectrum needs. A longer-term goal would be to use all the data informing these processes to stand up a digital twin that would allow for virtual "deployment" and "operation" based on changing real world conditions.

"Basic objectives and benefits here of AI are right-sized builds," Sangam said. "As we all know, networks are built for peak capacity and that is only for a certain duration…So if you over-build, there a lot of unnecessary sunk costs for the operator. If you under-build, that creates not a great user experience…You have to basically balance that build just to meet the demand—not too much, not too little—and that's exactly where AI shines."

AI FOR CUSTOMER-FACING AND NETWORK OPERATIONS

This particular telco AI use cases, which encompasses a lot of more specific operational processes, speaks to the two major challenges (opportunities?) operators are currently facing. They need to make more money more quickly, and they need to automate the operation of the network in a way that saves them time and money while also opening up new capabilities that could, in turn, lead to making more money more quickly. It's a bit circular.

On the customer operations side, Sangam highlighted AI-enhanced customer service, offers and service plans, advertising and marketing, customer provisioning, chatbots and troubleshooting. On the network operations side, there are also chatbot and troubleshooting applications, along with network optimization, mobility management, network slicing, advanced SON and energy saving.

Customer-facing AI chatbots are "where the major part of the AI is being used right now," Sangam said. On the network side, operators are inputting troubleshooting guides and other technical materials into AI models that are accessed by engineers via a chatbot interface. "If you're a technician, you get a trouble ticket…you basically, through a chatbot interface, you ask the questions to the models…instead of you manually searching through all the manuals and everything. The most probably cause and the experience of handling such issues previously are already presented to you very quickly." Sangam, citing a conversation with the CTO of Telus in Canada, said they've seen a 20% improvement in technician productivity using this approach.

IMPROVING NETWORK PERFORMANCE AND USER EXPERIENCE

Sangam said using AI for radio link management—things like channel estimation, determining coding, modulation schemes, etc…—is a focus area for standards body 3GPP with study items in Rel. 18 set to become work items in Rel. 19. The high level is, "How can we select the best beam for the users you're serving," Sangam said. "AI has a huge role to play there."

Sangam summarized with a few primary considerations operators should keep in mind:

- How to move from open loop to closed loop automation.
- Where in the network to host compute for AI workloads, which is very much related to architectural trends around virtualized and open radio access networks.
- How AI fits into the adoption of new service management and orchestration (SMO) technologies and, in the context of Open RAN, the relationship with the real-time RAN Intelligent Controller (RIC) and non-real time RIC.
- Data access, sovereignty and ownership.
- The logic around using third-party LLMs, and other types of multi-modal foundation models, as opposed to building telco-specific models either in-house or via consortia.
- And the workings of an AI continuum that spans devices, edge and centralized clouds and the network itself.

Red Hat

Are you ready for the **future of AI?**

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(Image courtesy of 123.RF)

THE ART OF THE POSSIBLE—TELCO AI FOR AUTONOMOUS INFRASTRUCTURE MANAGEMENT

"A fully-automated, zero-touch deployment…self-configuring, self-healing, self-optimizing, self-evolving… That's the nirvana," of telco AI, according to Red Hat Senior Director of Technology and Architecture Azhar Sayeed. Speaking recently with *RCR Wireless News*, he laid out that long-term vision then looked at the incremental steps operators can take to move towards "hyper automation," which will ultimately be a necessity given the rapidly increasing complexity of networks and services.

In pursuit of that end state though, there are a number of infrastructure challenges that need to be addressed, including the sheer scale of distributed infrastructure, disaggregation of hardware and software, a huge ramp in data being generated by network-connected devices and the network itself, a dynamic service landscape that requires near-constant configuration changes, then baking-in automation from day zero. "Telco infrastructure is becoming massive," Sayeed said. "Net/net the effect is that data center hardware is being deployed much, much closer to the subscriber…We need to think about how do you actually manage an ever-changing infrastructure…Automation really becomes step zero for implementing anything AI."

AZHAR SAYEED
Senior Director, Technology and Architecture,
Red Hat

There are three kind of big pillars that underlie closed-loop infrastructure management:

- Hyper automation of everything--servers, networks, storage, capacity planning, business processes and infrastructure-as-code.
- Analytics and AI--data analysis, AI modeling and training, deep learning, decision-making accuracy and variance analysis.
- Autonomy and governance--policy/operational decisions, thresholds for actions, bias removal, privacy and security.

These disciplines support closed-loop infrastructure management where configuration changes are based on observations from instrumentation, analysis of that data, and established triggers, or reactions, all working in harmony to create an eventually circular cycle of autonomy. "You instrument what you observe," Sayeed said. "You gather that particular data, then you can analyze…You create certain triggers…then you can react based on those triggers…Observability is key here because that's what provides you [with] the quality of data."

The long-term trajectory here is from tactical automation to process automation and on to hyper automation, he explained. As AI applied to this evolution, "It's about really taking a complete look top-down and building that particular trusted data environment for your AI/machine learning to operate" in. "The environment is actually already changing from your on-prem to multi-cloud. You need to have hyper automation really to be able to actually automate both your on-prem and public cloud environments, to be able to gather that kind of data, create that trusted data environment, then apply AIOps to it."

For operators, tactical automation gets rid of low-value, high-volume tasks and provides a fairly straightforward opportunity to learn from mistakes and asses costs and benefits. Process automation is used to unify siloed processes and facilitate faster innovation; this also requires the organizational overhaul that runs through telco AI discourse. Sayeed called it an "automation-first culture." Then hyper automation, or advanced automation, draws on trusted data, applied AI and ML then takes action based on event-driven triggers.

The good news is that operators are already effectively doing what Sayeed characterized as "predictive AI" use cases, things like predictive maintenance, network optimization, customized marketing campaigns, fraud detection, network security, traffic analysis and network planning. So that sets a good stage for further advancement and, he added, "only now the computing power has come to a point where you can actually do this near-real time or real-time and actually be effective."

From that current state, operators can move towards phase one of implementing AIOps which largely relates to the closed loop infrastructure management process outlined above. "Data science with artificial intelligence combined can get you to some of these capabilities," Sayeed said. And while some AI use cases are well established, gen AI is new for telcos.

With a current focus on customer-facing gen AI tools largely around self-service chatbots and customer care, Sayeed sees as a path to using gen AI for engineering support wherein the intuitive interface helps them more easily parse network data. "Over a period of time, you can get into all the other things such as service management, text-to-code, all sorts of inter-domain communication and conversation and integration…That's really where I see the role generative AI and how it's coming up."

(Image courtesy of 123.RF)

WHY SHOULD TELCOS BUILD DATA CENTERS NOW? HINT--IT'S FOR TELCO AI WORKLOADS

FOR TELCO AI WORKLOADS, ON-PREM DATA CENTERS ARE THE FUTURE, ACCORDING TO DELL TECHNOLOGIES

During the forum Dell Technologies and silicon partner AMD announced the Dell PowerEdge XE9680 Server with AMD Instinct MI300X Accelerator and ROCm 6 open software platform. Optimized for machine learning, deep learning and gen AI workloads at scale, the server promises to accelerate computational tasks in data centers and can support training for the largest AI models.

AMD's Director of HPC/AI Strategic Accounts Justin Ionescu and Dell's Director of Strategic Global Partnerships Suresh Raam spoke in detail about how their partnership will aid the accelerated cloudification of telco networks in the move to 5G Standalone (SA) and the decentralization of compute from data centers to the network edge.

"AMD and Dell are very much focused on democratizing the AI space for both hardware and software," said Ionescu. Raam added, that in order for telcos to get the most out of what AI can offer, this "democratization" should start at the data center. "From the telco lens, virtualization starts at the telco data centers, and it's a great place to promote the network operational benefits and modernization," said Raam.

SURESH RAAM
Director, DE–Strategic Global Hardware Partnerships,
Dell Technologies

JUSTIN IONESCU
Director of HPC/AI Strategic Accounts,
AMD

Some of those benefits, explained Ionescu, include predictive maintenance, fraud detection and prevention, the ability to leverage analytics to reduce customer churn and identifying network congestion, hotspots and traffic patterns.

When compared to public cloud AI infrastructure, on-premise AI infrastructure offers telcos better latency, data sovereignty, security and operational savings, argued Raam. In fact, he stated that studies have shown that on-prem data centers for telcos could save up to three times in cost compared to public cloud. "And the cost drivers include … operational cost[s] related to hosting in a cloud, from leasing that infrastructure to paying down for licenses," he added.

Dell has also observed that there are certain AI use cases for telco data centers that require millisecond latencies, such as those for near-real time or real-time network operational applications "which could not be achieved with the cloud-based architecture," said Raam. As a result, he said that a key goal of the Dell and AMD partnership is to "build the idea that [on-prem data centers are] the future."

Ionescu described AI as a "leading technology mega-trend [that is] pervasive from endpoint to edge to cloud" and is "propelling early adopters into very advantaged positions."

(Image courtesy of 123.RF)

AI-NATIVE IS ABOUT AI (OBVIOUSLY), BUT IT'S ALSO ABOUT CHANGE MANAGEMENT

BROWNFIELD OPERATIONS REJOICE!—CLOUD-NATIVE IS NOT A PREREQUISITE FOR AI-NATIVE

We've covered in these pages before an idea put forth in great detail by McKinsey and Company--and by others--that operators have to be cloud-native before they can be AI-native. If you subscribe to that line of thinking, you'll quickly realize that there are more than two but less than five country-scale operators that are cloud-native today; and, drawing from that, you'll realize then there's little to no hope for everyone else to leverage AI in pursuit of this future state of AI-native. Fortunately, according to Per Kangru, technologist in the Office of the CTO at VIAVI Solutions, that's not the case.

PER KANGRU
Technologist, CTO Office,
VIAVI Solutions

He provided a clear-eyed assessment saying, "If you start your AI journey not being cloud-native…then you will have a lot of technology debt to take care of later on." Fortunately, taking care of technology debt stays at or near the top of operators' to-do lists so that's nothing new. But, "If you look at it from the perspective of do we require the underlying network that we're trying to operate, do you require that one to be cloud-native? And the answer is, from my perspective…absolutely not."

Kangru continued: "Most of the operators have a significant brownfield. That brownfield needs to be managed." And AIOps and attendant design patterns can help. It might not be easy to apply AI to 20-year-old networking technologies but, "We're going to do as well as we can."

DATA MATURITY AND LOCALIZED LANGUAGE MODELS

In discussion at the forum, and in previous discussions, Kangru has stressed the idea of thinking holistically about AI in terms of assembling data, training models, and delivering applications that can be decomposed and recomposed in service of multiple use cases—essentially avoid redundancy, make the highest and best use of the assets you have, and deliver results cheaper and faster. He gave the example of industry-wide emphasis on AI for RAN energy saving which requires forecasting of expected traffic at a cell site or cluster of cell sites. This same forecasting could be used, for instance, to also do predictive anomaly detection.

"When you start looking at it," Kangru said, "if I'm doing it only for energy savings, I may end up rendering a pretty significant bill for doing that forecasting for every element all of the time and…I'm only able to recover it from the energy savings use case. But if I'm then able to say, 'I'm going to do the forecasting and, based on this forecasting, I can run a number of different use cases in parallel using that data'…When you're building it in that way, you're able in a pretty good way to figure out what are the most valuable components and what are the most valuable assets you have in your AI landscape…That's where you really start to see the value of reusable assets and make sure they support whatever ecosystem you're building up…That means as well that your return on investment doesn't have to be all of the assets for a single use case. You can actually have multiple use cases driving that."

Going upstream of the AI application serving an operator's particular use case is all of that precious data. This raises the question to what extent operators have the appropriate data platforms in place to feed it into models then use those models to do something that delivers net-new value. "Data maturity is really different between different operators," Kangru said. Companies that realized in the not-too-distant past that they would someday soon be able to use that data have a "significant head start" in model training, he said. The ideal situation, he said, is data that's so well structured and managed, with strong considerations around access control, privacy and security, that operators could begin exposing relevant data assets to vendors and other partners. He described a comprehensive digital twin of not just the network but the supply chain and other processes that feed into that production network. But, again, that's very much an ongoing exercise in data maturity.

With the data structured the right way, the next step is model development. Kangru threw out a term that speaks to the dueling complexities of taking a multi-billion parameter general model like ChatGPT then adding proprietary data and fine-tuning (read: shrinking it) to make it functional for a particular domain or company, versus building from the ground up like what we're seeing with the AI RAN Alliance or the joint venture between Deutsche Telekom, e&, Singtel, SK Telecom, and SoftBank. "The problem," Kangru said, is "the more specific you want it to be used for, the more specific you want it to be trained for."

He analogized how some RAN experts know everything there is to know about Ericsson or Nokia or Samsung or whoever, but that company-specific knowledge doesn't port from one to the other. Expanding on that, an LLM trained on the best available material from one vendor may yield awful results when you use it against a different vendor. Centrally-trained models that use public data can give decent outputs, but when it comes to your network and your settings, it's important to have the model targeted to your desired outcomes, he said. "There's many things around it where localized understanding is essential. You need to have it localized for your vendor permutations, your design decisions you took when you built it out, and then from that as well your configuration settings, your service matchings, and so on across it."

DOING AI ISN'T AS SIMPLE AS BUYING AI

The clock on Kangru's session ran out before he could go deeper on what it actually takes to make all of this wonderful technology work within the constraints of operator organizations, but he did make an important closing point. "It's a multi-step journey. AI is great but you have to know what you want to do with it…It's a fantastic journey [but]…it's a journey broader than just buy a product and you get fully-fledged AI solutions…It's extremely important to realize that and extremely important to realize how it turns into a change management journey of the organization."

(Image courtesy of 123.RF)

THE JOURNEY TO LEVEL 5 NETWORK AUTOMATION

OPERATORS ARE UNDER INCREASING PRESSURE TO REALIZE RETURN ON 5G INVESTMENTS

As operators continue the shift towards multi-vendor, multi-cloud and cloud-native architectures, their operations are only becoming more and more complex. There is increasing the need to scale network operations and to see the return on their 5G investments. According to Timea Laszlo, product manager at VMware, they can't do these things without moving from "rule-based" to "end-to-end" automation.

Laszlo detailed the key differences between each level of automation and argued that telcos shouldn't wait to begin their journey towards fully-automated network operations.

Laszlo said most telcos are on Level 1 or Level 2 automation, which means there may be some amount of automation, but largely, they are still manually operating their networks. "When we go above these levels to 3,4,5, that's when we actually change the way we operate the networks," she said, adding that Level 3 means the automation is conditional or rule-based. "So auto-scale, auto-heal can work in situations where it can be controlled by a rule, but humans still need to make a decision in unexpected situations," she explained.

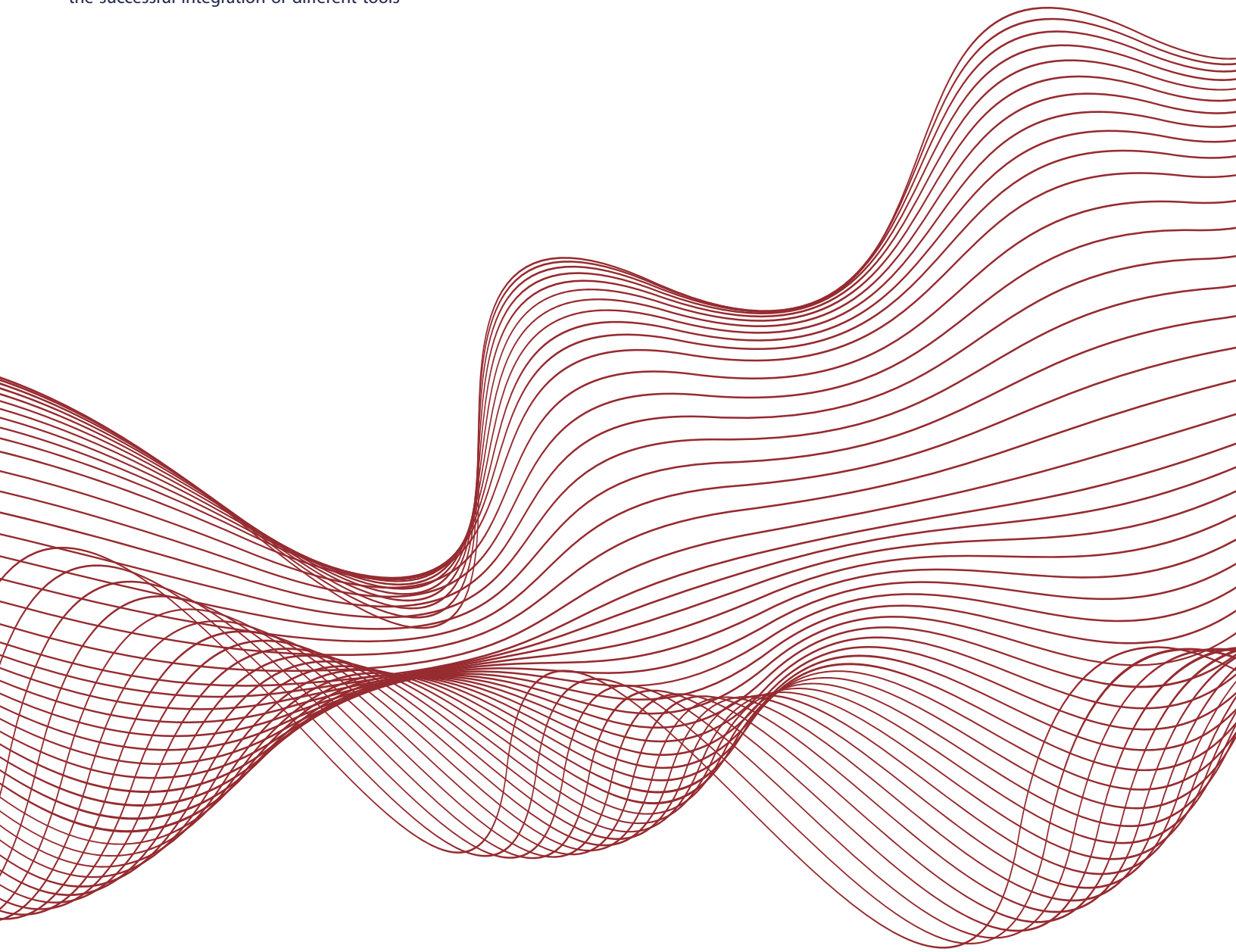
"When we go to the upper levels — for example Level 4 — we can extend this to cross-domain use cases. It's more complex, we have more data, and the network can adapt to some unexpected situations, but it still requires human involvement. When we talk about Level 5, that's the fully autonomous network, which is self-learning without human interactions," she continued. Level 5 networks free telcos up to focus on revenue-generating innovations and services, she said.

THE "MAGIC" OF AUTOMATION

Because telcos are moving towards open and cloud-native networks, they need to operate tools and applications from multiple vendors and these different elements must work together. Further, telcos operate with five nines, and therefore, cannot afford outages. Ensuring the successful integration of different tools and applications requires a great deal of testing, which takes time and trust, stated Laszlo.

"Automation really helps," she said, commenting that while it's hard for operators to "let go" of some of the control and management of their networks, it's important that they "empower their teams [and] let [automation] do the magic." She added, as well, that operators should "include the automation from the beginning" and "select vendors that are aligned with their automation vision."

"Telcos are under huge pressure right now to reduce cost and progress towards 6G networks, and I think all of this will encourage them to adopt automation more and more," she concluded. "We can expect significant progress in the next five to 10 years."



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