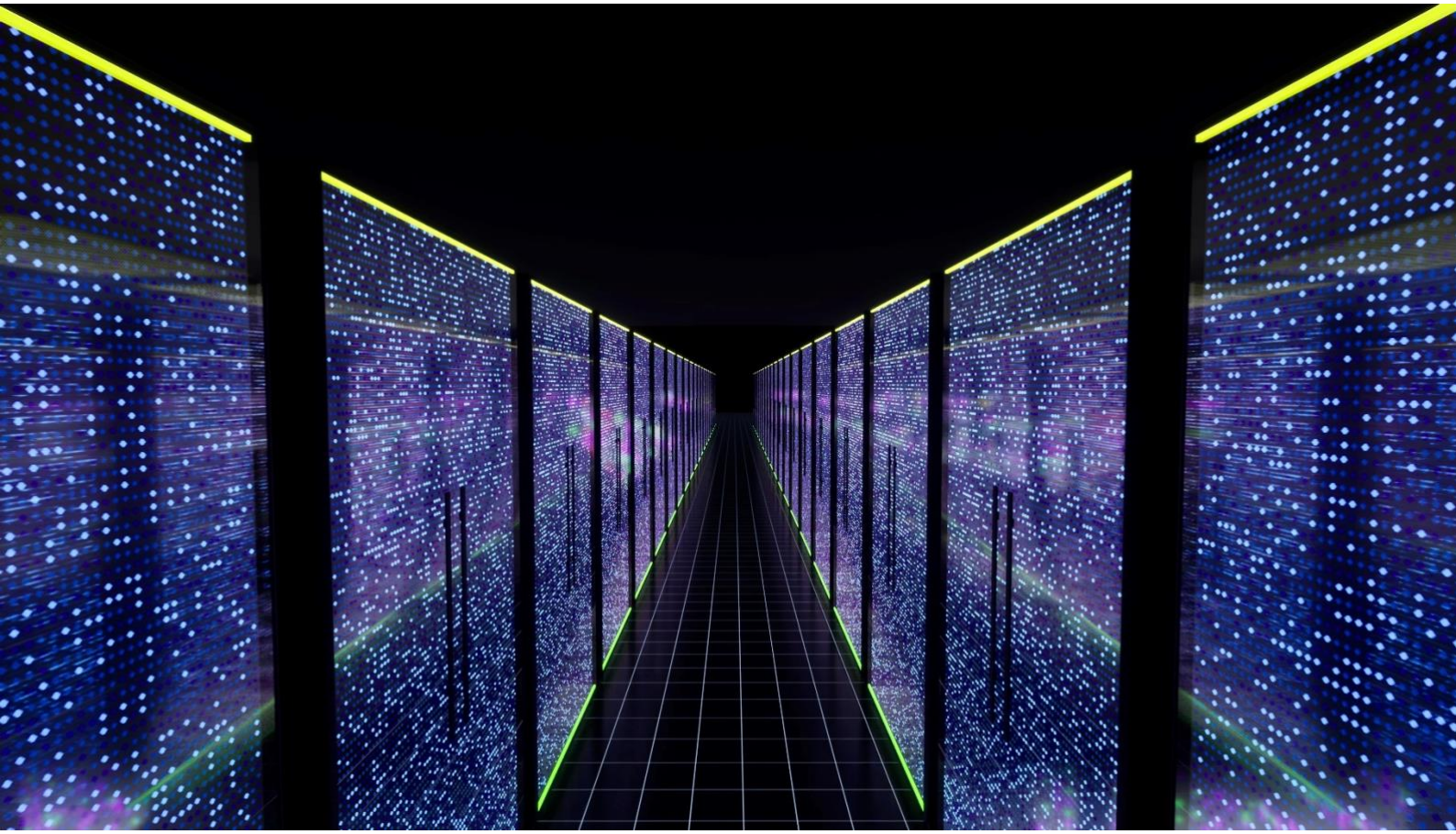


Driving network innovation with AI-enabled telcos

Artificial Intelligence remains front of mind for businesses as new products and services emerge that enable new, innovative use cases. Telcos that are ready to integrate AI into their operations, infrastructure and services can be at the forefront of their own network transformation and that of others.

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Introduction

As the telecoms industry has seen growth stagnate in recent years, operators are facing pressure to transform their business model and identify key areas where they can cut costs and create new revenue streams. In this article, we will explore how AI-enabled telcos can be at the forefront of network innovation by using AI to enable valuable use cases and accelerate their move towards DevOps-centric practices, as they look to transition to a more agile techco model.

AI is an important tool for telcos to realise this ambition and its impact across the industry, in particular in the types of services that can be delivered to end-users will only increase with time. In a 2022 report on the role of AI in transforming the future of work, we discussed the ways in which AI will catalyse the fourth industrial revolution and result in significant societal, cultural and environmental changes.

In previous articles, we have also explored the role that AI can play in enabling key telco use cases, specifically looking at internal use cases, for instance how AI can support 5G rollout and improve customer experience and consumer telecoms services, such as chatbots, the management of connected home devices and customer care. In the context of an intensifying climate crisis, telcos, like other enterprises, will have to seek growth in an increasingly sustainable way: there again, AI, although resource-intensive in its processes, can play a positive role overall in driving sustainable transformation.

AI-assisted automation is widespread in today's networks

AI and automation already have an established role in curbing energy consumption across the telco network. They require significant investment (e.g. in cloud-native transformation and more generally, a software-first approach) but their impact on the running of the network can yield immediate benefits in terms of resilience, energy savings through sleeper modes and a better understanding of the network through improved analytics. Advancements in energy-efficient technologies and intelligent network management will help to reduce total energy consumption, and associated costs while enabling sustainable development in the telecom sector.

In **self-organising networks (SONs)**, where capacity is automatically tuned to current or predicted demand, the optimisation process is driven by AI-based automation. In addition, by automatically tuning capacity to current or predicted demand, SONs reduce the amount of manual work from the network teams who monitor network metrics. With advanced diagnostics and AI-driven proactive

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repair, they can undertake more maintenance remotely or enable **self-healing capabilities** for more routine tasks.

AI and automation can also play a role in optimising the use of network resources and in reducing the amount of equipment and the energy required to **deliver resilience.** For instance, AI-assisted closed-loop automation allows telcos to scale their network capacity more efficiently and reduces the need for more manual interventions like capacity buffers and permanent redundancy which form part of traditional network design to safeguard against equipment failure. The already mentioned **sleeper modes** are another important example where AI and automation can have a large and lasting impact on total energy consumption. AI-enabled sleeper modes can transform traditional sleeper systems, that utilise temporary shutdown at fixed schedules, into predictive, dynamic shutdowns. These sleeper functions may operate at multiple levels: from the macro cell site right down to the underlying silicon (e.g. CPU core). KDDI & Nokia saw 2-5x more power saving than non-AI systems, whilst using Nokia's AVA management platform.

KDDI & Nokia deployed an AI-controlled RAN (AVA), shutting down unused network elements during periods of low traffic. Some cells were down between eight and nine hours per day.

20% lower power consumption per cell

The challenge in using AI-driven automation as is the case in the above use cases is to reduce total uptime without reducing the QoS for network users. Proactive maintenance, resource allocation and QoS are combined to help inform network engineer teams of longer-term deployment and repair decisions. This means that AI can leverage customer impact scores to support network planning decisions to creating the most efficient and service effective network deployments. For example, this helps to determine where small cells are deployed to provide coverage within key metrics related to QoS & cost per subscriber.

Finally, **AI-assisted automated reporting** can help telcos with gaining a more transparent view over network and team operations. Better reporting does not directly equate to network or business optimisation, but data capture can play an important role in enabling a clearer understanding of where network improvements are most needed, like in automated workflow management systems, where employees use synchronised scheduling of their routes to better understand team workflows. Through AI-enabled workflow management, employee data such as skillsets or the equipment they

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have in their vehicle is stored in a system which routes the closest and most appropriate employee to a site needing servicing. AI/ML makes the system more predictive and adaptable to changes in parameters, ensuring that workflows are optimised for both current and future needs.



Telcos who are pushing forward in their cloud-native journeys realise that AI and automation is imperative to realise the investment made in cloudifying the network. The most advanced telcos must incentivise vendors to integrate AI features into network infrastructure while ML models can be utilised for larger, strategic and organisational decisions. AI-enabled telcos will be able to achieve the greatest capex savings in the shortest amount of time, thereby placing themselves at a competitive advantage relative to other telcos. With lower capital expenditure across the network, telcos can re-invest these savings into service innovation.

Enabling transformation for the enterprise customer

Optimising the telco network with AI will have knock-on benefits for the end users who consume these services, in particular enterprise customers.

Edge computing offers an opportunity for telcos to monetise their 5G infrastructure and create new enterprise use cases. However, increased demand in edge will lead to more distributed data centres. This energy-hungry infrastructure which will account for an estimated 5-10% of energy consumption by 2030. This is based on a medium-level development in edge infrastructure; it might be more if edge develops faster.

. Improvements to HVAC systems and immersion cooling systems will become important to the cost-effectiveness of these deployments, and AI has an important role to play in optimising these systems. Real-time monitoring of equipment within data centres is essential for engineers to understand the rate of equipment degradation. ML- predictive analysis on this data provides greater precision on the life-cycle of this equipment. These changes will help enterprises with on-premises edge deployments or private networks to control the total cost of deployment.

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Service platforms, by providing fundamental monitoring, reporting, resource management & orchestration amongst other important functions, will play an important role in enabling AI to optimise enterprise outcomes. With increasingly complex network infrastructure, nodes across the cloud, network, and premise must be orchestrated to for optimal traffic flows. Telcos already use AI for closed-loop workload optimisation in order to leverage the right type of compute (e.g. GPU vs CPU). This can be extended to the enterprise IoT space that now spans across industries such as manufacturing, healthcare and public city environments, all seeking to reduce total cost and improve operation. As the IoT expands, devices will proliferate that only require remote and sporadic monitoring and limited feedback. AI-enabled platforms will help to ensure these low-energy devices can run with low amounts of data and communication. An example of such AI-enabled platforms is where devices utilise mobile initiated connection only (MICO) modes and only connect to gateways and networks as needed. Finally, these platforms can help to put CPUs' multi-core processors into sleep mode instantaneously, a particularly useful feature when dealing with more volatile workloads in smaller footprint data centres.

AI is key to telcos' transformation

AI is a powerful tool that will drive digital transformation in the telecoms space. The more familiar telcos become with AI use cases and the software-oriented methods that are needed to underpin it, such as cloud-native architectures and DevOps practices, the more likely they will succeed in their journey towards a techco model. In December 2022, Vodafone announced US$500m opex and capex savings over the past three years by adopting a more software-centric approach to its hiring process. This strategy has enabled them to implement various automation processes and digital twins that have guided their action and decision making in network maintenance and strategy.

AI will continue to create opportunities for telcos to reshape network maintenance and expansion and provide decision makers with a clearer picture of the state of the network while automating human input and network repairs. AI will also bring about more efficient outcomes in edge compute and increasingly complex IoT environments through end-to-end orchestration. However, it is worth bearing in mind that generative AI has faced criticism for its intensive energy usage, which is bound to increase as large language models (LLM) are extended to include GPT-4 and beyond. (See aforementioned AI: Sustainability friend or foe?) Whilst energy consumption will obviously vary with the type of AI and the extent of its use, telcos need to constantly ensure that they are using modern software practices (AI, ML, automation etc) to yield positive outcomes.

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