



Issue 4 2022  
ISSN 1745-1736

THE GLOBAL VOICE OF  
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## TALKING HEADS

Juniper Research's  
Barker identifies CSPs'  
enterprise market  
opportunities



**PLUS** 7-PAGE Analyst Review on applying AI to energy saving in mobile networks • Amdocs acquires MYCOM OSI for US\$188m • New models go beyond pay-per-ping over the cracks in CSPs' balance sheets • What the future of business messaging looks like • Will enterprise services revenue change the outlook for CSPs? • Why effective automation and orchestration are the tickets to network monetisation • Inside 5G and Wi-Fi's complicated relationship • How CSPs are using behavioural science to achieve personalisation • News, features and interviews online at [www.vanillaplus.com](http://www.vanillaplus.com)

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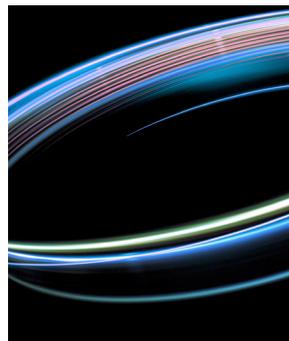


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# Pay-per-ping over the cracks

**New models demand new thinking, not just new names for the same old line items, writes George Malim**



**George Malim**  
managing editor

With great excitement, the long-awaited massive part of massive IoT looks to be emerging into reality and communications service providers (CSPs) are avidly observing as however-many-million or billion new connections are added to their networks. They recognise not all of these are good things and many in fact permanently roam without paying the premium that consumers

do. They also understand that this won't be a permanent state and specific IoT connectivity services will be charged for.

Regrettably, for CSPs, each massive IoT device won't have its own monthly cellular subscription in the same way as consumers. Certainly, a sensor in a truck won't be topping up so it can Netflix and chill this evening. It's also definite that the business case won't stand having hundreds of thousands of devices paying consumer-style fees. I haven't even mentioned whether a combine harvester can experience bill shock or not.

That's because it's well understood a new market that uses the network in a different way to the old market has different requirements that should be costed and billed for differently. This doesn't mean a give-away rate for IoT any more than it means consumers will subsidise machine connections. Instead, it means learning to tie the provision of connectivity infrastructure to the value of the service it enables.

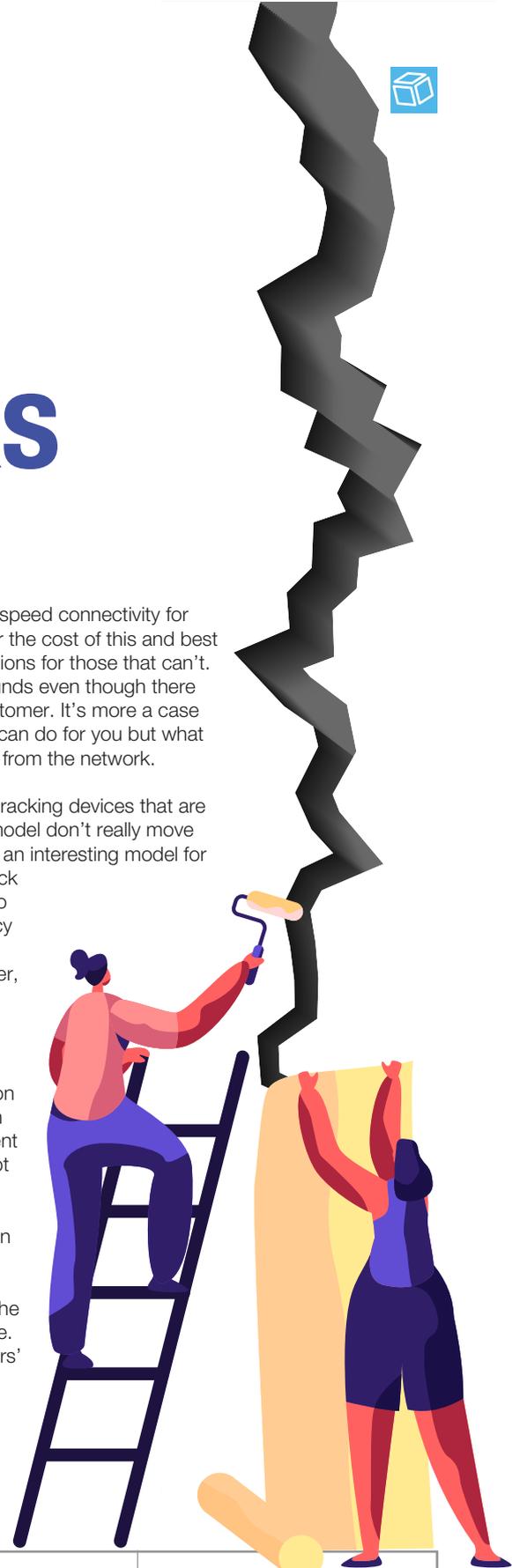
This means low latency, high speed connectivity for high value tasks that can bear the cost of this and best effort, non-prioritised connections for those that can't. This is less divisive than it sounds even though there will be multiple classes of customer. It's more a case of: ask not what the network can do for you but what you need – and can pay for – from the network.

To this end, models such as tracking devices that are provided on a pay-per-ping model don't really move the needle for CSPs. Yes, it's an interesting model for organisations that want to track their assets, people and cargo and they can set the frequency of pings and even the data covered in each ping. However, for CSPs to get properly excited they need far more than a million devices saying 'Here I am and temperature here is 18 degrees' to move on their revenue generation to an enhanced level. Any excitement about this is simply an attempt to paper over the cracks of lost voice revenues and commoditised data earnings in the consumer markets.

This issue is all about where the new revenues for CSPs will be. I hope you find our contributors' searches interesting.

Enjoy the magazine!

George Malim



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Tel: +44 (0) 1732 807410

 **PRESTIGE MEDIA LTD.**  
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VanillaPlus magazine is published as a digital edition at least 4 times a year. It is available free of charge to all readers worldwide, at the publisher's discretion. To subscribe **free of charge** go to: [www.VanillaPlus.com](http://www.VanillaPlus.com), click the "Subscribe" tab on the Home Page and answer the questions shown. The Publisher reserves the right to alter or end this free offer at any time without notice. No guarantee is stated or implied. You can unsubscribe at any time by emailing [subscribe@vanillaplus.com](mailto:subscribe@vanillaplus.com) with UNSUBSCRIBE in the Subject line.

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## Amdocs acquires MYCOM OSI for US\$188m to monetise intelligent services

**Amdocs** is to acquire **MYCOM OSI**, the UK-headquartered provider of software-as-a-service (SaaS) -based cloud network and service assurance systems to communication service providers (CSPs). The acquisition will expand Amdocs' network portfolio to include end-to-end service and network orchestration by bringing key assurance capabilities to power networks. MYCOM OSI's service assurance suite comprises performance management, fault management and service quality management.

MYCOM OSI delivers 5G assurance applications and solutions to multiple customers with 5G networks, as well as serving wireline operator networks, which are becoming increasingly virtualised, containerised and software defined. MYCOM OSI's cloud-native solutions take advantage of the benefits of the cloud such as scalability, cost and reliability, and support the converged network-cloud ecosystem.

"This is a strategic growth move that builds on our other recent successful acquisitions in the network and cloud space and executes on three of our core strategic pillars: intelligent

network automation, 5G and cloud," said Shuky Sheffer, the president and CEO of Amdocs. "As the network and services of the 5G era become increasingly dynamic and complex, a holistic, end-to-end approach is key and can only be achieved with a powerful artificial intelligence-backed assurance solution suite. That's why we're so excited to welcome the highly talented and dedicated MYCOM OSI team to Amdocs."

Andrew Coll, the chief executive of MYCOM OSI, added: "We're excited to be embarking on the next chapter of our company story as part of the Amdocs family as we bring our combined expertise together under one roof. At a time of rapid transformation in the communications sector, the combined scale and deep domain expertise will create a broad range of complementary and innovative solutions, such as closed-loop automation to help service providers in deploying 5G networks and services at scale." ■



**Shuky Sheffer**, Amdocs

## Mobileum and Digis Squared announce edge-to-edge network testing and analytics partnership

**Mobileum** and **Digis Squared** have entered a strategic partnership to bring a comprehensive set of network testing and cognitive optimisation solutions to market. The collaboration brings together Digis Squared's expertise in developing cognitive tools to automate and analyse radio network and edge-to-edge performance, and optimising networks and capacity management to benefit the customer experience, and Mobileum, whose telecoms analytics portfolio enables communications service providers (CSPs) to improve business performance, monitor customer experience and access new monetisation opportunities.

"Finding meaning in data is what we do," said Ron Haberman, the chief product officer of Mobileum. "Our active intelligence platform enables CSPs to connect deep network and operational intelligence with real-time actions to increase revenue, enhance the customer experience, reduce costs and streamline operations. The partnership with Digis Squared extends the edge-to-edge network testing, optimisation, planning and management capabilities we can deliver. In addition, the in-house expertise and capabilities that the Digis

Squared team brings in machine learning analytics is a great fit with our predictive analytics and automated actions approach."

AbdelRahman Fady, the CTO of Digis Squared, added: "Digis Squared is pleased to partner with Mobileum to provide a more comprehensive testing solution across legacy 2G and 3G technologies through 4G to 5G, private networks and OpenRAN. With 5G, IoT and OpenRAN deployments already underway, this new ecosystem will see CSPs working with a distributed value-chain of stakeholders and information silos that require a new approach to monitoring digital risk and analysing data. AI tools that can swiftly identify issues and automatically solve known problems will be vital to ensure the smooth operations of the highly complex multi-technology, multi-vendor systems, which CSPs rely on today." ■



**Ron Haberman**, Mobileum

### NEWS IN BRIEF

## Globe Telecom selects Netcracker managed services

**Globe Telecom**, the mobile operator in The Philippines, has chosen **Netcracker** Managed Services to upgrade its support services and to maintain a higher level of operational efficiency. Globe Telecom provides mobile, fixed-line and broadband networks to more than 80 million customers.

Netcracker will deploy its operations automation framework and provide a variety of managed services covering mission-critical processes such as order fulfilment, proactive monitoring and performance management to meet Globe's business objectives. The CSP will benefit from faster issue resolution, improved order processing time and significantly lower platform costs. ■

## Beyond Now digital business platform hits Google Cloud Marketplace

**Beyond Now**, an ecosystem orchestration and digital platform provider, has announced that its **Infonova** Digital Business Platform is now available on the **Google Cloud** Marketplace empowering organisations to embrace new business models and grow revenue together with an ecosystem of partners.

The digital business platform is delivered as a software-as-a-service (SaaS) offering and is ideal for businesses who are looking to rapidly build digital marketplaces for small and medium-sized enterprises (SMEs), IoT, enterprises and consumer solutions that use partner orchestration hubs or modernise their business support systems (BSS). ■



NEWS IN BRIEF

## Digicel deploys Enea AdaptiveMobile security to protect mobile networks

**Enea**, a specialist in mobile network security, has announced that **Digicel Group** has deployed Enea AdaptiveMobile Security's comprehensive signalling security solution to protect mobile networks and subscribers in 26 markets across the Caribbean and Central American region. Using the Enea AdaptiveMobile Security SS7 and Diameter signalling security platform, together with threat intelligence services, Digicel ensures unrivalled protection for its networks and subscribers in each country.

Bad actors and fraudsters exploit technical vulnerabilities to breach subscriber privacy, to deny access to services and to directly defraud both mobile operators and subscribers. Enea AdaptiveMobile Security's signalling security firewall and threat intelligence solutions protect networks using signalling protocols such as SS7 and Diameter from continuous attack. This offers domestic and roaming subscribers protection from new and emerging cybersecurity threats. ■

## Multi-access edge computing spend to reach US\$23bn by 2027

A new study from **Juniper Research** has predicted that global multi-access edge computing (MEC) spend will grow from US\$8.8bn in 2022 to US\$22.7bn by 2027. This growth of 260% will be driven by increasing requirements for on-premises machine learning and low-latency connectivity; enabled by 5G technology.

The new research, Edge Computing: Vertical Analysis, Competitor Leaderboard, and Market Forecasts 2022-2027, predicts that more than 3.4 million MEC nodes will be deployed by 2027; rising from less than one million in 2022. It identifies autonomous vehicles and smart cities as key beneficiaries of increasing MEC roll-outs, by enabling the handling of data generated by connections in these markets to be processed at network edges. This will reduce network strain by decreasing the physical distance that cellular data will need to travel. ■

## BT and Ericsson sign partnership to boost 5G private networks

**BT** and **Ericsson** have announced a multi-million-pound new partnership to provide commercial 5G private networks for the UK market. The deal will enable BT to sell mobile network technology products to businesses and organisations in sectors such as manufacturing, defence, education, retail, healthcare, transport and logistics.

Ericsson Private 5G is a fit-for-purpose, dedicated and agile private network solution that provides guaranteed high-performing indoor and outdoor 5G cellular coverage, making it suitable for a range of uses particularly in environments such as factories, education campuses and other large sites where security and ultra-low latency connectivity are important.

Marc Overton, the managing director of BT's Division X, part of its enterprise business, said: "This UK-first deal we have signed with Ericsson is a huge milestone and will play a role in enabling businesses' transformation, ushering in a new era of hyper-connected spaces. Unlike a public network, a private 5G network can be configured to a specific business's needs, as well as by individual site or location. They also provide the foundation to overlay other innovative technologies such as IoT,

and artificial intelligence (AI), virtual and augmented reality, opening up a multitude of possibilities."

Katherine Ainley, the chief executive of Ericsson UK & Ireland, added: "This



**Katherine Ainley**, Ericsson

ground-breaking agreement with BT means we are together taking a role in ensuring 5G has a transformative impact for the UK. The high quality, fast and secure connectivity provided by Ericsson Private 5G can help organisations make all-important efficiency gains that can create safer, more productive, and sustainable business operations and help the country build global leaders in the industries and technologies of the future." ■

## Swisscom expands MATRIXX Software partnership to monetise all services

**MATRIXX Software**, a global specialist in 5G monetisation solutions, has announced that **Swisscom** has expanded its use of MATRIXX Digital Commerce as its single, converged monetisation platform. With this latest move, Swisscom will now be able to extend the customer experience benefits of MATRIXX's cloud native, real-time commerce solution across all product and service offerings.

"Over the past nine years, we've seen firsthand the value that MATRIXX can deliver," said Philip Achermann, the head of billing at Swisscom. "Powered by its Digital Commerce Platform, we've been able to achieve two critical objectives: reducing time-to-market and delivering customer experience. Now, as we make the next wave of strategic investments, simplification across every aspect of our business is critical. We chose to extend our relationship with MATRIXX because it is ahead of the curve in its work with hyperscalers, and we are confident that MATRIXX is a trustworthy partner for our strategic and secure journey to cloud."



**Glo Gordon**, MATRIXX Software

Glo Gordon, the chief executive of MATRIXX Software, added: "Securing this expansion with the Swisscom team is a tremendous validation of everything we've done together so far. We are thrilled to be the monetisation solution as Swisscom evolves and expands its business beyond connectivity." ■



## Accedian launches Skylight Interceptor for network detection and response



**Richard Piasentin**, Accedian

**Accedian**, a provider of performance analytics and end user experience solutions, has announced the release of **Skylight Interceptor**, the company's cloud-based network detection and response (NDR) solution. A new addition to the Skylight solution family, the launch marks Accedian's entrance into the cybersecurity market. Skylight Interceptor is set to help major enterprises and service providers

protect their networks by delivering prioritised, context rich incidents that speed detection and response to security threats. It enables organisations to identify the sophisticated zero day threats that are often missed by traditional perimeter security solutions.

Skylight Interceptor is built on Accedian's experience in the network performance and analytics industry, managing the largest and most complex networks on the planet with the most precise, granular, and contextual data, and rich visibility. This solution bridges the gap between security and IT operations with a common platform, complementing existing security solutions and adding an essential new layer to an organisation's cyber defence posture.

"Skylight Interceptor helps organisations eliminate blind spots that are often missed by traditional perimeter security – in the cloud, on-premises and on remote sites – using the same Skylight sensors that are deployed for performance analytics," said Richard Piasentin, the chief marketing and strategy officer at Accedian. "Skylight Interceptor builds on Accedian's years of experience to deliver a true NetSecOps solution." ■

## Tecnotree launches DOCS 5G digital convergent charging platform

**Tecnotree**, a provider of digital business support systems, has launched its 5G-enabled Digital Online Charging System (DOCS) system. DOCS is a cloud-native microservices-based convergent charging platform designed to cater to both current and futuristic monetisation use cases of communication and digital service providers (CSPs).

With flattening average revenue per user (ARPU) and declining loyalty, compounded by an explosion in data consumption, CSPs are under tremendous pressure to offer appealing and hyper personalised services to acquire and retain customers. Tecnotree's DOCS system is designed to support existing and futuristic monetisation requirements of CSPs across the verticals and industries. Based on the latest 3GPP recommendations and TM Forum Open

API standards, Tecnotree's DOCS platform enables CSPs to build, launch and monetise their own as well as to create partner offerings to generate new revenue quickly.

"We strongly believe that telco partners and CSPs should be empowered to deliver new digital offerings and enhanced customer experience to their end customers," said Leena Koskelainen, the chief operating officer of Tecnotree. "Thus, we have not limited our offerings to only telco services but have extended our digital BSS suite portfolio with new convergent charging solutions for new age 5G and IoT based service providers. DOCS is going to be the cornerstone for CSPs to monetise their 5G investments as it can also be implemented to cater to specific 5G services with co-existing deployment models along with your current online charging systems." ■

### NEWS IN BRIEF

#### Turn-key data loss prevention solution launched by Acronis

**Acronis**, a specialist in cyber protection, has debuted a new advanced data loss prevention (DLP) pack for Acronis cyber protect cloud, a system that shields managed service providers (MSPs) and businesses of all sizes from data leakage. Notably, the solution does not require months for deployment nor highly skilled teams to maintain it.

Drawing from decades long experience enabling MSPs in data protection, this expansion resolves the main obstacles hindering the broader adoption of DLP solutions: gruelling roll-out and cumbersome ongoing administrative execution. For years, organisations have struggled to protect sensitive data from unauthorised access via external attacks or insider risks such as IT misconfigurations and human error. Previously, only a handful of large enterprises had the resources to manage the overall complexity, high deployment costs, and more significant obstacles that come with DLP adoption. ■

#### TEOCO adds FWA planning capabilities to ASSET

**TEOCO**, a provider of analytics, assurance and optimisation solutions to more than 300 communication service providers (CSPs) worldwide, has launched ASSET Q2 2022, the latest release of its radio network planning tool. ASSET Q2 2022 contains advanced features that will enable CSPs to plan and launch 5G fixed wireless access (FWA) services accurately and efficiently.

ASSET is deployed by CSPs worldwide and provides full capabilities to plan state-of-the-art networks. ASSET's 5G capabilities have been specifically designed to allow CSPs to achieve higher levels of prediction modelling accuracy, and the introduction of FWA features will allow them to manage this radically different planning environment as they move further forward on their 5G journey. ■



# CSP focus turns to generating revenue from enterprises

**As 5G arrives, private networks start to gather momentum and new applications enabled by artificial intelligence (AI), machine learning and software-based network control transform telecoms. VanillaPlus caught up with Sam Barker, the head of analytics and forecasting at Juniper Research, to understand where the opportunities lie for communications service providers (CSPs)**

**VanillaPlus:** CSPs continue to need new sources of revenue and to increase revenue from existing services. Is it fair to say the enterprise or business-to-business market has been overlooked amid the excitement over potential 5G consumer revenue? Isn't it the reality that the real money in telecoms comes from enabling communications for enterprises?

**Sam Barker:** Network operators' revenue comes from multiple sources, however they all generate revenue streams from their network infrastructure, including voice. ▶

**Sam Barker**  
Juniper Research

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messaging, Internet of Things and international roaming. Whilst the majority of revenue is generated from costs levied on mobile subscribers, it is more evident than ever that CSPs must now explore the B2B markets to grow revenue.

The traditional mobile pillars of SMS messaging and peer-to-peer (P2P) voice calling are in decline. Although the global pandemic brought about a change of consumer habits, with mobile commerce growing quicker than forecast out of necessity, and voice calling seeing an upturn in lieu of face-to-face interaction, the general trend suggests that over-the-top (OTT) messaging and calling services offered by third-party providers will continue to impact CSPs' revenue.

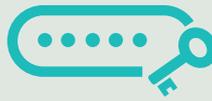
However, there are other revenue streams that CSPs must now focus on: mobile commerce, mobile identity, carrier billing and application-to-peer (A2P) voice functionality all offer tangible alternative revenue opportunities for CSPs that put the cost onto the enterprise. Indeed, Juniper Research's reports into areas including A2P Messaging, Flash Calling, CPaaS and Conversational Commerce, all expose a single trend; that scaling up CSPs' revenue involves increasing B2B services.

**VP: How do you see the future of business messaging developing as hybrid working becomes standard, regulation rebuilds trust in messaging in general and customers and prospects increasingly find messaging an acceptable method of conducting business?**

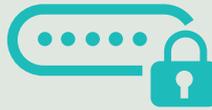
**SB:** As with all digital services, authenticating users and transactions is becoming increasingly important. The move to a hybrid working environment is accelerating the need for these new layers of security. SMS, as a technology, provides the perfect platform for many of these digital service providers to authenticate users by sending an SMS to a mobile phone number. Through the pandemic, enterprises have been able to see the advantages of investing in digital authentication services and the level of investment appears set to continue.

Mobile authentication involves sending the user a verification code over SMS – an essentially universal technology. Whilst the technology does lack the security of the other channels, as it lacks end-to-end encryption, it still remains a valuable proposition for enterprises. The mobile SIM card is used as a tool to verify identity that can enable legally binding authentication for new user accounts and payments. Indeed, these users' certificates are stored on the CSP's SIM card, which are then accessed via a PIN code.

**Figure 1:**  
**Examples of mobile authentication processes**



Password and social login; this is used for low-risk transactions. In this instance, the authentication is managed by the user themselves and there are no opportunities for mobile authentication providers.



Password, verified digital and TOTP; this is used for medium-risk transactions. These are becoming increasingly common amongst service providers.



Verified digital ID and MFA (Multi-factor Authentication); one of the strongest current methods of authentication. This service also provides the strongest opportunities for mobile authentication service providers.

Source: Juniper Research

In doing research on CSPs' reliance on authentication for SMS, we anticipate that more than 60% of total SMS business messages sent in 2022 were for authentication purposes. Adoption of SMS authentication has been accelerated due to the pandemic, and the increase in hybrid working scenarios has greatly enhanced the need for this level of authentication. In addition, there are many methods in which the enterprise can complete authentication. These are shown in **Figure 1**.

The COVID-19 pandemic has accelerated the development and user adoption of digital services, which has driven the uptake of mobile authentication services by enterprises. Juniper Research notes that the speed of digital adoption has increased due to the pandemic, with new services – such as digital virtual assistants – developing as a result. Through the pandemic, enterprises have been able to see the advantages of investing in digital technology with authentication, and the level of investment appears set to continue.

**VP: What about the resurgence of voice communications – is trust in voice returning, are users turning to telephony again or is voice dominated by conferencing apps? How do you see telephony reinventing itself and having relevance for the current generation?**

**SB:** It is imperative that mobile operators develop new revenue opportunities in order to ensure the success of their mobile voice services. There are many new areas Juniper Research has identified as key to increasing voice-based service revenue for operators, such as flash calling, programmable voice, contact centre-as-a-service (CCaaS) and voice recognition services.

In addition, voice firewalls are used to identify potentially fraudulent voice traffic to further the profitability of voice channels. Owing to the development of VoLTE and voice-over-5G (Vo5G), unlike SMS traffic, voice traffic adds a degree of complexity. This is due to these technologies ▶



## It is not only the enhanced complexity of voice traffic that encourages this use of voice firewalls, the rise of A2P communications will also cause an increase in the amount of IP-based voice traffic

requiring various different network planes to carry IP-based traffic. Without a comprehensive voice firewall, CSPs will not be fully monetising this resurgence in voice traffic the market is currently experiencing.

It is not only the enhanced complexity of voice traffic that encourages this use of voice firewalls, the rise of A2P communications will also cause an increase in the amount of IP-based voice traffic. Furthermore, this increased traffic will correlate to an increased prevalence of fraudulent activity. To protect this resurging voice revenue, it is essential that CSPs invest in these solutions to not only monetise A2P voice traffic, but also protect P2P voice traffic in areas where this remains an important service.

However, investing in new voice services is also important. In early 2022, voice players collaborated to provide a proof of concept for 5G interactive calling. Considering the increasing usage of Vo5G, network operators must capitalise on this momentum by not only developing, but also deploying, interactive calling capabilities. As mobile operators are already in competition with these OTT apps, we expect that CSPs will continue to offer advanced functionality to reclaim some of the P2P traffic lost, whilst increasing the value of its existing A2P services.

By 2026, our research forecasts that there will be nearly 2.5 billion Vo5G users worldwide. The launch of 5G standalone networks will provide an increased speed but reduced latency to end users, which will improve the potential of new voice calling services that allow operators to supply new levels of innovation for IP based telephony services.

### **VP: How will CSPs encourage the return to voice in telecoms?**

**SB:** The underlying theme in the telecommunications market is CSPs' focus on B2B revenue. Voice will be the same. The most prominent method of doing so will be through the implementation of CCaaS. Contact centres provide communications between companies and their consumers, and CCaaS solutions enable companies to enhance and upgrade their protocols in their control centres in any way they choose and with almost immediate effect. CCaaS is a service that merges cloud-based contact centre infrastructure with contact centre processes, and we expect this to play a significant role in the increasing usage of omnichannel communications strategies to centrally manage inbound and outbound communications for enterprises.

CCaaS is often an ideal solution for many contact centres, because it allows for scalability, as operational needs change daily. As CCaaS provides flexibility, this allows brands and enterprises to keep investment costs low whilst the capabilities of customer support are expanded. Previously, on-premises contact centre solutions meant that deploying new avenues of communication was often complex and time consuming. Voice will obviously play a major part in CCaaS operations, and CSPs will provide the underlying connectivity for voice channels.

CCaaS requires moving a contact centre infrastructure to the cloud, which will allow for the easy adoption of new functionalities and technologies. These technologies, including AI and automation, will allow voice cloud solutions to utilise voice AI in CCaaS; enabling users to view all calls and digital conversations in real-time, whilst also monitoring call routes and clearing. CCaaS platforms must work with CSPs to negotiate wholesale traffic agreements, from which CSPs can benefit financially. The launch of 5G networks and increasing reliance on software-based network functions means that these new voice functionalities can be implemented more efficiently, and innovation over voice channels will accelerate to meet the needs of CCaaS users.

Another technology that CSPs can use for voice revenue is flash calling, sometimes called A2P voice. Flash calling operates in a similar fashion to SMS business messaging; utilising a user's phone number to authenticate a user. However, this is done via an unterminated voice call, rather than a terminated SMS message. In addition, rather than using a code displayed in the content of the SMS message, flash calling uses the A number itself as a code.

However, at present, there is not a significant number of CSPs who are actively monitoring or auditing their networks for this category of traffic. As a result, monetisation opportunities are being missed on a wide scale. Last year, Juniper Research anticipated that over 60 million flash calls were made globally and that figure could rise to 128 billion.

However, given the increased complexity in using the A number to authenticate the user or transactions, fraudulent players will need to take extra steps to avoid the use of flash calling platforms and the subsequent cost. It is of note that at present, brands and enterprises do not pay for official flash calling traffic, as the owner of the network, the CSP, can charge a premium for this traffic, if it can be identified by voice firewalls. ►



## We expect that overall payments acceptance will broaden, somewhat driven by merchants' desire to accept as many payments as possible

One of these new services enabled by higher levels of virtualisation is programmable voice. Programmable voice is the ability to make, control, receive and monitor calls via voice application programme interface (API) software. These voice APIs enable an application to connect to an operator network, but they also allow the app in use to control voice services, such as call recording and audio conferencing. Having these services is key to competing with the rise of OTT apps and the innovation they are able to bring to the market. Indeed, focusing on the B2B market for voice will enable CSPs to create new revenue by charging enterprises for A2P voice services.

### **VP: What does conversation commerce mean to Juniper Research and where do you see the opportunities for CSPs here?**

**SB:** Conversational commerce is the process by which end users of conversational devices are able to make use of them for commerce purposes, including retail and banking. Conversational commerce is being driven by the rising interest in omnichannel communication and retail.

The omnichannel experience is being extended further through new developments, such as social commerce. eCommerce has the potential to move towards increasing the availability of – physical – products in real-time; linking brands to their consumers with fewer intermediaries. From these enterprises' viewpoint, ensuring they cover all channels in which customers wish to answer is essential; a failure to do so will lead to missed monetisation opportunities yet again. Indeed, there are a multitude of technologies that CSPs will support that will be pivotal for the omnichannel communications business model.

A key technology that Juniper Research has identified is rich communication services (RCS). The biggest hurdle the technology faces is a high level of regional fragmentation of adoption; to enable a user, both the handset and the CSP need to support RCS for business communications. This enables messaging platforms, which work with enterprises, to identify and authenticate the user, as well as allowing CSPs to identify the RCS business messaging traffic.

In addition, RCS vendors need to ensure that they can accept as many different payment methods as possible, as preferences for these change regionally too. RCS vendors must mitigate this fragmentation by considering these regional disparities and partnering with leading payments vendors on a region-by-region basis, or risk suffering from a disparate regional portfolio themselves.

We expect that overall payments acceptance will broaden, somewhat driven by merchants' desire to accept as many payments as possible. However, the regional disparities are not likely to diminish to any significant degree, especially amongst different payments mechanisms.

### **VP: Do you think CSPs will be able to generate the revenue they need from business messaging, voice telephony and conversation commerce? What do they need to do in order to maximise their opportunities in these areas?**

**SB:** The telecommunications market has grown to become largely resilient; the focus for CSPs must be on utilising their existing network to generate new revenue or increase the size of existing revenue streams. As previously mentioned, CSPs are now focused on services that levy the cost on enterprises, rather than consumers, to generate revenue.

For messaging revenue, CSPs must continue tackling the issues of grey route messaging over their networks. By using grey routes to masquerade A2P SMS messages as P2P, fraudsters lower the cost to terminate the traffic. The onus is on the CSP to distinguish A2P from P2P traffic; many network operators are implementing traffic control measures, such as firewalls, to identify potentially fraudulent activity and subsequent revenue leakage.

To foster confidence in conversational commerce, there must be an increased level of convenience for the end user. If these services fail to provide users with reasons to start using conversation commerce, they will continue to use established commerce channels. However, these brands and enterprises will be largely unconcerned with the eventual method of payment. From a brand's or enterprise's viewpoint, they must ensure that they cover as many possible communications channels with their customers as possible, to maximise sales or service revenue.

However, for those players handling the payment of conversational commerce transactions, there must be an evaluation of regional variations of differing preferred payment methods. Indeed, there are numerous payment methods that have established themselves across varying regions. Brands and enterprises, especially those working in a multinational context, will look to partner with payments providers who can offer the most in-depth portfolio of commerce payment methods. ■

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# The future of business messaging and A2P voice

Communications service providers (CSPs) will deliver more than 2.7 trillion business messages this year, rising from 2.5 trillion last year. Out of these, more than 60% will be attributable to mobile authentication, including one-time passwords (OTP) and multi-factor authentication (MFA). SMS messages provide a link or authentication code to a digital service; the value of SMS lies in its ubiquity. In addition, interest in over-the-top (OTT) apps and rich communication services (RCS) continues to grow as a rich media alternative. However, this does lack the guaranteed termination of content owing to a high amount of regional fragmentation, reports Juniper Research

The COVID-19 pandemic has highlighted the need for a more secure means of authentication than the use of passwords. Providers of ecommerce and other retail services are now deploying a digital-first strategy. A digital-first strategy is now also being followed by network operators worldwide as a means of reducing the operating costs of physical retail stores and call centres, whilst introducing a digitalised form of customer service.

Europe and the Asia Pacific region represent some of the highest traffic for authentication, especially for OTPs. In addition, Asia Pacific has a high adoption of the **GSMA's** Mobile Connect solution amongst stakeholders in the region. North America also uses mobile networks for MFA traffic, with many connectivity platform as-a-service (CPaaS) players launching services in these regions to capitalise on this growth.

However, recently, CSPs are facing increasing pressure from over-the-top (OTT) applications that are launching A2P services that seek to take this traffic, and the associated revenue, from the CSPs. This mirrors the trend in which CSPs gradually lost peer-to-peer (P2P) messaging traffic to these OTT apps over the last ten years. These OTT apps are far more agile than CSPs, and do not need to adhere to industry-wide specifications that can hinder development. Whilst this has accelerated the interest in RCS business messaging (RBM), CSPs have shown their lack of agility in comparison to OTT players.

RCS represents the greatest opportunity for CSPs to develop significant revenue from rich-media messaging; however, at present, not all mobile network operators support RCS. Although this support is continuing to grow, enterprises will remain hesitant to transfer large portions of their business messaging traffic to RCS.

The deployment of an RCS campaign without the guarantee of the message being delivered in the intended format to all end users would mean that investment in high-traffic marketing campaigns will be unattractive.

However, authentication traffic is expected to remain on SMS for these three key reasons:

- **Familiarity with the service:** Enterprises are familiar with the processes of batch sending SMS messages. RCS adds an extra layer of complexity to these processes, including conversational elements, AI-based chatbots, and rich media capabilities.
- **Guaranteed termination:** As previously mentioned, RCS is not universal like SMS. As a result, authentication traffic is likely to remain over SMS. Whilst guaranteed termination is key, the speed of the delivery of the message is also important.
- **Inexpensive rates:** RCS is relatively more expensive compared to SMS. Given the aggregate costs of bulk sending, significant cost savings can be attained by placing this traffic through SMS.

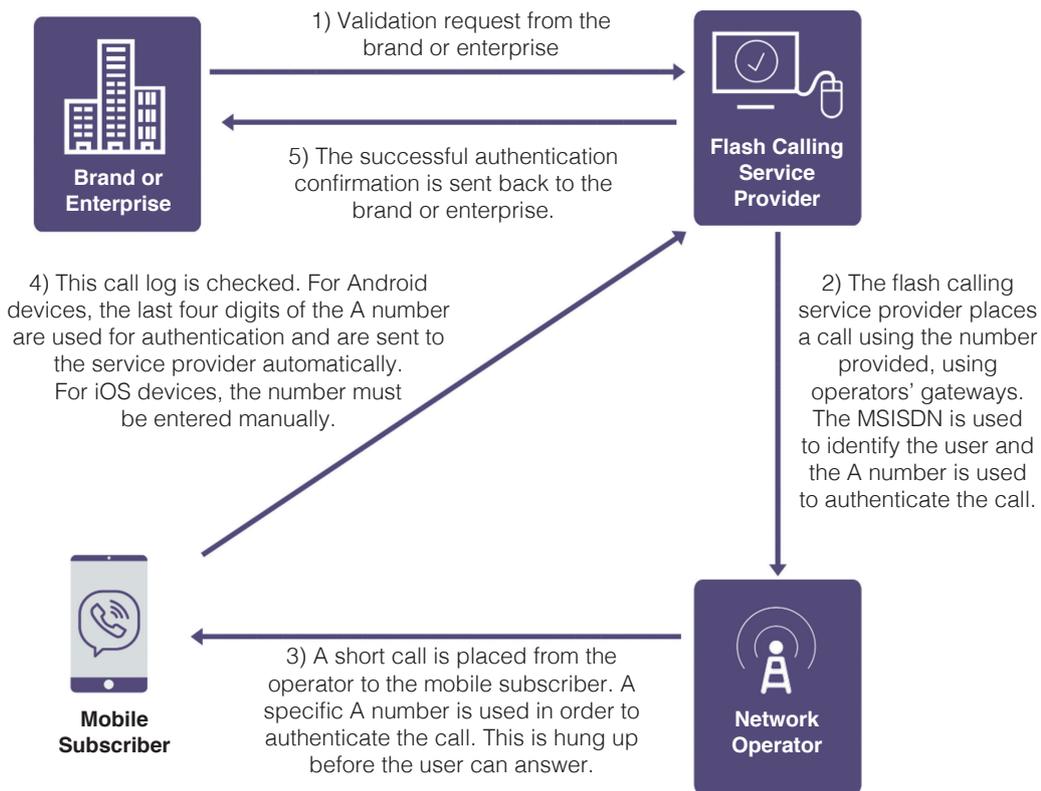
However, there is one potential avenue that operators must explore to retain application-to-peer (A2P) revenue: flash calling.

Flash calling is relatively nascent. However, it has significant potential to disrupt the A2P messaging space for authentication purposes. What is clear is that A2P traffic has a presence in the majority of markets. As a result, the impact from flash calling could be a global phenomenon, rather than being limited to a small number of geographical regions. ▶

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**Figure 1: How flash calling works**



Source: Juniper Research

MFA is a key area of authentication and mobile identity. One common theme that is emerging is a digital identity solution that is progressive and versatile; driven by data and facilitated by technology, including application programme interfaces (APIs), machine learning (ML) and advanced verification services.

**Figure 1** shows the process for flash calling:

Customer expectation is also a driver. Simplification of authentication services will be the catalyst for success of which authentication solution is widely used. From the perspective of the brand or enterprise, however, the differences between A2P SMS two-factor authentication (2FA) and flash calling are minimal, and thus the brand or enterprise will initially choose the most cost-effective.

However, these costs may rise if flash calling authentication traffic fails to authenticate the user, thus requiring more attempts to do so. Based on the billing mechanism between the service provider and the brand or enterprise, this may result in additional costs which will make A2P SMS two-factor authentication (2FA) more cost-effective. **Juniper Research** recommends that service providers limit attempts to avoid this, or implement single billing for application programme interface (API) calls to the same mobile subscribers over a short period of time, such as ten minutes.

Flash calling is a process in which brands

and enterprises can utilise to authenticate areas of their relationships with clients. Juniper Research defines flash calling as 'an authentication process that uses mobile voice networks to authenticate users or actions. A missed call is placed, with the incoming number acting as the one-time password which can be processed automatically.'

Firstly, CSPs must begin auditing their networks to identify flash calling traffic. After this, CSPs have two options: monetising this traffic to generate a direct revenue stream or blocking the traffic to encourage the continued use of SMS. If left unattended to, the service may lead to substantial losses for CSPs who do not only fail to monetise this traffic, but will also experience a migration of A2P SMS 2FA traffic to flash calling services.

With the nascent nature of flash calling, many flash calls are likely to fail in the early stages of use. Flash calling providers must ensure that brands and enterprises are not charged for these failed calls. Low pricing or free traffic should be offered in order to entice potential brands or enterprises to use flash calling service providers. In turn, a path to a return on investment is demonstrable and will encourage further investment. However, implementation of this strategy must ensure fair usage policies and clear pricing information for commercial usage once the trial period ends. ■

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A world map with a network overlay of white lines and dots connecting various points across the continents, representing global communication infrastructure.

# CSPs eye-up enterprise revenue opportunities as voice loses influence

**The search has been on for most of the last two decades for communications service providers (CSPs) to uncover new sources of revenue to underpin their continuing need to invest in the next generation of cellular networks as well as sustain fibre infrastructure roll-outs. This is not a question with a single answer and many of the apparent answers have already proven to be wrong but with the clock ticking down to a commoditised future for CSPs, what monetisation levers do they have left to pull, asks George Malim?**

Much of CSPs' profitability during the last 20 years has come from enterprises which is in direct contrast to the coverage, attention and focus on innovation that has been experienced in the consumer sector. The mobile generations in tandem with smartphones and the app explosion have transformed how we all communicate as consumers and at work but this has left CSPs with a problem. Who will pay for their infrastructure and, perhaps more importantly, who will pay more to use it? ►



**Vladimir Mitrasinovic**  
Amdocs



**Martin Morgan**  
Qvantel



**Maria Lema**  
Weaver Labs



**Hamish White**  
Mobilise

“It is true that most profitability for CSPs does come from enterprises, but what has changed in the last few years is that enterprises are not exclusively buying connectivity, minutes or devices,” says Vladimir Mitrasinovic, the regional vice president for EMEA at **Amdocs**. “They want much more than that and, as users consume more bandwidth, CSPs will need to increase their prices or risk higher costs eroding their profit margins.”

“Of course, enterprises remain a key source of revenue for telecoms companies, but they need to be prepared for market changes by expanding and augmenting their offerings and pricing structures,” he adds. “If they aren’t, they may be pushed into a bidding war, which will inevitably result in a reduction of their profitability, a hit to their image, and they may be outbid by alternative providers.”

Martin Morgan, the head of digital marketing at **Qvantel**, agrees that the opportunity centres around being able to sell richer services that are enabled by CSPs’ strengths. “The opportunity is to sell solutions that are built on connectivity – especially in 5G where the CSPs can manage the latency and quality of service (QoS) of the network,” he says. “This gives CSPs a stronger position and means they can’t be pushed aside by another ICT provider.”

Others see the need to expand beyond public telecoms networks and into ICT service provision, with private network provision an attractive

opportunity. “Real money in telecoms comes from delivering the enterprise networks, not only communications for enterprises,” says Maria Lema, the co-founder of **Weaver Labs**. “Specialised networks can serve a variety of use cases and are the key to success in increasing revenues. Building networks that serve multiple use cases in a cost effective and replicable way is where key savings and revenue multipliers come into play.”

“Businesses no longer invest in complicated networks to carry just one type of traffic,” continues Lema. “That’s outdated and simply doesn’t work well with how the market dynamics operate. Businesses buy software that solves their problems in the application layer. The network must be able to handle what the software is giving it to transport. Network solutions, such as IMS and SMS have proven to be a black hole in investment. The application layer and the software industry have already solved the problems of messaging and communications without the need for any special network processes in place.”

### Mixed messages

It doesn’t look like business messaging will be the saviour of telecoms revenues either. “Back when services like **WhatsApp** weren’t considered a business tool, I met with many CIOs and CTOs that believed business messaging would prevail over consumer-based applications,” says Mitrasinovic. “But we now find ourselves in a time when business

**Businesses no longer invest in complicated networks to carry just one type of traffic**



**For several years, CSPs have sought to decouple their charging from the cost of providing the network and instead to charge for the value customers derive from the connection**

messaging takes place across many communication platforms. Of course, businesses are concerned about security and personal data protection, but we cannot think of the future of messaging as a dedicated server. Instead, the security of existing communication platforms needs to be assessed and improved. This is where innovation and evolution become vital for CSPs, many of which had to adapt during the Covid crisis to create new offerings and services that supported business messaging.”

In fact, the pandemic may have created some false symptoms that could prove a distraction to CSPs. Stay-at-home workers have inevitably increased their messaging and voice interactions while businesses have turned to messaging as a means to maintain customer relationships and drive marketing. How much of this will remain after the situation stabilises is open to interpretation but few see a sustained resurgence for traditional voice.

“Voice has become a commodity for all customers – enterprises and consumers alike,” acknowledges Morgan. “CSPs need to be able to look at new revenue streams.”

### No time for sentimentality

Lema shares Morgan's lack of sentimentality. “Voice as in telephony is dead,” she says. “The only reason we still support 2G is that a generational change hasn't really happened yet. All communications happen through the application layer, and we don't expect any surge in revenues coming from telephony. This will be a very low percentage of the revenue in the coming years. There will be a clear decline in usage and revenues as we move forward with more solid 5G coverage and increased bandwidth for apps.”

Something drastic will need to change in order for voice to bounce back and be a substantial part of CSP revenues. “Voice has suffered and changed dramatically over recent years,” explains Mitrasinovic. “There is an ongoing resurgence, but not in the way that we think. Copper-based networks have evolved into fibre-based networks for robust IP-based communications and the ever-increasing need for capacity and broadband speed. Voice communication is not going to reinvent itself and will likely need to be catalysed by new use cases, such as between human and machine. 5G is enabling CSPs to provide their customers with much more reliable connectivity, which will also help to re-cement voice as a valuable communication tool, reopening the door for voice-based revenue streams for CSPs.”

Straightforward provision of a portfolio of communications services won't be enough to

elevate CSPs into a higher revenue market. They will need to add capabilities that enable them to make differentiated offerings. This might take the form of bundling in ICT capabilities as Lema mentioned earlier but offerings may need to be more sophisticated and specific to customers' needs. Those that can do this will be rewarded.

“Together, business messaging, voice telephony and conversational commerce will provide enterprises with a source of enhanced communication,” says Mitrasinovic. “The CSPs that will profit most from this are those that offer all of these methods of communication and add their own twist. Just providing yet another price plan for voice messaging will not generate significant additional revenue for telecoms companies, especially as non-CSP providers begin to play in this area. CSPs therefore need to embrace the changes being seen within the industry, combining their services and providing customers with additional capabilities, alongside seamless connectivity. By providing security, closed communication and allowing transparent and easy access, CSPs will be able to maximise their revenue opportunities in all three of these areas.”

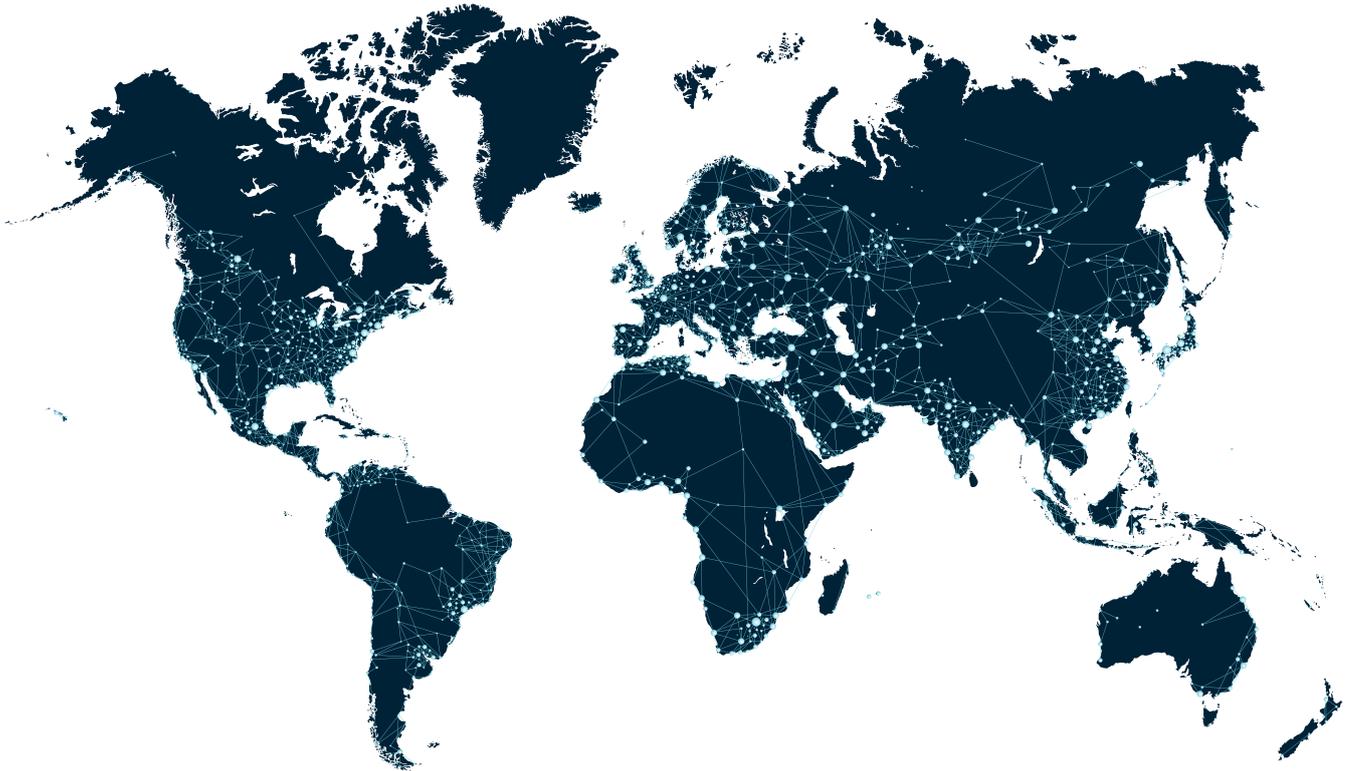
### Risk and reward

For several years, CSPs have sought to decouple their charging from the cost of providing the network and instead to charge for the value customers derive from the connection. This is a complex undertaking and, understandably, there is no great appetite among enterprises to shift to this inevitably more expensive model. This doesn't mean, however, that enterprises are unwilling to pay for value, if CSPs can deliver it.

Morgan sees the opportunity: “Yes,” he confirms, “CSPs can develop value-based pricing for services where latency and quality of service are important. At the consumer level the example everyone talks about is gaming with no jitter or lag. In enterprises this could be provision of Industry 4.0 solutions for robotic production in a smart factory, where the customer would be willing to pay a premium for a service level agreement to ensure QoS so that the robotic production line runs smoothly.”

This involves taking on risk as part of an external business process but, if agreements are constructed properly, the rewards could be appealing.

“I don't think that enterprises are interested in models that tie charging to the value of the service enabled rather than network usage,” says Mitrasinovic. “Many are willing to pay a premium for specific services, but it's hard to say whether CSPs will generate more revenue with such charge ▶



optimisations. However, if CSPs open up their platforms, enabling third-party content to be input and managed in one place, it may be easier for them to manage the entire value chain and simplify the link between the value they enable and how they charge, ultimately increasing their profitability.”

Technologically, CSPs are able to engage in these more complex models and handle the more sophisticated array of partner relationships that successful service delivery demands. “From a BSS vendor perspective, a revenue model that charges consumers based on service value rather than network usage is not only possible, but also an effective way for CSPs to drive incremental revenue in today’s competitive telecoms landscape,” says Hamish White, the chief executive of **Mobilise**. “Having a digital ecosystem of partners offering an ever-growing range of products and services is essential to effective upselling. However, the wider the range of products and services the more complex the user experience can become.”

“Digital BSS platforms enable CSPs to deploy their own suite of products and services and also integrate third-party value-added services, like loyalty and reward schemes, streaming services and device insurance for example, into one digital customer interface,” he adds. “Cross-selling and upselling must be performed in a targeted manner. CSPs should adopt a hyper-personalisation strategy, which use data drives behavioural insights technology that integrate artificial intelligence, machine learning and data analytics, to strategically offer customers services, offers and prices that are most likely to successfully sell based on each customer’s individual behaviour patterns.

Digital BSS platforms enable CSPs to access, analyse and act upon this information from one comprehensive system, making a value pricing model more feasible.”

Lema warns against rushing down blind alleys of opportunities that don’t provide a means for CSPs to differentiate and ultimately will fail to enable them to transform their businesses. “Again, messaging, telephony and conversational commerce are all carried out by the application layer,” she says. “The only way CSPs can improve their position in the market is by being able to provide more agile means of creating connectivity to serve the wide and heterogeneous set of needs of the enterprise market right now. These challenges span far beyond voice provisioning and will be the ones providing the key source of revenue in the future.”

The opportunities that stand out for CSPs are less in the voice and messaging arena and more in a specialised market of providing a wider package of technology to enterprises. Examples might encompass provision of a private network at a manufacturing site that also adds messaging, voice-to-machine capabilities, management of robots and has revenue tied to business outcomes, such as production line uptime. This type of lateral thinking, that goes way beyond the telecoms network and does not only replicate offerings of ICT providers, is how CSPs will transform their profitability and revenue generation capabilities. The coming years will uncover which CSPs have been able to make the shift and which instead become – commodity – suppliers of telecoms infrastructure to those that could change successfully. ■

**Lema warns against rushing down blind alleys of opportunities that don’t provide a means for CSPs to differentiate and ultimately will fail to enable them to transform their businesses**



# Why effective automation and orchestration are the tickets to network modernisation and monetisation

**Communications service providers' (CSPs) transition from physical to multi-cloud networks is driven by the promises of enhanced service experience, complete resilience, operational agility, and optimised capital expenditure. It is a radical departure from the traditional single-purpose hardware appliances model. CSPs therefore must now design and operate their service deliveries across a web of data centres, bridging physical and virtual ecosystems while enabling interoperability across a more diverse multi-vendor ecosystem. Here, VMware considers the intensive tasks for coordinating virtual and cloud network functions (VNFs and CNFs collectively termed xNFs), combined with the design and management of services. An automated approach, in the form of orchestration, that abstracts the multi-cloud complexity and removes tedious manual tasks is mandatory to achieve the telco cloud's expected efficiencies**

Achieving effective automation requires holistic support of network functions and the services lifecycle from their creation to their termination – creation, onboarding, installation/configuration, start/stop, scaling, monitoring/diagnosis, reconfiguration, healing and updating. To perform these activities, an orchestrator must interoperate with several other components of the modern network architecture – Kubernetes, VIM, EMS, VNF-M, OSS/BSS and service assurance. Using vendor-neutral standards, such as ETSI-MANO, TMF and O-RAN, is crucial to successfully coordinate the various components of this architecture while protecting CSPs from potential vendor lock-in issues. Since late 2013, CSPs have been deploying NFV in production. Mature standardised solutions, such as management and orchestration (MANO), however, have not yet been widely available or used. Many of the current deployments struggle with a lack of interoperability across the various vendors, which

paves the way for half-baked solutions requiring major service integration fees and, consequently, delaying roll-outs of virtual based services.

## Market dynamics

Most vendors in the automation and orchestration market are either network equipment providers (NEPs) or operations/business support system (OSS/BSS) providers that typically propose a top-down or blueprint-first approach to orchestration and whose solutions primarily work in siloed stacks. These approaches do not consider the complexity and rapid evolution of cloud technologies, which can create continuous integration challenges or deficient onboarding, placement and management processes.

Network transformation is well underway, which affects all layers of service delivery. Transformation can offer opportunities, but also present fast-paced ▶

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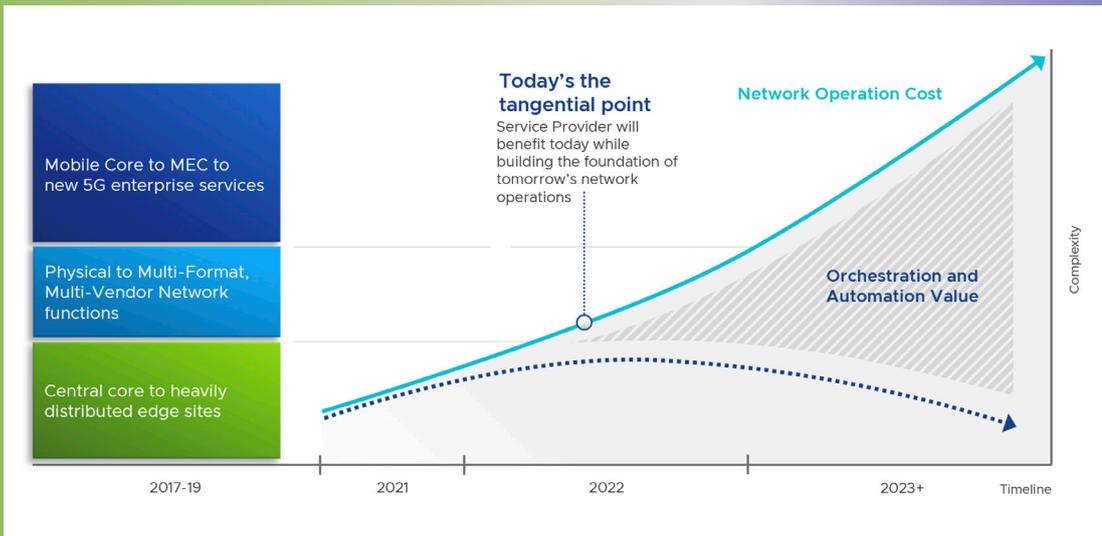


Figure 1: Building a system for network modernisation: VMware Telco Cloud Automation

changes which require new mindsets, skills, practices and solutions. As CSPs rapidly try to adapt to these changes, the complexity of their operations increases exponentially with each change – from infrastructure to multi-cloud and containers-as-a-service (CaaS) management to network functions, services and network slicing.

As the cloud gains in importance in the service delivery, there are massive multi-layer innovations starting from infrastructure to applications to the service layer. A clear innovation is the transition from a central or regional core data centre to a highly distributed cloud ecosystem, including near and far edges – and even traditional public clouds or IT for certain types of workloads. There exists a transition from only a few data centres to hundreds and more, designed with fragmented technologies such as heterogeneous VIM and Kubernetes. Coupled with those changes is the multiplication of multi-vendor network functions and enterprise applications running on VMs and containers. Some networks are already supporting thousands of xNFs, but the overall market is still nascent.

CSPs understand that orchestration and automation must be implemented at the heart of any service delivery to mitigate the network transformation operational impacts with leaner processes that scale. Automation and orchestration are the right answers to enable organisations to innovate while controlling the costs of these rapid and disruptive advances. Now CSPs are beginning to see the value in their operations to curb the complexity and cost curve (see **Figure 1**). CSPs benefit today by implementing these capabilities – those benefits will only increase as the virtualisation footprint grows. CSPs that wait to orchestrate and automate their networks, on the other hand, will miss revenue-generating opportunities and see costs and complexities increase. It comes as no surprise, then, that by 2024 according to **Appledore**

**Research** the global service orchestration market will reach US\$1.9bn, at 93.2% CAGR.<sup>1</sup>

When developing an effective automation and orchestration solution, it is essential to keep in mind that CSPs globally find themselves at different stages of network maturity. As such, the ideal automation solution can manage 4G, VNF-based networks, help a CSP graduate to 5G, CNF-based networks and, for those CSPs that already operate with 5G, cloud-native networks, support cutting-edge automation, such as network slicing to unlock new revenue sources. An effective automation solution must support both VNF and CNF-based workloads and help carry a CSP from 4G to 5G in a way that minimises network disruption and opens avenues to reduce costs and bolster revenues. In other words, the path to network modernisation does not only lie in constructing features to address tomorrow's requirements, but one that can provide end-to-end management, automation and orchestration for many of today's 4G-based requirements as well.

With this mindset, **VMware** built VMware Telco Cloud Automation – a product that provides extensive network automation for 4G and 5G-based networks. VMware began its journey with Telco Cloud Automation in 2016 by assessing the market, listening to CSPs and launching as an orchestrator to address 4G deployments and VNF management. VMware's findings were twofold: first, CSPs must implement orchestration and automation as soon as possible to improve efficiency and ensure readiness for modern cloud network innovations. Second, most of the existing solutions on the market were designed around CSP vendors' vantage points with traditional drawbacks such as vendor lock-in and heavy integration costs.

These solutions all shared a fundamental flaw: none have fully taken advantage of the cloud's ►

**As the cloud gains in importance in the service delivery, there are massive multi-layer innovations starting from infrastructure to applications to the service layer**

<sup>1</sup> <https://appledoreresearch.com/2022/03/30/the-rapid-evolution-of-end-to-end-cross-domain-service-orchestration/>

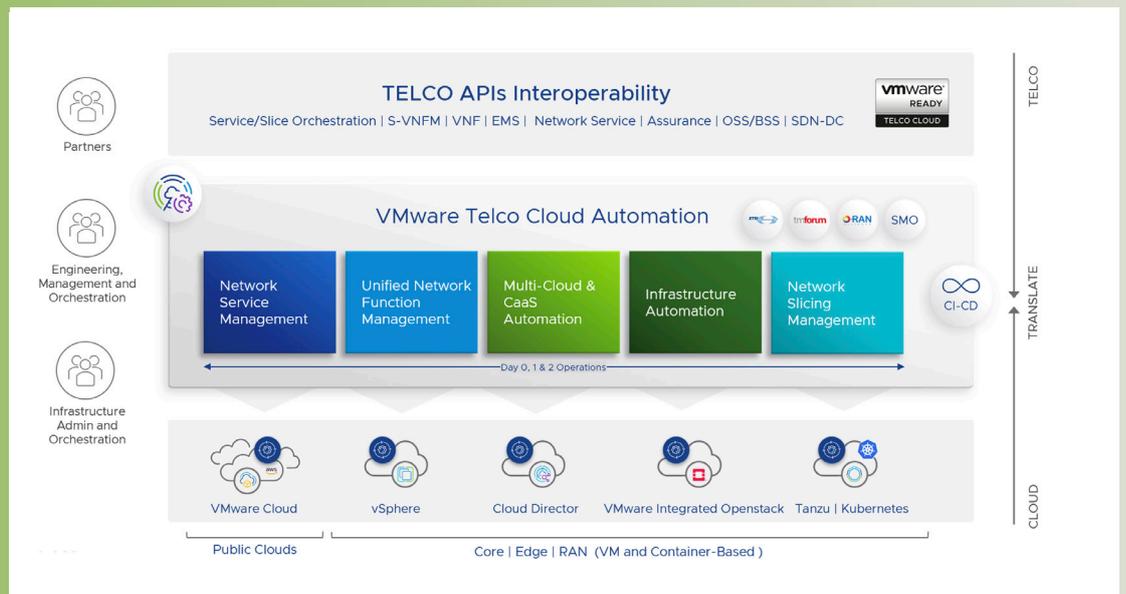


Figure 2: CSPs' end-to-end automation journey

**VMware Telco Cloud Automation's xNF management capabilities are both fundamental for any network seeking comprehensive VNF management or for those striving for CNF deployments**

capabilities over time, nor have they tapped into possibilities associated with multi-cloud deployments. To address these pain-points, VMware applied its cloud expertise and proposed a new cloud-smart approach to orchestration – a strategy that abstracted much of the cloud complexities and exposed the new multi-cloud ecosystem through standard CSP interfaces, such as ETSI and TMF. The pith of this approach was VMware's ability to build native integrations at each layer and to continuously synchronise the south-bound infrastructure stack – VIM/CaaS/IaaS – with the upper service and application management stack of NFVO/xNFM/EMS/SOM/xAPPs/rAPPs. VMware, in short, constructed an automation solution that addressed the immediate needs of CSPs, while also enabling a path for future network growth and development.

**How does effective xNF management create a modern, monetisable network?**

VMware Telco Cloud Automation is a multi-domain, multi-layer automation and orchestration platform that accelerates time-to-market of communication services while igniting operational agility through unified automation across networks and clouds. It delivers modern, multi-cloud automation for each layer of the telco cloud – from infrastructure to xNFs to network service and slicing – and streamlines the CSPs' end-to-end automation journey (see **Figure 2**).

Building from its original bread-and-butter capabilities, VMware Telco Cloud Automation offers robust management of network functions through a generic network function manager (G-VNFM) that unifies and standardises the lifecycle management of network functions across hybrid technologies, including VNFs and CNFs from a host of network function vendors, as depicted in **Figure 3**. This

automation layer allows for easy onboarding and instantiation of new network functions and the corresponding lifecycle management of their Day 0 to Day 2 operations. This layer also permits additional CNF-based automation, such as late-binding for Kubernetes nodes customisation.

VMware Telco Cloud Automation's xNF management capabilities are both fundamental for any network seeking comprehensive VNF management or for those striving for CNF deployments. Below we present capabilities central to VMware Telco Cloud Automation's xNF automation layer to illustrate how its features enable seamless workload deployments for any network at any stage of maturity. For more on VMware's late-binding capability, see the section on CNF, VM and Kubernetes node customisations on Page 21.

**Design network functions and services through an easy-to-use visual composer.** The visual composer provides an end-to-end environment to design new or modify existing ETSI-MANO compliant TOSCA templates. The network function template integrates elements such as VDU, HELM, network, resources, automation interfaces, and other artifacts.

**Easily onboard network functions and services.** Telco Cloud Automation enables onboarding of SOL001/004-compliant network functions and services. Telco Cloud Automation provides a simple UI for network function onboarding in few easy steps. Since most of the network functions have been certified through VMware Ready for Telco Cloud<sup>2</sup> before being onboarded, it ensures smoother implementation and artifacts compliance. Once onboarded, the network functions and services are added to their respective catalogues for review and instantiation. ▶

<sup>2</sup> Ready for Telco Cloud is one of the most adopted programs in the telco industry, with 255+ pre-certified network functions from 40+ vendors (including both virtual and modern applications).

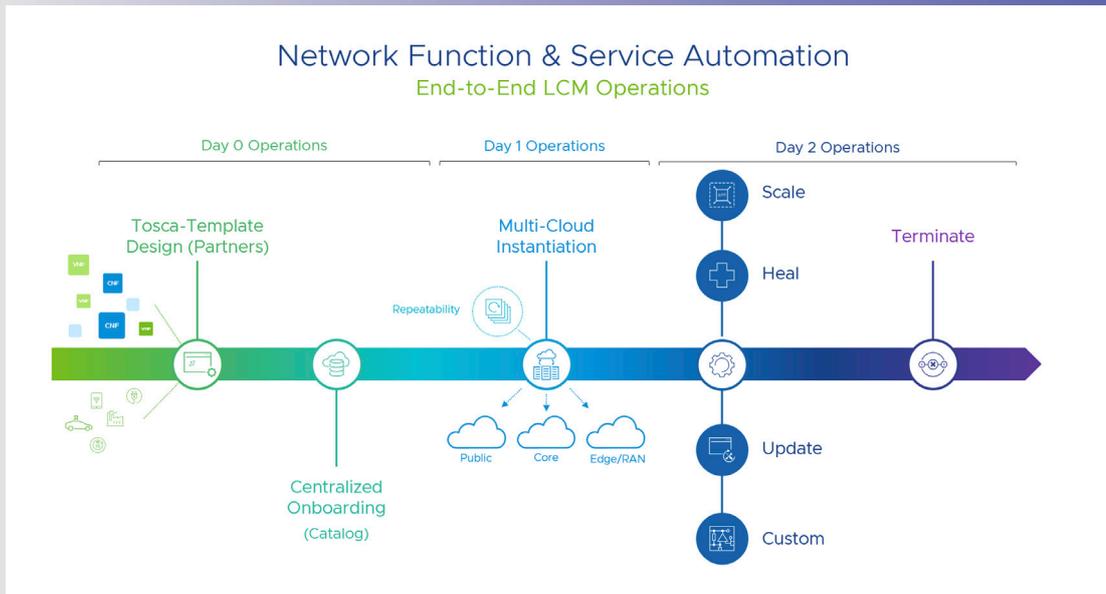


Figure 3: VMware’s vision of network function and service automation

**Access all network functions and services in a single location.** The centralised catalogues offer access to all onboarded xNFs including those onboarded using Telco Cloud Automation and others managed through third-party S-VNFM.

**Intent-based placement (cloud-smart).** Continuous synchronisation between Telco Cloud Automation and the VIM/Kubernetes clusters enables effective intent-based placement. Telco Cloud Automation automatically optimises workload placement on the most suitable cloud, matching the descriptor requirements with the cloud profiles – limiting possible rollbacks and allowing for more dynamic management of the application and cloud resources.

**CNF, VM and Kubernetes node customisations.** In line with the notion of intent-based placement and to solve a major industry problem related to CNF instantiation, Telco Cloud Automation automates the Kubernetes node customisations, in a process known as late-binding. Late-binding addresses a fundamental issue for network operators: how to balance a set of heterogeneous vRAN and 5G core vendor requirements with consistent operations. Telco Cloud Automation’s late-binding configures cloud resources on-demand based on the network function requirements and then (re)applies these configurations during cluster scale-out or upgrades.

**Automated lifecycle management.** Telco Cloud Automation offers automation capabilities driven by a workflow engine that executes operations described in VNFD and NSD, plus custom-defined workflows. These policies apply to the entire lifecycle management (Days 0 – 2 operations) of network functions and services for lean operational processes. They also remove complicated, tedious and repetitive tasks while maximising overall

resource utilisation through dynamic scaling and multi-cloud workload mobility.

The confluence of these features provides comprehensive xNF management for CSPs at any stage of network development – from those deploying 4G-based VNFs to those seeking hybrid xNF deployments to those entirely cloud-native. VMware Telco Cloud Automation serves as that unifying, multi-layer platform for CSPs on the journey to network modernisation. VMware Telco Cloud Automation’s xNF management also helps CSPs reduce costs and unlock incremental sources of revenue.

Telco Cloud Automation’s centralised and unified xNF management transforms traditional processes and reduces manual tasks required at the network layers – improving efficiency of Day 0 – Day 2 operations and reducing opex. xNF automation is also a key factor in improving network and service resiliency and reducing mean time to repair (MTTR). These improvements lead directly to an improved customer experience, which allows CSPs to meet and exceed increasingly stringent service level agreements (SLAs) – opening additional sources of revenue. This improved customer experience offers better quality of service, bolsters customer satisfaction and SLA adherence, resulting in additional revenues, market share and reduced customer churn.

Network automation and orchestration are key components to supporting CSPs at any stage of workload deployment – from 4G-based VNFs, to hybrid xNFs to pure 5G-based CNFs. What’s more, VMware’s Telco Cloud Automation support for 4G and 5G-based workloads can – through easy onboarding, instantiation and centralised lifecycle management – walk a CSP through network modernisation efforts, all while reducing costs and opening new revenue sources. ■ [telco.vmware.com](https://telco.vmware.com)

**VMware Telco Cloud Automation serves as that unifying, multi-layer platform for CSPs on the journey to network modernisation**

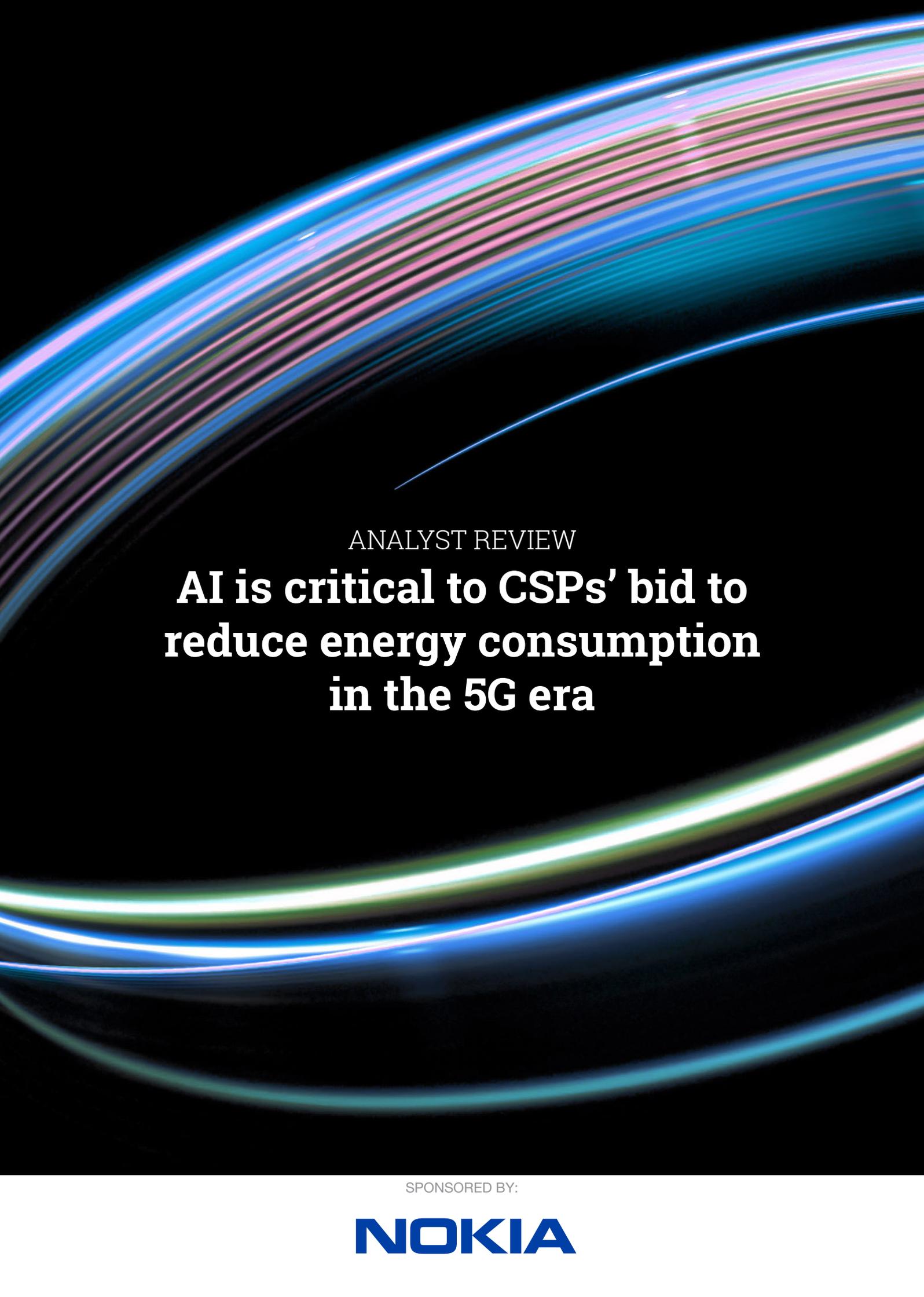


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ANALYST REVIEW

**AI is critical to CSPs' bid to  
reduce energy consumption  
in the 5G era**

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# AI is critical to operators' bid to reduce energy consumption in the 5G era

**Caroline Gabriel**, Research Director, Networks,  
Analysys Mason

**Communications service providers (CSPs) are under increasing pressure to reduce their energy consumption, and this issue has been rising steadily to the top of their corporate agendas**

There are many reasons for this:

- The current spike in fuel costs will drive up energy costs and, if action is not taken, this could put opex efficiency programmes at risk
- Consumers are increasingly concerned about the environment and interested in the green credentials of the companies they purchase from
- Governments around the world are putting sustainability at the heart of their economic plans. Many CSPs have pledged to support large-scale sustainability initiatives such as the European Commission's 2019 Green Deal, which set a goal of becoming carbon neutral by 2050 across the bloc.
- National and supra-national goals are filtering through to specific regulatory policies in the telecoms market, such as India's mandate for renewable energy sources to be used in rural cell towers

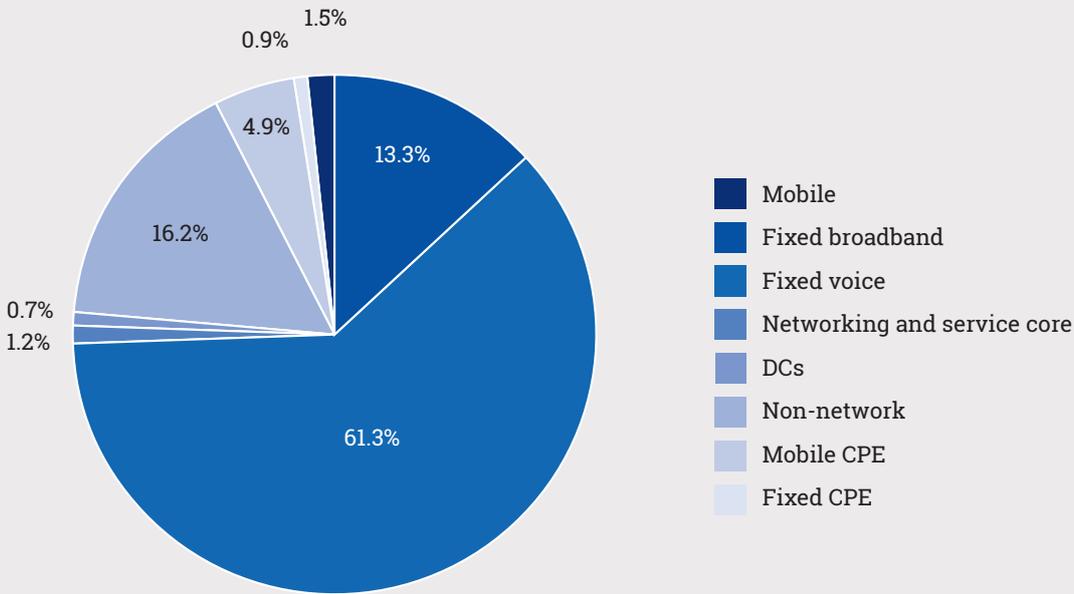
These combined pressures are driving a rising number of CSPs to put environmental, social and governance (ESG) issues at the very top of their long term strategic agendas. As José-María Álvarez-Pallete López (CEO of **Telefónica**) put it in November 2019: "The central axis of our strategy requires innovative, intelligent and sustainable technology solutions that generate a positive impact on the environment and help manage the digital transition." ►

**SPONSORED REVIEW**



Figure 1: Split of energy consumption, new technology mix

[Source: Analysys Mason, 2022]



## Energy efficiency is critical to CSPs' sustainability and cost control

Reducing the energy consumption of their networks is critical to CSPs' broad efficiency and sustainability goals, and they increasingly recognise that this issue is now a commercial imperative. Vague targets and lip service are certainly no longer enough to satisfy the increasingly well-informed consumer, let alone the regulator, or the operator's own CFO.

**Analysys Mason** conducts an annual survey of senior executives within over 80 tier one CSPs, and the results reveal that energy efficiency has, in every year from 2018 to 2022, become a more important strategic priority, from the viewpoints both of sustainability and cost control. In 2018, energy efficiency was, on average, eighth of the CSPs' 10 top strategic priorities for the next decade; in 2022, the figure had risen to fourth.

Within these long term roadmaps, concrete actions need to be decided now, to support short and medium term improvements. CSPs are evaluating many different ways to reduce energy consumption, from introducing liquid-

cooled base stations to replace air conditioning, to retiring legacy copper or wireless networks. But perhaps the greatest opportunity to achieve long term, sustainable efficiencies lies in the intelligent management of the network itself, supported by emerging AI/ML technologies.

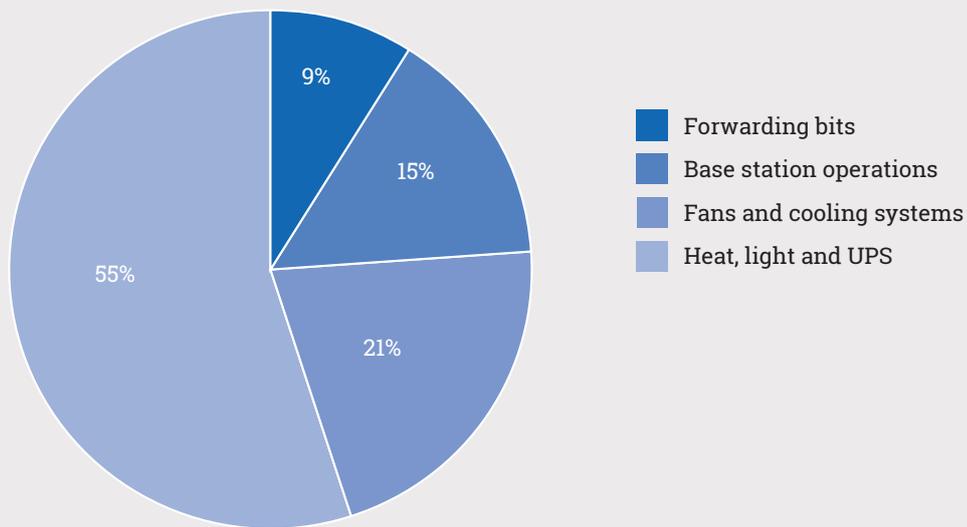
## The mobile network has the greatest potential to deliver energy efficiencies

The telecoms industry is relatively energy efficient compared to some sectors. About 1.5%-2.0% of all electricity usage is related to telecoms networks (a figure that is fairly stable), and a further 1.5%-2.0% is related to broader ICT. (This excludes the energy associated with network construction.) However, rising use of broadband data, and the need to increase network capacity and density to support that, threatens to increase energy consumption and cost. On average, energy accounts for about about 6.2% of total telecoms opex.

Only about 5% of CSP energy usage is not network-related (power for corporate offices, stores and field-force fleets, for instance). So the networks themselves must be the main focus of ►



Figure 2. Typical power consumption breakdown within the RAN (excludes backhaul or fronthaul)  
 [Source: Analysys Mason, 2022]



innovative energy efficiency initiatives.

Furthermore, the focus must be firmly on the mobile network. For fixed-line operators, migration to fibre introduces a network that has significantly lower energy consumption than copper. According to Telefónica, fibre-to-the-home (FTTH) has the potential to reduce the energy consumption of fixed access network equipment by around 85%.

By contrast, the radio access network (RAN) can account for around 70% of a mobile operator's energy consumption. **Vodafone** stated in 2022 that the proportion of its energy usage and costs that derives from the RAN increased from 66% to 73% between FY2019 and FY2021, an absolute rise of 16%, whereas other areas' energy use fell by 15%. **Figure 1** shows Analysys Mason's estimate of the breakdown of energy consumption in a developed telecoms market, excluding legacy copper and 2G/3G technologies.

For the telecoms industry, then, new approaches to energy management in the mobile access networks will deliver the biggest savings, especially if CSPs focus their efforts on the aspects of the RAN that are currently least efficient.

Within the RAN, according to **Nokia**<sup>1</sup>, energy consumption is typically split as follows:

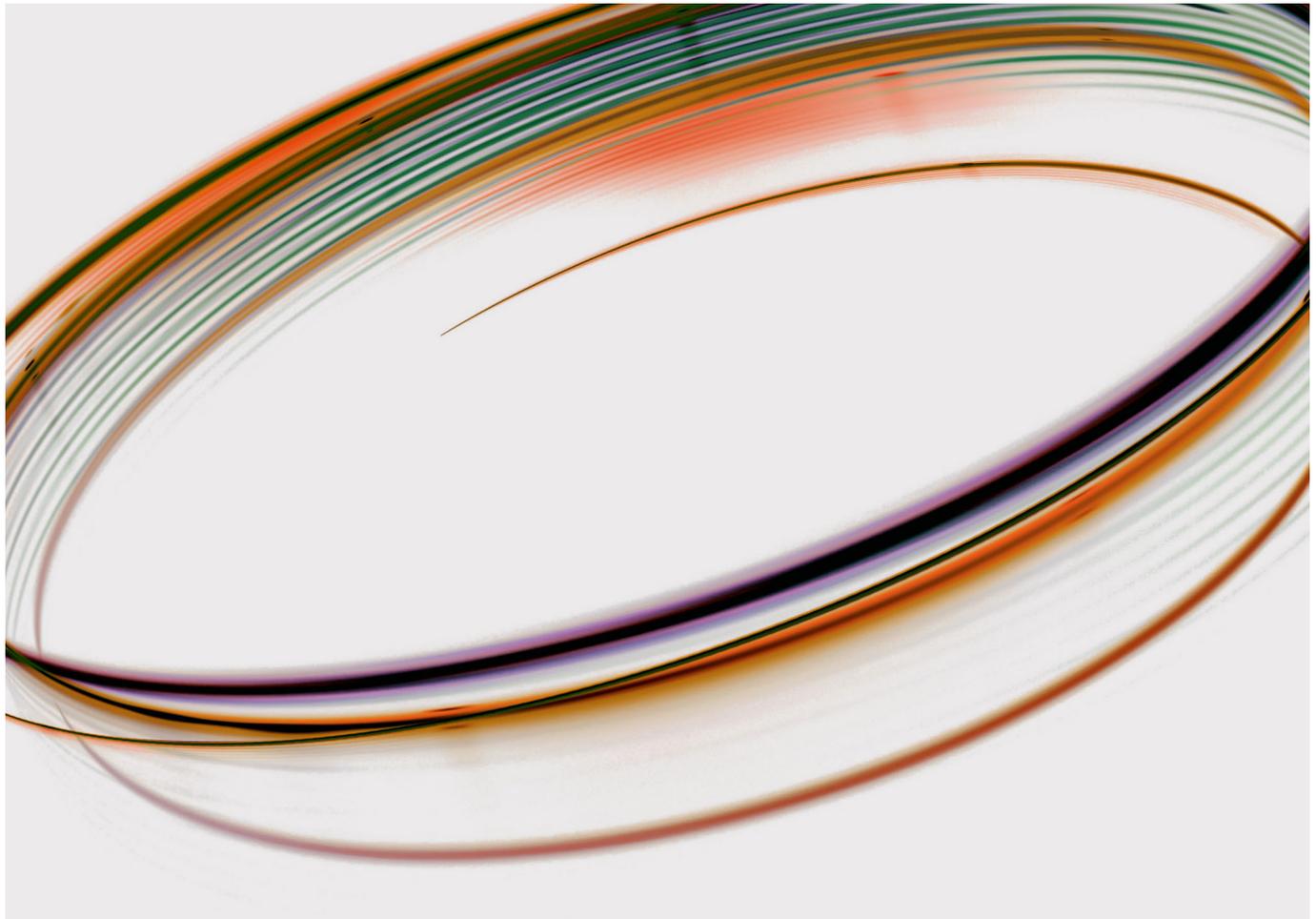
- **Forwarding bits** **15%**  
 (the only energy that is supporting revenue generation)
- **Base station operations**  
 - **broadcasts and idle resources** **21%**
- **Fans and cooling systems** **55%**
- **Heat, light and UPS** **9%**

With data transfer accounting for only 15% of energy usage, this means 85% is expended just on keeping base stations in operation.

In the run-up to the introduction of 5G in Europe, much was made of the improved energy efficiency of the 5G air interface, compared to that of 4G. 3GPP's 5G specification, in line with ITU targets, called for a 90% reduction in energy consumption compared to 4G, on a like-for-like basis (same type and number of base stations with same traffic and signalling load).

5G NR was designed with greatly improved support for energy savings during low-to-medium traffic, and also improved the feature called micro-sleep TX, which puts radio units into sleep mode whenever there is a gap in transmission. ▶

<sup>1</sup> <https://gsacom.com/paper/5g-network-energy-efficiency-nokia-white-paper/>



However, despite these inherent improvements in 5G NR, studies suggest that the 90% reduction has not been achieved in real world deployments.

Once the complete network is taken into account, rather than individual base stations, the impact of 5G on energy consumption and cost is seen very differently. Energy costs are increased by the use of relatively power-hungry components in some 5G equipment, such as massive MIMO antennas. Far more important is the increased number of network elements. The rise in total energy consumption and cost mainly relates to the need for 5G networks to support very high levels of traffic in heavily loaded areas, and to support the extensive coverage required for some 5G use cases such as ubiquitous vehicular connectivity.

- Base station densification (more antenna elements)
- Network densification (more cells)
- Larger numbers of spectrum bands, including high frequency bands

These all influence one another, and each one can contribute to rising energy consumption and cost across the total network. All of them will be accelerated where CSPs introduce some of

the high-bandwidth services envisaged once 5G standalone is implemented.

## CSPs have considerable scope to reduce energy consumption

Despite the energy challenges of implementing dense 5G, there are many ways that CSPs can reduce their consumption, especially in the two main areas of energy usage, the base stations (36% of total) and the cooling systems (55%).

The key is that energy consumption depends not just on the architecture but the usage patterns, and equipment or whole sites may be idle much of the time during periods of low traffic. Many of the solutions to increase energy efficiency and reduce cost relate to intelligent management of base station power up/power down according to traffic patterns. This is the most important way to reduce power consumption in the active base station.

In Europe, for instance, 30% of base stations typically carry 80% of the traffic. This means that ►



real energy consumption must be measured in two ways:

- Efficient data transmission in a loaded case, which relates to average spectral efficiency
- Minimising energy consumption where there is no data, which means a high sleep ratio

A study by Nokia and Telefónica<sup>2</sup>, published in December 2020, concluded that 5G networks could indeed be up to 90% more energy efficient than legacy 4G networks, but this was after Telefónica had introduced power efficiency measures such as automated power-down for idle base stations.

Automated and intelligent management and prediction of traffic patterns, and therefore of power up/down, is greatly enhanced by the use of AI/ML. Along with new methods of cooling, Analysys Mason believes that intelligent power management is the most important approach to mobile network energy efficiency, especially in 5G. That means this is also the biggest contributor to overall telecoms industry energy efficiency, since mobile networks are the biggest consumers of power and the only networks where power consumption is rising.

## AI can enhance energy efficiency measures across all network domains

Intelligent power up/power down management is estimated to reduce RAN energy consumption by as much as 10% on its own, according to Analysys Mason calculations<sup>3</sup>. When combined with other AI-powered approaches to intelligent network and power management, it can reduce energy costs and carbon footprint by 30%.

CSPs and towercos are starting to evaluate

AI-driven technologies for automating wake-up/sleep (for example **American Tower** is developing such a system itself to improve its tower energy costs and potentially offer as a value-added service). A survey conducted by GSMAi and Nokia<sup>4</sup> found that 78% of CSPs will rely on AI-based solutions to help reduce energy consumption.

AI-based energy management automation is already proving itself as a fast track to shrinking the carbon footprint of telecoms networks, especially mobile ones. The solution can predict low traffic periods and shut down resources such as frequency carriers or even whole sites dynamically. The main impact comes from automatic wake-up and sleep including base station shutdown on the basis of symbols, channels or carriers.

Nokia calculates that AI-based solutions achieve two to five times higher savings than non-AI systems that perform temporary shutdowns based on fixed schedules. Critically, AI also enables a dynamic and subtle approach to power up/down, that does not have any negative impact on performance or end customer experience, unlike some early power management tools, which could switch off service altogether for some users because thresholds were too static.

With AI, the algorithms take the specific configurations and conditions of every site into account, assuming that every site is different rather than making broad generalisations to underpin power rules.

AI can also be important to enable network density to generate efficiencies rather than boost consumption. This involves flexible, predictive cooperation between 4G and 5G radios, between different spectrum bands, and between the macro and small cell layers, to achieve the optimal balance between performance and ►

<sup>2</sup> <https://www.nokia.com/about-us/news/releases/2020/12/02/nokia-confirms-5g-as-90-percent-more-energy-efficient/>

<sup>3</sup> <https://www.analysismason.com/research/content/perspectives/green-5g-sustainability-rma18-rdns0/>

<sup>4</sup> [https://www.nokia.com/networks/services/NokiaAVA/energyefficiency/?did=D00000007BR&gclid=EAIaIQobChMI8tXk\\_ovS9wIV5mxvBB2WRQ0mEAAAYASAAEgIRNvD\\_BwE](https://www.nokia.com/networks/services/NokiaAVA/energyefficiency/?did=D00000007BR&gclid=EAIaIQobChMI8tXk_ovS9wIV5mxvBB2WRQ0mEAAAYASAAEgIRNvD_BwE)



power efficiency in any given traffic load. For instance, adding a low power 5G NR small cell to an LTE macrocell can enable traffic to be offloaded from the macro node in a quiet time, so that the macrocell can stay asleep for a long period of time.

CSPs also need to apply AI beyond the active network, since about half of energy consumption is related to auxiliary components such as fans, cooling systems, lighting and other power supplies. AI-powered energy management must cover both active and passive equipment. Machine learning with predictive analytics can track energy usage trends with enormous granularity, to detect performance anomalies not just in the active radios, but in traditionally 'invisible' passive equipment, which might be draining power, perhaps because a unit is old, misconfigured or malfunctioning.

## AI software solutions such as Nokia AVA can achieve savings rapidly and cost-effectively

Whatever their impact on energy efficiencies, adoption will still be limited if the technology involves significant additional cost, commercial risk or disruption to skills and processes. Some early AI-based systems were highly complex to deploy and run and were seen as the preserve of only a few CSPs with significant internal skills and resources.

However, the new breed of AI-powered network and power management systems is very different. Software-only offerings that cover every aspect of the sites, such as [Nokia AVA](#), can be set up within a few weeks on existing hardware, including the public cloud, with no

need for associated network modernisation, architecture redesign or specialised skills. And because the solution is cloud-based, it has no dependency on a particular base station type, and can be used in all kinds of equipment, including small cells, and in multivendor networks.

Despite the simple deployment process, AVA can be scaled up immediately to manage active and passive equipment in thousands of sites and cells. And risk is further reduced by Nokia's outcome-based software-as-a-service (SaaS) model, which enables CSPs to pay only for the energy efficiency outcomes they actually achieve.

All this means that CSPs can achieve a very quick and visible impact on their energy consumption and cost, with immediate savings generated after a few weeks of set-up time. Power savings ranging from 7% to 30% have been seen in real world, large-scale networks from day one of full operation of an AVA system.

The impact of implementing an AI-driven solution will be even more significant as mobile networks, particularly 5G ones, become increasingly dense, and as traffic patterns change with new use cases such as Industrial IoT applications. These will put different strains on the network alongside those of ever-faster mobile data connections, and it will be critical that the power management system can adapt dynamically and without needing to be reconfigured or upgraded manually.

AI-based systems, then, future-proof the energy efficiency approach as well as delivering short term gains, and the resulting savings will help CSPs save cost immediately, while contributing significantly to their sustainability goals and longer term green agendas. ■

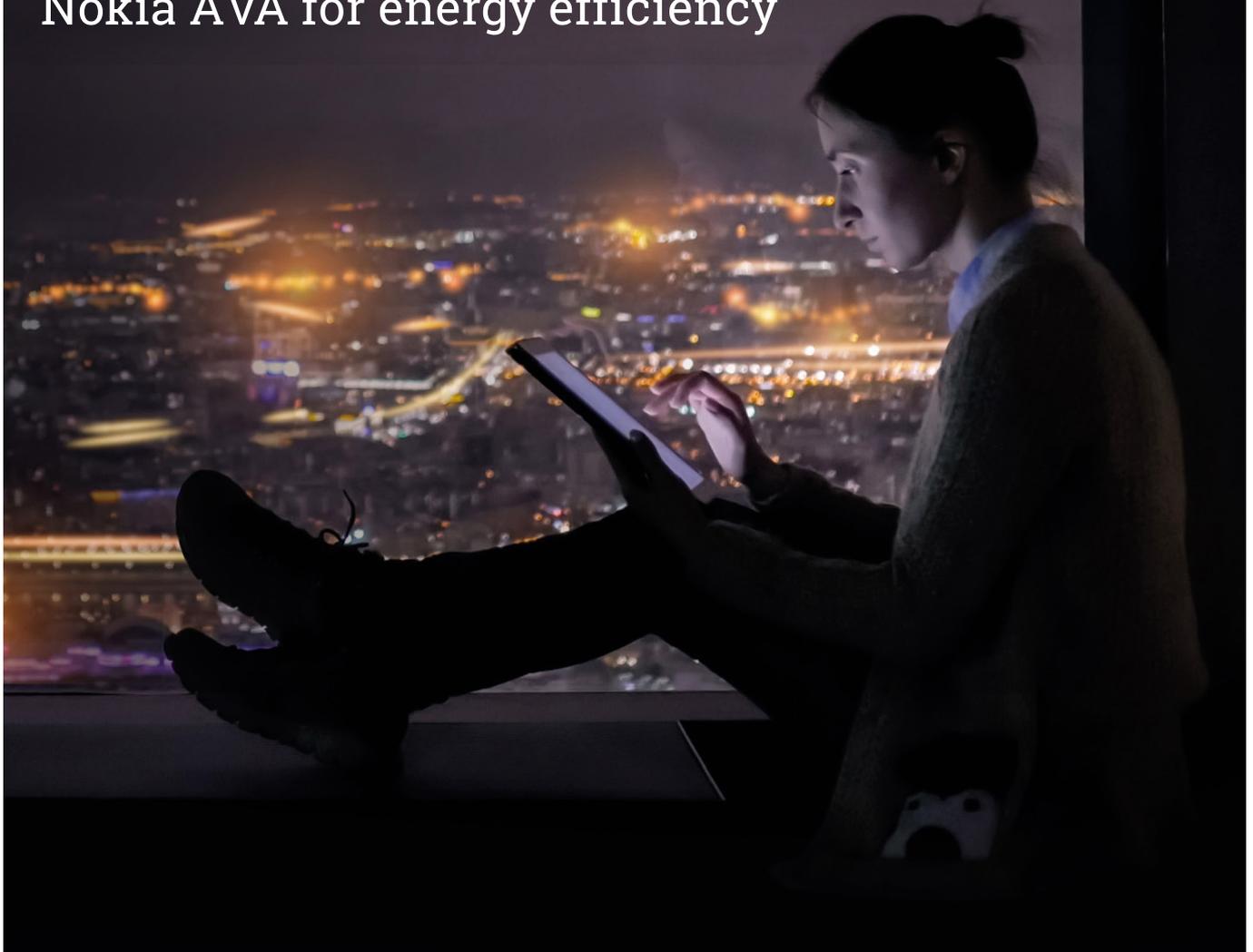


**NOKIA**

Case study

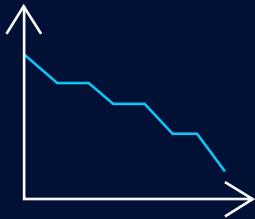
# How KDDI used AI to cut RAN energy consumption in half

Nokia AVA for energy efficiency





## Business benefits



Up to 50%  
reduction in radio  
cell energy use

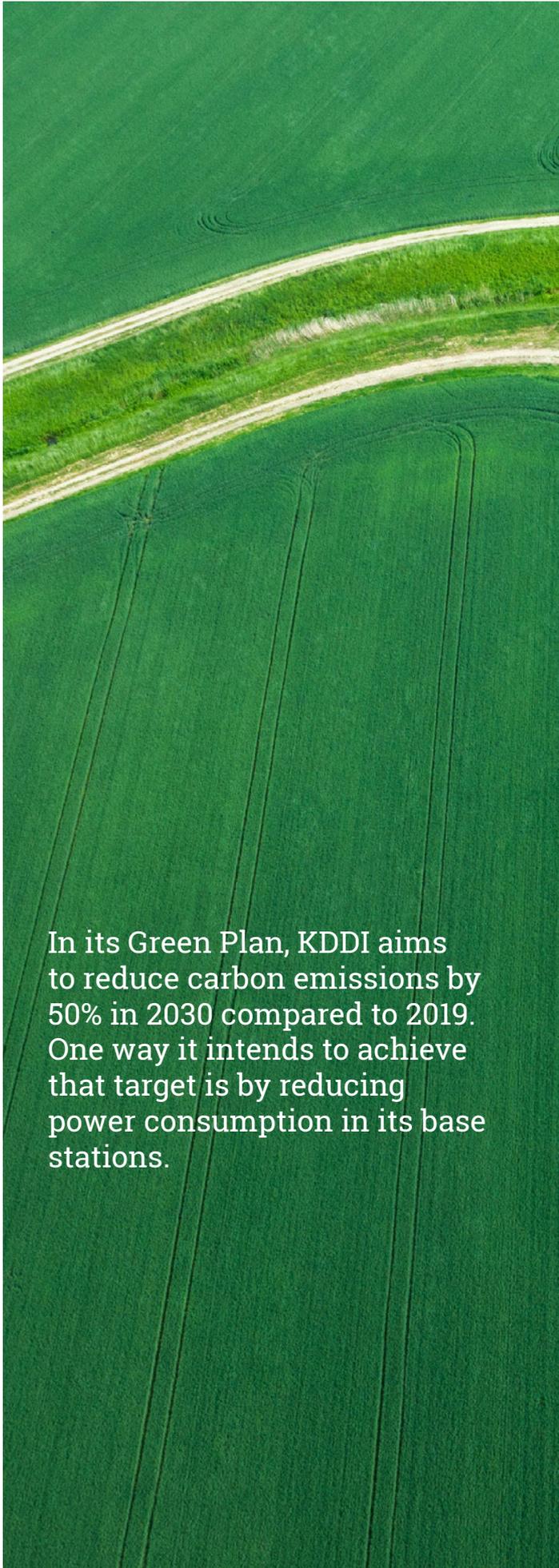


Energy savings did not  
have any impact on  
network performance



Four weeks from  
project set-up to  
data pipeline

Reducing base station energy consumption and carbon footprint is a top priority for communications service providers (CSPs) as they expand their networks to meet growing demand. Yet those sustainability goals can't come at the expense of a reliable, high-quality user experience. What's needed are new approaches to network energy management and optimisation – data-intensive processes that demand the power of artificial intelligence (AI). KDDI partnered with Nokia to trial Japan's first AI-controlled radio access network (RAN). Using the capabilities of Nokia AVA for Energy Efficiency, the trial validated adaptation of base station energy consumption in response to changing traffic volumes, with minimum impact on subscribers. ▶



In its Green Plan, KDDI aims to reduce carbon emissions by 50% in 2030 compared to 2019. One way it intends to achieve that target is by reducing power consumption in its base stations.

## The vision

**KDDI** is Japan's second-largest communications service provider (CSP), providing mobile services to more than 60 million subscribers across the country. Like many other CSPs, KDDI wants to help create a more sustainable, decarbonised future. In its Green Plan, KDDI aims to reduce carbon emissions by 50% in 2030 compared to 2019. One way it intends to achieve that target is by reducing power consumption in its base stations.

Reducing power consumption in the base stations is an important first step since KDDI's radio access network access network (RAN) currently accounts for approximately 60% of its total energy usage. But to effectively manage and permanently optimise network energy consumption, vast amounts of data would have to be collected and analysed from many different sources — a task far too data-intensive to be done manually.

What KDDI needed was an AI-powered network energy management system that could assess real-time demand and traffic patterns, then automatically adjust the amount of power being consumed by RAN resources to match demand. To ensure the system could do all that without compromising the premium user experience expected by subscribers, KDDI worked with **Nokia** to trial Japan's first-ever AI-controlled RAN. ►



## How Nokia helped

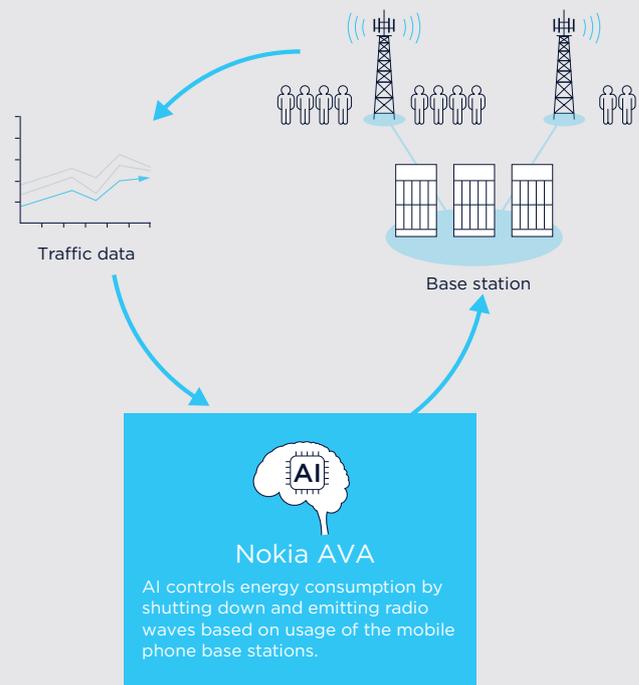
Shutting down unused network elements during periods of low traffic is an excellent way for CSPs to realise significant energy savings. With this pilot project, KDDI used the AI-driven Nokia AVA for Energy Efficiency to perform the precise predictions needed to balance power consumption, network performance and customer experience requirements.

Nokia AVA for Energy Efficiency uses AI to analyze and anticipate changing traffic volumes in the sites and cells of a RAN – to determine when radio resources can be powered down to reduce energy consumption. It also coordinates across multiple neighboring cells to achieve the best overall power savings within a coverage area. For example, in cases of cross coverage, one cell could be turned off completely at times of low traffic as long as the area is sufficiently served by adjacent cells.

To ensure there are no negative impacts on KDDI customers when radio resources are temporarily put into sleep mode, Nokia AVA for Energy Efficiency continuously monitors network performance, powering cells back up any time an unexpected network performance degradation occurs and correcting cell states in case of faults. It also gives KDDI the ability to manually intervene at any time as needed.

This represents a shift from the current approach to network energy management, which applies manual, static schedules for powering radio resources on and off. Nokia AVA for Energy Efficiency drives predictive, closed-loop actions for faster, automated responses to changing conditions for both maximum energy savings and network quality. ►

### How Nokia AVA for Energy Efficiency works



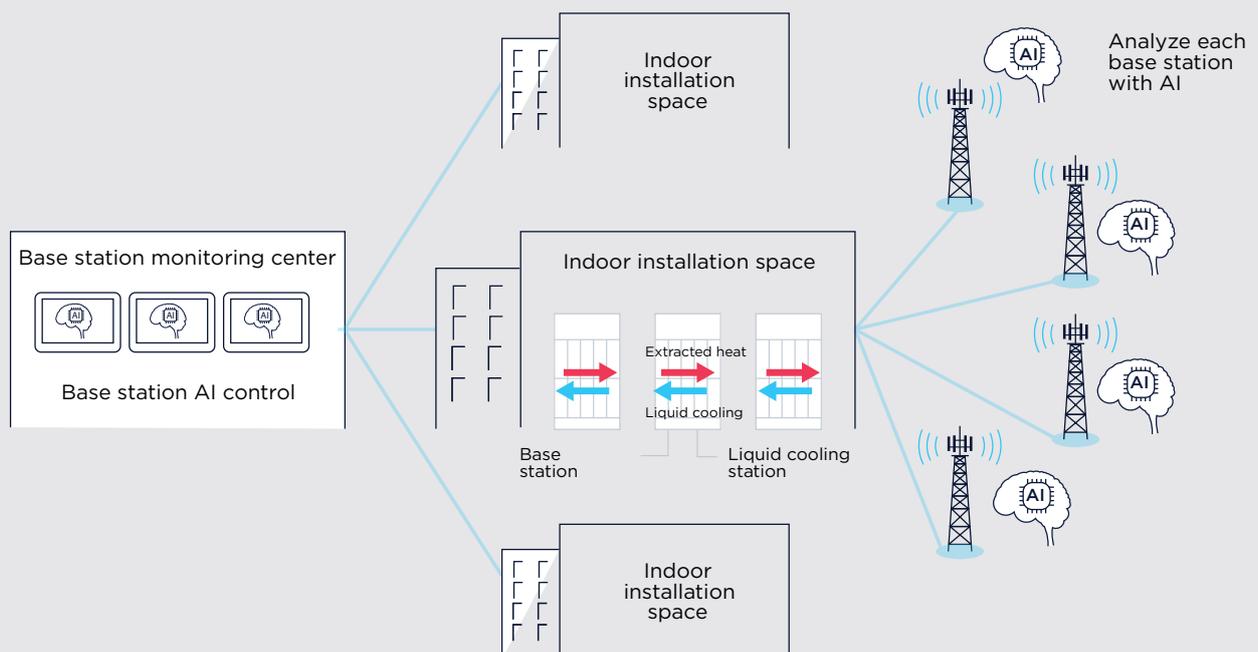


## A cooler way to cut power consumption

This trial of Nokia AVA for Energy Efficiency is just one way KDDI is working with Nokia to reduce energy consumption and carbon emissions. The CSP is also using the Nokia AirScale baseband solution to test Japan's first liquid cooling system for 5G base stations.

By using liquid coolant, which has a higher cooling efficiency than conventional air-based cooling systems, KDDI aims to cut power consumption by more than 70% for the air conditioning systems that cool the rooms that house its base station facilities. ►

### Liquid cooling of base stations





## The opportunity

Because Nokia AVA for Energy Efficiency calculates when to put radio resources into sleep mode based on the required performance every day for every cell, it can implement the widest possible energy-saving windows while still delivering KDDI's desired customer experience. During this pilot, some cells were powered down between eight and nine hours per day.

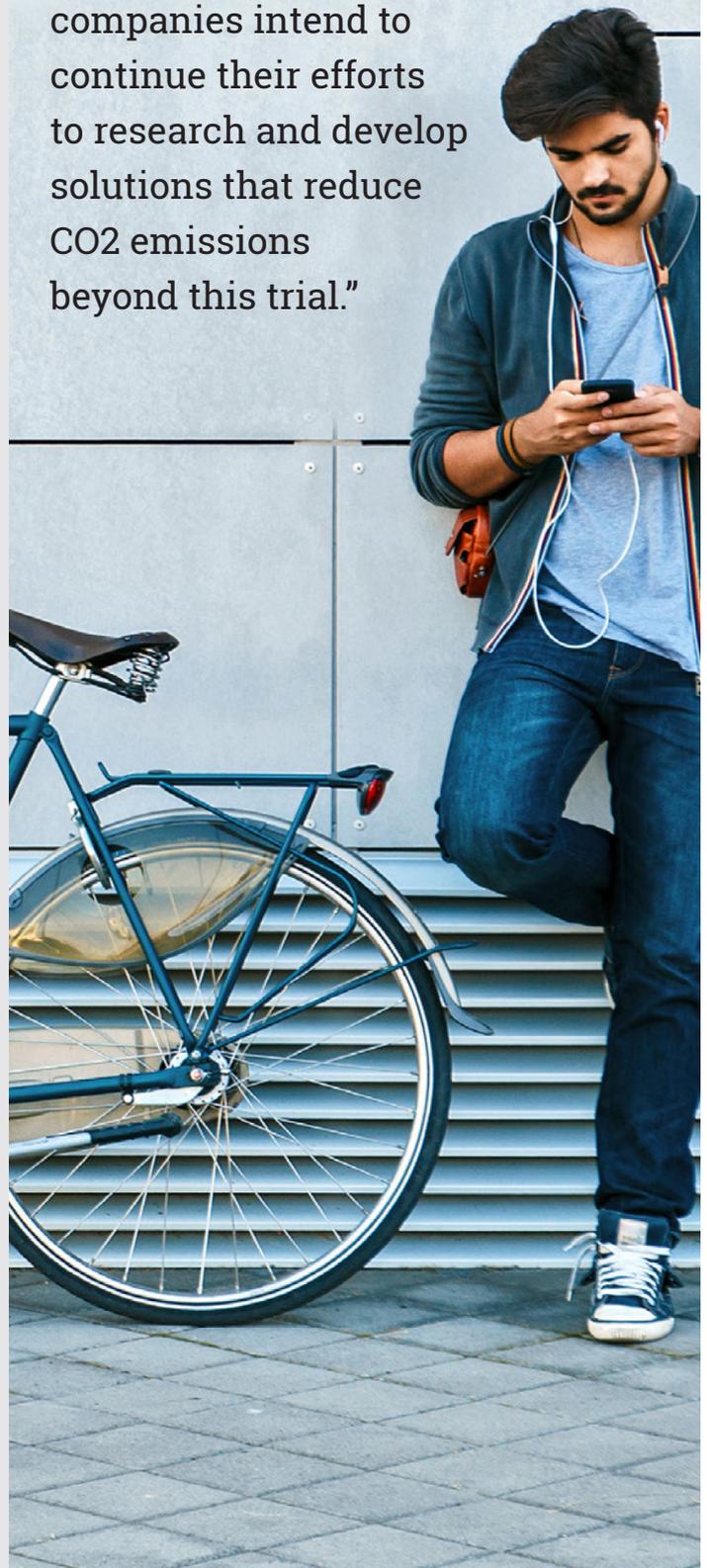
The result? On average, KDDI reduced power consumption by up to 50% in low-traffic environments and by up to 20% per cell.

In addition:

- Nokia AVA for Energy Efficiency delivered energy savings without any network performance degradations (such as traffic overflow in adjacent cells) or alarms, despite the wide sleep-state windows each day – for minimum impacts on the user experience.
- It took only four weeks to set up the project, including the data pipeline needed for the AI algorithm – for faster energy-saving results.

While this project focused on Nokia radio equipment, Nokia AVA for Energy Efficiency is fully multi-vendor, meaning it can be deployed in any of KDDI's base stations throughout Japan – and with the strong outcomes of this trial, KDDI plans to roll out AI-driven energy management across its commercial operations network-wide. Both KDDI and Nokia will continue to work together to research and develop systems that can further reduce base station carbon footprint. ■

“KDDI and Nokia are committed to reducing CO2 emissions utilising technology and both companies intend to continue their efforts to research and develop solutions that reduce CO2 emissions beyond this trial.”

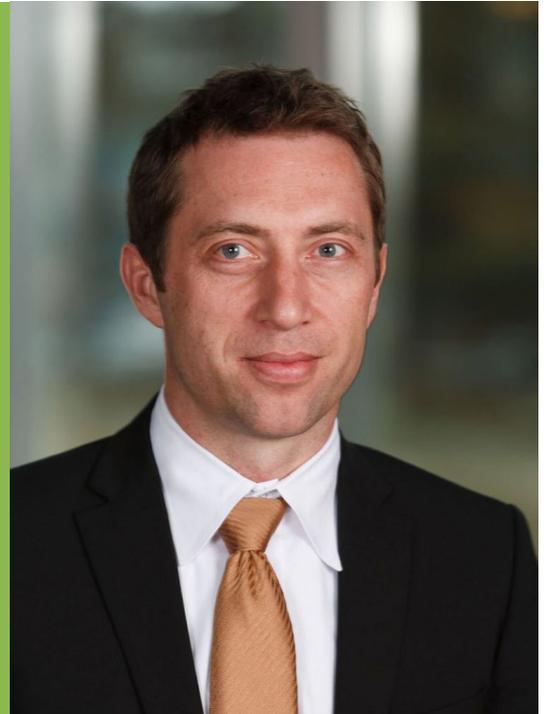




# Five myths of 5G and Wi-Fi debunked

The relationship between 5G and Wi-Fi is a complicated one. Wi-Fi has long been woven deeply into the cultural fabric of our daily lives from enhancing business operations to enabling education and much more, says Markus Nispel, the vice president of international markets, office of the CTO, at Extreme Networks

Markus Nispel  
Extreme Networks



**We must align the timelines and consider the development lifecycles of these technologies, rather than just when they're released**

5G has generated a lot of hype and is continuing to expand in terms of the breadth of use cases it enables. For example, there is a growing enterprise interest in private 5G, with practical use cases including video analytics and industrial IoT in manufacturing or logistics networks.

As a result, there's been a lot of talk about the future of wireless technologies and whether Wi-Fi will be replaced. And, while some of it is true, there are still many misconceptions around these two technologies from their respective market impact to if – or how – they will converge. But what's the truth? Here, we shed light on some of the biggest misconceptions regarding 5G and Wi-Fi networks.

## Myth 1 – Wi-Fi and 5G are generationally similar

This myth concerns the framework by which we compare the two technologies. The wireless industry has recently been comparing Wi-Fi 6 with 5G but, when you consider the development timelines, this comparison simply doesn't make sense. It's like comparing an entire season of a TV show with a single episode of another.

That's because Wi-Fi and 5G develop at different rates. Wi-Fi has always released and adopted new standards in three-to-four-year increments, so each generation lasts a few years before the next update comes along. Cellular has a similar incremental process known as 3GPP releases but these updates are bundled together into generational packages known as 4G or 5G that last for around a decade.

These differing approaches make sense. Cellular generally requires longer deployment cycles and more complex integrations, whereas Wi-Fi lifecycles are much more agile. However, the result is that we end up comparing the wrong things. Instead of comparing Wi-Fi 6 with 5G, it would be more accurate to compare it with 3GPP Release 16. We as an industry have to start comparing Wi-Fi and 5G in the right way. We must align the timelines and consider the development lifecycles of these technologies, rather than just when they're released.

## Myth 2 – Private 5G is always a Wi-Fi competitor

This one is a bit of a grey area, which all comes down to how we think about the 5G technology market. 5G can be very roughly divided into two segments: macro and micro – or private.

The private space includes everything that's deployed or operated by enterprises. This market as a whole may eventually become bigger than Wi-Fi, but that doesn't mean they are always competitors. There are multiple sub-markets here, which include distributed antenna system (DAS) replacement for neutral host, solutions that replace other legacy approaches to communications and voice, solutions for IoT, fixed wireless access for wireless wide area networks (WWAN), and a number of IT/OT use cases on the enterprise local area network (LAN).

What this means is that private 5G must be sliced up in terms of its competitiveness with Wi-Fi. The ►

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26th September 2022

This webinar explores two of the key cellular technology themes: 5G and mobile private networks/private wireless, including looking at technology evolution, adoption trends and changing commercial models.

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**So in some areas, 5G definitely must become more like Wi-Fi in order to gain traction in the enterprise**

truth is that some applications within certain private 5G sub-markets certainly do compete, whereas others don't.

**Myth 3 – Wi-Fi is ideal and 5G must replicate it**

This is another partial truth. The misconception is that, because Wi-Fi has been deployed in the enterprise, 5G needs to become just like it. But cellular actually brings several strengths as a technology that Wi-Fi doesn't currently offer.

For example, it delivers superior coverage per radio, which is partly a function of spectrum regulations and transmit power, but there are also technical elements of cellular as a protocol that improve range beyond Wi-Fi. It also has advantages with mobility, security and application determinism.

Of course, Wi-Fi has its own strengths most notably its usability, unlicensed spectrum, LAN integration capabilities, and cost-efficiency. But rather than saying that 5G should become just like Wi-Fi, we should be recognising that they have different strengths. Wi-Fi's shortcomings – most notably coverage and determinism – tend to be 5G's strengths.

So in some areas, 5G definitely must become more like Wi-Fi in order to gain traction in the enterprise. But the Wi-Fi industry should also be considering its relative weaknesses during the development of Wi-Fi 7, so it can start closing gaps against 5G's strengths. I would focus on better application service level agreements (SLAs) and improving roaming.

**Myth 4 – 5G and Wi-Fi will converge**

The convergence debate generates plenty of attention in the wireless industry. People often say that the two technologies will eventually converge because they'll both be deployed in the enterprise, driven by a mixture of business opportunities and

operational requirements for capabilities like increased resiliency and ubiquitous coverage.

This does have some truth in it, but the misconception is usually the way in which they'll converge. The elements that will converge are the experience elements, particularly as private 5G enters the mix of wired and wireless integration. This will cover areas like the management process, the policy, and the platforms – edge and cloud – these technologies are deployed on. Enterprise IT users put a high premium on usability and unified management, so private 5G will no doubt be pulled into that fold. Route to market will also converge as enterprise-focused partners and system integrators add private 5G skills and solutions to their portfolios. ►





Here are a few examples of ITU objectives:

- Downlink peak data rate – 20 Gbps
- Uplink peak data rate – 10 Gbps
- Latency – 1ms

However, these specs are rarely what the user actually experiences. Keep in mind that the 3GPP releases define technology blueprints that is: how you could deliver a specific requirement, not necessarily how you will deliver it. In reality, products never adopt all the features of the releases. And similarly, these numbers – like 20 Gbps – are thrown around as if they're the norm for users, but there's usually a significant difference between what's advertised and what 5G will actually deliver to any given user.

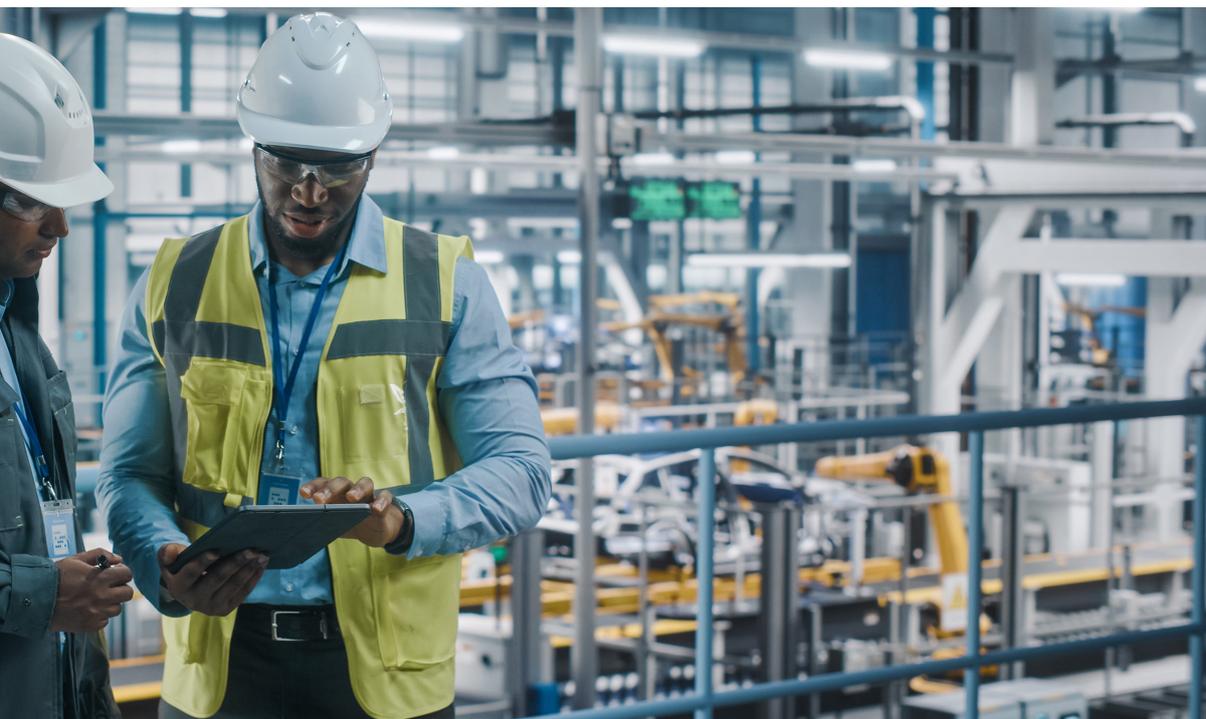
What won't converge are the protocols. 3GPP and IEEE/Wi-Fi Alliance efforts will not collapse into one. Similarly, many think that radio hardware will be an early area of convergence assuming that we'll just add a 5G radio to Wi-Fi access points. But these technologies use different spectrum, solve different requirements, and are deployed in different densities. Adding radios also adds cost and power draw requirements. It may be a future, but these limiting factors mean it's not a near-term reality.

**Myth 5**  
**– Advertised specs are current reality**

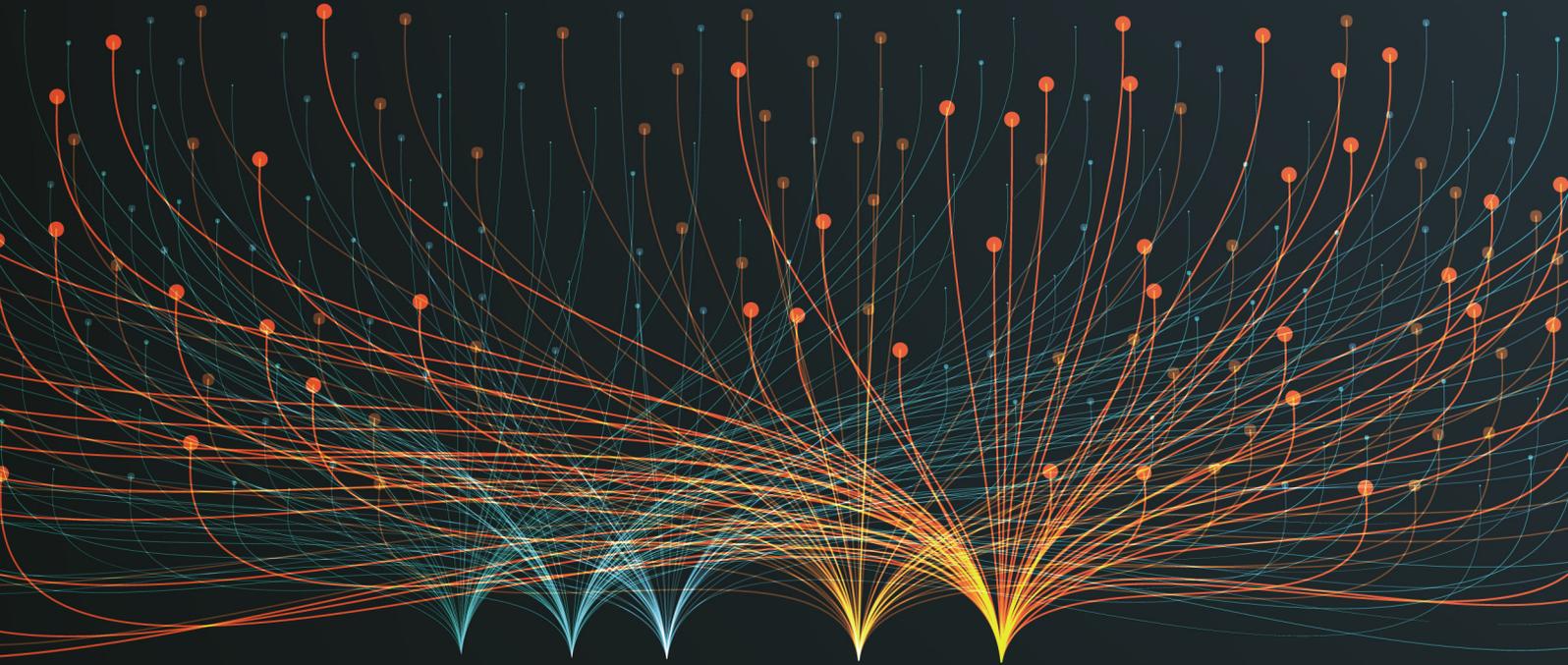
This is an important one. Here's how the process works. The ITU comes out with requirements for 5G technology. Then 3GPP develops a series of releases that can address those requirements.

Similarly, the 1ms latency requirement is thrown around everywhere, but that's not realistic in terms of what 5G can do today. Even if or when it does deliver this, keep in mind that this is a one-way radio-only measurement, not an end-to-end system metric. So, whether it's with 5G or Wi-Fi, users must always remember to take any advertised specs with a pinch of salt.

Ultimately, there's still a long way to go for both of these technologies, as each generation continues to evolve faster than its predecessor. The potential for both Wi-Fi and 5G is huge. As an industry and a user base, we must all remember to focus on what's important, and not let myths or misconceptions sway our judgement. ■



**Ultimately, there's still a long way to go for both of these technologies, as each generation continues to evolve faster than its predecessor**

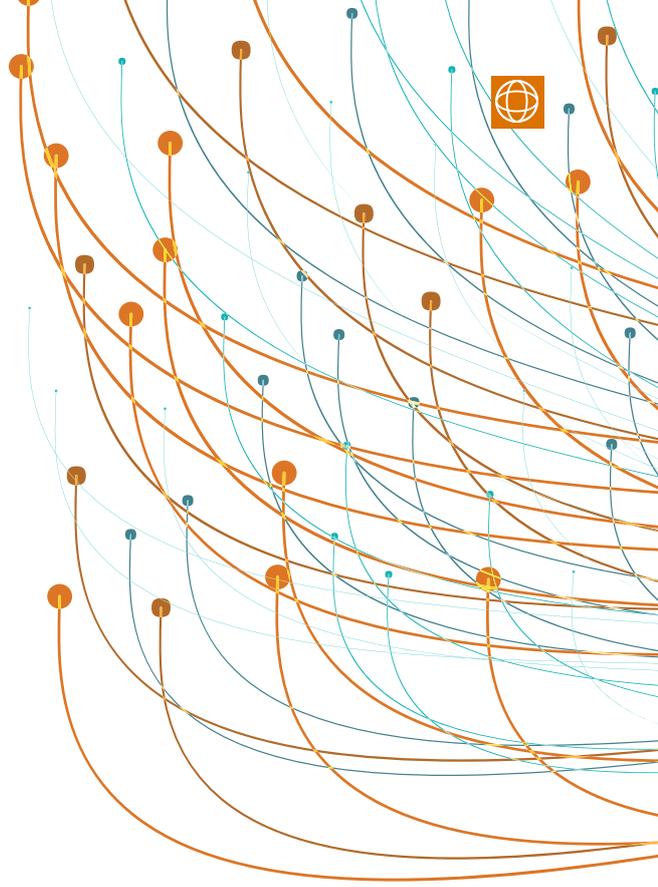


## How are CSPs using behavioural science to drive relevance and increase revenues?

**There's a widening disparity between truly personalised, relevant marketing communications and run of the mill, superficially personalised experiences. Behavioural science can enable brand owners to adopt a privacy first approach to engaging in truly personalised and relevant marketing communications, at a time when the vast majority of consumers agree that the more personalisation they see from a business, the more loyal they feel, writes Sharifah Armirah, the chief client officer of Intent HQ**

In highly saturated, poorly differentiated industries like telecoms, financial services and utilities, where customer decisions are frequently price-based, having the ability to truly personalise marketing communications can make a significant difference to long term customer retention rates. Large and potentially hindered by legacy technology, brands in these sectors can struggle to incorporate new, innovative data into their campaigns or to drive the incremental gains that are critical in such a saturated, price-sensitive and competitive market. Behavioural science could hold the answer, giving highly competitive brand marketers a cost effective and repeatable way to increase their customer engagement and conversion rates.

For instance, by using a behavioural science approach it is possible to identify and reach new, high value audiences, upsell products and services and increase customer value. By redefining customer segmentation with the creation of data-driven microsegments, new variables that determine future buying behaviours can be uncovered. This was verified in two recent campaigns conducted for tier one communications service providers (CSPs) one in the UK and one in North America. In each example, the client was able to identify new and profitable audiences, exceed target campaign conversion rates, improve upon average campaign performance benchmarks and generate a higher than predicted ROI. Very importantly, they also avoided making some serious mistakes when it came to identifying exactly who their target audience was. ▶



**Sharifah Armirah**  
Intent HQ



Key to achieving these campaign outcomes was having the right data mining technology, systems that are capable of utilising artificial intelligence (AI) to abstract the real human meaning of observed behaviours from the behaviours themselves and underutilised customer datasets like CSP weblogs. From a marketing standpoint, weblog data is a typically undervalued customer data set because it is extremely difficult to use. It is vast in scale and consists of multiple billions of rows and is regarded as highly sensitive.

**Behavioural patterns**

When armed with the right technology, new behavioural patterns can be identified within weblog data that can supersede traditional, preconceived ideas of their most relevant campaign audiences. Rather than making assumptions, brand owners can be pushing the frontiers of cognitive understanding through digital footprints and doing so in a respectful and valuable way for all parties. However, a lack of access to the right data and technology means many will resort to ineffective spray and pray targeting methods.

The problem is a longstanding one. Diversity and inclusion sensitivity has become more prevalent, but on the whole, marketing has tended to rely on using familiar stereotypes and this alienates consumers. People want to be recognised as individuals and the target audience often isn't who the marketers think it is.

Take this example of another real campaign, whose original targeting approach amounted to little more than guesswork led by stereotypes. The client thought their customers for a roaming service offering were millennials who were video streaming and exceeding their data plans each month. They were about to launch with creatives showing this millennial user and it would have been totally inappropriate and potentially alienated the real consumer. Behavioural science data showed that

the real primary audience was consumers aged over 55 who were using their mobiles for listening to podcasts and music. They weren't interested in unlimited data packages because 97% of them were not exceeding their allowances.

In highly commoditised markets, having the ability to identify new markets based on consumer values and lifestyle preferences cannot be underestimated. Brand owners need to think differently about creating sustainable, customer-centric growth particularly in the face of an intensely competitive, rapidly-commoditising market. At times when brand and product differentiation is difficult and where customers are increasingly scathing when it comes to wastage, being relevant is most important.

Most personalisation efforts are hamstrung by the quality of insights possible with the available data. The answer isn't to collect more data. It's to apply AI to the data you're already collecting in order to understand its real human significance, the meaning of observed behaviours from the behaviours themselves without compromising on privacy.

When armed with the right behavioural data and analytics, our CSP clients could unlock an infinite number of microsegments and target customers with very carefully curated offers. This in turn maximises revenue growth with greater customer engagement and conversion rates.

Businesses that can achieve true personalisation and close the gap between superficial targeting and a deep understanding of consumer behaviours will be tomorrow's biggest winners. They'll interpret new and better insights from richer sources of data and have the power to activate those insights for improved commercial outcomes growing revenue by reaching new audiences and cutting churn by delighting existing customers. ■

**In highly commoditised markets, having the ability to identify new markets based on consumer values and lifestyle preferences cannot be underestimated**



While we have made every effort to ensure the accuracy of this listing, the current COVID-19 pandemic means that many events are changing timing, dates and locations. Therefore please check at the events' websites to ensure details are up-to-date before travelling.



**DTW** **DIGITAL TRANSFORMATION WEEK**  
EUROPE

**Digital Transformation Week Europe**  
20-21 September 2022  
Amsterdam, The Netherlands  
<https://www.vanillaplus.com/event/digital-transformation-week-europe/>



**EDGE COMPUTING EXPO**

**Edge Computing Expo North America**  
5-6 October 2022  
Santa Clara, California, USA  
<https://www.vanillaplus.com/event/edge-computing-expo-north-america/>



**IOT TECH EXPO**  
EUROPE

**IoT Tech Expo Europe**  
20-21 September 2022  
Amsterdam, The Netherlands  
<https://www.iot-now.com/event/iot-tech-expo-europe>



**SMART GRID FORUMS | IEC 61850 Week 2022**

**IEC 61850 Week 2022**  
17-21 October 2022  
Cardiff, UK  
<https://www.iot-now.com/event/iec-61850-week-2022>



**DTW** **DIGITAL TRANSFORMATION WEEK**

**Digital Transformation Week North America**  
5-6 October 2022  
Santa Clara, California, USA  
<https://www.vanillaplus.com/event/digital-transformation-week-north-america/>



**DIGITAL TRANSFORMATION WEEK**

**Digital Transformation Week Global**  
1-2 December 2022  
London, UK  
<https://www.vanillaplus.com/event/digital-transformation-week-global/>

# IoT at the Edge: Enabling the Real Time Enterprise

According to a recent IBM survey of 1500 senior executives across 22 industries in 11 countries:

**94%** expect to implement edge by 2025

**81%** expect edge to improve operations by 2025

According to recent Forrester survey of 207 decision makers, biggest benefits of edge are:

For **31%** data does not need to be transferred

For **27%** faster response avoids network latency

For **27%** regulations require local control



aping the IoT future

This 100+ page, independent analyst report is the latest addition to Beecham Research's popular 'Succeed with IoT' series.

**“Streaming all that data to the cloud has a cost. If we process it locally and only stream the valuable data that reduces costs.**

Chief Operating Officer  
Edge Computing Virtualization and Orchestration

IoT has moved away from the old model of processing all IoT data in the cloud, which limited its role to monitoring and reporting. As a result, IoT at the Edge will transform IoT in enterprise operations – **towards the Real Time Enterprise.**

What does this mean for enterprise use of IoT?

What does it mean for use of IoT connectivity?

What part does 5G play in this?

What does it mean for security of IoT solutions?



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