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IoT NOW

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Kigen's Vincent Korstanje explains why iSIM can help businesses out-think the future

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Could 2023 be the year of making it easy?

The Internet of Things has consistently been described as a technological journey that simplifies, accelerates and optimises previously convoluted, unconnected and manual processes. The act of connecting machines and devices means they can be controlled remotely, automated easily and used to gather data to fuel a virtuous circle of continuous improvement. Had all of this been delivered in-line with the script when IoT first emerged ten years ago, the celebration party would still be going today

Of course, few innovations survive first contact with reality and IoT was no exception. The connectivity wasn't available everywhere, the cost of connected devices was prohibitive, the management burden still relied on a person in a truck and a team of clever programmers, and the marketing and product development teams hadn't fully worked out the business case for many early IoT ideas.

The early market required organisations to be digital economy experts, IT and networking innovators and have an in-depth specialism in mobile roaming on the side. This isn't realistic for cold chain logistics experts, copper mining professionals or healthcare providers and it's why IoT uptake has been slower than expected.

Now, though, IoT is beginning to mature. The pandemic has helped in some ways by increasing familiarity with relying on connectivity to perform previously in-person functions and stimulating acceptance of managing processes and things remotely. However, it has been hindered with the resulting chip supply crisis.

We now have a marketplace that is accepting of the technology behind IoT and, crucially, a vastly simplified supply chain. If you're an enterprise with a product or service that would benefit from IoT enablement you can now interact with far fewer suppliers to create a new device, test it and gain certification for it, connect it and manage it. The days of having to buy a chip, a module, an antenna, perform testing and debugging, apply for certification, find a carrier in each market the device is deployed in, despatch SIM cards to devices and then select which tools you will use to run the system are over – unless, of course, you have the scale and capability to manage each of these ingredients in your own organisation.

George Malim, managing editor

Instead, you can buy pre-integrated chips, modules and antennas, often from providers that will handle device design and certification for you, if you want. These functional units can even be paired with connectivity and deployment services, depending on your preferences and the vendor you select. This has the potential to hugely accelerate the idea to market entry cycle and all the elements are coming together in 2023, which may truly turn out to be the year of making it easy in IoT.

Enjoy the magazine!

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Cognizant to acquire Mobica to enhance IoT software engineering service offerings

Cognizant has entered into an agreement to acquire **Mobica**, an IoT software engineering services provider headquartered in Manchester, United Kingdom, for an undisclosed sum. Mobica's services span the full software development cycle, with core competencies in development, implementation, testing and deployment of embedded software, and a specialisation in clients' strategic internal research and development projects.

The acquisition significantly expands Cognizant's IoT embedded software engineering capabilities and provides clients with a deeper and broader array of end-to-end support to enable digital transformation. Embedded software engineering is a fast-growing segment of the IoT and engineering market. Market intelligence firm **IDC** forecasts global product engineering spending to increase from US$83 billion in 2021 to US$164bn by 2026. Upon closing of the acquisition, Cognizant will add nearly 900 people across Europe and North America, including approximately 550 engineers in Poland.

"Mobica's strong track record of delivering strategic embedded software engineering services is well-aligned to Cognizant's Global 2000 client base and key industries, while its large presence in Poland significantly enhances our growing development teams in Eastern Europe," said Annadurai Elango, executive vice president of Cognizant's Core Technologies and Insights. "We believe combining Mobica's expertise with Cognizant's strong IoT and product engineering capabilities will result in enhanced digital transformation outcomes

Sam Kingston, Mobica

for global clients in the technology and automotive industries and beyond."

Mobica's expertise in three key areas – connected devices and digital transformation, silicon and technology platforms, and automotive and intelligent mobility – is expected to further strengthen Cognizant's client offerings and position as a partner in enterprise digital transformation.

"Mobica has built a reputation for world-class IoT embedded software engineering expertise across the entire technology stack, from chip to cloud," said Sam Kingston, the chief executive of Mobica. "The alignment we share with Cognizant from a technology, industry and client-focus standpoint represents a strong platform for continued growth in Europe and North America, and an opportunity for our talented team to grow their skills and careers."

Laird Connectivity expands SOM portfolio with Boundary Devices deal

Laird Connectivity, a global provider of wireless modules, internal antennas, IoT devices and custom wireless solutions, has acquired California-based **Boundary Devices**, a designer and manufacturer of system-on-modules (SOM) and single board computers (SBC). Founded in 2003, Boundary Devices provides SOM and SBC products that serve a diverse and global customer base across high-growth end markets, including IoT, commercial equipment, laboratory instruments and industrial automation. The company provides a one-stop-shop destination for customers seeking a total solutions partner able to offer: hardware design for **NXP Semiconductors**' i.MX applications processors, software development, US-based manufacturing, and integration, all backed by engineering and customer support.

The acquisition significantly enhances the growing Laird Connectivity SOM portfolio by providing a full complement of SOM and SBC products for a wide range of customer applications. This builds on Laird Connectivity's strategy to simplify wireless connectivity for customers by combining the value-added solutions of Boundary Devices with the wireless connectivity portfolio of Laird Connectivity.

"I am excited to welcome the Boundary Devices team to our organisation," said Bill Steinike, CEO of Laird Connectivity. "Through combining Laird Connectivity's wireless portfolio with the advanced embedded computing solutions from Boundary Devices, we can significantly enhance the value we bring to our customers. This acquisition, with the expansion of our product families and added resources across our advanced engineering teams, is a critical milestone in our strategic vision to help our customers accelerate and enable innovative wireless solutions."

News in Brief

Memfault raises US$24m series B funding

Memfault, which offers an IoT reliability platform, has announced it has raised US$24 million in its series B funding round. The round was led by **Stripes** with additional participation from existing investors **Partech Partners** and **Uncork Capital** as well as the **5G Open Innovation Lab**. The funding will support the company's product roadmap and partner development and grow the Memfault team across all areas to address rising enterprise demand.

"Memfault stands alone in the market," said Stripes partner Saagar Kulkarni, who will join Memfault's board. "For decades, device developers have been plagued by time-consuming and costly development processes because there was no alternative. Memfault's goal to revolutionise IoT device development by solving these challenges at scale is ambitious and will transform industries by accelerating the transition to the IoT."

Truphone finds new owners

Truphone, the provider of compliance systems, embedded SIM (eSIM) technology for supporting mobile network operators and device manufacturers, and the operator of the core Truphone networks and mobile virtual network operator licences in nine countries, has been sold to new owners. The sale was required following sanctions imposed on its Russian oligarch former owners as a consequence of the war in Ukraine.

The loss-making business was sold for a nominal £1, with a deferred consideration based on its performance, to German investor Hakan Koc and Pyrros Koussios, a telecoms industry executive and private equity investor.

News in Brief

Juniper predicts eSIM market will be worth US$4.7bn in 2023

A new **Juniper Research** study says the value of the global embedded SIM (eSIM) market will increase from US$4.7bn in 2023 to US$16.3bn by 2027. Increasing by a predicted 249%, the market will be driven by the adoption of eSIM-enabled consumer devices, says Juniper, as seen in **Apple**'s recent release of the eSIM-only iPhone 14; triggering accelerated operator support.

The firm found that the total number of smartphones using eSIM connectivity will increase from 986 million in 2023, to 3.5 billion by 2027, with manufacturers such as **Google** and **Samsung** developing equivalent eSIM-only Android devices in order to compete with Apple and maintain their global market positions.

Counterpoint reveals 2% cellular IoT module growth

Global cellular Internet of Things (IoT) module shipments grew by only 2% year-on-year in Q3 2022, according to the latest research from **Counterpoint Research**'s global cellular IoT module and chipset tracker by application. China led the market followed by North America and Europe, although China's shipments decreased 8% year-on-year in this quarter due to a resurgence of Covid-19 cases.

"The top ten applications in the market captured more than 80% of shipments this quarter, with the top five being smart meters, point of sale, automotive, industrial and routers or customer premise equipment (CPE)," said Mohit Agrawal, an associate director of Counterpoint Research. "Smoke detectors saw the fastest growth, followed by residential applications and drones."

Berg Insight says connected EV charging points in Europe and North America to hit 18m by 2026

Berg Insight has released new findings about the market for electric vehicle (EV) charging infrastructure in Europe and North America. The number of connected EV charging points in Europe and North America reached an estimated 3.3 million units in 2021. Europe represents the largest share comprising around 2.6 million of these charging points, corresponding to a connectivity penetration rate of 57%.

In North America, about 0.7 million of the total number of charging points were connected, equivalent to a connectivity penetration rate of 52%. Growing at a compound annual growth rate of 40%, the number of connected charging points in the two regions is expected to reach 18 million in 2026.

The connected EV charging station market is served by a variety of players. The type of companies offering back-office software platforms for charging stations include dedicated charging station management software providers, hardware providers as well as charge point operators (CPOs). The back-office platforms developed in-house by CPOs are in some cases also offered as white-label solutions to other CPOs.

In North America, **ChargePoint** is a CPO with proprietary hardware and software solutions that also offers its solutions to other CPOs. Other companies having a notable number of connected charging stations on their platform in the region include **Flo**, **SemaConnect**, **EV Connect**, **Blink Charging**, **Shell Recharge Solutions** and **Tesla. ChargePoint** and **Enel X** further account for the majority of the connected home chargers in the region. Examples of specialised software vendors with a significant number of charging points connected to their platforms in Europe include **Last Mile Solutions**, **Virta**, **AMPECO**, **Greenflux** and **Driivz**.

Caspar Jansson, Berg Insight

"Connected charging points can be monitored closely and controlled so that they only use surplus energy or only charge when energy prices are low," said Caspar Jansson, an IoT analyst at Berg Insight. "The increasing adoption of EVs, together with increasing energy costs will on strengthen the case for connected and smart charging solutions."

FMI reports eSIM subscription market to open up new avenues for telecoms sector business

The worldwide embedded SIM (eSIM) subscription market's net value has been forecast by research firm **Future Market Insights** (FMI) to reach more than US$980 million in 2023, with a compound annual growth rate (CAGR) of 30% expected from 2023 to 2033. According to this analysis, the market's entire worth would rise to US$13.510bn by 2032.

The firm cites rising use of eSIM subscriptions in consumer electronic items being pushed by benefits such as greater connectivity, reliability, and security as the driver for growth. The consumer electronics industry remains a crucial component affecting the development, advancement, and revolution of a number of technological services, including eSIM subscriptions.

In addition, the growing trend among smartphone manufacturers to include an eSIM within their devices is expected to enhance demand for eSIM subscriptions and the hardware category. The usage of M2M and IoT technologies in the automotive industry is also expected to raise demand for eSIM subscriptions. The GSMA Embedded SIM Specification, which will improve vehicle connectivity and pave the way for a new generation of connected cars, has just received support from the automotive industry, and it is expected to increase demand for eSIM subscriptions from a variety of connected services, allowing the industry to grow, said Mohit Shrivastava, an analyst at the firm.

Sogedo partners UnaBiz for smart water metering in France

Sogedo has reduced leaks

Sogedo, an independent water company and water distributor, and **UnaBiz**, a global provider of IoT solutions, have announced a ten-year partnership to enhance water conservation and better manage water consumption for communities and individuals in France.

With resources becoming increasingly scarce, utility companies and users are becoming more aware of their water consumption habits. To address this growing concern, Sogedo has partnered UnaBiz to deploy smart water meter solutions powered by **Sigfox** connectivity to enable customers to better control their water consumption. This partnership will significantly digitalise the management of Sogedo's water supply networks and enable consumption monitoring at scale.

The low-cost and energy-efficient water metering solution was initially implemented by Sogedo in March 2016. Since then, more than 22,000 devices have been deployed and over 1,000 alerts have been recorded by the water company, resulting in the detection of over 500 leaks in its customer base. The timely detection of leaks has allowed Sogedo to save over 90,000m3 of water throughout its water distribution network, the equivalent of 30 Olympic-sized swimming pools.

"This ten-year partnership demonstrates the relevance of UnaBiz's IoT solutions in the utilities sector and our plans to further densify our network in France," said Patrick Cason, the managing director of UnaBiz in France. "In addition to the 0G network infrastructure, UnaBiz will also provide additional services such as a multi-cloud platform, access to new IoT protocols and additional sensors for new services. By putting technological innovation at the service of environmental transition, UnaBiz and Sogedo are making a lasting commitment to transform tomorrow's world."

Assured Telematics launches forklift tracking and management solution with Hiab Integration

Assured Telematics, a provider of custom telematics solutions and applications to enterprise fleets, has launched a forklift tracking, monitoring and maintenance solution, and a new integration with **Hiab**, a provider of smart and sustainable load handling solutions, for its **Moffett** truck-mounted forklifts. By partnering with **BeWhere**, a mobile IoT company, and **Geotab**, a provider of IoT and connected transportation, Assured Telematics now provides accurate and detailed forklift insights and a management solution for both indoor and outdoor tracking on electric and propane powered forklifts.

The BeWhere Forklift telematics platform accepts external power from six to 55 volts and has an internal battery which provides continuous tracking when external power is not available. The hardware measures 2.24 x 1.4 x 0.79 inches.

"The combination of using a manufacturer's telematics system such as Hiab's HiConnect, and third party hardware, such as the BeWhere Forklift Platform, to bring common data points into a platform, such as MyGeotab, is a huge step in supporting fleets that are already using tractor and trailer platforms from Geotab," said Frank Pellitta, the president of Assured Telematics.

News in Brief

Water Ways wins repeat prescription

Water Ways Technologies has received a repeat order for its medical cannabis IoT irrigation and fertilisation systems. The order was received from an existing client, an Israeli licensed producer who is currently expanding its medical cannabis cultivation facility in Israel. The system is an IoT-controlled irrigation and fertilisation system for cannabis cultivators and growers. Water Ways designed the system for the specific needs of cannabis growers and cultivators worldwide.

"This is a repeat order of the system in Israel which is proof of the advantage of our technology to medical cannabis growers," said Ohad Haber, the company's chairman and chief executive. "The system's first client, **Cronos** Israel, finished implementing the system in 2020."

ON Power scales up with Landis + Gyr

Icelandic charging service provider and clean energy supplier, **ON Power**, has partnered with **Etrel**, a subsidiary of **Landis + Gyr**, to accommodate the growing uptake of EVs in the country. The companies have configured a system that will enable ON Power to expand its charging infrastructure and provide a user-friendly charging experience.

The OCEAN software is a scalable EV charge point and energy management platform that provides monitoring and management of residential, business, and public charging locations from a single cloud-based tool. The hardware-agnostic system enables ON Power to transfer the existing operations and expand with the market needs, regardless of implemented charging hardware or location.

How iSIM is helping businesses to out-think the future

SIM innovations are seeing the traditional telecoms model of providing plastic cards replaced by software or device-based alternatives in the form of embedded and integrated SIMs (eSIM and iSIM). This move is about far more than saving money on logistics and SIM trays in devices because it opens up new opportunities to integrate secure device identity with connectivity at the point of manufacture. It also increases the scope to save costs by integrating chipsets, modules and SIM functionality, freeing up device space and reducing manufacturing costs. Operationally, benefits will also accrue as IoT service providers and original equipment manufacturers (OEMs) stop configuring devices for local markets at the point of deployment and instead integrate SIM functionality in the factory. This also removes the need to replace SIM cards during the life of most devices, enabling switching to new providers and future-proofing devices for the length of their lifecycles.

In addition, iSIM has the potential to help monetise IoT devices by enabling value to be extracted from the implicit integration of the device's identity and secure connectivity. By doing so, the secure SIM technology is joined to the device identity, thereby creating trust in the device and its data. Trusted data is monetisable data.

Here, Vincent Korstanje, the chief executive of Kigen, tells George Malim, the managing editor of IoT Now, that iSIM's rapid development means the IoT industry, and in particular, the ecosystem around iSIM is now ready to support customers with simplified, secure, efficient SIM functionality ▶

SPONSORED INTERVIEW

George Malim: Five years ago, iSIM was announced and it is now entering the marketplace. How do you reflect on the ways the industry has accepted and adopted iSIM?

Vincent Korstanje: The speed of iSIM development is very interesting. iSIM, on paper, is a small change in the **GSMA** standards, but one that brings a big change. As an industry our role is to make it easier for OEMs to move from eSIM to iSIM to unlock entirely new security use cases and applications. The pace of iSIM demonstrates how the industry is moving faster towards this goal.

It took 22 years for SIM and 12 years for eSIM to become mass-market, OEM-mandated technology in volume but within five years, iSIM products are coming to market. It's particularly pleasing for us because **Kigen** was formed to make this a reality, and today, our ecosystem is thriving.

We are now benefiting from the flywheel effect in iSIM, inspired by **Amazon**'s success model of ecosystems. This sees the module makers, the OEMs, the mobile network operators (MNOs) and mobile virtual network operators (MVNOs), and the silicon chip makers committing to iSIM. Growth starts with the chip makers putting the hardware on chips, and the more chip makers you have doing this, the more module makers you have getting involved with eSIM and iSIM on their modules. This, ▶

Vincent Korstanje

"We already discussed the demand iSIM adoption generates for MVNOs and MNOs. When it comes to IoT, it's not just traditional networks that are benefiting"

Vincent Korstanje, the chief executive of Kigen

in turn, drives OEM adoption, which creates a need for MNOs and MVNOs to support eSIM and iSIM. So the flywheel continues to spin, gathering momentum as availability drives demand, and the market serves the need for more chips and modules.

GM: How is the ecosystem coming together to assemble the ingredients of the iSIM flywheel effect?

VK: The ecosystem is developing very strongly. Recent examples include **Sierra Wireless**'s out-of-the-box connectivity offering that utilises embedded universal integrated circuit cards (eUICCs) enabled by our secure eSIM OS and services. Sierra Wireless has publicly stated that it has plans for iSIM-based propositions based on Kigen.

Quectel has also brought its packaged connectivity offerings to the market that brings connectivity to customers alongside its modules and other IoT-related products and services. This makes it easier for customers to access certified, already-bundled solutions. We certainly see that, since 2020, the industry and OEMs have widely asked for more pre-packaged offerings, so it's a real credit that module and chipset providers have been able to respond so quickly.

We've supported this demand with major players such as **Murata Semiconductors** and **Sercomm**, and many more are considering similar moves. What's exciting is that choice of hardware is now readily available for anyone who wants to take advantage of secure connected device manufacture at scale.

GM: How is this availability of hardware supporting networks and resulting in product?

VK: We already discussed the demand iSIM adoption generates for MVNOs and MNOs. When it comes to IoT, it's not just traditional networks that are benefiting. For example, we have been working together with **Skylo**, to make it easy for OEMs to integrate satellite connectivity via non-terrestrial networks into cellular modules with no change in hardware or processes. As the move from eSIM to iSIM is also a standards-based transition, they have already been able to demonstrate satellite connectivity on Flex's iENBL hardware. For devices where relying on cellular networks alone could be problematic, for instance for tracking temperature sensitive shipment assets, this eliminates the gaps in coverage that global deployments encounter.

iSIM also offers greater simplification for products that have constrained space and power. One of

the first iSIM enabled innovations has been a cellular-connected printed label that can be printed on the factory dispatch units and stay connected for one or two years in transit or storage, based on the **Sony Altair** iSIM chipset. Now in use in multiple countries, it is an example of how new and unique use cases can support true digital transformation goals for companies and entire sectors. This is how we are going around the circle faster and faster and generating and gaining from the flywheel effect I described earlier.

GM: What advantages does iSIM have over eSIM?

VK: iSIM has massive benefits in IoT because the advantages that eSIM brought are now accelerating into iSIM. iSIM means you can go from having three chips to one by combining the radio and the SIM in a chip. The more integrated something is, the more you can rely on what's there. Usually, you put functions on the lowest common denominator, but with more integration, there is much more you can do on the chip. The other advantage is that iSIM allows more to be put into smaller devices because the form factor of fewer chips and no plastic SIM card is far smaller. For us, the SIM is the start. It's a very interesting crypto vault that allows you to do different things with very high-security mobile infrastructure. eSIM and iSIM enable true end-to-end certificate-based security not just on the SIM but on the device. This will have substantial applications in regulated markets in particular. ▶

GM: How important is it that iSIM binds the identity of the device to its connectivity?

VK: This should not be underestimated. The value of taking data from a smart meter signed by eSIM or iSIM in the IoT SAFE app and having strong trust that the data is proven secure and not hacked is immense. Knowing that the device is on the network and is authenticated enables data from it to be trusted and to have value.

If you want trusted data from which you can make conclusions in sectors like health, for example, it's very important that it hasn't been tampered with. In services like electric vehicle charging, which are becoming more sophisticated, assurance that the data has not been hacked is paramount. The iSIM becomes the basis of the device's identity and adds value to the data coming off the device.

GM: Has the IoT industry had a lightbulb moment that has now put iSIM into the mainstream?

VK: I think it's happening. iSIM changes the business model, and the new model has obvious benefits. Previously, if you had a smart meter and you wanted to change the SIM, you had to send someone to change it, which doesn't work at scale. Another reason now is the cost of modules which has to come down. If a module on a label is US$40 that has to be much lower for many use cases to work. Lower-cost radio technology in the form of Cat-M and NB-IoT cellular is part of that and provides a lower-cost alternative to 5G, which most IoT apps don't need.

iSIM contributes to the overall goal of IoT of reducing the total cost of ownership (TCO). At the same time, we are getting smaller and smaller modules and fewer chips in devices, which has the benefit of reducing the form factor, enabling deeper integration and reducing power usage. These advantages will help accelerate the market. I think there is generally good awareness of what iSIM can do. We are working very closely with module makers and the next step is to build up in-factory provisioning, so devices don't need a global bootstrap to start connectivity. We're also working with leading operators in every region to ensure the device isn't restricted to one carrier when it goes out the door.

Take, for example, a device can leave a factory in Shanghai and auto-roam until it reaches its point of deployment in Rotterdam, at which point it joins the **KPN** network. You can have connectivity everywhere and we need to focus attention not just on eSIM and iSIM but on the ability to make it work. That's what the market wants and what we're enabling.

There are multiple ways to make iSIM more accessible. Module makers are increasingly bundling in connectivity, and this gives OEMs more choices and takes away the burden of managing connectivity. The idea of iSIM is all about growing the market share of cellular connectivity and a great example is the offerings I spoke about earlier from Sierra Wireless, which set out how smart connectivity will be bundled in with iSIMs in the future.

GM: What role would you like governments to take in support of iSIM?

VK: I don't think they need to take a specific stance with iSIM as such, but they do have a role to play regarding the implementation of security standards. When it comes to certifications, governments should advise that high-security standards need to be implemented for use cases such as health. This should involve standards-based security with protected profiles specified to the same level as smart cards, which are the starting point for these next-generation SIM technologies.

The iSIM is an operating system to provide that functionality and governments should set out higher standards and define areas to which they should be applied. By doing so, they will address security today and in the future.

GM: What's next for Kigen?

VK: We're still very active and focused on our core offerings and what OEMs should be doing to bake secure ID into their products. When we started on this journey, security seemed to be an afterthought, and that is changing. What is clear is that the SIM supply chain is changing, for example, from having a chip maker and a module maker and a SIM and connectivity provided by an operator, to a simplified vision where there is a SIM operating system (OS), the chip and the module. Kigen provides the SIM OS, the factory digital key process to secure the ID of the device and the remote SIM provisioning platform to enable connectivity.

iSIM is a software-focused model and that provides flexibility and efficiency that has not been seen before. Hardware partners have chipsets, modules, start-up kits and evaluation boards with which OEMs can access our ecosystem to scale up production. Kigen's focus is to bring costs down, to work more cost-efficiently in the servers, factory provisioning and in the IoT SAFE secure app. By doing so, we will help enable faster, simpler, more secure IoT connectivity and iSIM use cases that enhance monetisation of IoT. ■

If you want trusted data from which you can make conclusions in sectors like health, for example, it's very important that it hasn't been tampered with

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Smart tracking for micro-mobility in smart cities

E-bike and e-scooter fleets have stormed from city to city in just two years, re-defining urban mobility and addressing some of the most vexing transportation challenges in cities congestion, emissions, air quality, and inconsistent access to transit. Research shows the sustainability benefits clearly: if the share for e-bike riding rises to 11%, we could see a 7% decrease in CO2 emissions from the urban transport sector by 2030 – potentially accounting for over 50% of urban trips in the US and 70% in cities like London

Behind the scenes, micro-mobility solutions are complex. They connect a diversity of stakeholders – government and city councils, product manufacturers, and platform operators – interoperability is important. Vehicle operators need a reliable, long-lasting solution to locate and retrieve lost devices or to re-distribute them to places of greater usage. Their success lies in the simplicity they present to the users, who will only change their behaviours if the services offered are significantly more convenient, trustworthy, and reliable. Those who sign up to use e-scooters also offer up a great deal of personal and sensitive data, including billing information and other involuntary analytics, such as location and individual vehicle information.

Urban mobility is re-mapping the way we experience our cities

Kigen's customer is pioneering the development of tracking and analytic solutions for managing and servicing large fleets of micro-mobility urban transportation. The customer needs to support a unified experience for customers whilst meeting the regulatory, security and safeguarding requirements of multiple cities, across many regions. This required the simplified manufacture of a low-power and compact cellular IoT enabled device that can be personalised to meet local needs and associated carrier profiles, allowing them to offer a locate and retrieve functionality, reporting a lost asset and collect utilisation statistics to drive adoption. ▶

Kigen's integrated SIM (iSIM) operating system (OS) combined with its strong partnerships within the module and chipset ecosystem provided a route to simplifying secure manufacture and late-stage personalisation eliminating the need for multiple product development routes and inventory management. To meet the needs of citizen data security, it was essential that these edge devices are treated with the most robust security protocols – implementing chip to cloud security with **GSMA**'s IoT SAFE security scheme. This approach offers further assurances on ease of data cloud integration and interoperability.

The results

By simplifying the manufacture of cellular connected micro-mobility vehicles to offer location tracking, pattern tracking and further usability features in a compact, low power and ready to connect out of the box solution, vehicle companies now have a solution that can scale seamlessly. To ensure that the early benefits of greening our cities are realised, operators of fleets and city councils can take advantage of well-established security frameworks ensuring data of the city, its consumers and all IoT that serves them is cost effective, secure, and tamper-proof.

Kigen's iSIM OS and solutions are built with high-growth markets of massive IoT, such that enterprises can leverage strong security even at the most constrained size, power, and cost envelopes. Through greater integration of components, longer battery life and tamper-proof protection can allow to safeguard IP and innovation for manufacturers. Much as large fleets of urban vehicles, Kigen's iSIM OS is enabling edge devices in consumer lifestyle products, in mobile medical healthcare devices as well as point of sale devices. This in combination with standards-based security scheme such as IoT SAFE is a perfect combination to support the market's growth and strengthen the social contract with users. ■

Kigen's customer is pioneering the development of tracking and analytic solutions for managing and servicing large fleets of micro-mobility urban transportation

What's an iSIM and why should you know about it?

While embedded SIM cards (eSIMs) are still gaining traction, the next generation of subscriber identification modules is coming to the fore. Integrated SIM, or iSIM, is the next step in the move away from physical SIM cards offering connectivity benefits for both consumer and IoT applications. In this article, Amr Houssein, managing director of BSS telecoms software developer Mobilise, offers his introduction to iSIM technology

While a physical SIM card requires a dedicated slot on the smart device and eSIM demands a dedicated chip in order to initiate its set up, iSIM isn't soldered onto the device's circuit board. Instead, an iSIM has a dedicated space on the system on chip (SoC) where it's protected by a tamper resistant element (TRE).

Just like eSIM, iSIM allows carriers to preload network profiles or remotely provision them on a user's device without them needing to visit a store or acquire a physical SIM in any other way. There are, however, differences that bring benefits to several use cases.

The IoT market

iSIM is significantly smaller than eSIM — about 98% smaller, to be precise. Device real estate is a pretty valuable matter, and a standalone chip that's dedicated for eSIM can take up precious space. This smaller size, alongside advancements in low-power silicon modules, opens the door for a number of IoT use cases.

For instance, iSIM brings heightened visibility to transport and logistics applications, helping businesses track the location and condition of products shipped worldwide. Smart labels embedded with a low-power connectivity module, an iSIM chip and a battery that can power the label for almost a year can form the basis of an IoT connectivity solution that takes up minimal space, yet provides major supply chain insight.

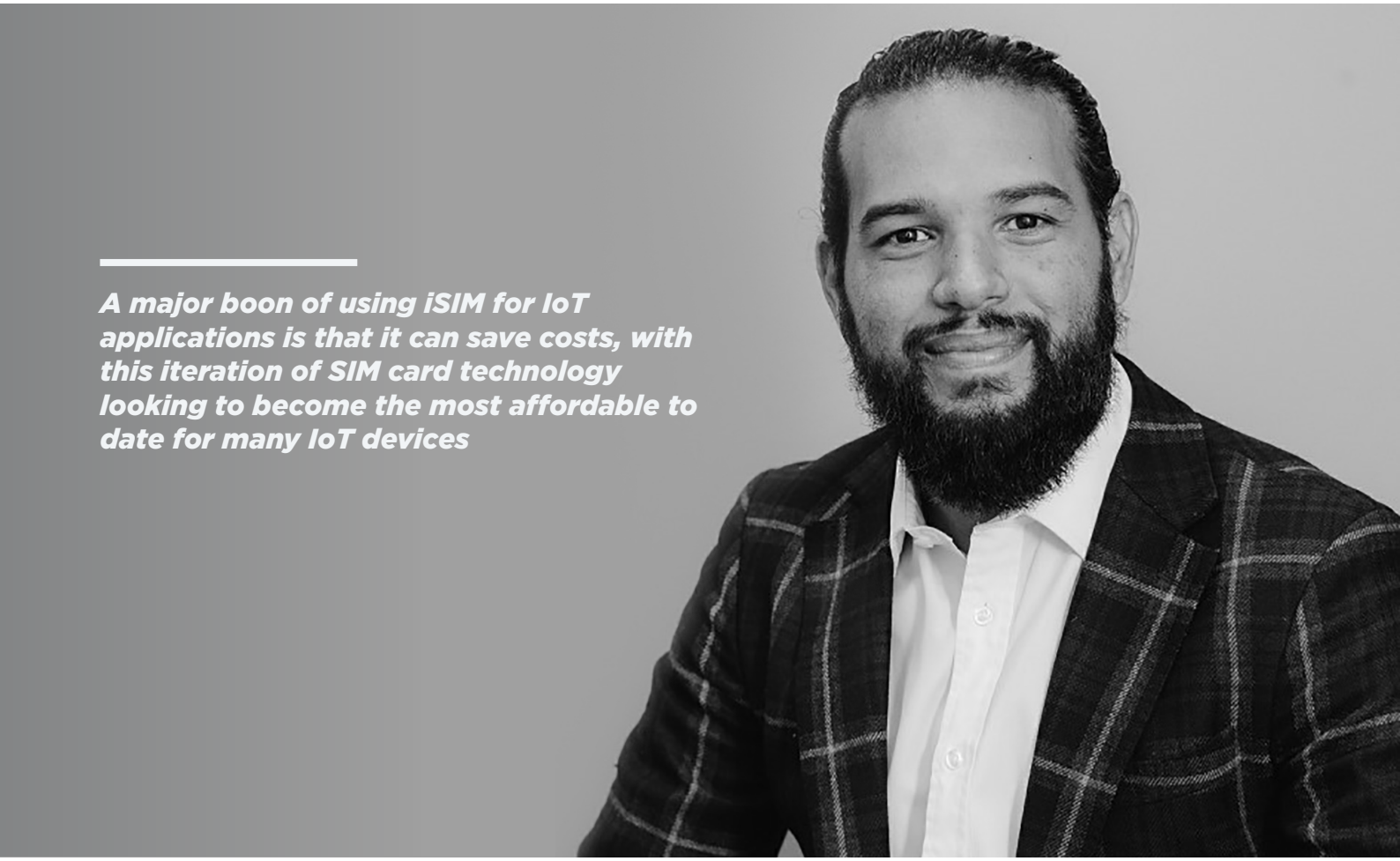
While it may look like any other label, a smart label has the ability to monitor and report on any disturbances to the delivery process. For instance, if there is a sudden change in temperature that would damage the goods, a notification is sent that triggers an action to resolve the situation.

Ultimately, iSIM changes the way device makers can access cellular capabilities for devices that couldn't be served before. If we consider everyday consumer electronics, like hair straighteners for example, fitting an iSIM would add zero bulk to the appliance. What manufacturers could gain, however, is data on operational conditions and user behaviour that can help them improve their products. In addition, iSIM could also offer a digital interface that helps consumers control and manage their appliances themselves, adjusting parameters such as temperature based on their preferences.

The consumer space

A major boon of using iSIM for IoT applications is that it can save costs, with this iteration of SIM card technology looking to become the most affordable to date for many IoT devices. For consumer devices, however, this won't make much of an impact on the overall cost of the device — though it certainly won't drive prices up. Instead, there are other major benefits for these applications.

First, there's the size of the chip. A 98% size reduction on eSIM is valuable to OEMs that are ▶



A major boon of using iSIM for IoT applications is that it can save costs, with this iteration of SIM card technology looking to become the most affordable to date for many IoT devices

constantly looking to add more complexity to a device. With a smaller SIM, there's more opportunity to add in something new. Second, it introduces chip-to-cloud secure connection, heightening its security credentials. A third major driver for iSIM in both the IoT and consumer space connects to **GSMA** standards. Standard SGP.02/22, which defines a technical solution for the remote provisioning and management of eSIM in consumer devices, was separated from the standards and flows used for IoT applications. This made it challenging for service providers to build a unified solution to address the two sectors.

However, things look set to change with the introduction of standard SGP.31. This will make use of the benefits of existing GSMA eSIM remote provisioning specifications tailored to the machine-to-machine (M2M) and consumer markets and fill the gaps for IoT use cases. Its aim is to make the use of eSIM more widely available, but that's encouraging for iSIM too.

We're already seeing several consumer device OEMs begin to explore iSIM as a result of SGP.31. Already, many Android models are being tested with iSIM for both wearables and handheld devices. And, what's even better for consumers, is that the transition from eSIM to iSIM can happen seamlessly, without introducing any changes to the user experience.

Let's not get ahead of ourselves

iSIM is undoubtedly the next generation of SIM technology and will apply cellular connectivity to the unconnected. It's all part of an exciting future — but we mustn't neglect the here and now.

eSIM adoption remains very much underway, and consumer appetite is real. **Amdocs** reports that 81% of consumers are actively in favour of an eSIM-only future for smartphones, driven by the prospect of being able to switch between plans seamlessly. But we're still just scratching the surface of eSIM's potential. We've seen major industry players, such as **Apple** and **AT&T** demonstrate their support for the technology this year, with the launch of an eSIM-only iPhone 14 acting as a catalyst for change.

For those operating in telecommunications, this uptake feels like it's been five years in the making. So while iSIM will undoubtedly offer many exciting benefits for manufacturers and consumers alike, benefits that we'll all enjoy in the not-so-distant future, it's clear industry is only just beginning to bask in the eSIM era.

We're already seeing several consumer device OEMs begin to explore iSIM as a result of SGP.31

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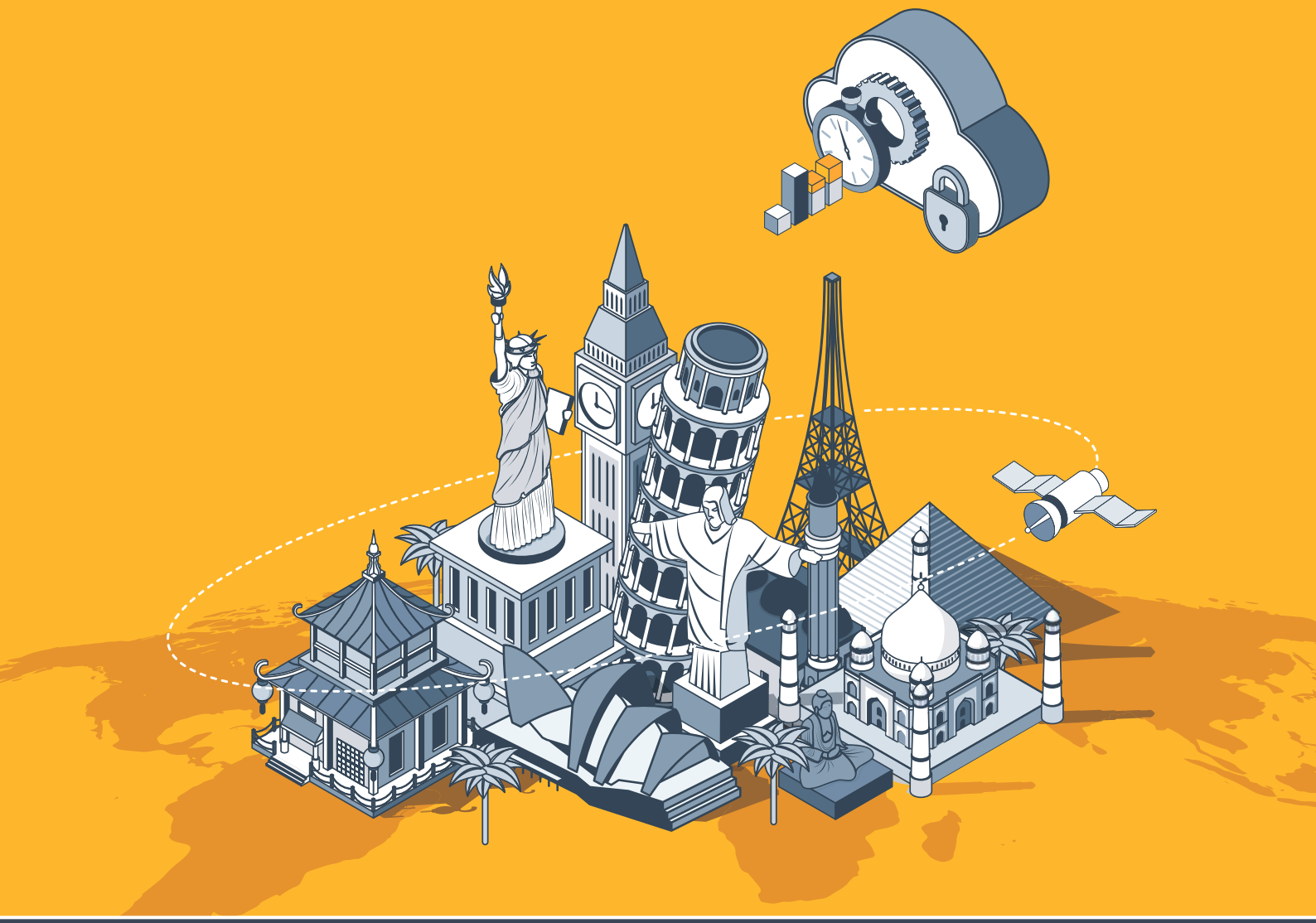

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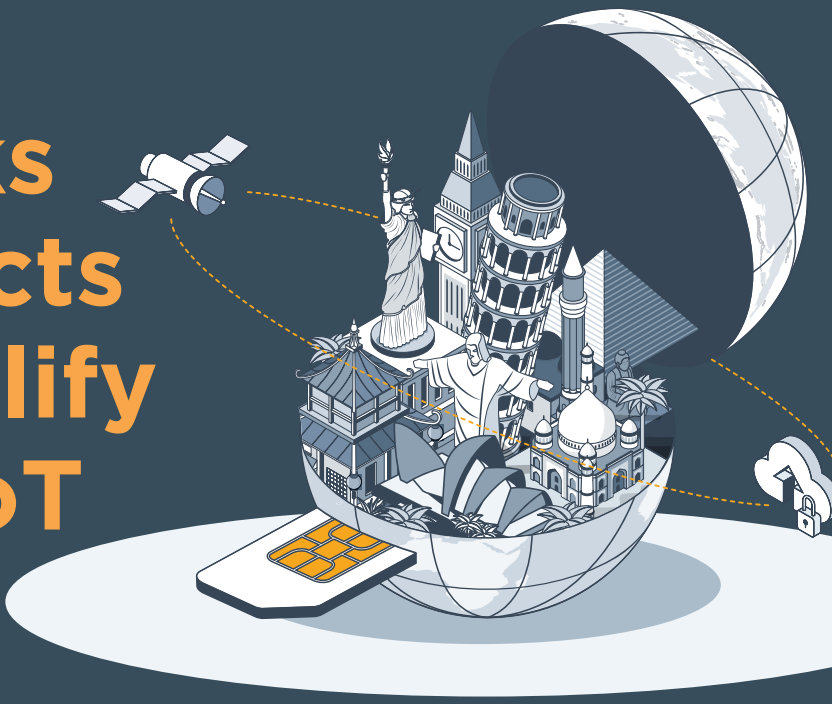
floLIVE thinks global and acts local to simplify and assure IoT connectivity



As volumes of connected devices grow, and device manufacturers and OEMs expand their business operations overseas, simplified access to global connectivity is a must. IoT service providers and mobile network operators need to take new approaches to support the global nature of their enterprise customers' business, by providing them access to seamless, simplified global connectivity. The IoT service providers need to be able to ensure devices have access to optimised connectivity wherever they are deployed while also maintaining compliance with local and vertical industry regulations. Mobile operators also need ways to serve their global customers in markets where they don't have capacity. Both types of organisations need a new approach to IoT connectivity and simplified, automated ways to manage connections at scale.

With its global core infrastructure located in data centres across the world, floLIVE operates a hyper-local data network based on an array of interconnected local core mobile networks from which it provides centrally managed local connectivity for any device in any location. The network has been designed to comply with privacy laws, data regulations and roaming restrictions enabling floLIVE to offer low latency, high performance, fully compliant connectivity. The floLIVE connectivity management platform (CMP) enables module makers, device OEMs and IoT organisations to control their connectivity in the same way a carrier does. Users can monitor their devices, access real-time network events and usage, change operators remotely and predictively troubleshoot failures.

The need to manage mega-volumes of global connections flexibly and at huge scale is being addressed by the simplifications new SIM variants bring to the supply chain. However, the connectivity now needs to offer the same flexibility, performance and ease of management, Rony Cohen, the co-founder and head of business development at floLIVE, tells George Malim, the managing editor of IoT Now. Cohen is an experienced telecoms industry executive and serial entrepreneur who has held senior positions in established multinational firms and has founded several successful mobile phone and M2M-related businesses. His previous positions include serving as chief executive of Marathon Telecom, as director of 018 Xfone, and telecom director at Equator Investments. He holds a degree from the European Business School ▶

SPONSORED INTERVIEW

The old way of doing things also has substantial administration and management required which is increasingly unsustainable for mass-scale IoT

George Malim: What impacts do you expect the arrival of eSIM and iSIM to have on IoT connectivity? Big promises are being made about improved flexibility and operational efficiency but how will IoT service providers be able to unlock these?

Rony Cohen: First of all, we welcome new advances in SIM technologies. Mass IoT will only be available and deployed if we move away from plastic SIMs. There is no space for shipping billions of plastic SIM cards around the world anymore. This only causes delays and incurs additional costs, not to mention the negative environmental impact. Mass IoT will only be achieved with embedded or even integrated SIMs and there is significant potential for electronic or surface-mounted SIMs to simplify SIM-enabled connectivity.

From our point of view, when **Apple** announced the iPhone14 which has no plastic SIM capability and mandates usage of eSIM, it took the industry to a new place. In this new reality, roaming is slowly becoming defunct. With eSIM capabilities, operators can't force users to utilise a roaming SIM because they have access to an embedded universal integrated circuit card (eUICC) eSIM. This means users can simply scan a QR code and connect to a local service, there's no reason for them to roam. This is forcing operators to admit roaming is dead and pushing the consumer market towards the same model as the IoT space.

There is another element to the introduction of iSIM for IoT use cases – size. While the motivation for moving towards iSIM is reduced footprint in terms of size, memory and power consumption, the GSMA eUICC standard requires exactly the opposite – a large size SIM, strong processing power and a large data payload when downloading new profiles to a device. So for IoT use cases, the highly efficient multi-IMSI technology is the way to go.

GM: The ability to access local connectivity for devices easily is central to the eSIM and iSIM business case. Do you think the IoT market is aware and ready for the concept of localised connectivity?

RC: Until now, we have had two models of operation. The industry has the traditional model where an enterprise tries to buy a SIM card from a phone company and gets it shipped back to a factory for installing into devices. The alternative has been to buy country-specific SIMs from an aggregator that either ships multiple different SIMs to the factory or offers roaming SIMs in the same way. A third possibility, of having SIM cards installed into devices locally before deployment, becomes increasingly unviable as volumes increase.

For IoT use cases, roaming has severe limitations. These range from the growing list of countries that don't allow permanent roaming, to situations in which the roaming deals that an aggregator provides don't necessarily deliver the optimum connectivity for a specific application in a specific location. There can be gaps in coverage, poor performance, or high latency, all of which can be catastrophic to IoT use cases, and none of which occur with local connectivity.

The old way of doing things also has substantial administration and management required which is increasingly unsustainable for mass-scale IoT. IoT is a global business, and the headache of managing multiple operator relationships, each with different billing cycles, service level agreements (SLAs) and contracts is prohibitively resource intensive.

Awareness of this reality is growing and as an industry, we now understand the problems of scale that roaming faces. Permanent roaming, in markets where it is legal, was not included in operators' network design plans. For the first time, mobile operators are struggling to manage and accommodate roaming. A large operator, for example, might have 35 million subscribers and therefore has built its roaming network to accommodate maybe one million roaming subscribers. If it suddenly needs to support ten million IoT devices via roaming connections, it is physically not going to work. Localised connectivity is the natural solution.

The second aspect here is the commercial perspective. Mass IoT connectivity contracts are typically for five or ten years. This works well for battery-powered devices with consistent needs and low power consumption. The low power wide area (LPWA) network technologies offer flexibility to suit use cases such as battery-operated trackers but the frequency and size of communication substantially affects cost. On the other hand, devices that have greater network demands, less predictable usage and shorter lifespans don't find the constraints of a five-year contract appealing. When you have billions of devices that all demand a minimum level of performance and this is what customers are paying for, performance becomes the key issue at hyperscale.

GM: What role does floLIVE play in the continuing move towards IoT connectivity maturity?

RC: These are exactly the challenges we were aligned with when we founded floLIVE. We understood the need to own the core network and the entire technology stack, and we were sure about the demand to receive it as-a-service both for IoT service providers and mobile network operators (MNOs). We had a strong vision which was lacking in the industry at the time.

I said to customers in 2015, when we launched the company, that IoT is global but mobile network operators are local. That has resulted in global IoT products and devices but the need for mobile virtual network operators (MVNOs) to commercialise local connectivity. Achieving that is going to happen within our technology and the way we solve the challenge is by customers taking the technology we provide as-a-service.

When we provide this as-a-service we utilise the infrastructure we have built in the local data centres of core networks all over the world. This is the only large-scale, global infrastructure for IoT that anyone has ever built. We are tremendously proud of what we've achieved. Over a dozen core networks globally distributed and additional packet gateways in large countries. This enables ▶

Rony Cohen
floLIVE

us to offer 2G, 3G, 4G, NB-IoT, CAT-M and 5G coverage in all locations, and to be ready for the connectivity technologies of tomorrow, too.

We've done this by working with mobile operator groups that have a large footprint. We have several partnerships that can provide local international mobile subscriber identifications (IMSIs), local IP addresses and low latency services.

GM: How do you handle privacy and compliance mandates?

RC: By having local infrastructure, our services are compliant with General Data Protection Regulations (GDPR) and privacy laws and ensure compliance with data sovereignty requirements. This is particularly important in regulated industries where sometimes companies have no interest in sending data across networks via roaming and in some cases would be in breach of relevant regulations if they did. For example, financial service providers in Europe are not allowed to move transaction data across national boundaries.

Our core infrastructure enables the protection of our customers' data and achieves compliance while also solving the issue of permanent roaming. Mobile operators are already using our infrastructure to enable hyperscale IoT networks without the need for roaming. We see the addition of satellite networks to our global IMSI library as another network to provide complementary connectivity in rural areas that are not covered by national mobile operators. In low-earth orbit (LEO) networks as with narrowband IoT (NB-IoT), the SIM needs to be authenticated, and the way to do that is with a core network. We've signed up two satellite operators so far and a third is on the way and these are being used to fill gaps in coverage, further strengthening our comprehensive global connectivity.

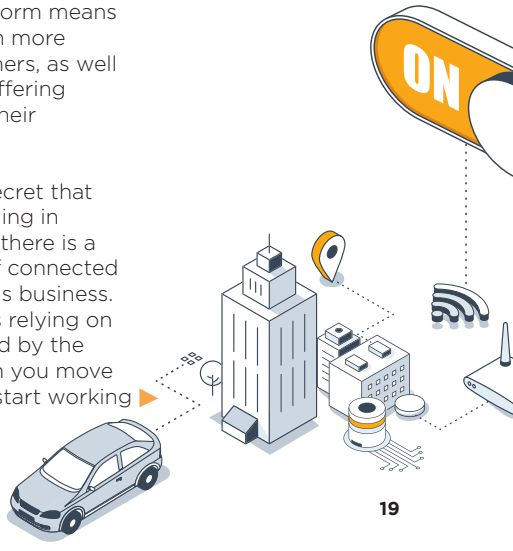
GM: Hyperscale volumes demand total automation, yet IoT service providers still need to be in control of their connectivity. How are connectivity management platforms (CMPs) enabling visibility?

RC: Enterprises can support themselves, as long as they have full visibility and control over their connected assets. Most CMPs are largely similar to one another, relying on legacy technologies; furthermore, implementing these CMPs requires long integration cycles with other systems and platforms. This leads to significant time-to-market, raised overall cost and poor ability to meet SLAs.

The main difference with our CMP is that it's cloud-based, holistic and provided as a service to both IoT service providers and mobile operators. When I say 'holistic' I mean that our CMP comprises all necessary building blocks, all designed and built on the same, modern software technology and highly flexible to accommodate the specific needs of our customers. Having a single vendor that can take responsibility over the service and support of the entire platform means service providers can commit to much more aggressive SLAs towards their customers, as well as reduce their operational costs by offering advanced self-service capabilities to their customers.

But there is another aspect – it's no secret that most mobile operators are still struggling in turning their IoT business profitable – there is a paradox between the huge number of connected devices and the ability to monetise this business. This is mainly due to mobile operators relying on these legacy technologies and trapped by the high operational costs. However, when you move to the cloud, the economies-of-scale start working ▶

Our core infrastructure enables the protection of our customers' data and achieves compliance while also solving the issue of permanent roaming



The difference between us and anyone else is that we're an infrastructure company and connectivity is an application layer that we provide

in your favour. With floLIVE, mobile operators don't have to invest heavily in capex and can start small and gradually expand as their business grows. A holistic platform also helps cut down the costs of other necessary systems such as core networks and billing.

The difference between us and anyone else is that we're an infrastructure company and connectivity is an application layer that we provide. We provide a CMP for mobile operators as well as to IoT service providers. As service providers are given the whole platform out-of-the-box, they can immediately start selling connectivity. We include the global operator coverage, the real-time visibility, the business support suite, and the SIM manageability. That single SIM is all that the business needs to hit the ground running.

GM: What are the benefits for mobile operators?

RC: If I were to lay out the main benefits for mobile operators, the number one benefit would be profitability. This is key when any organisation decides to enter a new market or offer a new service. The second benefit, and in some cases this may be even more interesting than the first one, is our ability to generate revenue for the mobile operator. When I said earlier that IoT is global but mobile operators are local, I was referring to the fact that no mobile operator will invest in sales and marketing efforts overseas to attract customers. However, floLIVE is very well positioned to bring in new connectivity revenues from our existing and growing number of global customers, and this is a game changer for many mobile operators – the ability to attract new users to consume their services, with no marketing or advertising, and no effort on their part.

Other benefits are the ability to support the many new and innovative business models that have been triggered by the many different IoT use cases, enhanced by the fact that we own the entire technology and do not source elements from other parties. Indirectly, the fact that our platform allows customers access to every network or billing event in real-time, reduces the load off the mobile operators' support organisations, leading to further reduction in operational costs and increased customer satisfaction.

Altogether, we're running this global, cloud-based service that keeps deployment time very short and operators can use it to provide their customers with connectivity overseas. They can continue to serve their customers cost-effectively with high-performance connectivity – and do so profitably.

GM: How about for the IoT enterprises?

RC: Right now, enterprises need to be able to manage their device connectivity more efficiently. Imagine calling an operator support centre and trying to explain that you have an issue with a connected vending machine in Tanzania. They effectively have no control over these devices and no way to find out what is happening with it.

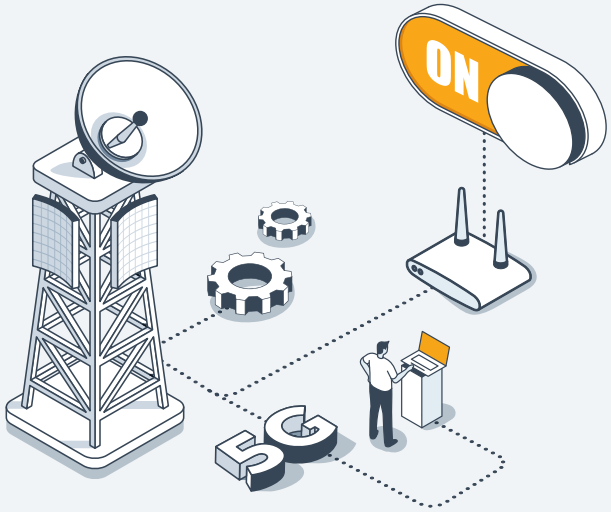
With us, the app goes on top of the global infrastructure we have built so our customers have a user interface that tells them whether the device is connected, the performance it is receiving, its up-to-date data usage and much more. This takes away the complexity and replaces it with usable, valuable data. I see this as an equivalent to the **AWS** model but for IoT connectivity.

Our approach also opens new business models for many kinds of IoT enterprises. Not only can enterprises use it for their own devices, they can start reselling connectivity and immediately open new revenue streams. Connectivity used to be far too complex to be offered by resellers, involving its own core competencies and relying on businesses creating relationships with multiple operators in various regions. Now, resellers can own their own connectivity via our CMP, and take control and visibility, handing that over to their own end users. Our platform is multi-multi, multi-tenant, multi-tier, and multi-network. As a result, enterprises can adopt a turnkey model to start reselling connectivity.

GM: What makes floLIVE different to other providers?

RC: Our uniqueness lies in our hyperlocal global data network. This network is the first and largest of its kind in the world today, connecting mobile operators and IoT service providers from all over the world – a carrier-grade cloud-native platform that offers the same level of service, performance and SLA to all our customers globally. And all services are available and exposed via a rich REST API suite that allows any customer to consume our connectivity services anywhere in the world in exactly the same way.

When we say our platform provides a single pane of glass, we really mean it. We have recently added an important capability to our platform – M2M and consumer eUICC capabilities. This further expands our offering into a single platform that's a one-stop-shop for all connectivity elements – core infrastructure, multi-IMSI SIM management, real-time IoT billing and eSIM RSP.



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SIM CONNECTIVITY REPORT

Will SIM innovations turn communications management platforms into IoT springboards?

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Will SIM innovations turn communications management platforms into IoT springboards?

IoT connectivity resembles the final frontier for simplifying deployment of devices. Currently, the process of enabling connectivity for global devices involves needless complexity, multiple layers of lengthy administration, performance guarantees in different markets that are hard to verify, currency fluctuations and challenging-to-reach local support. Global connectivity often demands multiple vendors or even in the case of a single vendor, a service actually provided by a third party. This leaves IoT service providers facing higher costs than necessary, a convoluted management burden and the very real possibility that they can't find out the status of their devices

What's needed is a simple, straightforward, fixed price service that offers assured connectivity to an agreed service level in any location with the fee based on each active device. As part of this streamlined proposition, customers – the IoT service providers – should have the ability to monitor and manage their devices and track and control costs through an easy-to-access user interface. A further benefit should be radical simplification of the onboarding process. The days of shipping plastic SIMs to factories or installing them at the point of deployment must end so logistics costs can be reduced and environmental impact minimised.

The challenge and the vision are well-understood and IoT connectivity is moving towards comprehensive communications management platforms (CMPs) that provide the visibility and control IoT service providers need. At the same time, SIM innovations in the forms of embedded SIM (eSIM) and integrated SIM (iSIM) are moving the market away from the traditional, plastic SIM and enabling SIM functionality to be integrated into IoT devices at the point of manufacture. This has the potential to put control of connectivity in the hands of IoT service providers rather than mobile operators, although both technologies can also be an opportunity for mobile operators if they see them as a means to support customers' needs more effectively.

Management of IoT SIMs is not the same as consumer SIMs because of the sheer volume of SIMs involved and the differing requirements of use cases on the network. The range is enormous from very basic, low power, low data devices that simply ping the network to communicate that they are functioning on a sporadic basis to always-on mobile broadband devices that have mission critical functions. The communications requirements of each are completely different so there is no such thing as a one-size-fits-all IoT communications platform or network. Each use case sets its own connectivity criteria.

Platforms for growth

This need to manage IoT connectivity is being handled by CMPs which broadly originate from two types of business. One is the telecoms industry's vendor community which has developed CMPs to support their mobile operator customers and the other is the IoT mobile virtual network operator (MVNO) sector which typically offers their own ▶

CMPs to manage the connectivity services they provide. A dwindling number of IoT service providers opt to manage IoT connectivity themselves, recognising that the burden of negotiating and managing connectivity across global markets is not a core skill and takes up significant resource and time. IoT CMPs are also a key component in the offerings from technology providers and IoT MVNOs such as **1NCE**, **EMnify**, **floLIVE**, **IoTM Solutions** and **Mavoco**, says **Berg Insight**.

The firm has reported on third-party IoT CMP adoption, stating that 31% of the global installed base of 2.1 billion IoT SIMs were managed using third-party IoT CMPs at the end of 2021. **Cisco** is the largest IoT CMP provider by mobile operator partners, supporting the IoT operations of more than 60 mobile operators worldwide. The main challengers are **Ericsson**, floLIVE and **Vodafone**, which is the only mobile operator that licenses its platform to third-party service providers, and Mavoco. These companies focus on reducing the complexity associated with multinational deployments of cellular IoT devices. The China-based vendors **Huawei** and **Whale Cloud** are key players in their domestic market.

Several IoT MVNOs, including 1NCE, **Eseye** and **Soracom**, also provide white-labelled or branded IoT connectivity services via mobile operators. In addition to being a strategic partner to **Deutsche Telekom**, 1NCE has announced a deal with **SoftBank**, which will sell 1NCE's IoT services exclusively in 19 markets across the Asia-Pacific region. IoT MVNO **Aeris**' acquisition of Ericsson's loss-making IoT Accelerator business in December 2022 marks a significant development in the CMP market. Aeris could potentially develop a managed service offering around the IoT Accelerator, which can be resold by mobile operators. The new IoT Accelerator Device Connect service already resembles the offering of many IoT MVNOs, in which enterprises can buy managed connectivity services from multiple mobile operators off-the-shelf via the Device Connect global marketplace.

New models for connectivity management

The mobile operators won't necessarily be confined to selling their connectivity through marketplaces such as this. Many will continue to sell connectivity directly while others will utilise CMPs and MVNO providers to turn national or regional offerings into global propositions so they can retain and enlarge their business with existing enterprise customers.

The CMP market is therefore fragmented and subject to wide variance in the approaches taken by vendors to serve customers. This scale and scope is confirmed by **ABI Research** which has identified 62 companies offering CMPs, operated either proprietarily or commercially available to license. These companies span from connectivity resellers and aggregators to enterprise software developers, IoT service providers and carrier grade infrastructure manufacturers, the firm says.

'The largest CMP vendors such as Cisco and Ericsson, and their products have always acted as gateways for third party partnerships to jointly sell through to the same IoT enterprise customers," explains Jamie Moss, Research Director for M2M, IoT, and IoE at ABI Research. "Today, the CMP is also a nodal product for turnkey IoT system providers, acting as a gateway product to promote the sale of value-added components of their portfolio, and ideally the full stack. From an enterprise customer perspective, CMPs are not typically charged for, but device management, and security management, and data orchestration platforms are, with CMPs acting as a single pane of glass interface over them all."

Manage for scale – and profit

IoT connectivity is a large market and it is poised to become enormous, exacerbating the connectivity management challenges IoT service providers face and ▶

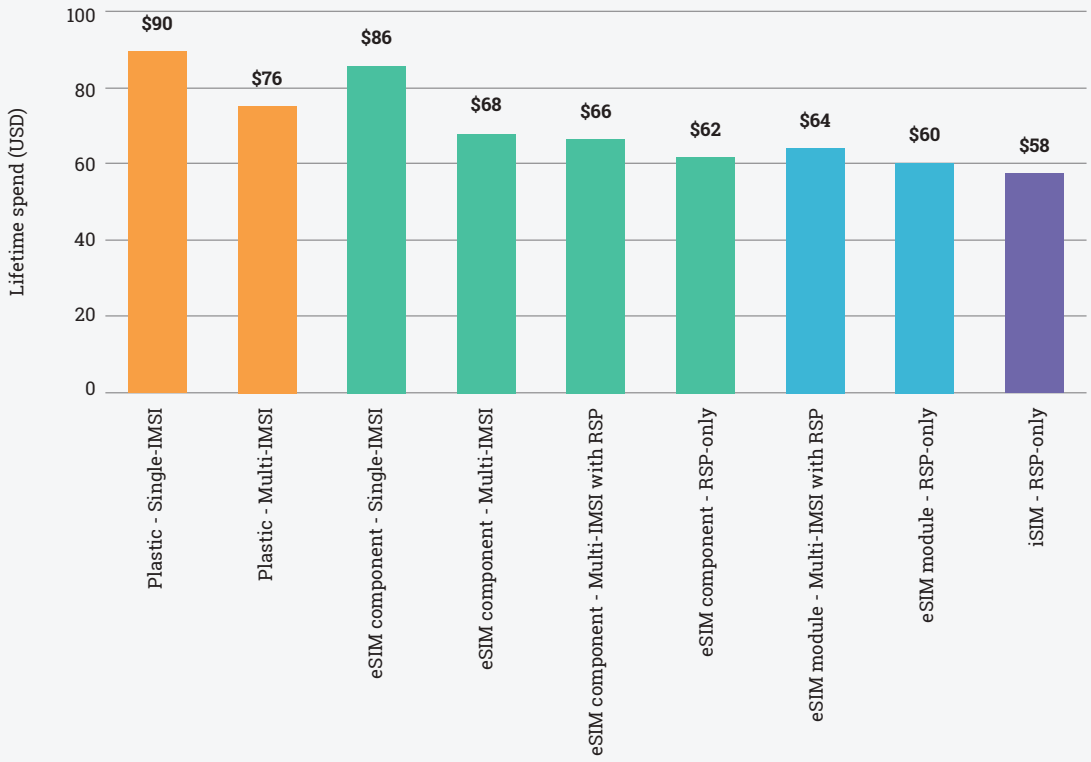

Figure 1: Lifetime spend for various SIM options
Source: Transforma Insights

highlighting a need for automated systems that simplify both onboarding of devices and their maintenance over their lifespan. ABI Research reported at the end of 2021 that the global market for the sale of data transport, and the management of that connectivity, to original equipment manufacturers (OEMs), enterprises and municipalities was US$12.14bn. This annual total will more than double to US$31.77bn in 2026, the firm says.

"The demand-side revenue that the enterprise purchasers of these services will realise in their return on investment (ROI), be it for downstream connected services and products sold, or internal operational processes optimised will be far greater still," adds Moss.

This is borne out by the huge predicted increased in IoT roaming traffic. Research firm **Kaleido Intelligence** expects IoT roaming traffic to grow from 174 petabytes in 2021 to 650 petabytes in 2026 and that's in spite of growth being constrained due to the continuing chipset supply crisis. Overall, the firm says cellular IoT roaming connecting will exceed 850 million in 2025.

The SIM revolution

With Berg Insight now projecting that there will be 4.3 billion IoT devices connected to cellular networks worldwide by 2026 it's clear that the days of shipping plastic SIMs to factories for installation in products are ending. Alternatives such eSIM and iSIM open up the prospect of embedding or integrating SIM functionality that can be configured for the local markets in which they are deployed remotely. This means OEMs can make a single product version, with a single stock-keeping unit (SKU) number for the global market, rather than having multiple regional versions.

eSIM adoption is already well underway with familiarity driven by consumer devices and **Apple**'s early commitment to the technology. iSIM adoption is set to follow. However, while there are efficiencies and savings to be made by choosing eSIM and iSIM in comparison to plastic SIMs, for some customers it will still be simpler to have plastic SIMs. Typically, the cost of managing eSIMs or iSIMs and playing for remote SIM provisioning (RSP) can be greater than costs associated with traditional SIMs for use cases that involve only a few markets or even a single country. Consideration also needs to be given to the volume of devices likely to be deployed and whether they need installation and maintenance.

Lifetime favourites

It is less of a cost or barrier if a device needs to be configured at the point of deployment to have a SIM card added then than for a device that is simply mailed out to its point of use. In addition, if the device is expected to have regular maintenance this could also be an opportunity to swap the SIM at minimal additional cost. In contrast for deployment in multiple regions, at large volume and with long maintenance-free service lives, traditional SIM management activities are unviable. As the market matures, costs associated with eSIM and iSIM will reduce and fewer traditional SIMs will be utilised.

Transforma Insights has published an extensive study into the relative costs associated with eSIM and iSIM and these are set out in **Figure 1**, which details the lifetime spend associated with various SIM approaches. The report author Matt Hatton says: "eSIM and to a lesser extent its coming successor iSIM, have established themselves as part of the range of capabilities that need to be carefully considered by an organisation when planning a cellular-based IoT solution. Any enterprise will need ▶

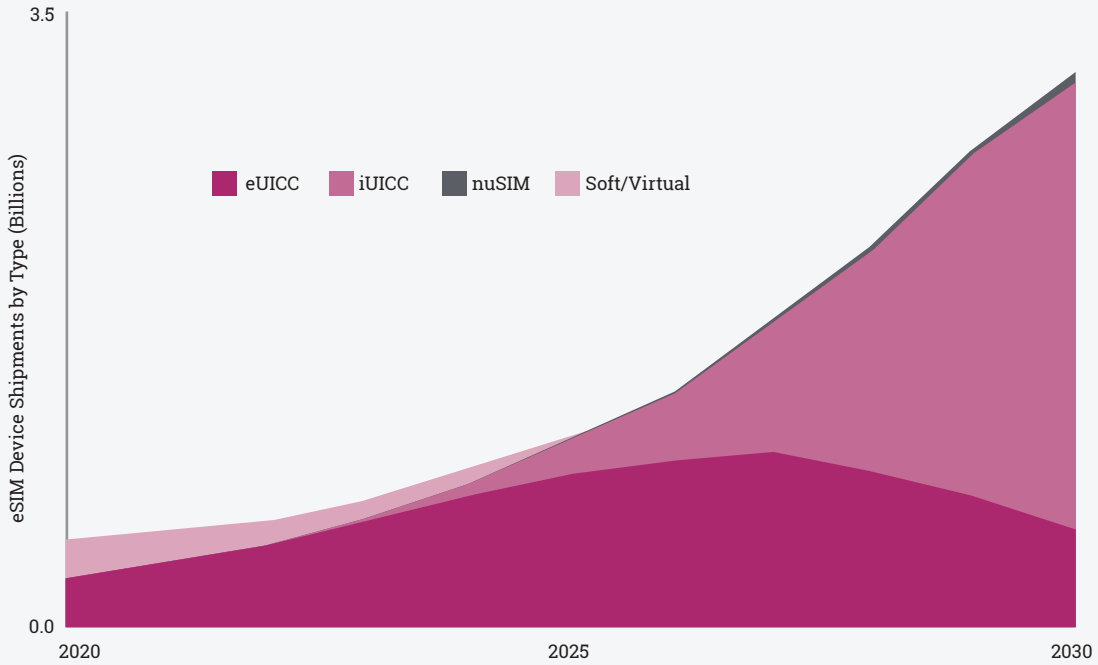

Figure 2: SIM shipments by type 2020-2030
Source: Counterpoint Research

to consider the overall lifetime cost of the device, with considerations of both direct and indirect costs of using the various options. In the report we examined nine costs that will determine which is the best option, including component hardware, subscription management, lifetime connectivity, logistics and compliance. All are relevant to the cost-benefit analysis of using eSIM. Overall we see there being significant savings for the average deployment from using eSIM/iSIM and RSP."

More than 14 billion eSIM devices will be shipped between 2021 and 2030, covering all form factors such as hardware-based eSIM, iSIM, nuSIM and Soft SIM, according to **Counterpoint Research**'s eSIM Devices Market Outlook report. eSIM uptake is poised to grow across a wide range of connected devices over the next decade, thanks to the flexibility, cost efficiency, security and other supply chain and management-related benefits offered by the embedded technology.

In 2021, more than 350 million hardware-based eSIM-capable devices were shipped across a host of categories such as smartphones, smartwatches, tablets, IoT modules and connected cars. In the next five years, hardware-based eSIM will remain the dominant eSIM form factor and will account for more than half of the shipments. iSIM, which sees a SIM integrated into the chipset (SoC) offers additional benefits and shipment of these chipset began in 2022.

"The physical MFF2/WLCSP form-factor soldered eSIM (eUICC) chip has been the go-to standard for eSIM implementation even with the rise of alternative implementations such as soft SIM and nuSIM over the last decade," says Neil Shah, the research vice president at Counterpoint Research. "However, the iSIM (iUICC) form factor will grow the fastest as the industry stakeholders move forward together to offer end-to-end support from the SIM enablement and management perspective."

The CMP as the differentiator

That end-to-end support over the lifetime of whichever SIM form factor is selected is where the CMP providers come in again. Operators and MVNOs are certainly not excluded from this and may see their CMP as the means by which they cement customer loyalty in place of the connectivity itself. The promise of eSIM and iSIM is greater flexibility and the choice to switch operators to better coverage or a better deal. This presents both a threat and an opportunity for a mobile operator.

On one hand, they can more easily lose customers and face weakened ability to lock customers into their propositions for the long-term. On the other hand, they have the opportunity to add value by offering high-quality, ubiquitous coverage over multiple operators' networks. It may turn out that the CMP is the critical differentiator. IoT service providers will utilise CMPs that present device information in the way they prefer and enable them to manage their device estate in simple ways that don't require them to become telecoms experts.

Ultimately, it might be moving CMP that becomes the bigger barrier and moving operator just something that seamlessly happens as IoT connectivity is optimised automatically for every device. With a deployed base of millions for a growing number of deployments, it's easy to see how customer loyalty shifts from the connectivity provider to the CMP provider. That doesn't exclude operators but it does mean they need to offer CMPs with the features, capabilities and business models what IoT service providers want to engage with.

floLIVE facilitates Streamline's real-time livestock tracking, with NB-IoT and satellite connectivity

Streamline is a specialist in asset tracking services that has been in the tracking industry for more than 30 years. As technologies have advanced, Streamline now designs bespoke solutions for a wide range of tracking use cases and has expanded into livestock tracking management for farmers unions and farmers associations

South Africa has stringent compliance laws around the movement, placement and sales of livestock, in order to ensure pure sales that are not impacted by Foot and Mouth Disease. **Streamline** turned to **CommsCloud**, **floLIVE**'s leading reseller in Africa, to design a bespoke, interactive IoT solution that would offer farmers the visibility and control they need over their animals. This would ensure compliance and reduce the heavy costs associated with movement bans.

By working with CommsCloud and floLIVE, Streamline has quickly deployed hundreds of IoT device trackers in South Africa, obtaining real-time visibility over cattle placement and movement.

Anywhere animals travel, Streamline's customers can view where devices are, and even gain granular insight into behaviours, such as when animals are being chased or have been stolen. Using floLIVE's multi-international mobile subscriber identification (IMSI) solution, Streamline is not locked into any specific operator, and can ensure always-on connectivity wherever animals roam. Utilising both narrowband-IoT (NB-IoT) and satellite connectivity, Streamline aims to deploy hundreds of thousands of devices before the end of 2023.

Business impact

- **Hundreds of devices already in the field**, with the potential for 7.5 million across South Africa
- **Real-time intelligence into livestock placement and behaviour**, ensuring regulatory compliance and reduced theft
- **Always-on connectivity**, with zero visibility gaps, using both NB-IoT and satellite technologies.

The challenge for Streamline

According to the World Bank, more than 1.3bn people globally rely on small-scale livestock production for their livelihoods and their nutritional needs[1]. In some areas of South Africa, cattle production makes up as much as 80% of the agricultural gross domestic product (GDP). Regulation is fierce, often aimed at reducing the spread of diseases such as Foot and Mouth Disease (FMD). In fact, in 2022, the South African government placed movement restrictions on all cloven animals, with the goal to reinstate its FMD-free status[2]. Export of cattle meat cannot take place unless the animals have been in a disease-free area for a certain period of time.

SPONSORED CASE STUDY

Working with farmers unions and farming associations, Streamline set out to support its customers with managing this colossal challenge, accurately tracking livestock using IoT devices, to facilitate compliance, without adding heavy manual efforts.

Streamline wanted to be able to offer farmers:

Real-time traceability: Knowing where livestock are at any given time would be a game-changer for ensuring compliance, and provide buyers, retailers and end consumers with peace of mind that all meat is FMD-free.

Accurate tracking: Traditional methods of tracking livestock use radio frequency identification (RFID) tags, which need to be manually scanned at a regular cadence to prove the placement of different animals. With hundreds of thousands of animals, this was impossible to maintain.

Always-on connectivity: As livestock can move quickly from one location to another, Streamline needed to ensure that devices never lost availability or coverage when moving from one mobile operator's region to another.

Two-way control: As well as gathering information from the devices, Streamline knew that its customers would need to be able to push information and updates back to the field. This would allow them to react to data on battery life, coverage and latency.

"We chose CommsCloud and floLIVE because they offered connectivity across the board at the best possible rates compared to the big players," explains Samuel Schalkwyk, the owner and managing partner of Streamline. "From day one, we've experienced excellent service. Our solution was up and running within a week, and any issues - they were online and assisting us right away."

Streamline spent some time researching its options for telecoms and connectivity, and chose to work with CommsCloud, a connectivity solutions provider with more than 20 years of experience in the industry. CommsCloud partnered with floLIVE's IoT platform, using its unique multi-IMSI SIM technology and holistic connectivity management suite to provide connectivity to Streamline's devices.

The devices have been designed with every contingency in mind. They are just 16 grams in weight, and equipped with solar panels so they can be charged by the sun. Without sunlight, they can go for around a week without being charged. They monitor temperature, battery level, effectiveness of radiation, and they are equipped with an accelerometer to track different animal behaviours, such as if an animal is being chased, or if it has been stolen.

If a device stops moving for a predefined period of time, the farmer will get an alert, prompting them to take action. With geofence areas defined, and an additional mapping application, farmers can track the device in real-time, and quickly find a lost device or a hurt or stolen animal in the wild. Stolen livestock is becoming increasingly common in South Africa, making anti-theft devices more important than ever[3].

While the devices were designed to predominantly use NB-IoT, the use of floLIVE's multi-IMSI solution gives Streamline the ability to switch operators where possible to get better availability or lower latency. As latency directly impacts battery life, this is critical. Soon, Streamline will be able to use satellite communication to augment connectivity where there is a lack of operator coverage.

Streamline can now pass on the following benefits to its customers:

Real-time visibility: Wherever livestock travel, farmers will be able to monitor behaviour, in real-time and without gaps, passing on this visibility to their own customers. There are already hundreds of active devices in South Africa, with 350,000 planned by the end of 2023, and the potential for 7.5 million across the country.

Intelligent thresholds: Farmers can update the devices remotely, triggering less frequent updates to lengthen battery life during rainy periods, or automatically reducing the reporting rate at a specific threshold.

Low rates: floLIVE's connectivity is significantly less expensive than larger players, especially considering the usage of both NB-IoT and satellite connectivity. By using the same technology for both, cost-savings are huge.

Full coverage: The multi-IMSI approach means devices can be made in China, shipped to South Africa, or deployed anywhere globally, and they will work without interruption. Even where there is no cell phone coverage, Streamline can offer always-on visibility.

No operator lock-in: Streamline can work with any operator, without being tied to a specific service agreement, contract, or coverage area. This gives them a flexibility and future-focus that wouldn't be possible with a larger player.

We chose CommsCloud and floLIVE because they offered connectivity across the board at the best possible rates compared to the big players

www.flolive.net

[1]https://www.un.org/en/academic-impact/%E2%80%98beef%E2%80%99-foot-and-mouth-disease-academia-helps-farmers-balance-production-and
[2]https://nahf.co.za/guiding-document-cattle-movement-ban-foot-and-mouth-disease-outbreak-16-august-2022/
[3]https://www.researchgate.net/publication/285371222_The_Extent_of_Livestock_Theft_in_South_Africa

Device certification enforces trusted identity and fuels IoT growth

If an IoT device can be trusted, it can be used for critical applications, its data is more valuable and its users and owners can be assured of a safe experience. Trust relies on device certification to assure the device's identity and to enable security approaches such as public key infrastructure (PKI). Martin Lowry, IoT product manager at GlobalSign, tells Jim Morrish, a founding partner of Transforma Insights, how, as IoT becomes more critical to business operations, device certification is providing the foundation for trusted identity in IoT ▶

SPONSORED INTERVIEW

Martin Lowry
GlobalSign

Jim Morrish: It has been a difficult few years and the world has changed a lot. What do you think are the most significant challenges that we now face?

Ofer Yatziv-Green: We face continuing headwinds with the unstable global economy and supply chain challenges. From a technology standpoint there are continuing chip shortages that impact both consumer and business products. Many electronic products use the same chips and components so everything from a dishwasher to an industrial IoT gateway is affected. Experts predict that the global economy will continue to be unstable and is greatly affected by regional conflict and the trickle down negative effect this has on manufacturing resources and transportation.

JM: Many of these dynamics seem to result in IoT-enabled solutions becoming more critical than they have been in the past. Would you agree?

OY-G: IoT is likely the fastest growing market today. Some say that it's the fourth Industrial Revolution and is forecast to surpass the most recent technology revolution, the smartphone. The global pandemic drastically changed how companies operate. Many organisations now operate with employees working remotely which increases the requirement for stronger device and infrastructure security. For many years security for IoT solutions was somewhat of an afterthought, securing devices with a username and password was likely most commonly used. In today's world, manufacturers of IoT solutions are now focusing their efforts to employ best of breed security for their devices. Many governments have established, or are developing, laws to govern security for IoT devices and it is now becoming imperative that solution builders use these security practices to remain competitive and relevant.

JM: As IoT becomes more critical to business operations, so it becomes more important to know that data received from devices can be trusted. How can this be done?

OY-G: For many IoT device manufacturers public key infrastructure (PKI) is or has become the de facto standard for securing devices. However, PKI has traditionally been used for user, browser and server security and was not envisioned to secure IoT device identities and data. In recent years GlobalSign has developed an IoT Identity Platform that specifically addresses PKI for devices using x.509 certificates. An X.509 certificate binds an identity to a public key using a digital signature.

A certificate contains an identity, a hostname, or an organisation, or an individual, and a public key such as RSA, DSA, ECDSA, ed25519, and is either signed by a certificate authority or is self-signed. When a certificate is signed by a trusted certificate authority, or validated by other means, someone holding that certificate can use the public key it contains to establish secure communications with another party, or validate documents digitally signed by the corresponding private key. With the use of device-based PKI and x.509 certificates, fleets of devices can be securely enrolled, and issued certificates which enables these devices to securely authenticate and transmit encrypted data to their host systems.

JM: How can you ensure that a security solution is to some extent homogenous across all device types, including legacy devices and technologies?

OY-G: In many IoT use cases, devices include a software stack and processing capabilities which may allow them to participate in a PKI-based security solution. If the device can send a certificate signing request (CSR) to our Certificate Authority URL then, based on the information passed in the CSR, we can issue a certificate to the device. There are many ways that a device could include information in the CSR to attest to its identity, some examples are: device common name like model name or number, serial number, shared secret and so on. This flexibility allows devices designed for varying use cases to participate in a PKI-based security solution.

JM: Is trusted identity the key to all of this?

OY-G: Trusted identity is key to securing IoT devices and use cases. As discussed, devices must be able to attest to their identity before allowing them to participate in a customer's use case. Many device manufacturers are now implementing PKI early in the manufacturing process, allowing devices to be secured through the supply chain and when deployed in the field. Managing the device certificate lifecycle after deployment is also a critical capability, allowing devices to automatically re-enroll and be issued with a new certificate when their current certificates expire thus ensuring the device is secure as possible.

IoT is likely the fastest growing market today. Some say that it's the fourth Industrial Revolution and is forecast to surpass the most recent technology revolution, the smartphone

www.globalsign.com

Digitisation takes IoT connectivity into a new era of choice, sustainability and customer support

As IoT matures, customers are looking for connectivity from providers that are easy to work with, can offer rapid onboarding, flexibility and excellent support. Digitalisation and automation are the keys to enabling this, but customer priorities also include security and sustainability. Wrapping these capabilities together with a comprehensive portfolio of IoT connectivity technology and then taking it to market is the challenge and opportunity facing service providers, Cyril Deschanel, the managing director Tele2 IoT, tells George Malim, the managing editor of IoT Now.

Having joined Tele2 IoT almost five years ago, Deschanel brings experience from more than seven years at Vodafone where he served as regional director of IoT for Southern Europe, Latin America and the Middle East. Before Vodafone, he spent over six years at Sierra Wireless taking his experience in the sector back to before the dawn of IoT.

As IoT enters its next phase, embracing new SIM technologies unlocks the traditional market dynamic of long contracts between connectivity providers and customers and provides true flexibility and choice to the market. For Deschanel, this provides an opportunity for markets to move away from the constraints of legacy providers and their cumbersome systems and enter a new era of simplified operations and easily accessible connectivity services and support ▸

SPONSORED INTERVIEW

George Malim: What are your priorities for developing Tele2 IoT's business?

Cyril Deschanel: We started on this professional journey almost ten years ago – Tele2 IoT will be ten years old in October – so there have been enough years to look at how we have delivered on our promises. We have focused on a horizontal growth strategy that addresses all verticals by providing advanced connectivity services with us as an enabler on the communications side. While we address the worldwide needs of our customers, our focus is on companies in Europe, the UK and the US.

We are headquartered in Sweden, which accounts for about 20% of our business, with the remaining 80% split between 70% in Europe and 10% in the US. We have customers based across Europe and the US and IoT deployments in more than 180 countries. We have 22% year-on-year revenue growth which is approximately double the typical rate in this market of 9-10%. And we're very proud that we have ten million connections in 180 countries with SIMs deployed everywhere.

Another important key performance indicator is that we have reached 84% employee satisfaction in our organisation which is above the market average. Our 75 people are dedicated to IoT-only, which is in marked contrast to other companies, especially telecoms carriers, that use people who are not IoT specialists to try and support customers. The combination of this dedicated expertise and employee satisfaction helps to feed customer satisfaction in a virtuous circle.

Probably the most important aspect of our business, though, is customer satisfaction – and ▶

Cyril Deschanel
Tele2 IoT

We're investing in our geographic expansion, with the goal of getting closer to customers

we are achieving excellent results in this area. We have a net promoter score (NPS) of 49 which is well above the market where typical scores range from -10 to 20. We've been increasing customer satisfaction year after year and when employee engagement is this high, it also helps to satisfy customers.

GM: What's next and what are your investment priorities?

CD: We're investing in our geographic expansion, with the goal of getting closer to customers. We have been addressing markets remotely which is good for start-ups and SME customers but, for larger enterprises, you need to have a closer relationship so we're investing in having presence in France, Italy, Spain, DACH, and reinforcing our presence in the UK. We have credibility in these markets already. I've been running southern European activities in previous carrier jobs, and we have people based in these countries, so they have local language skills, and they understand the culture and the customers, and they have a lot of market knowledge in these countries.

Southern and western European countries have mature markets but their legacy weighs on them. These countries are served by players with legacy systems, tools and processes that are far away from the digitised capabilities that we have built. We bring value by having a different approach that is much faster. We can on-board customers in two-to-five days, for example, and we have a digital contract with customers.

Customers that are used to working with slower, local incumbent providers and have done so for ten or 15 years don't know what they can get in terms of speed and integrated experience. This is why we are investing in digitalisation alongside getting closer to customers through geographic expansion.

As we move from an inside-out to an outside-in structure, the critical challenge is how we automate systems, so the customer experience is the best in the world. The more we grow, the more we need to improve and the only way to achieve that is by digitalisation.

There are areas in which we can evolve and automate such as in no-touch delivery and our plan is to digitise completely over the next three years. When we are fully digitalised, this will help to fuel customer experience and customer satisfaction but also to support the high growth rate of new customer acquisition.

We have also invested in completing our offering, so we now have the full suite of IoT technology available. In addition to providing 2-5G cellular connectivity we now offer narrowband-IoT (NB-IoT), LTE-M and voice over LTE (VoLTE). NB-IoT and VoLTE are our most recent additions, and we have launched all of these technologies, so we have the full suite of cellular technologies in order to cater to all the needs of our customers.

The next area we've invested in is security. We've signed a partnership with **Equinix** which gives customers the most secure link to transport data. We've already pre-connected with major cloud providers such as **Amazon**, **Google**, and **Microsoft** to ensure more secure and reliable data transfer or our customers.

These four areas of investment are where we want to continue to build this fantastic organisation.

GM: How do you differentiate the customer experience Tele2 IoT provides from your competitors?

CD: Our team of dedicated IoT experts come from all over Europe and the world and is completely dedicated to IoT. Our IoT network operations centre (INOC) is dedicated to IoT exclusively and it is operated by people with a diverse range of experiences from different countries. We come from a Swedish organisation, so the culture is focused on high quality, high transparency, and being easy to work with. This feeds through into how we interact with customers. For example, we recently had a customer with an issue who called our technical service. We helped them, spending ten hours to solve a problem which was not our responsibility, and they were so pleased they sent our whole team cupcakes, saying they had never seen such good support from any telecoms operator in the last ten years.

This is how we want to stand out. Another example is that I was at a customer dinner recently and they offered to be an ambassador for us, attracting new customers to Tele2 IoT. If your own large customers are ready to recommend you and are willing to talk to other companies about you, that's a phenomenal advantage.

These examples are possible because rather than 'why' we have built our customer service capabilities and we are continuing to build customer intimacy to support the business. Our aim is to overcome your challenges whatever industry you are in. We're here to help you address your challenges and we understand that IoT is not always an easy journey for either small or large companies.

GM: As embedded and integrated SIMs (eSIM and iSIM) arrive on the market carriers' customer ownership is threatened by the flexibility and choice these SIMs offer. What is Tele2 IoT's view of these technologies?

CD: We're innovative and proactive so in our portfolio we have plastic SIMs, rugged SIMs, the MFF2 eSIM form factor SIMs, and embedded universal integrated circuit card (eUICC) technology. We're certainly not hiding away from new SIM form factors and models. In fact, we already have our 2SWITCH eUICC offering where you can provision your SIM over-the-air to other operators.

We were the first operator to launch and sell a virtual SIM profile through a customer project ▶

where we developed a groundbreaking integrated SIM, enabled and powered by our virtual profiles. Customers can embed it in their SIMs, modules or basebands, and we already have more than one million deployed virtual profiles. It's a significant step for an operator to do that in terms of control and security and it means challenges are being addressed.

We see two main challenges with SIMs. The first is supply chain issues, which we are working to address by building up our stockpile of SIMs. During the worst part of the semiconductor crisis, we successfully worked out a way to minimise the need of semiconductors through a smart separation in the chip. This enabled us to keep up the growth even through these challenging times.

The second is that, with eUICC, our customers get the most flexibility possible. The eUICC SIM opens up the possibility to address and resolve restricted market issues, change operator, and other features. We are continuously working on improving our core connectivity to be number one in the world, and through a virtual profile from us - you will have access to exactly that.

Customers can have multiple profiles and swap operators as required thanks to eUICC. If you have both eUICC and a virtual profile, you completely unlock the market, and this is what is needed to help IoT reach its potential.

Of course, there's a lot of work involved in making this happen. We've recently had a team of our technical experts testing eUICC across borders between Germany, The Netherlands and Belgium. This was an important undertaking to understand how roaming will work and helps us lead the way in giving this technology to our customers. Certainly, eUICC is now part of many tenders, especially international ones. Customers don't want to be locked-in to an operator for 10-12 years anymore.

GM: What about sustainable IoT operations? Has this become a priority for customers?

CD: Sustainability is at the heart of what we do, and customers now see and understand the sustainability goals of society. Ten years ago, customers were only paying lip service to sustainability, but it is now a real differentiator because people want to work with companies that take sustainability seriously.

Almost all IoT applications contribute to a more sustainable world so being extremely strong on sustainability is a strength. In fact, we're the sixth most sustainable company in Europe with our number of employees and in 2020, Tele2 Group became the first carbon neutral telco in the Nordics and Baltics.

GM: How do you see Tele2 IoT's role developing as IoT goes further into the hyperscale era?

CD: We started from zero nine-and-a-half years ago and we are now in the top ten in Europe, but we still want to go further. Through our efforts we want to be the flag carrier of democratising global connectivity. The IoT industry is ever-changing and trying to evolve as the world demands to be more connected. We truly believe that IoT Vendors that can see and act on the blockages hindering that evolution will be the winners. At Tele2 IoT we are striving to build the best tools for our customers that will enhance the management of multi continental deployments, decrease latency between their end points, and increased quality of services, as well as increase coverage in rural areas and making it easy for them to scale up the number their connected devices. These are the so-called barriers from our standpoint. By removing them through fit for purpose products coupled with best-in-class service, we believe Tele2 IoT will be a big contributor to overall development of the IoT market.

We see two main challenges with SIMs. The first is supply chain issues, which we are working to address by building up our stockpile of SIMs

www.tele2iot.com

Ilogs digitises care in a changing society

Over the past few decades medical, economic and social developments have resulted in a substantial increase in life expectancy in many countries, while at the same time birth rates have declined. These changing demographics present real challenges for society, challenges that require innovative solutions, particularly around the care of our ageing populations. Ilogs, the Austrian-based European e-health specialist, is tackling these challenges and filling the care gap by digitalising care, which means they offer professional digital care and a digital system that supports care processes

For Andreas Jansa, the director of Ilogs UK: "The main question we ask ourselves is: 'What can digital systems and devices do for people living at home who need care – and how can we support both them and their caregivers? With Ilogs solutions, people receive better care, but we also support the care system in delivering better care. This is crucial as baby boomers age – more people need care and there are fewer people to deliver that care, both because of declining birth rates but also because the caregivers themselves are getting older, which creates a domino effect that results in shortages of care workers. This is where digitalisation is so important."

While Ilogs can't be compared with real human contact, their digital solutions allow people to monitor things like blood pressure or blood sugar levels daily, rather than waiting for their caregiver's weekly visit. The patient checks these things with their online consultant via Ilogs' Alexa of Care tablet, which sends an alert fifteen minutes before the consultation so the patient can get ready. When the Alexa of Care rings, the patient picks up and the consultant takes them through testing blood pressure, measuring blood sugar or anything else that needs to be done.

"Having the consultant guide them means we can make sure everything is done correctly," says Jansa. "In addition, in some cases, there are regulations that require the tests are done with a consultant on video because that video acts as a record that the tests were done and that they ▶

SPONSORED CASE STUDY

were done properly. This also covers medication – it helps ensure that everything is done safely and correctly."

"Social isolation is also a massive issue these days," adds Jansa. "More than a third of people living in the EU live alone and this has been shown to be very unhealthy for your mental wellness, which has a direct impact on your physical health. So, our 'Alexa of Care' also puts people in contact with others in their community who may be facing similar challenges. We are only the transporter of information, the enabler – so we do things like assist municipalities in sending events and other information to people through our system to alleviate their loneliness. We are also integrating a shop where people can buy care-related items easily. All of this means we help people live at home longer and more independently with a higher quality of life."

Ilogs is trying to do this with as few devices as possible, which means integrating different monitoring devices such as an oximeter, blood glucose monitoring, blood pressure monitoring into one device, something that will be very helpful for elderly people who have multiple challenges. Ilogs also has a wearable, which can also do a lot more than just step counting and of course, safety is of course job number one when talking about connected care.

"Our wearable has a **Tele2 IoT** SIM card in it and it is key to our offering because safety is really the most important thing," adds Jansa. "Falling, getting lost outside – these are all serious safety issues and can really impact a person's health. We have another device that looks like a watch. Caregivers and family can locate it at any time and call it, while the person wearing it can use it to call for help at any time. We have a lot of care organisations integrated, such as the **German Red Cross**, as well as **Axa Health** – its call centre can call for an ambulance or other help when needed."

A second Tele2 SIM is in the Alexa of Care tablet, which gives the reliable connectivity Ilogs needs and also allows the Alexa of Care and the devices to 'speak' to one another.

Patient confidentiality

When it comes to connected care, ensuring that patient confidentiality and privacy is not compromised is vital. Ilogs encrypts most data, including video calls, uploaded documents, and chats between patients and their caregivers.

"What isn't encrypted is positioning," says Jansa. "This is because we need to be able to send positioning information to healthcare workers or when calling for an ambulance – you need to act quickly in an emergency situation so some information needs to be readily available, such as location – but even there we do two-factor authentication. On the customer side, some of the care homes don't even use smartphones, so it's up to them how they handle this – but from our side we encrypt and authenticate and ensure everything is secure."

Tele2 IoT and SIM management

Ilogs' main markets are Austria, Germany, Poland and the UK. It has also started in Spain with a partner, and the company is present in Belgium, the Netherlands, the US and Australia. That means a lot of SIMS deployed in a lot of different countries and regions. Ilogs uses 2CONTROL, the Cisco IoT Control Center, to manage its SIMs with its own system completely integrated with 2CONTROL.

"We do carry out checks on our deployments, of course, but the nice thing is that I don't need to ask the SIM cards how it's doing because the wearable is talking to me all the time," explains Jansa. "If the wearable stops talking to me, then the system checks why, and we can troubleshoot with 2CONTROL – is it the battery? Is it the SIM? Is it the connectivity? Was the watch turned off? Is it broken? It could be any number of things and we are able to check on that, alerting the customer to check the watch or whatever the solution will turn out to be."

Why did Ilogs choose Tele2 IoT? There are several simple but important answers to that question. "After I talked to ten different vendors promising that SIM cards were non-steered, Tele2 IoT was the only one who delivered on that promise," says Jansa. "I've worked with different vendors in different countries and while some deliver on non-steered, the price has been crazy. Tele2 IoT, on the other hand, is very attractive price-wise."

"Tele2 IoT is super-fast in answering service requests and very pro-active," he adds. "The onboarding process is clear and smooth, which has been great because in the past we've had to ask what is going on or what is the next step, but with Tele2 IoT it was the opposite – it was coming to us with the information before we even asked for it and it's the only company doing this. Customer care is important to me because it is part of my responsibilities, so seeing how Tele2 IoT does things has really impressed me." ■

More than a third of people living in the EU live alone and this has been shown to be very unhealthy for your mental wellness, which has a direct impact on your physical health

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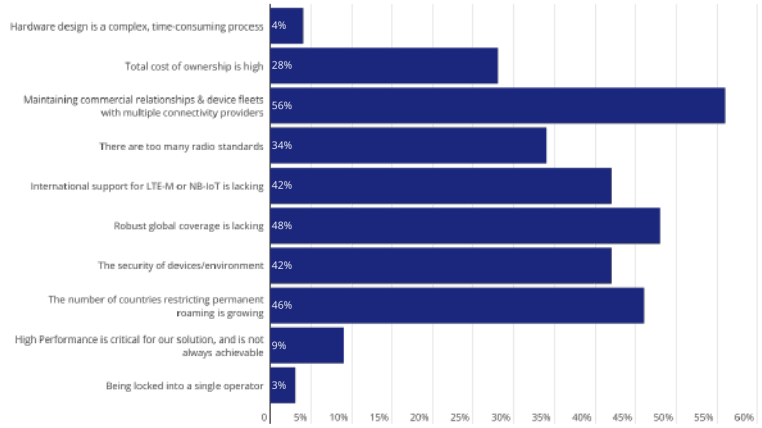
Cellular connectivity complexity hampers global enterprise IoT

Among the countless surveys covering the IoT ecosystem today, many will highlight how customers experience challenges related to connectivity for their deployments and that these challenges often result in the projects' failure. Kaleido Intelligence felt that this particular area needed to be addressed. The result of this was the largest enterprise survey to date, with nearly 760 responses, focusing entirely on cellular IoT connectivity

The results, published in Q2 2022, were enlightening. In order to obtain a complete picture of the connectivity landscape, respondents were split between those who had already adopted cellular technology for their IoT deployments, in addition to those who had not yet adopted the technology.

What do you perceive to be the main challenges where cellular IoT connectivity is concerned? (Cellular IoT adopter responses)



Several overriding themes emerged from the survey results, highlighting the challenge that exists in the ecosystem today:

Complexity

The cellular IoT market is unfortunately littered with issues that raise the complexity enterprises face in navigating the market. There are substantial barriers to overcome for those considering using cellular technology for IoT, in addition to those wishing to scale up their existing operations.

For non-adopters, overcoming hardware design complexity was cited as the number one barrier to market entry, by 84% of the market. To date, there are very few cellular IoT connectivity providers that can offer expertise and guidance in this domain, and with 3GPP standards and best practices being unfamiliar territory to the majority of enterprises, it is evident that an opportunity for connectivity service providers is not being maximised to its full potential.

For those adopting cellular IoT, 56% of respondents felt that ecosystem barriers were created due to the need to engage with multiple ▶

For operators receiving IoT devices onto their networks, challenges arise in the fact that devices often consume little traffic that can be monetised, while still consuming signalling traffic, which in turn requires investment into computing capacity

connectivity providers to address their international connectivity requirements. Coverage, commercial flexibility and quality of service (QoS) all factor into these concerns here, but the ideal is for customers to use a single provider for all of their cellular connectivity needs.

Roaming

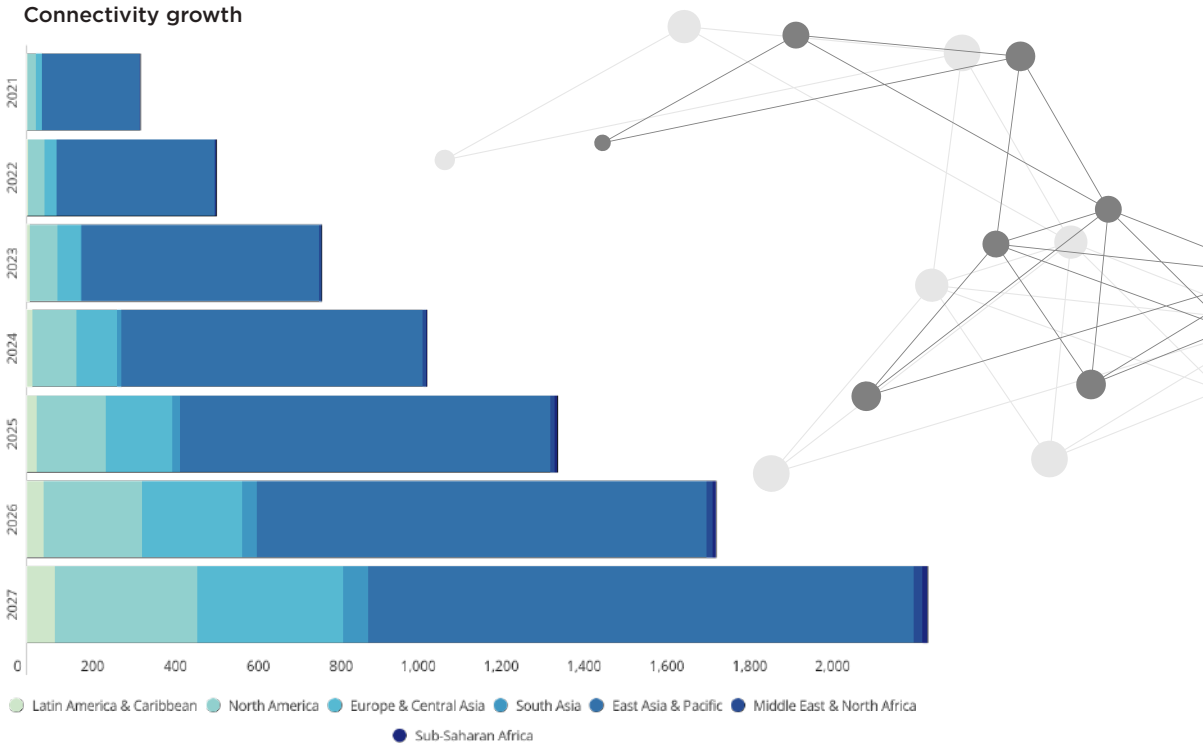
In the world of cellular IoT, roaming plays a significant role in supporting international connectivity efforts. In Europe for example, over 50% of IoT connections are roaming on an inbound basis - with connectivity supported by an operator located outside of the country of operation. Kaleido's surveys have found that 42% of mobile network operators (MNOs) and mobile virtual network operators (MVNOs) report that more than a quarter of their customers require international connectivity for IoT projects.

For operators receiving IoT devices onto their networks, challenges arise in the fact that devices often consume little traffic that can be monetised, while still consuming signalling traffic, which in turn requires investment into computing capacity. Regulators and operators alike have, in some countries, adopted hostile attitudes to the practice of permanent roaming, typically defined as such when an IoT device is registered on a foreign mobile network for more than 90 consecutive days. These attitudes can either consist of outright bans of permanent roaming, or present an underlying risk to IoT customers that, in the future, their device fleets may be at risk of losing access to the networks they require.

The risk associated with permanent roaming is clearly top-of-mind for many enterprises: the ability to offer solutions around this was ranked as the second most important capability for connectivity service providers to have by those adopting cellular IoT.

Security

Unsurprisingly, security was another key theme for cellular IoT connectivity: 59% of adopters ranked end-to-end security as their number one priority for deployments. While cellular technology is well-known for its security, notable gaps continue to exist today, particularly in scenarios where devices are roaming. This, coupled with inexperience or a lack of expertise to execute security best practices where application, device and data security are concerned, can lead to considerable issues for enterprises in the context of security risk. With 42% of cellular IoT adopters stating that the security of devices or the environment was lacking, it is apparent that there ▶



Undoubtedly, Covid-19 has had a real impact on the cellular IoT market in the context of accelerating business digitisation strategies

is an opportunity for service providers to take steps to address this gap; however, many connectivity providers offer little to no features where identification or mitigation of security threats are concerned.

eSIM

Embedded universal integrated circuit card (eUICC) embedded SIM (eSIM) specifications have been developed by the **GSMA** to afford customers a level of flexibility in their choice of connectivity provider, by virtue of enabling the SIM card to be remotely programmed over-the-air (OTA) to switch network providers. However, the majority of IoT devices using eSIM remain in insurance mode in the field: that is to say, they have never used the OTA network switching capability envisioned by the GSMA, on account of commercial, legal and technical challenges making network switching a long and arduous process. This was reflected in the survey, with 46% of those that hadn't used eSIM stating that it is either simpler or more cost-effective to utilise other solutions, such as global roaming SIMs or multi-international mobile identification (IMSI) SIMs for their connectivity needs.

Private LTE/5G

Private cellular networks have risen to the fore over the last few years as a means of making use of the near-fibre performance levels of LTE and 5G in conjunction with the flexibility of a wireless communications solution. However, it was evident from the survey that a large proportion of enterprises still remain unsure of how to navigate the market, as well as being unsure of the technology itself. More than 60% of the survey respondent base stated a need for expertise when choosing devices and configuring networks, while 52% of respondents claimed they were unsure of how suitable private LTE or 5G would be for their organisation's needs. It is evident that there is much work to be done on educating the potential customer base and guiding them through the procurement and deployment phases.

Trends shaping 2023 and beyond

Although cellular connectivity continues to form a relatively small proportion of the overall IoT installed base (approximately 17% in 2021), the technology has seen its market share grow over the years, with around 14% of the total IoT installed base using cellular connectivity in 2020. Meanwhile, significant growth over the coming five years is expected, in spite of ongoing chip shortages, supply chain constraints and economic headwinds.

Undoubtedly, Covid-19 has had a real impact on the cellular IoT market in the context of accelerating business digitisation strategies. Remote asset monitoring and tracking, automation, in addition to healthcare have seen upticks in demand as a result of the pandemic, while new service areas and technologies, such as private LTE and 5G in addition to growing narrowband-IoT (NB-IoT) and LTE-M coverage worldwide have helped address the variable connectivity needs required by enterprise customers.

A significant proportion of future cellular IoT connectivity growth is expected to be fuelled by licensed low power wide area networks (LPWAN) such as NB-IoT and LTE-M. Kaleido forecasts that some 2.2 billion cellular IoT connections will use licensed LPWAN in 2027, up from 162 million in 2020. Devices using these radio access technologies (RATs) require a different approach to deployment and management:

- International roaming agreements for NB-IoT and LTE-M are far from pervasive, despite the good progress made by some tier one carriers. This means that service providers must be in a position to provide expert advice to customers in terms of how coverage is rolled out, support for power-saving features such as power saving mode (PSM) and extended discontinuous reception (eDRX), in addition to providing an understanding of total cost of ownership in relation to device and connectivity costs. ▶

- Billing modules for communications management platforms (CMPs) must be adapted to meet the changing requirements for LPWAN monetisation. Increasingly, charging is no longer based on traditional MB-consumption models, but on network access fees, number of messages transmitted and others. Rating and charging systems must be flexible to accommodate several new business model types.

Network coverage both on a geographical scale as well as from a service provider footprint perspective is additionally becoming a key topic within the industry. Over the coming years, customers will no longer expect to see cellular technology support offered in isolation by providers. In this context, the development of the 3GPP's Release 17 non-terrestrial networks (NTNs) offers a significant milestone in helping enable that vision, with several service providers emerging to offer NB-IoT support through direct-to-satellite connectivity. While the market for NTN is at a nascent stage, and has yet to prove itself as a scalable and profitable solution, work towards mechanisms to assure robust global coverage for IoT customers is being generated by both the supply side for IoT connectivity; Kaleido has had several discussions with mobile operators on this topic; as well as the demand side, particularly for customers with connectivity needs in areas either underserved or unserved by existing terrestrial networks.

Private mobile networks can, in some instances, address the coverage gap experienced by end-customers, particularly where no backhaul to centralised servers is needed or required. However, where NTN may address and expand upon the non-critical side of IoT requirements, private networks offer the potential for guaranteed quality of service, high performance and the ability to address key business needs in a manner that public radio networks cannot. As costs for 5G devices and network components continue to fall, it will become an increasingly important economic factor in technology choice for private networks, given equal or better performance versus private LTE with fewer network components required. Kaleido expects more than 12,000 sites will use private 5G by 2027, with deployed sites growing by an annual average of 137% per annum.

2023 Survey

It is apparent that the connectivity service provider ecosystem cannot stand still given the considerable challenges posed for the enterprise market. As such, Kaleido will relaunch its enterprise survey for 2023. This year's survey will aim to understand how enterprise perceptions towards the challenges uncovered in the 2022 survey have shifted over the past year, as well as aiming to delve deeper into how ecosystem players can best address the needs of the market. Where are the opportunities beyond connectivity? How can connectivity service providers best position themselves for the needs of specific industry verticals?

The survey results will give a clear indication of where enterprises, across high growth vertical sectors, are with connectivity strategies. The analysis will help pinpoint the evolving needs, challenges, success stories and priority areas that the ecosystem as a whole must address to help all stakeholders move forward in enabling results driven seamless connectivity solutions.

Be prepared for a wealth of new insight, use cases, industry education and direction come May 2023 to help shape your connectivity strategy.

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Private mobile networks can, in some instances, address the coverage gap experienced by end-customers, particularly where no backhaul to centralised servers is needed or required

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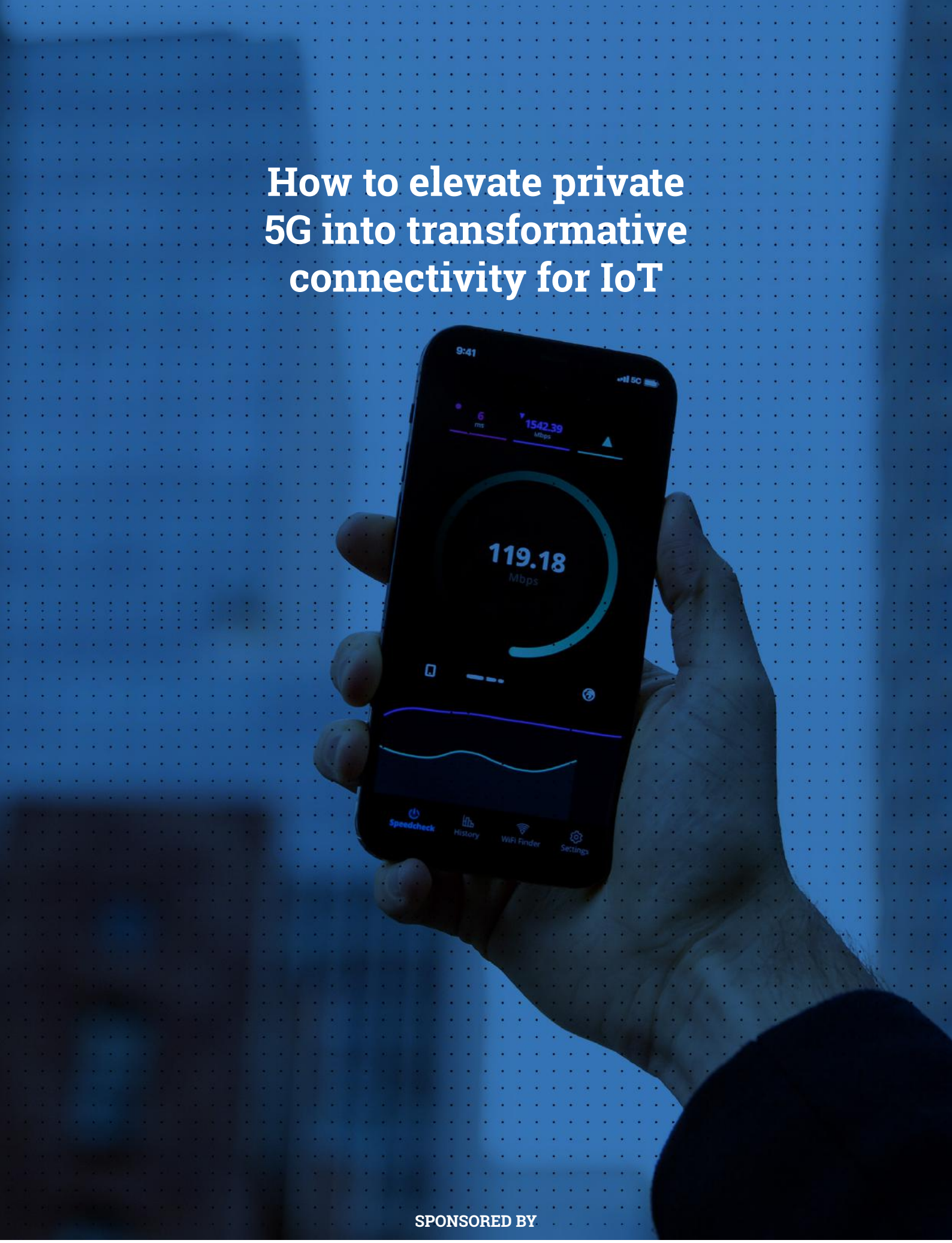
How to elevate private 5G into transformative connectivity for IoT



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Bob Emmerson
Beecham Research

Robin Duke-Woolley
Beecham Research

How to elevate private 5G into transformative connectivity for IoT

Private 5G networks are a means to an end, that end being the conversion of massive amounts of IoT data into actionable local and distributed information and intelligence that is securely accessible for authorised personnel and third parties in corporate ecosystems. Private 5G networks are part of the broader organisational trend towards digital transformation. The term digital transformation refers to the deep integration of digital enabled processes into all aspects of an enterprise, along with an associated cultural change. The key objective is to enhance customer experiences by implementing fundamental operational changes. Private 5G, with its combination of greater device density, high bandwidth and low latency services enables transformative connectivity, which in turn allows enterprises to realise their transformation strategy, write Bob Emmerson and Robin Duke-Woolley, Beecham Research ▶

Private 5G is a catalyst to elevate industrial operations. The main benefits of private cellular networks for business operations include:

- Consistent localised campus coverage, both indoors and outdoors, designed to meet on-site needs
- A highly secure environment, with enhanced network security and data remaining on-site
- The provision of enough network capacity to meet connectivity and data handling requirements at all times
- Local management control over network traffic and use, including seamless integration with enterprise IT/OT
- Very high and controllable network reliability
- Predictable and assured low latency – data control
- High data throughput and support for high density devices

The infrastructure is a software-defined network that significantly raises the performance and capacity bar. Within the 5G framework, massive machine type communications (mMTC) can support up to one million devices per square kilometre; enhanced mobile broadband (eMBB) can transmit data at 10 gigabits per second; and ultra-reliable low latency communications (URLLC) offers extremely low, down to 1ms latency. These services are set to drive the expansion of a massive hyperconnected ecosystem where networks serve the connectivity requirements of billions of battery-lowered, low power consumption devices, with acceptable performance trade-offs between speed, latency, and cost.

Private 5G is essentially a wireless LAN that delivers unified connectivity and a secure means of wireless communication within a specific area. It functions as a wireless extension of an enterprise's wireline LAN.

Survey results

An international survey of 750 senior executives in key business sectors and across leading countries in APAC, Europe and North America was recently conducted by **Tata Communications** into what the company calls 'the digital-first advantage'. Among other findings, this underlined the importance of having a transformation strategy, supporting a workforce that needs to be able to work anytime and anywhere. In addition, there is a clear need to establish better channels of communication and collaboration with a wide ecosystem. To emphasise that, 41% of survey respondents said that without a shift to digital-first during the pandemic, they would have lost significant market share.

Companies should not neglect their people and culture. They need to invest in the workforce, or risk wasting their digital technology investments. One-third of respondents to the survey said that a lack of digital skills was a major ▶

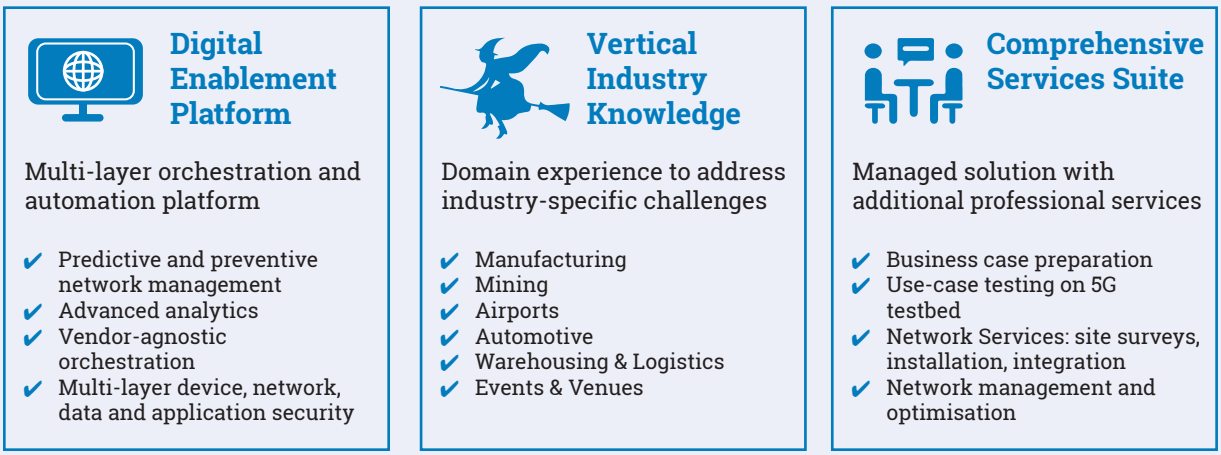

Figure 1. *Tata Communications' comprehensive private 5G service includes a fully featured platform, supported by technical knowledge and experience in key vertical sectors, along with a suite of professional services.*

issue. People and skills are just as important to consider as technology. They need to use technology in a way that enhances employee welfare and engagement. 45% of companies in the survey said that without the right tools and systems to support new ways of working, they risked employee burnout in the longer term.

A comprehensive proposition

Supporting this move towards private 5G in the market, Tata Communications' MOVE private network proposition is designed to help enterprises enable that digital transformation journey. It is a fully managed service encompassing site survey through to network deployment and management. As shown in **Figure 1**, it is a one stop offer, comprising pre-integrated private network, data analytics, and a network management platform, that can be curated to individual digitisation and connectivity requirements. The services suite includes a 5G testbed that can be used to test use cases before they are deployed.

The architecture includes an orchestration and automation platform overlay to the 5G edge and 5G data centre components. A key feature is the ability to deploy private networks across multiple sites and administer them from a central location. This is realised by connecting them over Tata Communications' extensive global network infrastructure.

Platform access is via a self-service portal, providing control and visibility over the connectivity, devices and edge applications. Multi-layer security is another key feature. Tata Communications also provides domain experience and an understanding of industry specific challenges and needs.

In summary, the functionality of the Tata Communications' MOVE private network proposition includes:

- Rich partnership ecosystem to provide industry-specific use cases
- Business consultation, to estimate business impact of the selected use cases
- Customer experience / customer excellence centre for demos or trials ▶

- End-to-end integration with strong data analytics and edge compute
- Zero-trust security, to protect from any internal or external threats
- Support for hybrid use cases and total cost of ownership (TCO) optimisation
- Orchestration and automation capabilities, with which to manage legacy technologies as well as private 5G

Edge compute

Picking up on the 5G edge component identified above, edge compute provides real-time business intelligence on operations in the local environment, as they occur. Both developments keep information on-premises, thereby improving security. By transferring a significant percentage of the processing tasks from the cloud to individual local servers, edge compute helps reduce network congestion and enhances the quality of experience for end users.

Edge compute is a relatively recent development. It reflects the scale of IoT traffic, which will grow in line with device deployments, as well as the move to more real time processing. Forecasts indicate that IoT device deployments are set to grow at an annual rate of nearly 12% through the decade to 2030, leading to 29 billion connected devices by the end of the decade (Source: **Statista**). To put this into sharper context, by 2030 there are expected to be more IoT devices connected to mobile networks than mobile handsets.

As IoT generates increasing amounts of data, it has become unwieldy and too slow to send all that data to the cloud for processing then send it back for local control. Instead, it needs to be aggregated and processed close to source in smaller volumes. This challenge has been anticipated and addressed by edge compute, which processes the data at or close to the source, the edge of the network. This results in more efficient data processing. Advances in chipset technology have increased the computing resources of devices and the compact hardware products deployed at the edge, enabling them to function as small nodes in large intelligent networks. ▶

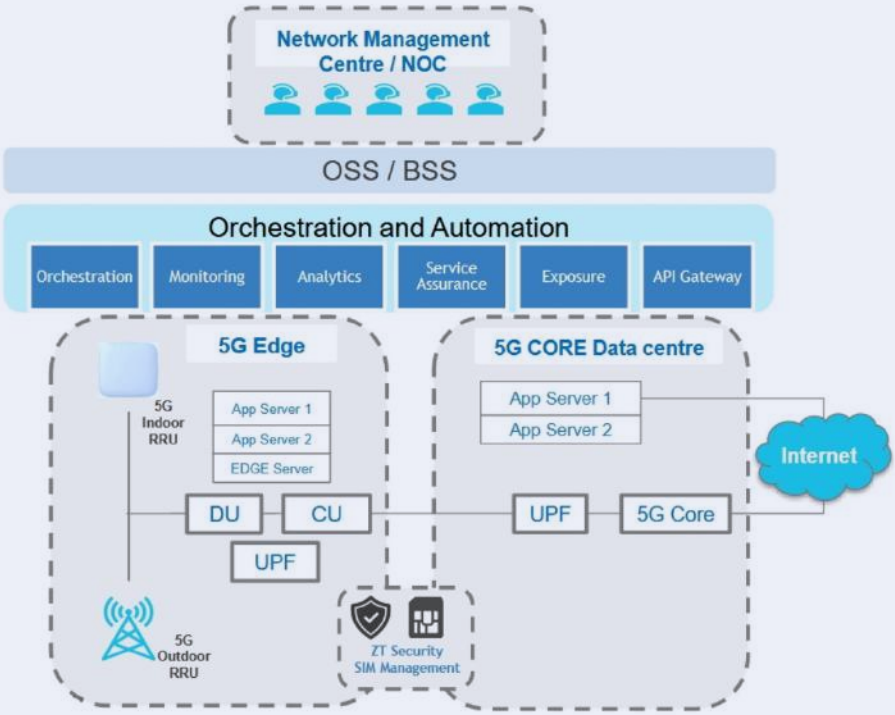

Figure 2. *Tata Communications' 5G network solution, end-to-end architecture. Services include spectrum consultancy, security, automated deployment, SLA-based operation and AI-based service assurance.*

As indicated earlier in Figure 1, the architecture of Tata Communications' solution includes an orchestration and automation platform overlay to the 5G edge and 5G data centre shown in **Figure 2**. The digital enablement platform provides automated configuration and provisioning, accessing agnostic network management, closed loop automation and zero-trust security.

Leading sectors for private 5G

Tata Communications private 5G offer is particularly focused on smart manufacturing, warehousing and logistics, extractive industries (mining and raw materials), sporting and entertainment venues, seaports and airports. Each of these sectors is currently experiencing strong take up in use of private 5G, especially where there is an international element to operations. For example, recent world events such as the COVID-19 pandemic and war in Ukraine have had a substantial impact on manufacturing, warehousing and logistics, as well as airports and seaports. These sectors are experiencing a rapidly increasing need for higher levels of automation on site as well as across sites internationally.

A typical use case is shown in **Figure 3**. This illustrates the versatile functionality of a private 5G deployment in manufacturing and distribution operations. Note the digital testing facility, which includes rapid prototyping and management of digital twins, based on early testing.

There are five mainstream functions in this manufacturing environment: R&D and innovation; production and manufacturing automation; product quality testing; product delivery; and distribution and customer support. They reflect the flow from design concept through to delivery to the customers. In addition, this value chain involves ten IoT applications, with video analytics on the left and AI based drone surveillance on the right. A private 5G network can be used to facilitate communications and collaboration between the sectors and deliver both real-time and historic data to IT and C-level management.

In just a decade, IoT has moved from a support role in business operations to becoming increasingly central as the need to process more data, with higher levels of automation has grown. This is impacting on many sectors, but in particular those involving:

- Manufacturing
- Warehousing and logistics
- Extractive industries
- Sporting and entertainment venues
- Seaports and airports ▶

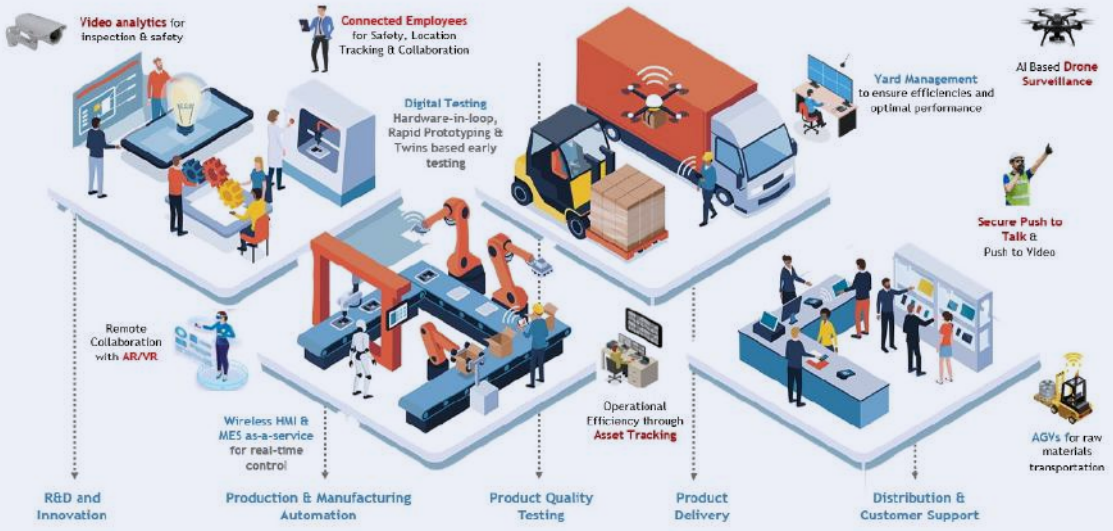

Figure 3. *A typical smart manufacturing environment.*

This has raised the need for private networking both for on-site operations and across sites, in particular for international operations.

In response to this, Tata Communications' MOVE private network proposition offers the main benefits of private networking for enterprises. It is a comprehensive solution, a proposition that provides an end-to-end, cutting-edge, digital transformation solution.

The key benefits for enterprises that deploy a Tata Communications MOVE network include:

- Improved profitability through ROI consultation and implementing actionable business insights generated by data analytics
- Ease of testing use cases in Tata Communications Private 5G innovation centre
- An end-to-end managed service approach to private network deployment
- Automated service assurance and quality of service monitoring
- All-round protection for all devices connected to the network, for assured data privacy and security

About Tata Communications

- Present in 190+ countries and territories around the world
- Serves over 7,000 customers globally that represent over 300 of the Fortune 500
- Connects 4 out of 5 mobile subscribers worldwide
- Connects businesses to 80% of the world's cloud giants

The company enables the digital transformation of enterprises globally, unlocking opportunities for businesses by enabling borderless growth, boosting product innovation and customer experience, improving productivity and efficiency, building agility and managing risk.

Tata Communications is driving the next level of intelligence powered by cloud, mobility, IoT, collaboration, security and network services. These capabilities are underpinned by its global network, the world's largest wholly owned subsea fibre backbone and a Tier-1 IP network.

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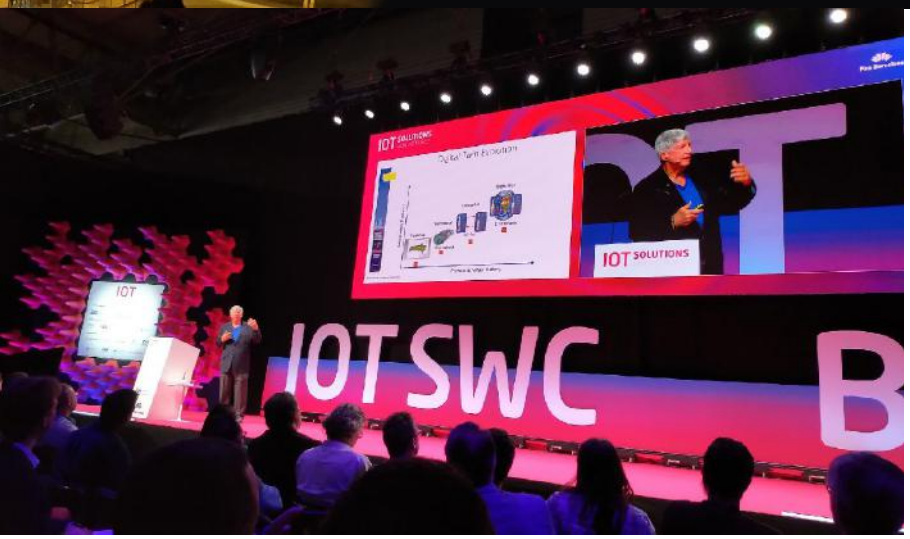
Industry needs drive a thirst for new IoT solutions

The annual IoT Solutions World Congress in Barcelona recently took place, and Antony Savvas was there for IoT Now to find out how industry movers and shakers were tackling challenges around connectivity, building partner ecosystems, sustainability and evolving standards



Michael Grieves, Digital Twin Consortium

With more than 300 exhibitors and over 250 speakers, the IoT Solutions World Congress, organised by **Fira de Barcelona** and the Industry IoT Consortium, featured firms such as **ABB**, **Amazon Web Services**, **Device Authority**, **Entrust**, **Emnify**, **Faircom**, **KNX**, **STMicroelectronics**, **Nozomi Networks**, **Relayr**, **Sternum**, **Deutsche Telekom** and **TxOne**, among others.

The IoT market is expected to grow 18% in 2023, reaching more than 14.4 billion active connections, according to **IoT Analytics**. It also estimates there will be more than 27 billion connected devices by 2025. With this sort of growth there are expected to be issues around deployments and connectivity capacity, let alone factoring in the changing market conditions as a result of rising energy prices and a tense geopolitical situation.

Deployments

At the show, IoT connectivity services firm **Eseye** demonstrated how it is making it easier for partners and enterprises to deploy solutions. It showcased its AnyNet SMARTconnect on-device connectivity software platform. The offering embeds intelligent, global IoT connectivity directly into any device, aiming to enable organisations to get to market faster and to focus on creating value for their customers.

Smart building specialist the KNX Association was also active on the deployment and connectivity front at the show. It launched a new solution to connect all major smart home devices, including those from the likes of **Apple**, **Google**, **Amazon** and **Philips**.

The KNX standard is one backed and used by 500 manufacturers globally, all involved in the provision of smart building technology. The standard is said to be currently integrated into 8,000 different products.

KNX Association CEO, Heinz Lux said at the launch: “Semantic connectivity for all IoT products in the world is coming.” Semantic technologies revolve around a set of methods and tools for machines that provide advanced means for categorising and processing data. “For our industry, we are offering a combination of IPV6, KNX IoT project deployment experience and semantic software to offer our KNX IoTech solution,” said Lux.

As a result, he says, the smart home products from Apple, Google, Amazon and Philips, among others, can all be connected for the first time without any “complicated” router or gateway appliances. “KNX does not want to replace any of these brands, we just want them to communicate with each other, using our tools and our software sitting on top of them,” added Lux. Up to now, he says, many existing smart home appliances have “basically been proprietary”, through not working with rival solutions.

The move was welcomed by **Qt Group**, a software company used by developers to create applications and smart devices through the entire product development lifecycle, from user ▶

Sean O'Reagain, European Commission

interface (UI) design and software development to quality management and deployment. Patrick Dalez, business line director at Qt, told **IoT Now**: "The move by KNX is a logical one in the smart building sector and it is something that should be happening in other sectors like health, electric vehicles, smart cities and other verticals."

Government

Speaking of government, a number have made recent announcements around security and standardisation. The US government plans standardised security labelling for consumer IoT devices, and the UK is planning its own product security and telecoms infrastructure protection legislation. The **European Commission** is also seeking to further legislate over how data can be collected and stored, and how organisations can mitigate data breaches.

The European Commission gave the first keynote at the Barcelona event, in connection with how industry could improve its productivity using IoT technology, while at the same time protecting workers in the process. Sean O'Reagain, deputy head of Industry 5.0 at the Commission, demanded a replacement for Industry 4.0 with a "more human touch". He said the Commission wanted to "future-proof" industry while at the same time making sure it helped support the Commission's green deal industry plan and its net zero targets.

"Industry 4.0 was all about capitalising on productivity improvements, but Industry 5.0 must be human centric, resilient and support sustainability efforts," said O'Reagain. "Workers must be at the centre of Industry 5.0 development, which must take account of their welfare. They must be seen as an investment, not a cost."

On the legislative side, O'Reagain confirmed the Commission would consider taxation and employment law to encourage industry to adopt a more ethical Industry 5.0. IoT data collected through projects and industry partnerships, says O'Reagain, will support the Commission's strategy.

Digital twins

One way for industry to adopt Industry 5.0 is the use of digital twins. The idea is that a virtual twin of an existing product or service is generated, using constantly collected manufacturing and business data, to make sure the product is maintained and improved. Alternatively, if an organisation is developing and building a new product, it may well build a digital twin using ongoing development and business data to check that the product will work, before launching the physical product (the other twin) to market.

However, the IoT connectivity needed to support such strategies is facing a big test, as more companies adopt digital twins and more data is generated around them, the Congress heard. Michael Grieves, chief scientist and executive director of the **Digital Twin Consortium**, has held senior roles at the likes of **Boeing**, **GM** and **NASA** over the last 50 years, and he was worried.

"By 2030, the computer systems used by industry will be 128 times more powerful than today when it comes to data generation, and, by 2040, they will be 16,000 times more powerful," said Grieves. He is concerned that existing IoT sensors, appliances and networks will not be able to handle such data workloads when it comes to feeding digital twins.

Whatever the concerns about the adoption of Industry 5.0 and digital twins, Anand Gandhi, senior vice president of global enterprise sales at Eseye, warns that the industry first has to make sure what is promised already is fully delivered and supported. "There are exhibitors at this show who are simply selling IoT SIMs, that's not a solution, it's a product," he said. "For something to be worthwhile and to take the market forward, it has to be an end-to-end connectivity solution that has a roadmap to it. You cannot future-proof connectivity without an ecosystem of many different network providers in multiple geographies actively supporting it."

Sustainable edge data

Global engineering group ABB says it is using IoT to try and reduce the world's energy consumption by 10%. Mari Haapala, digital lead of the **ABB Motion** unit, told the conference that expert analysis of data from digitally connected motors and drives can identify the best ones to boost energy efficiency.

"45% of all energy in the world is used by motors, making this process more efficient can have a huge positive effect towards achieving net zero," she said. "If we achieve this we (the IoT industry. Ed.) could save 10% of the world's energy."

Haapala says 75% of the world's motors are not run efficiently, and ABB wants to provide IoT data to the industry to help optimise them, re-purpose them or, where necessary, replace them. ABB is working with companies like Microsoft to help improve sustainability in industry through ABB's Energy Efficiency Movement, which has also seen the likes of **Deutsche Post**, **DHL Group** and **Alfa Laval** join it.

Industry 4.0 was all about capitalising on productivity improvements, but Industry 5.0 must be human centric, resilient and support sustainability efforts

How to deliver sustainability through the Internet of Things

An increasing number of companies are adopting Environmental, Social and Governance (ESG) policies to demonstrate corporate responsibility to their customers, the general public, and their industry peers. To support these policies, companies need to collect the right kind of business data to demonstrate they are doing what they are promising

This is where the use of the Internet of Things (IoT) becomes vital, helping to facilitate better real-time monitoring and reporting on key ESG metrics, through reliable, always-on big data aggregation and analytics, leading to improved sustainability outcomes.

Industry views

To measure how companies try and meet their ESG targets, independent research was conducted by **Censuswide**, on behalf of satellite services provider, **Inmarsat**.

It surveyed over 1,000 senior technology and ESG professionals with sustainability decision-making power across a range of business sizes, with respondents spanning the five industrial sectors of agriculture, mining, oil and gas, utilities and transport. They were located across Europe, North America, South America, Africa and Asia.

The research found 80% of respondents were planning to increase their use of IoT solutions over the next year to better measure and understand the impact of their sustainability initiatives.

But despite a clear desire for most businesses to become more sustainable, respondents believe their competitors are more focused on creating 'green' business perceptions rather than tangible outcomes, with 76% "doubting" their peers' ESG reporting. ▶

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This disconnect mirrors broader social mistrust in industry benchmarks, underscoring the value detailed performance data can add to the credibility of ESG reporting. In fact, 81% believe the use of IoT solutions to measure progress will help overcome deeply ingrained trust issues around their peers' sustainability claims.

More than half (54%) believe IoT will be "integral" to improving the sustainability of supply chains, by enabling more ethical sourcing of materials, improving efficiencies, and helping to meet international emissions targets.

In addition, three quarters (72%) expect IoT to play a key role in strengthening their own environmental credentials, including reducing energy and water usage, minimising the use of harmful pollutants and improving biodiversity.

Agriculture

The agriculture sector has been a leader in deploying creative IoT solutions, as its operations are spread over large, often remote areas, making it a natural fit for these technologies. Field-based IoT monitoring in agriculture ensures full visibility into crop cultivation, with data being gathered on weather, soil condition, and the presence of pests or disease, to help minimise any negative environmental impact and increase operational efficiencies.

Broader sustainability benefits include water conservation, increased energy efficiency and lower fuel usage. Two thirds (65%) of respondents believe IoT-enabled insights, such as measuring the temperature of storage facilities or the moisture content of soil, are key to improving sustainability.

Of those already using IoT solutions, most report having seen a broad range of sustainability benefits. The majority (87%) have seen improved environmental outcomes as a result of leveraging such tools, including a reduction in harmful pollutants and improvements in local biodiversity.

Mining

While the mining sector is often a key target for environmental criticism, there is no denying it has an important part to play in the green energy transition across a range of areas, including the mining of lithium, copper and other elements that are key to the production of battery storage and electric vehicle solutions.

Mining firms looking to improve their sustainability credentials know data is king. So much so that 85% feel their organisations could be doing more to effectively leverage IoT solutions to produce data to feed into ESG reporting.

A solid majority of respondents (53%) agree that improved automation and digitalisation of the data capture process could help mining companies better measure and understand their sustainability successes and failures. While almost half (47%) think the industry needs granular, real-time data to measure and analyse sustainability progress more accurately.

With IoT offering solutions for both of the above, its potential seems to be well understood, as 86% of mining respondents say their businesses plan to increase the use of IoT solutions to track sustainability initiatives within the next year. ▶

The agriculture sector has been a leader in deploying creative IoT solutions, as its operations are spread over large, often remote areas, making it a natural fit for these technologies

IoT use cases in the industry include solutions focused on controlling and managing artificial lifts, drill rigs and oil pipelines in challenging and often remote locations.

Many firms already utilise IoT sensors to capture telemetry data that can be backhauled to a central location and used to underpin smarter, more efficient ESG decision-making. Current use cases include applications that monitor facilities, water dams and geohazards.

Oil and gas

Not only are oil and gas producers under tremendous pressure to reduce their environmental impact, but they are also obvious targets for scrutiny on their ESG performance – including by some of their own industry peers.

Almost three quarters (72%) of survey respondents from the oil and gas sector say businesses in their industry "overstate" sustainability claims, while 74% believe their peers are more focused on perception around sustainability rather than tangible metrics and outcomes.

At the same time, 82% perceive their own businesses to be more sustainable than those of their competitors, highlighting an urgent need for hard data to help companies benchmark their actual sustainability progress.

IoT use cases in the industry include solutions focused on controlling and managing artificial lifts, drill rigs and oil pipelines in challenging and often remote locations. Such technologies make difficult and potentially costly operations safer, as well as supporting smarter ways of working and providing access to actionable data to drive meaningful progress on sustainability.

Of those businesses already using IoT solutions, 90% of respondents say they have seen better environmental outcomes as a result, including less energy and water usage, a reduction in harmful pollutants and improved biodiversity where they operate.

Meanwhile, 61% report supply chain improvements, including more ethical sourcing of materials, improved efficiencies and an increased ability to meet emissions targets.

More broadly, the majority of respondents agree that IoT-enabled data insights will help overcome the issue of industry mistrust in sustainability reporting (82%).

Transport and logistics

The transport and logistics industry, is by its very nature distributed and always moving, making it a particularly promising candidate to reap the rewards of connected IoT technologies.

As such, a large majority of transport and logistics respondents (79%) agree the use of IoT is critical to improving sustainability, and 77% say they've already seen the ROI (return on investment) of IoT solutions used.

What's more, 80% say they plan to increase their use of them to measure and understand the impact of their sustainability initiatives more accurately within the next 12 months.

Of those currently using IoT, over two thirds (69%) say they have seen improved environmental outcomes as a result, the lowest of any sector surveyed. This suggests there is some way to go for transportation firms to gain confidence that they know how to leverage such technologies to get the most from them. Two fifths (40%) also felt IoT solutions had already helped to close the "trust gap" and made their ESG reporting more transparent and robust. ▶

Utilities

Utilities firms are being challenged to optimise distribution and maximise uptime, and expectations for both will only continue to grow in the years to come. To enable a larger share of renewable power in the overall energy mix, utilities are increasingly moving towards smart grids.

This is where electricity distribution, consumption and loads can be more effectively managed, with expectations that they will eventually complete the move to a decentralised grid model. As this shift takes place, IoT solutions enabling remote monitoring and localised control of the numerous points of generation in such systems will also grow in importance.

Almost nine-out-of-ten respondents agree the use of IoT solutions will be critical to improving sustainability (87%), operational efficiencies (88%) and commercial results (87%).

An IoT connectivity mix

To deliver IoT's full potential to improve sustainability outcomes and ESG reporting, Ethernet, Wi-Fi, and cellular networks obviously come into play. However, these connections only cover approximately 10% of the Earth's surface.

And this clearly isn't good enough when you need to monitor operations in remote locations. Satellite-based IoT is the only real way to augment fragmented cellular coverage through 4G networks, and to address the enormous coverage gaps in 5G coverage. It can also provide long distance, high bandwidth, low latency backhaul to the low power wide area networks (LPWAN) increasingly used in industries like agriculture, mining and oil & gas.

In addition, the capacity that satellite offers, is more than sufficient for the vast majority of IoT applications. Data from hundreds of agricultural probes in the ground, for example, can be aggregated at the edge and then communicated via satellite for centralised processing.

Maybe this is why research firm **Omdia** projects a compound annual growth rate of 25% in satellite IoT connections between now and 2025. While in revenue terms, **Transparency Market Research** projects the satellite IoT market will exceed $6.14 billion by 2031, expanding at a compound annual growth rate of 22% from 2021 to 2031.

This is probably why 91% of survey respondents believe that satellite connectivity is "key" to improving the effectiveness of IoT solutions to better business sustainability.

In fact, businesses expect to turn to satellite networks more than traditional methods of connectivity over the next decade. The research shows that 50% favour satellite for IoT connectivity, 22% will look to telco cellular connectivity, and 19% would turn to private cellular. In addition, 26% will rely on WiFi. ■

The full Censuswide/Inmarsat report can be read here:
https://www2.inmarsat.com/l/321511/2023-02-14/8yjshv

To deliver IoT's full potential to improve sustainability outcomes and ESG reporting, Ethernet, Wi-Fi, and cellular networks obviously come into play

How to gain IoT device certification in six-to-eight weeks

Certification is a necessary yet complex and time-consuming step that IoT devices need to go through if they are to be allowed to be used in regulated markets and permitted to connect to carrier networks. The burden of keeping up with requirements from various jurisdictions doesn't have to tie up internal resources if a comprehensive certification agent service is used, writes Yoon Seungryoul, the North American Certification Director at Quectel Wireless Solutions

The first layer is regulatory certification which is fundamental in order to allow market access for devices

Certification is an inescapable requirement for all new devices and encompasses certification of components such as modules as well the final device or product that is brought to market. Depending on the strictness of regulation and the policies that have been adopted, IoT devices need to be certified as meeting regulatory requirements and the needs of carriers in each market. The spread and depth of requirements can be bewildering and represents a distinct additional task for companies to understand which certification is required for which market.

The certification layer cake

The first layer is regulatory certification which is fundamental in order to allow market access for devices. This type of certification includes CE for the European Union and Federal Communications Commission (FCC) certification for the US. Other regions have certification requirements as well so globally deployed devices will need certification to be obtained for all the markets they aim to operate in. This can create the need for different versions of products for different reasons. ▶

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The next layer is conformance certification which certifies that a device is compliant with the demands of a particular industry organisation. This would typically involve an industry organisation that oversees a technology setting out attributes that certified devices must comply to. Certification organisations here may have been established by wireless carriers or equipment manufacturers to define test specifications and methods.

The aim is to ensure device interoperability on global wireless networks and well-known examples of certification organisations include the **Global Certification Forum** (GCF), **PTCRB**, which used to stand for personal communications service (PCS) type certification review board but

now no longer stands for anything, the **Bluetooth Special Interest Group** (SIG) and the **Wi-Fi Alliance**. Each of these set their own criteria for compliance with the benefit that compliant devices can be used globally – subject to regulatory certification.

Another layer of certification, which is particularly relevant to IoT devices, is carrier certification which involves individual carriers requiring devices to meet their certification requirements before being allowed to connect to their networks. This can be a lengthy task with carrier certification programmes ▶

Figure 1: Typical certification requirements by country
(Source: Quectel)

Country/ Region	Mandatory for Market Access	Voluntary & Depends on Customer/Carrier Requirement		Carrier Mandatory Y/N?
	Regulatory	Conformance	Carrier	
US Local	FCC	GCF *Device can refer to module GCF	Verizon	Y
	FCC	PTCRB	AT&T	Y
	FCC	PTCRB	T-Mobile	Y
	FCC	PTCRB	US Cellular	Y
Canada	IC	PTCRB	Rogers	Y
	IC	PTCRB	Bell	N
	IC	PTCRB	Telus	N
Europe	CE	GCF	Vodafone Global / Deutsche Telekom / Telefonica / BT/EE / Swisscom / TIM	N
Australia	RCM	GCF *Reports at least	Telstra	N
	RCM	GCF *Optional	Spark	N
China	CCC/SRRC/ CTA	/	China Telecom / China Mobile / China Mobile	N
Japan	TELEC/JATE	/	NTT DOCOMO / Softbank / KDDI	Y
Korea	KC	/	KT / SKT / LGU+	Y *If product volume exceeds 1,000.
Taiwan	NCC	/	/	/
Thailand	NBTC	/	/	/
Singapore	IMDA	/	/	/
Russian	FAC	/	/	/
South Africa	ICASA	/	/	/
Brazil	Anatel	/	/	/
Mexico	IFETEL	/	/	/

Our modules, antennas and connectivity are augmented by our original design manufacturer (ODM) and testing and certification services that are now well-established in our portfolio

taking substantial time to pass. Carriers such as **AT&T**, **NTT Docomo**, **Orange**, **SK Telecom**, **Softbank**, **Telefonica**, **Telstra**, **T-Mobile**, **Verizon**, **Vodafone** and many others all have certification programmes in place for IoT devices.

Certification doesn't end with these three main forms of certification. Industry-specific organisations such as eCall, ERA-GLONASS, in the satellite sector, and vendors' own programmes also add to the certification burden. Finally, there are also environment and safety-related certifications such as ATmosphere EXplosible (ATEX), Restriction of Hazardous Substances (RoHS), Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and waste electrical and electronic equipment (WEEE).

If that feels like a long list of certifications for a single product to comply with, you'd be correct, but certification is needed to ensure the essential safety, security, performance and interoperability functions of IoT devices. Regulatory certification addresses radio frequency usage and safety, electro-magnetic interference, environmental issues, labelling, energy efficiency and accessibility. Conformance certification ensures correct adoption of protocols, SIM and universal SIM, field testing practices, performance criteria and radio frequency utilisation. Carrier certification is vital for network interoperability, carrier lab tests, field and drive testing, radiated performance requirements and testing and network safety.

Simplify and accelerate certification

Only with all of these certifications achieved can products be safely and efficiently launched, so certification therefore plays a critical yet often overlooked role in bringing an IoT device from concept to commercial reality. The task is substantial but the good news is that organisations don't have to continuously re-invent the wheel and repeatedly gain certification for components. For example, if a module has been approved by a regulator, industry body and carrier it may not be necessary for the device to gain separate certification.

This is dependent on individual regulatory requirements but often the certification of the module in a device is sufficient and can be used to support certification of the device. This has obvious benefits in aiding efficiency of the process and minimising repeated effort so it is well-worth IoT organisations seeking out modules that are already certified in order to help simplify and speed up the device's overall certification process.

Beyond modules

Specifying pre-certified modules is only one way to lighten the load and adopt an optimised strategy for achieving certifications. Certification agents can handle the process on behalf of customers and this can be a good way for IoT service providers to avoid the costs and delays typically associated with gaining all the necessary certifications a device needs to be sold and to operate in a market. As an alternative to building an in-house team of certification specialists, certification agent services can radically streamline the process because they are already familiar with all the requirements a product is likely to face on its road to certification.

Quectel has developed in-step with the IoT industry since it was founded more than twelve years ago as a vendor of IoT modules. The company has now grown to become a global IoT solutions provider with modules, antennas and connectivity, which enables us to provide pre-integrated solutions that combine modules, antennas and connectivity thereby accelerating time-to-market, increasing simplicity and reducing costs. An added benefit for customers that utilise both Quectel modules and antennas in their design, is that device testing is included for free.

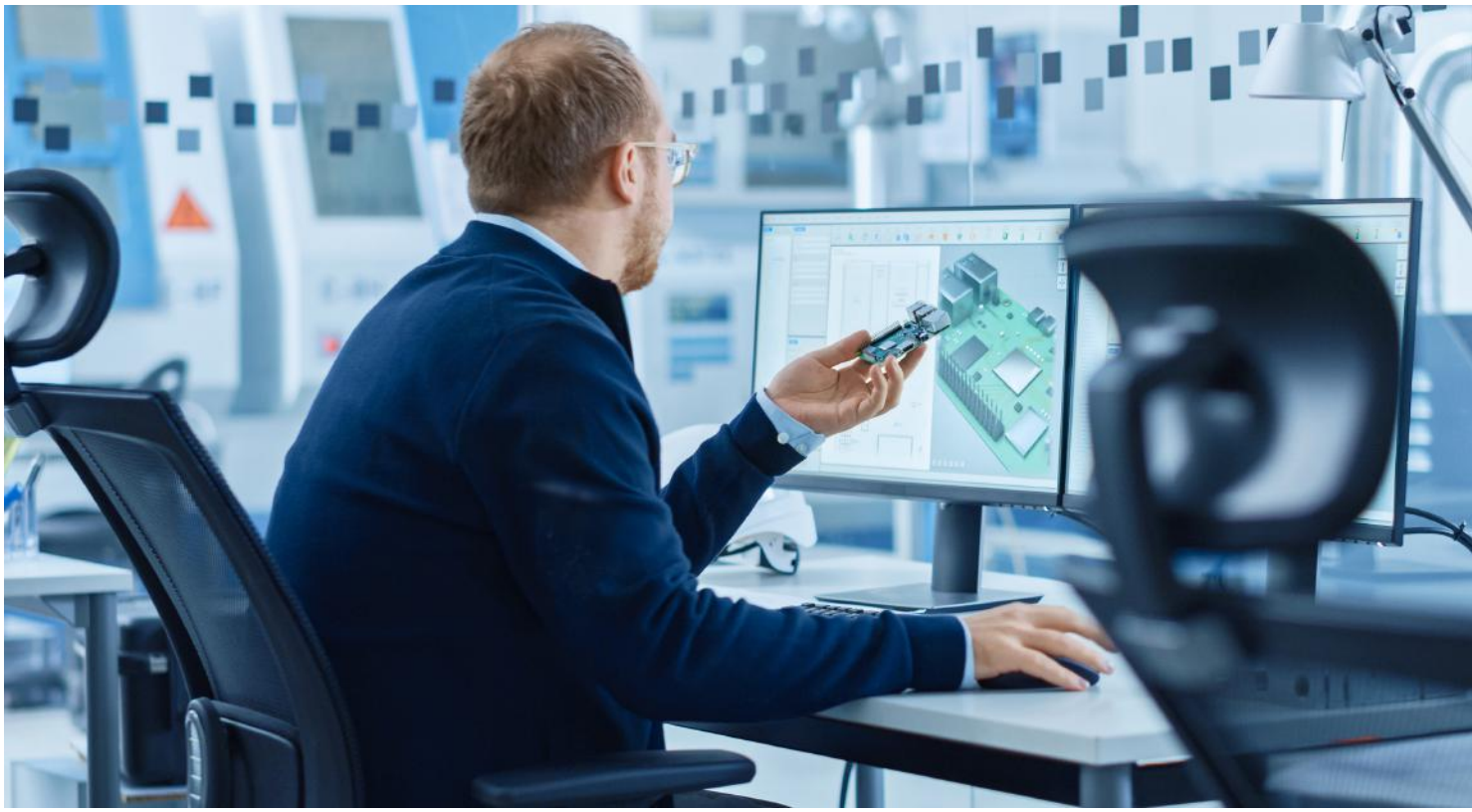
Our modules, antennas and connectivity are augmented by our original design manufacturer (ODM) and testing and certification services that are now well-established in our portfolio. We have helped countless customers build a smarter world by specifying our modules, antennas and connectivity in their devices and, as we have assisted their market entries, we have amassed an unparalleled amount of experience in certification.

Get certified in six-to-eight weeks

Quectel delivers a comprehensive certification and testing portfolio through Quectel Certification Services which offers a range of professional services and management tools, depending on each customer's needs. The experienced Quectel team is far larger than that of a single company and, because it supports so many customers in all markets, it has an in-depth global view of certification demands across nations, industries and technologies. This knowledge and experience would be expensive and time-consuming for all but the largest corporations in the world to build for themselves and we make it easily available to our customers.

We have become so experienced and adept at navigating the challenges of certification that we guarantee a six-to-eight week certification process for Quectel module customers' devices. That is in contrast to going directly to certification organisations which can result in it taking up to six months to gain certifications. For many IoT use cases a six-month delay to launch is unacceptable and could make or break a proposition in markets where being first-to-launch is a critical differentiator.

Quectel augments our certification expertise and our relationships with certification organisations with professional capabilities that, again, would be challenging for individual companies to assemble. Our pre-scan service in our own labs can be used to assess certification compliance before applying to certification authorities and we also offer our technical support facilities and debugging solutions to address common, and not so ▶



common, certification issues. This pre-test capability is extremely effective because we know what certification authorities look for, so we tailor testing to identify compliance or areas to work on. Our scale means that we are able to provide global on-site support which is particularly valuable to specialised vendors that do not necessarily have their own support network in every market in which they operate.

Quectel Certification Services are flexible and enable customers to utilise the resources they have while having the ability to lean on Quectel to address areas in which our help is needed. Our aim is to foster great co-operation so we provide a dedicated project manager for certification project management. We also maintain long-term co-operation with all types of third-party labs so work done can integrate easily and create the overall project outcome. Our experience also means we have a truly global team that has strong relationships with carriers.

Drive down your certification costs

This combination of technical support, in-depth knowledge of certification requirements across geographies and industries, and our relationships with regulators, testing labs, carriers and industry bodies means we are ideally placed to help you save on labour resources, shorten the lead time for a device to gain certifications and to achieve this at reduced cost. We offer the industry's most cost-efficient pre-testing and certification with faster time-to-market than organisations typically experience if they seek to achieve certifications by going direct to certification authorities.

Put simply, we have the scale to know what certification requirements you face, which organisations your product needs certification from, when pre-certified modules can accelerate the progress, and the relationships and tools to keep certification on track. Quectel Certification Services is ready to provide full, global certification consultation and service to integrated device customers that have products that are based on Quectel modules.

Our capabilities include project management, all paperwork tasks, dealing with labs and carriers, checking the test scope and making the minimum test scope, providing the necessary on-site support and providing testing and debugging. In addition, we will fix issues as they arise and negotiate waivers where appropriate. We'll take you through every step ending with the award of the certificate and delivering it to you. With so much else involved in developing new IoT products and taking them to market, certification is often left to the last minute but this approach causes delay, costs more and is inefficient. A simpler, faster and more cost-effective way is to use a certification agent that really knows what certifications you need and how to get them. Quectel Certification Services have been gaining certifications for Quectel modules and customers' devices for many years, and we're delighted to be bringing this expertise to customers and helping accelerate time-to-market.

Quectel Certification Services are flexible and enable customers to utilise the resources they have while having the ability to lean on Quectel to address areas in which our help is needed

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IoT Now Guide to MWC Barcelona 2023

PLUS: Sierra introduces smart connectivity with eUICC while KORE and AWS deliver IoT SAFE offering • When no room at the inn is a sign of success • Eseye launches AnyNet SMARTconnect software • 1NCE launches new OS • How to achieve a health-conscious lifestyle using the power of IoT • News, features and interviews online at www.iot-now.com

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When no room at the inn is a sign of strength

I have an unusual indicator of the scale and impact of each MWC Barcelona that I've come to rely on over the last 10 years or so. There's a charming if basic family-run hostel close to the city's Poble Sec underground railway station that is top of my list when booking accommodation for the duration of the event. I first used this hostel way back when the event was held at the Fira de Barcelona rather than at the far larger Fira Gran Via site

George Malim,
managing editor

It met and still meets all my requirements, occupying the intersection of a complex Venn diagram of price, proximity, security, cleanliness and, of course, Wi-Fi. For the first few years, all was well and I could easily book a room, recognising a cohort of MWC attendees with similar criteria in the hostel's corridors. However, shortly after the event's relocation to Gran Via, which reduced the hostel's appeal slightly because of the extended commute, the price began to edge up. By the time MWC Barcelona hit attendee numbers in the low six-figures, the hostel was not only losing its appeal on proximity but also on price. Then, a few years before the pandemic, crisis struck and no rooms were available.

This was in the October before the following year's event and that concluded my regular occupancy. There are several variables at play here. Much depends on the performance of the mobile industry. In years in which big investments are being committed to, vendors' spend on hospitality is highly evident. You can see chauffeurs driving black Mercedes that originate from as far away as Germany according to their number plates and catering crews, stand-builders and entertainers are drawn from all over Europe.

They all need somewhere to sleep and my hostel has become top of their lists too. The situation can also be worsened by Formula 1 testing if it is scheduled in the same week, which happens, and the football activities at Camp Nou, that can bring further tens of thousands of fans to the city.

Last year, as MWC Barcelona recovered from the pandemic and held an in-person event again, I left my decision to attend relatively late yet was still able to book my preferred accommodation in early January. That's reflected in last year's attendance figures which the organisers claim to have been 60,000. This is far fewer than the 109,000 reported in 2019 and explains why there was a room at the hostel for me last year.

This year will be a different story. Travel is back on. In spite of lingering pandemic constraints, the war in Ukraine and inflation, the mobile industry is buoyant with huge network builds continuing and innovations bringing new revenues. Sadly, even though I attempted to book a room last October, there is no room at the hostel for me this year. That's good news for MWC Barcelona and a good indicator of the mobile industry's health.

Enjoy this Guide and the show, however you attend it.

George Malim

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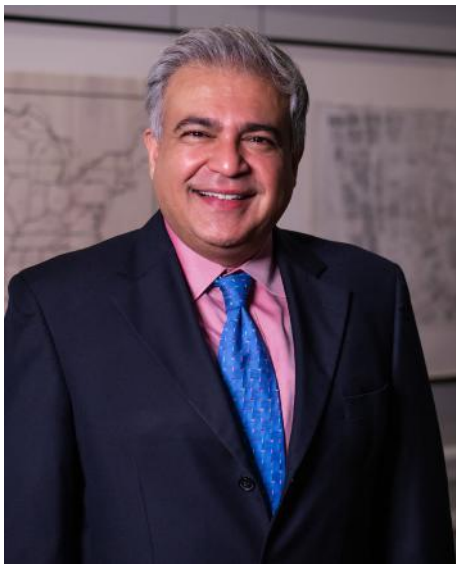
KORE and AWS deliver IoT SAFE solution for IoT use cases

KORE, a global provider of Internet of Things (IoT) solutions and worldwide IoT Connectivity-as-a-Service (CaaS) provider, is using **Amazon Web Services (AWS)** to simplify deploying, managing and securing massive IoT solutions. KORE has introduced its OmniSIM SAFE using AWS IoT Core to decrease security challenges associated with global massive IoT and large-scale IoT deployments.

The KORE OmniSIM SAFE connectivity offering is an innovative eSIM approach that uses **GSMA**'s IoT SIM Applet For Secure End-2-End (SAFE) standard. This standard enables device manufacturers and IoT providers to use the SIM as a root of trust to protect IoT data communications. This enables a standardised, device-level approach to security. AWS IoT Core connects with the SIM to simplify secure device provisioning and management, as well as message routing to AWS services. From deployment to management, this is a holistic approach to widespread device security and dovetails with massive IoT, because the KORE OmniSIM SAFE supports zero-touch provisioning pairing device to cloud with minimal physical intervention.

"IoT is positioned to grow exponentially through this decade as organisations seek ways to optimise and streamline operations," says Romil Bahl, the president and chief executive of KORE. "An estimated 75 billion devices are expected to be connected by 2030, but with those connected devices comes a unique set of challenges. IoT security can be an area of concern across industries due to a lack of



Romil Bahl, KORE

standardisation and a fragmented ecosystem this broadened landscape of devices exposes more security attack surfaces in kind."

KORE launched its OmniSIM SAFE solution working with **Energy Web**, a non-profit organisation focused on building open-source software to accelerate the energy transition. The Energy Web stack enables enterprises to build and operate production-grade applications by adopting decentralised technologies. One of the significant aims of Energy Web is to lower the use of carbon to meet global decarbonisation targets.

Sierra Wireless introduces Smart Connectivity Premium with eUICC capabilities

Sierra Wireless, a subsidiary of **Semtech** has introduced its Smart Connectivity Premium offering with embedded universal integrated circuit card (eUICC) capabilities and extended connectivity coverage in the United States. With universal coverage across geographies and technologies with one global SIM, the offering provides resilient IoT managed connectivity that is future proofed with its multi-international mobile subscriber identification (IMSI), multi-profile design enabled by **GSMA** eSIM (eUICC) specifications. The SIM dynamically switches between profiles and networks when one becomes unreachable, offering maximum coverage and built-in failover in over 190 countries. In addition, it provides customers with access to all three major carrier networks in the US.

"Sierra Wireless has been a valued partner of **Kigen** for many years," said Jean-Philippe Betoin, the senior vice president of Ecosystem Development at Kigen. "This new offering enables customers access to more networks via Kigen eSIM, enabling future-proofed IoT managed connectivity for global applications. With industrial IoT increasingly becoming business-critical, resilient connectivity options are essential."

Ross Gray, the vice president of Semtech's IoT Connected Services Group, added: "Sierra Wireless' Smart Connectivity service simplifies how customers connect and manage their deployments. With one global SIM, it accelerates IoT time-to-market, ensures resilient global coverage, maximises uptime, reduces operational costs, and provides IoT customers with seamless expansion into new markets with access to over 600 partner networks in more than 190 countries.

News in Brief

BICS selects Infovista for SaaS

Infovista, a global provider of network lifecycle automation, has announced that **BICS** has deployed its Automated Assurance & Operations system to power its suite of advanced analytics systems for its telecoms and enterprise customers.

BICS' Software as a Service (SaaS) solutions use detailed, near real-time traffic insights from Infovista's Automated Assurance & Operations to help customers rapidly build advanced reporting capabilities, in turn increasing operational efficiency and strengthening their competitiveness. Customers use the intuitive platform to identify and correct bottom-line impacting network, service and security-related issues and deliver the best possible end-user experience across 3G, 4G and 5G networks globally.

5G IoT to exceed 100m connections by 2026

A new study from **Juniper Research** has found that 5G IoT connections will reach 116 million globally by 2026, rising from 17 million in 2023. The research examined 5G adoption across key sectors, such as the automotive industry, mobile broadband and smart homes, and forecasts that the healthcare and smart cities market will account for over 60% of 5G IoT devices by 2026. The ultra-low latency and high bandwidth of 5G IoT technology will be the key factors in driving this proliferation of new connections.

Research co-author Olivia Williams, said: "5G will enable more efficient and dynamic healthcare provision that was not feasible with 4G or Wi-Fi. However, healthcare providers must first implement 5G in areas which provide a strong return on investment; most notably connected emergency services."

News in Brief

Digi launches ConnectCore

Digi International, a global provider of Internet of Things (IoT) solutions, connectivity products and services, has launched two Digi ConnectCore software service offerings: Digi ConnectCore Cloud Services and Digi ConnectCore Security Services. The offerings provide greater manageability and security for devices developed with Digi's complete line of ConnectCore system-on-modules (SOMs).

"Digi ConnectCore Services continue our mission to reduce the complexity OEMs are facing with implementing full end-to-end industrial IoT solutions and simplifying device security and management for our customers," said Andreas Burghart, the senior product manager for Digi's embedded division.

Airgain and DT offer EMEA asset tracking

Airgain, a provider of wireless connectivity solutions, has formed a partnership with **Deutsche Telekom** IoT to connect its asset tracking devices. The agreement will allow Airgain to bundle connectivity from Deutsche Telekom IoT with its asset tracking customers across Europe, the Middle East and Africa (EMEA) as well as within the US and beyond.

"Adding Deutsche Telekom IoT as a connectivity partner gives Airgain additional global reach," said Morad Sbahi, the chief revenue officer of Airgain. "They are a world-class partner with broad capabilities and a world-class signal. Airgain is excited to partner with one of Europe's top IoT innovators."

Eseye launches AnyNet SMARTconnect software

Eseye, a provider of cellular IoT connectivity solutions, has launched its AnyNet SMARTconnect on-device connectivity software. The new software embeds intelligent, global IoT connectivity directly into any device, enabling organisations to get to market faster and focus on creating value for their customers. In addition, AnyNet SMARTconnect increases resiliency, keeping devices connected and optimised both now and in the future.

Supplied as an independent plug-in software module, AnyNet SMARTconnect codifies Eseye's decades of connectivity expertise into flexible device software that partners and customers can easily integrate into their IoT or connected device. This helps ensure 'right first time' delivery and provides the flexibility of device design to help future-proof the solution to navigate current and future supply chain issues. It supports global deployments by enabling a single SKU, including initial bootstrap and provisioning. AnyNet SMARTconnect allows enterprises to bypass software development and install plug-and-play connectivity intelligence directly into their devices. This can accelerate a product launch by up to nine months, significantly reducing costs and allowing them to focus on the applications and data that deliver value to their customers.

"The Kaleido 2022 Enterprise IoT survey of 750 global enterprises, who had implemented at least one IoT project, revealed that 84% of them ranked the complexities of designing an IoT device as their number one issue they experienced," said Nick Earle, the chief executive of Eseye. "Enterprises are not device experts and do not have the budget or the necessary skills, such as firmware design and testing, to achieve this. This clearly illustrates that a standard embedded connectivity software solution is needed to enable the device with the intelligence to operate in different environments, detect connectivity, and optimise across multiple constraints, including battery performance, latency and security."

Nick Earle, Eseye

Eseye customer **AmericanPharma** has embedded the AnyNet SMARTconnect software into PharmaWatch, its environmental monitoring devices for the medical industry, for its vaccine temperature monitoring during COVID. The solution has enabled it to experience improved coverage across the US and allowed it to expand its PharmaWatch application globally.

Rockwell Automation announces ThingWorx IIoT has helped boost machine utilisation by 162.5%

Rockwell Automation, a provider of industrial automation, has announced that it has helped **Falcon Group** to boost its machine utilisation by 162.5% using the ThingWorx IIoT platform, part of the FactoryTalk InnovationSuite, powered by **PTC**. Headquartered in Dubai, Falcon Group comprises five industrial operations. One of these is a specialist precision engineering and fabrication company that caters for the demanding needs of customers in the aerospace, automotive, marine, healthcare, defence, oil and gas, and steel industries. At the heart of its operations are 16 CNC machines, all of which are essential to the company's machining capabilities.

Before support from Rockwell Automation, Falcon Group was considering purchasing additional CNC machinery to keep pace with customer demand and to support maintenance downtime for critical machines. When at peak capacity, to meet order dates, the company had subcontracted work to competitors. But before signing off on additional machinery, the company decided to assess its current asset utilisation.

Prabhu Badrinathen, the chief executive of Falcon Group, said: "We are always looking for ways to do things better and deliver even greater levels of service to our customers. We knew we had room to grow our machine utilisation, but it was not until we got the real-time, machine-level insights from the ThingWorx platform that we realised where inefficiencies were and where the changes needed to be made."

Sateliot and Sensefinity launch 5G IoT satellite technology to prevent cargo damage

Jaume Sanpera, Sateliot

Sateliot, a satellite constellation offering 5G standard connectivity from space, and **Sensefinity,** an IoT provider of asset tracking, have launched global 5G narrowband-IoT (NB-IoT) satellite connectivity. This will reportedly facilitate the data transmission technology from 1,000 smart containers saving medium-sized shipping companies up to US$1.4 million per year on container maintenance and repairs.

Actual satellite coverage is not 100% globally, as geostationary satellites only cover fixed areas of the planet. Moreover, their placement makes them much less efficient than low earth orbit (LEO) satellites, which come into play to fix this problem. Without narrowband IoT (NB-IoT) coverage at sea, trackers and sensors can only record the information, uploading it once the vessels are near shore, when it is already too late to do anything about damaged cargo. Furthermore, legacy satellite transmission costs for every container are a large addition to a vessel's already expensive bills, particularly when considering tariffs and port and channel fees.

With Sateliot's full 5G NB-IoT satellite constellation, Sensefinity will be able to report location, temperature, humidity, vibration and container breach in real-time, unlocking a set of high-impact use cases such as notifications when a container falls into the ocean, alerting for fires inside containers, warning for cold-chain breaks for sensitive cargo like food and medicines and reporting impacts and damages in containers.

Jaume Sanpera, the chief executive of Sateliot, said: "Investing in smart containers and global continuous connectivity transmission through our network of 5G NB-IoT satellites will provide vessels and shipping companies better control of transported goods, avoiding damage claims and lawsuits costing companies billions of dollars per year."

1NCE expands IoT software business with launch of new OS

Ivo Rook, 1NCE

1NCE has announced the creation of its software business unit following the launch of 1NCE OS – the company's IoT software offering developer tools and device control to make IoT even more accessible. The software tools are an integral part of 1NCE's Lifetime Flat service and are available free to 1NCE customers.

1NCE OS is designed to enable easy integration of 1NCE's connectivity and software features into IoT projects of any scale, for new and existing projects alike. Using 1NCE OS for device and cloud integration, customers can accelerate time-to-market for IoT projects by months. One of 1NCE's core principles is that customer data isn't to be monetised and used to sell additional services. Instead, 1NCE is transparent about turning data into tools that are included in the global lifetime flat rate.

Ivo Rook, the chief operating officer of 1NCE, said: "1NCE flips the script for customers – we don't monetise their data for a few extra dollars because our customers' data is theirs and theirs alone. 1NCE's move into software allows us to boost our customers' ideas not just when they need connectivity, but from the outset of their projects and all the way through a device's lifecycle. IoT connectivity and software for life for a single fee, and that's it."

News in Brief

Netmore divests M2M business to Melita

Maltese telecoms and IoT operator **Melita** is acquiring **Netmore Group**'s wholly owned subsidiary Netmore M2M AB (Netmore M2M) for an initial cash purchase price of US$1.88m, plus a conditional additional cash purchase price of up to a further US$2.8m. Netmore Group launched the Netmore M2M business in 2019 as part of its then business strategy to target the European market for SIM cards based IoT connectivity. The subsidiary has grown steadily since its formation and today has more than 300 customers in over 30 countries.

Through this transaction, these customers will have new tools for SIM card based IoT project deployment as Melita brings a proprietary connectivity portal with increased functionality, extensive IoT SIM roaming coverage, as well as additional security options. Melita is licensed and regulated in Malta and operates its international IoT business under the brand melita.io.

Blues Wireless raises US$32m

Blues Wireless has announced a US$32m Series A1 funding round led by **Positive Sum**, and including new investors **Four Rivers**, **Northgate** and **Qualcomm**. Previous backers **Sequoia**, **Cascade**, **Lachy Groom** and **XYZ** also participated.

"Even in these difficult economic times, enterprises will not hesitate to invest in transforming their physical products to be capable of remote monitoring and control," says Ray Ozzie, the founder and CEO of Blues. "To date, connecting products to the cloud using cellular has been a time-consuming and expensive endeavour, fraught with risk. Complexity kills. Blues has taken a developer-centric approach that simply eliminates complexity, from device to cloud, enabling products realistically to go from prototype to scale deployment in months instead of years."

Decarbonisation demands data centre energy efficiency at IoT scale

As enterprises of all types embrace IoT there is an opportunity to run operations more efficiently, with less complexity and a smaller environmental footprint. However, IoT is also contributing to substantial volumes of data storage, processing and analytics which is putting pressure on data centre capacity and, in turn, increasing power consumption and cooling requirements at data centres. In order to meet their green targets, organisations need to not only think of how IoT use cases are helping at the point of use but also how to mitigate the impact of the increased utilisation of data infrastructure.

Adam White, the division president for Power and Sensor Systems at Infineon, tells George Malim, the managing editor of IoT Now, that efficiencies are being made and technologies such as wide bandgap with gallium nitride (GaN) and silicon carbide (SiC) semiconductors are offering fundamental advantages over silicon. In data centres, these technologies are enabling progress to be made in reducing carbon emissions towards the net zero goal

George Malim: With the radical increase in both data traversing the internet and the 25-fold projected growth in demand for data centre storage, it's clear that efficiencies need to be improved if organisations are to meet their environmental targets. How is Infineon helping make data centres greener?

Adam White: As number one in power semiconductors, **Infineon** offers a wide range of solutions to make data centres greener. Our products are used in highly efficient power supplies for servers, uninterrupted power supplies, battery back-up solutions and voltage regulators to power the most demanding computing processes with the highest efficiency. Energy efficiency and decarbonisation is at the core of our solutions.

Although much progress has been made, the amount of energy consumed by data centres is increasing, but at a rate that is far slower than data growth. This growth is energised by our digital lifestyle with streaming and gaming, ▶

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working from home, remote education, digital healthcare, crypto-currency and the metaverse. Digitalisation is the key to progress, innovation and a better life. Just look at the metaverse with its new and fascinating ways to learn and to interact. Digital twins for example are not just for industry to simulate their production lines or a smart building. Everybody can either learn in a digital world or interact with other people around the world in a totally new, immersive way. Virtual reality and augmented reality will open up a new world. The metaverse expands our lives to a new dimension. And all this is linked with enormous data growth.

We need to step up our efforts in order to reduce CO2 emissions and reach the net zero goal. In particular, we need new technologies like wide bandgap with GaN and SiC semiconductors. They offer fundamental advantages over silicon. For example, GaN technology is driving higher power density, maximum energy efficiency and smaller system size. Infineon offers a broad range of system reference designs for both ACDC and DCDC to exploit the full value of GaN-based power switches. These systems are achieving higher efficiency and density with robust, high-quality and reliable products. This results in an amazing win for our climate. Let me give an example: If every data centre worldwide used the respective Infineon solution CoolGaN, we could save up to 10 megatons of CO2 emissions.

GM: Are the main gains to be made in power and cooling efficiencies and which technologies are driving performance improvements in these areas?

AW: The key topic is to address the architectural level. Thinking out the uninterruptable power supply and delivering battery back-up power at DC in a parallel power path improves the overall power flow by at least 4-6%. Such architectures are used today in hyperscale data centres and are addressed, for example, in the Open Compute V 3.0 standard.

Let's a have a look at the important key performance indicator of a data centre, the Power Usage Effectiveness (PUE). It divides the total power delivered to the data centre by the actual power consumed by the IT equipment. The ▶

Adam White
Infineon

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All the benefits of smart building technologies can also be applied to data centres

perfect PUE value is 1.0, when all power required for a data centre would be in the actual computing devices, not in cooling or power conversion.

According to recent research, IT and data centre managers report an average annual PUE ratio of 1.57 at their largest data centres. So, there's room for improvement in terms of uncontrolled cooling and power costs, along with reducing the CO2 footprint.

Wide bandgap technology is the most important development in the power semiconductor area, taking efficiency of energy conversion to a new level. We at Infineon offer a broad product and technology portfolio including silicon and the innovative technologies for silicon carbide and gallium nitride-based devices. They are driving efficiency of data centres.

GM: Please can you tell us more about your demo at MWC with your partner Supermicro Computer that showcases how to reduce the cooling requirements of server rooms?

AW: Supermicro developed a computing platform that can significantly improve PUE. Specifically, the Supermicro MicroBlade family offers the best server density for a variety of processors, up to 112 x 1-socket Atom nodes, 56 x 1-socket Xeon nodes, and 28 x 2-socket Xeon nodes in a 6U rack unit. The MicroBlade can provide up to 86% power efficiency improvement and 56% density improvement when compared to standard 1U rackmount servers.

The MicroBlade server uses our OptiMOS-based integrated power stages TDA21490 and TDA21535. The TDA21490 enables a robust and reliable voltage regulator design for high performance. It offers best-in-class efficiency with its OptiMOS power MOSFETs in a thermally efficient package. In addition, operation at a switching frequency of up to 1.5 MHz enables high-performance transient response and allows output inductance and capacitance to be reduced while maintaining industry-leading efficiency.

GM: What other technical approaches that help optimise utilisation and minimise wasted capacity are being adopted? How do these contribute to reducing the environmental impact of data centres?

AW: All the benefits of smart building technologies can also be applied to data centres. Of course, the actual server rooms are already ▶

fully air-conditioned, but it's also about efficient lighting control, intrusion detection and the rooms for employees directly in the data centre. The rooms can be intelligently managed through presence detection and automatic control of energy consumption for lighting and air conditioning, too.

Infineon has a wide technology portfolio of sensor and microcontroller solutions for all these smart building technologies. We provide holistic energy efficiency solutions.

GM: As connectivity in IoT enables billions more devices to connect, especially in the case of 5G, with very high data capacity, will technologies like edge computing be used to lighten the load on centralised data centres? How does Infineon see this playing out and what enabling technologies are you providing?

AW: Yes, these technologies will help. Edge computing is a growing topic in our business. The key advantage for edge computing is latency, network capacity and security. Corresponding to the slogan 'compute follows data', processing data at the edge reduces data traffic, thus relieving the networks, data centres and energy consumption. Much more, it ensures faster responses, because no time is lost in sending sensor data, analysing the data in a data centre and sending back control commands, for example. Additionally, data that doesn't leave the edge provides a smaller attack surface.

Microcontrollers become more important to safe and secure real-time applications. In addition to energy efficiency, security is also a major topic at Infineon. We offer best-in-class security solutions used in the automotive and financial industries. That's why Infineon is developing new computing, artificial intelligence (AI) and edge encryption solutions.

GM: How do you see Infineon's role in supporting the future of sustainable data centres?

We are engaged in a lively exchange with our customers. We understand their needs. That's the reason behind our 'from product to system' approach. We offer the knowhow for digitalisation and decarbonisation. This is the focus of our corporate strategy and is at the centre of our entrepreneurial activities. We will continue our previous successes for the sustainable data centre of the future. The key for the essential step towards higher energy efficiency is the use of new technologies and materials such as GaN. Infineon is an industry leader in power management technology, with over 20 years of innovation in GaN and owning one of the largest IP portfolios.

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Achieve a health-conscious lifestyle through the power of IoT

Thomas Rosteck, the division president for Connected Secure Systems, and Adam White, the division president for Power and Sensor Systems, at Infineon explain how smart semiconductor solutions can influence personal health

Smart devices and wearables are interwoven with countless activities in our everyday lives. They make our lives easier, more convenient and help us lead a health-oriented lifestyle. As life expectancy increases and the world's population grows, we need solutions that help us increase our fitness and wellbeing, maintain long-term health, prevent diseases, and provide personalised care in case of illness.

United Nations projections suggest that the global population could grow to around 8.5 billion in 2030 and 9.7 billion in 2050. This development presents the healthcare system with major challenges. In addition, we all want to live healthy, vital and self-determined lives for as long as possible. The topics of preventive healthcare and wellbeing are moving more and more into focus. A smart home can be of great help for tracking vital signs. Good health increasingly means taking responsibility for our long-term preventive care rather than reactively treating acute illnesses. It also places great emphasis on enhancing wellbeing to prevent illness, and it recognises the role of the home as an important factor in individual healthcare.

In addition, younger generations wish for more personalised and self-determined medical services. The ability to monitor health and fitness status at any time makes it possible to detect illnesses and stress at an early stage and to take action against them.

Better health awareness by vital sensing at home

Technology, and with it the Internet of Things, has the potential to support the healthcare sector across all levels – with predictive prevention and monitoring, in diagnosis and treatment as well as in follow-up care and support in daily life. Today, various health and fitness devices can already track key health parameters such as heartrate and blood pressure, can record and evaluate irregularities and can also share the information in real-time. This helps users stay more aware of their own well-being and also allows them to make pro-active decisions regarding their health. But the technology can only unleash its full power if it is trusted and thus accepted. Personal health data is highly sensitive, protecting the privacy of the data therefore more than essential.

The global IoT market trend in medical devices is clearly moving towards 'healthcare is self-care', with a focus on actively involving people and patient-centric care. The vital sign monitoring market segment is expected to grow rapidly.

For example, an unobtrusive smart ring that monitors sleep, activity, recovery, body temperature, heart rate and stress levels can ▶

Thomas Rosteck
Infineon

Adam White
Infineon

reliably measure vital functions for up to seven days on one battery charge and can identify trends at an early stage. This makes it even easier to consistently and seamlessly record and evaluate physical activities than is already possible with smart or sport watches.

Besides smartphones and smart wearables, other smart health devices already exist that monitor physical activities and thus support an active lifestyle. This is where smart homes come into play. Based on radar technology, sleep sensors, fall detection sensors and vital sensors in general are now small and easy to use. Patients can record their sleep behaviour with high precision at home, without external stress factors and in a comfortable environment – even when covered by bedding.

All this hyper-connectivity is driven by a whole new ecosystem of devices delivering innovative and more advanced levels of contextual awareness. This ecosystem bridges the gap between the real and the digital world with sensors that allow things to see, hear, feel, smell and thus understand their surroundings.

The role of semiconductors

Semiconductors from companies like **Infineon** are essential components in all these solutions, since they support the design of innovative technologies and devices for health-monitoring, preventive healthcare and, in the event of illness, self-treatment and assisted living at home. There can be no IoT without semiconductors.

Sensors record vital data, microcontrollers process and forward it, actuators trigger actions, networking technologies integrate cloud services with medical expertise and security solutions ensure the protection of extremely sensitive personal data. All this data is intelligently networked and wirelessly connected over the cloud to link people with services and information that match their needs and interests. But with more and more data being gathered for analysis, the need for embedded security has never been more important. Personal data and conversations must be protected to continue making IoT trustworthy. Security solutions ensure the protection of extremely sensitive personal data. And this is where come semiconductors into play again.

Using innovative materials, like gallium nitride, can increase the energy efficiency of electronic devices and therefore certain IoT devices will benefit. We undoubtedly will drive digitalisation further with smart solutions to enhance health and life quality. And all this can also be done in an energy-conscious and energy-saving manner – decarbonisation and digitalisation are intertwined.

Besides smartphones and smart wearables, other smart health devices already exist that monitor physical activities and thus support an active lifestyle

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Mobile World Congress Barcelona must show industry progress

Europe's biggest annual technology show in the form of Mobile World Congress (MWC) Barcelona takes place from 27 February. Antony Savvas takes a look at what attendees can expect

With the technology market clearly slowing as parts of the world see recession and other areas fear one, MWC Barcelona will be staged as new technologies and new business opportunities are aired amid uncertainty. However, what we have learned over many years when it comes to mobile technology is that if the technology captures the public's imagination, and if it is clearly useful to businesses, it will usually win through and eventually show traction, no matter what the economic environment.

5G use cases

Now is the time for the mobile industry to make sure it gets its marketing just right, and convinces new and existing mobile customers that 5G isn't just an opportunity to make your downloads go faster and make content streaming more reliable.

To cover the billions of euros, pounds, dollars and yen spent on 5G networks, communications service providers (CSPs), infrastructure companies, service providers, content creators, ▶

and their financial backers, have to showcase the right use cases to enable them to start getting their cash back and much more.

IoT driver

IoT service providers and equipment suppliers have to play a key role in this, driving the mobile industry forward in developing the right sensors and software. Whether this is to support 5G network slicing in industry, helping to build the best systems for the evolving metaverse, making sure the most reliable data analytics are provided to the rapidly growing electric vehicle (EV) industry, or supporting governments who are actively trying to improve the condition of our environment, to name but a few pre-requisites for a more positive mobile industry. The IoT industry has a worthwhile challenge in front of it.

A big draw

More than 2,000 exhibitors and sponsors are expected at this year's MWC Barcelona, at the Fira Gran Via, Barcelona, Spain, on 27 February to 2 March, 2023.

New editions to the show include 'Journey to the Future', the event's first immersive story-telling space, that will offer attendees a "unique, hands-on journey into the future of technology and connectivity solutions", says show organiser the **GSMA**.

"This year, we are going beyond mobile, providing an unmissable space to unleash tomorrow's technology, today. We are on a journey to digital everything, and it will take boundary-pushing powerhouses from across all sectors to truly achieve it," says Mats Granryd, the director general of the GSMA.

Sports Tomorrow

Thanks to the GSMA's collaboration with **FC Barcelona**, Sports Tomorrow Congress will this year be co-located at MWC Barcelona for the first time. It will create a space to identify and create new business opportunities across the mobile and sports industries, in addition to providing a new way for businesses and stakeholders in the sports and technology ecosystem to convene, make deals and launch products.

The theme at this year's show is Velocity, and this will be woven across five key discussion and thought leadership tracks, including 5G acceleration, Reality+, OpenNet, FinTech and Digital Everything.

Key speakers

"Along with our themes, we also want to ensure our content reflects the diversity of the world we live in, and we are delighted to share our latest confirmed speakers, including some of the biggest names in the connectivity industry and adjacent vertical industries, representing markets from around the world," said John Hoffman, the chief executive of the GSMA.

Speakers include Frehiwot Tamru, **Ethio Telecom**'s CEO; Martha Sazon, **G-Cash** president and CEO; Christel Heydemann, **Orange**'s CEO; José María Álvarez-Pallette, **Telefónica** CEO and GSMA chairman; Alejandro Agag, **Extreme E**'s founder and CEO; Vincent Clerc, **Maersk** CEO; Takayuki Morita, **NEC** president and CEO, and Anna Borg, **Vattenfall** president and CEO.

Industry City

Industry City will be returning, supported by sponsors including show Knowledge Partner **Accenture**. The space will showcase innovative demos from across the FinTech, manufacturing and smart mobility industries.

Other returning programmes include 4YFN, MWC's startup-focused platform, to shine a light on the most exciting startups in the digital space. 4YFN will connect startups, investors and companies to launch new business ventures together. It is brought to MWC once more by Platinum sponsor **Banco Sabadell**.

The GSMA Pavilion will host the Mobile World Live Broadcast Studio with live panel discussions broadcast on screens throughout the venue and online. Also at the GSMA Pavilion, there will be the latest innovations in mobile, with demos and immersive experiences such as a mobile IoT football challenge.

Diversity

Diversity4Tech returns, "demonstrating the advantages of our differences", says the organiser. In addition, the MWC Ministerial Programme, said to be the largest global gathering of policymakers who enable the digital economy, will convene ministers, heads of regulatory authorities and data protection authorities. They will meet with mobile industry CEOs and senior representatives of international organisations to share knowledge and debate priority policy and regulatory issues.

Other networking events include Beat Barcelona, the MWC and 4YFN official after-work 'Place to B' for networking and entertainment. And the regular Meet & Eat L'Hospitalet shares a delicious look at the local Barcelona gastronomy and culture through a partnership between MWC and L'Hospitalet City Council.

The GSMA expects the 2023 edition of MWC to generate nearly €350 million of economic benefit and 7,400 part-time jobs. More will come after this year too, as the GSMA has signed a deal with the local authorities to keep the event in Barcelona until 2030.

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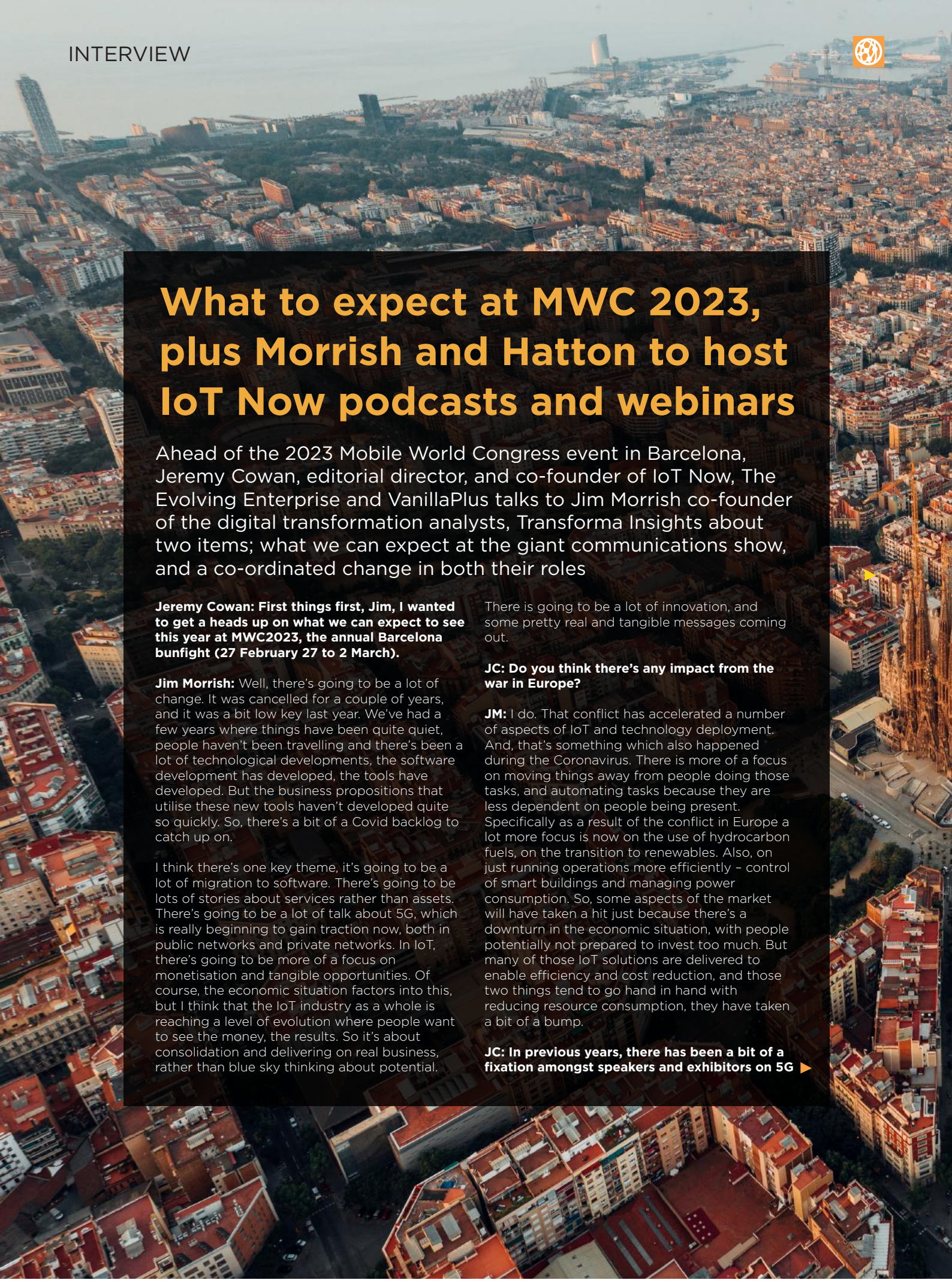

What to expect at MWC 2023, plus Morrish and Hatton to host IoT Now podcasts and webinars

Ahead of the 2023 Mobile World Congress event in Barcelona, Jeremy Cowan, editorial director, and co-founder of IoT Now, The Evolving Enterprise and VanillaPlus talks to Jim Morrish co-founder of the digital transformation analysts, Transforma Insights about two items; what we can expect at the giant communications show, and a co-ordinated change in both their roles

Jeremy Cowan: First things first, Jim, I wanted to get a heads up on what we can expect to see this year at MWC2023, the annual Barcelona bunfight (27 February 27 to 2 March).

Jim Morrish: Well, there's going to be a lot of change. It was cancelled for a couple of years, and it was a bit low key last year. We've had a few years where things have been quite quiet, people haven't been travelling and there's been a lot of technological developments, the software development has developed, the tools have developed. But the business propositions that utilise these new tools haven't developed quite so quickly. So, there's a bit of a Covid backlog to catch up on.

I think there's one key theme, it's going to be a lot of migration to software. There's going to be lots of stories about services rather than assets. There's going to be a lot of talk about 5G, which is really beginning to gain traction now, both in public networks and private networks. In IoT, there's going to be more of a focus on monetisation and tangible opportunities. Of course, the economic situation factors into this, but I think that the IoT industry as a whole is reaching a level of evolution where people want to see the money, the results. So it's about consolidation and delivering on real business, rather than blue sky thinking about potential. There is going to be a lot of innovation, and some pretty real and tangible messages coming out.

JC: Do you think there's any impact from the war in Europe?

JM: I do. That conflict has accelerated a number of aspects of IoT and technology deployment. And, that's something which also happened during the Coronavirus. There is more of a focus on moving things away from people doing those tasks, and automating tasks because they are less dependent on people being present. Specifically as a result of the conflict in Europe a lot more focus is now on the use of hydrocarbon fuels, on the transition to renewables. Also, on just running operations more efficiently – control of smart buildings and managing power consumption. So, some aspects of the market will have taken a hit just because there's a downturn in the economic situation, with people potentially not prepared to invest too much. But many of those IoT solutions are delivered to enable efficiency and cost reduction, and those two things tend to go hand in hand with reducing resource consumption, they have taken a bit of a bump.

JC: In previous years, there has been a bit of a fixation amongst speakers and exhibitors on 5G

use cases or the need for proven use cases. Consumers don't see it like that, obviously. What's your expectation about this year? And dare I ask, are we about to be bombarded with a lot of information of dubious veracity about 6G?

JM: Well, probably yes to both. So, there's going to be a lot of 5G messages around. The reality is there's not a lot of 5G out there at the moment. If I look at the forecast that we have, and the number of 5G non-massive machine type communications (mMTC) connections – so that's the higher speed connections, not the low power wide area (LPWA) connections – at the end of 2022 that was about 1% of the installed base of all cellular connections. So it's still quite a small concept. There's about another 500 million or 29% of cellular IoT connections are the mMTC, LPWA-type 5G connections. So, it's an early story.

But there are definitely use cases. For instance, **GSMA** has an initiative. It has a 5G transformation hub, which illustrates a number of particularly interesting case studies that use 5G technologies. As for 6G, well, one day I guess. As yet, there's no standard for what qualifies as 6G. Although that's not necessarily held back the industry in the past where of course, LTE was branded as something like 3.95G and then rounded to 4G. So, we have found ways around that before. But right now, I think the industry is attempting to digest 5G, it's still early days in that story. There's a lot of things that you can do with it. It's particularly suitable for private networks. And it also enables the control to move out of the network and into the software managing the network, and that allows for a lot more flexibility. And this kind of trend towards software-centric service providers in the IoT space rather than necessarily what we had up until now is many providers essentially tied to hardware and building on that basis. There's a long way to go with 5G before we get to 6G.

"Everyone claimed to have a machine-to-machine story and that transitioned to claiming to have an IoT story, even when they really didn't."

JC: About a decade ago, everyone claimed to have an M2M or machine-to-machine story and then that transitioned to claiming to have an IoT story, even when they really didn't. Is it the same now with artificial intelligence (AI) and the metaverse? I'm sorry, if I sound like a cynical hack, but I am a cynical hack.

JM: I know it seems reasonable. And by the way, somewhere in there blockchain came and went. So yes, we should definitely expect to hear a lot about artificial intelligence (AI) and the metaverse. But this is always going to be the way, the industry's press and conversation and buzz tends to pick up on the new technologies. So, sprinkling a little pixie dust never hurts for these vendors. What is often left behind though, as a legacy is often very tangible. IoT now is a real and very significant thing which is coming of age. Similarly, AI will find itself embedded in all sorts of devices and enterprises' processes over the next decade. Even metaverse, if you can put to one side for a moment the image of legless avatars, it can be a very significant technology. There's a lot of potential for virtual and augmented reality (VR and AR) in an enterprise context. So, for example, take VR; there's a company called **Northdocks** in Germany (**https://northdocks.com**), they've created an ultra-detailed digital twin of Cologne Cathedral using 5G-connected drones. That's a great asset for the stonemasons renovating the building. It avoids the need for scaffolding and allows them views from places which would have been previously inaccessible. Or AR, where, for example, **PTC**'s Vuforia Chalk allows remote experts to provide AR guidance to field engineers. So, there are some really tangible things that sit under that metaverse buzz.

JC: Do you think that as an industry we're shifting our focus quickly enough from the technological innovation that has really been front and centre of everything we've done and has always been exciting to watch, through to the human impacts and changes in society like environmental, social and corporate governance (ESG)?

JM: This is a tough one. Definitely, it's something that I spend some significant time thinking about. We're definitely shifting focus, but there's ▶

Jim Morrish
Transforma Insights

Matt Hatton
Transforma Insights

a real question over whether that's happening fast enough, and how it can happen successfully. So, it's encouraging, for example, to see the work taking place to develop the EU's AI Act. But there's real questions whether that will prove to be a handicap when competing with the USA and Asian countries, or whether it will prove to be to be a benefit. It's hard to call at this point. But, certainly, it to some extent restricts the potential of what can be done with new technologies. I think there's a wider challenge here. And it's one of ambition, because when many folks set out to regulate or to govern these industries, it's, for example, seeking to regulate AI to meet some ideal standards. But you know, it can be proven, for example, that's impossible for machine algorithms to be fair in all contexts, because different people have different definitions of fair. And there's a great example of this in correctional offender profiling in the USA, and this is basically assessing convicts, prisoners on the basis of their probability to reoffend whilst they're out on licence before they've been sentenced. The specific challenge there was to assess the risk of reoffending and rate prisoners of different racial groups fairly, whilst also ensuring that the risk assessments assigned to individual prisoners are accurate. And some research has focused on this and they claim to have proven mathematically that it is impossible to satisfy both of these goals at the same time.

For us to ensure that technological innovation reflects the kind of society that we want, we first need to decide what we want society to look like, and then have technology reflect that. And we've not done that first piece yet. Which makes it something of a problem to really define, ideally, what we want the technology to achieve, because we haven't defined quite what we want society to be yet. And I'll take a much more simple example that doesn't really get to troubling the dynamics of society. But take a simple example, which illustrates the problems of migrating traditional approaches to things into a technological environment.

If you consider a legal document of 20 pages and there's a last page on that which is a signature page, you could sign that signature page. And quite often these documents are loose leaf, there's nothing to associate that signed page with the first 20 pages. Now, that is an incredibly insecure way of certifying a legal document, it would never be allowed in a technological system. So you have this problem of fixing some of the challenges which we've just accepted as part of day-to-day life when you decide to render something as a system. And that is one of the significant challenges which underlies this consideration that we need to regulate technology to ensure it's consistent with what we want to achieve with society.

JC: Jim, how can people find you in Barcelona if they want to have a chat?

JM: Well, probably the best way is to is to send through an email. I'm available on email, and happy to meet with anyone who might be there. Reach out to **enquiries@transformainsights.com** which will come to me and Matt Hatton, my co-founder. ▶

Jeremy Cowan
IoT Now

For us to ensure that technological innovation reflects the kind of society that we want, we first need to decide what we want society to look like, and then have technology reflect that
- Jim Morrish

Cowan to hand the mic to Morrish

JC: There's also a much less important thing to discuss today. After 27 years covering the communications sector I'm retiring this year, which has implications for you, Jim. Following a decade or more reporting on shipping and transport, healthcare and parenting, then defence and manufacturing, I found myself managing a talented team of telecoms journalists producing 13 magazines, including Mobile Europe and Communications News.

The communications sector is unlike any industry I've worked in before. So, when the opportunity arose to launch a telecoms software magazine of my own in 1999, *VanillaPlus,* I grabbed it. And 24 years later, thanks to the energy and creativity of my past and present co-directors like Nathalie Millar, Cherisse Jameson, and Charlie Bisnar, it's still growing.

We've added other successful communications brands like *IoT Now, IoT Global Network*, and most recently, *The Evolving Enterprise*, which covers artificial intelligence and a lot more besides. So, now seems a good time for me to step back and let a new generation show what they can do. And I am delighted that Jim Morrish here, along with support from his TI co-founder, the excellent Matt Hatton, will be taking over as webinar moderators and podcast hosts on this site. Jim, what changes to these IoT and communications pods and webinars can we expect to see under your guidance?

JM: Thank you, Jeremy. Firstly, it's an honour and a privilege to be to be invited to take this over. You've established many brands, and clearly there's a significant following to these podcasts, webinars, and so on. In terms of what happens next, things will continue in much the same way. My philosophy is not to change something that seems to be working well. So, I think it's going to be more of the same, discussions with various industry luminaries to focus on impactful technologies or new announcements or new propositions. And trying to identify those real-world impacts of technology and tangible benefits and the real challenges, and filter out some of that noise.

JC: Because there is a lot of noise in this industry and filtering it out is what editors are there to do. Social media doesn't do that. It just allows everyone to shout louder. So, we'll be relying on your good sense and experience.

JM: Absolutely, I think there is a key role to play in filtering and highlighting the bits of a message that actually do matter and just, as you say, cutting through that noise. But also, some of the softer things we were discussing; the impact of human society, and the way we live our lives, taking a little time to focus on that, and how technology fits into that and enables that.

But on a slightly different topic, as the baton hands to me, my first question, Jeremy would be, what are you planning to do with your retirement?

JC: It's kind of you to ask. I wrote a novel a few years ago called *The Tin Soldiers*, about conflict minerals and telecoms' role in modern slavery. And I enjoyed it so much, not just the writing but the research, that I plan to do that again. I have a couple of works on the go, plus a historical novel that I want to do. It'll keep me busy. So, yeah, watch out for something by JJ Cowan.

JM: Absolutely, we'll invite you back to talk about that.

JC: Thank you, Jim. I know you and Matt will bring an enviable depth of analysis and experience to this, as well as some very interesting contacts. I can't think of safer hands.

Why mobile operators should consider a mindset shift to leverage the potential of eSIM-only iPhones

Since the announcement that iPhones in the USA will be eSIM-only, there has been a lot of buzz around eSIM technology. This move has marked a significant shift in the way services are delivered to consumers and has opened up opportunities for enterprise IoT. From wearables to health trackers and other edge use cases, mobile operators are increasingly able to provide their networks through embedded SIMs (eSIMs), rather than the traditional plastic SIM cards.

As the trend of downloading electronic profiles gains momentum, it will leave the legacy method of relying on roaming agreements in the dust, making local connectivity the new standard

According to Juniper Research, eSIM-powered devices reached 1.2 billion in 2021 and are expected to surge by 180% in the next four years, with a projected 3.4 billion devices by 2025. While two-thirds of mobile operators offered eSIM services as of January 2021, the industry's shift towards eSIM has been slower than anticipated. As 90% of mobile operators are expected to offer eSIM services by 2025, those that adopt this technology early may gain a competitive edge.

How eSIM-only phones impact the consumer market?

The growth of eSIM-only poses a significant threat to mobile operators, and it's easy to see why. With the convenience of downloading new profiles, it will be much easier for consumers to switch between operators at their leisure. This means that when travelling, consumers will no longer need to rely on expensive and limiting roaming packages from their home operator. Instead, they can simply download local connectivity for better performance and lower costs.

As the trend of downloading electronic profiles gains momentum, it will leave the legacy method of relying on roaming agreements in the dust, making local connectivity the new standard. This will lead to a decrease in revenue associated with roaming and the loss of the stickiness of plastic SIM cards.

To stay competitive, mobile operators will need to think of new ways to retain customers, such as providing exceptional service and support. They will also need to develop new revenue models, with local connectivity being a potential option. The first operators to embrace this shift will gain the most coverage, while those who lag behind risk being left in the dust.

The inevitable demise of roaming and its impact on IoT

As travellers move away from traditional roaming in favour of downloading local profiles at a fraction of the cost, operators need to prepare for a significant loss of revenue. While roaming may work well for consumers looking to travel, it has never been an ideal solution for IoT. The IoT agreements were designed with consumer travel in mind, but there are unique challenges that arise for IoT use cases, such as permanent roaming restrictions and data privacy regulations that must be met for compliance. Furthermore, roaming presents ongoing security concerns and makes it nearly impossible to achieve the low latency and performance necessary for many IoT use cases.

It is time to accept that roaming was never the right choice for IoT, and operators must adapt accordingly. As we enter the era of localised connectivity for IoT, the ability to download, manipulate, and consume local profiles has become easier than ever before.

It's an exciting time for IoT, but operators must be prepared to navigate this shift in connectivity to remain competitive.

Local connectivity meets global needs

Instead of an impending threat, I see a promising opportunity for operators on the horizon. So ask yourself, what do your customers really want? They don't necessarily care about the underlying technology, they just want reliable connectivity that is available whenever and wherever they need it. That's why we're already seeing major operators like AT&T and T-Mobile making significant investments in eSIM technology to take advantage of its potential. ▶

The future of IoT connectivity is all about global availability, but in a localized way

Nir Shalom
CEO
floLIVE

The future of IoT connectivity is all about global availability, but in a localised way. The ability to offer local connectivity solutions is key to overcoming the challenges of compliance, security, and performance. However, mobile operators still need to provide customers with a wide-reaching solution, as IoT is a global business.

But that's not all. Enterprise IoT customers are looking for greater control over their connectivity than ever before. They want to be able to manage their devices and gain insight into the network services they are consuming. Connectivity can no longer be a black box.

To position yourself as a modern and future-proof provider of IoT connectivity, and to stay ahead of market trends while maintaining best-in-class status in your respective territory, there are a few crucial steps you should take. Firstly, empower your customers to utilise your data connectivity solution through eSIM, moving away from the traditional plastic SIM cards.

Secondly, offer a solution that provides local connectivity options for IoT use cases, demonstrating the advantages of modern IoT solutions and preventing customers from seeking out alternatives. To ensure seamless local connectivity, ensure that the SIM cards you offer (whether eSIM or plastic) support multiple profiles, such as multi-IMSI or eUICC. Additionally, provide developers with complete visibility and control over the network services you offer. With a modern and intuitive platform that provides real-time views of network events, QoS control, and visibility into real-time charges, you can meet the demands of your IoT customers and position your company as a future-focused leader. By making these features widely accessible through multiple channels, such as API and web portal, you can ensure that your customers can consume them with ease.

When the dust settles after the iPhone 14 announcement, the question remains: which mobile operator do you want to be? Will you be a legacy operator struggling to keep up with the changing market, or will you be a forward-thinking provider of IoT connectivity, leading the change into a new era of modern, seamless connectivity? The choice is yours.

While we have made every effort to ensure the accuracy of this listing, the 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.

MWC Barcelona 2023
27 February – 2 March 2023
Barcelona, Spain
www.mwcbarcelona.com

Embedded World 2023
14-16 March 2023
Nürnberg, Germany
https://www.iot-now.com/event/embedded-world-2023/

LogiPharma
25-27 April 2023
Lyon, France
https://www.iot-now.com/event/logipharma/

IoT Tech Expo North America
17-18 May 2023
Santa Clara, California, USA
https://www.iot-now.com/event/iot-tech-expo-north-america-2/

The Things Conference 2023 Amsterdam
21-22 September 2023
Amsterdam, The Netherlands
https://www.iot-now.com/event/the-things-conference-2023-amsterdam/

IoT Tech Expo Europe
26-27 September 2023
Amsterdam, The Netherlands
https://www.iot-now.com/event/iot-tech-expo-europe-2/

IoT Tech Expo Global
30 November – 1 December 2023
London, UK
https://www.iot-now.com/event/iot-tech-expo-global-2/

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