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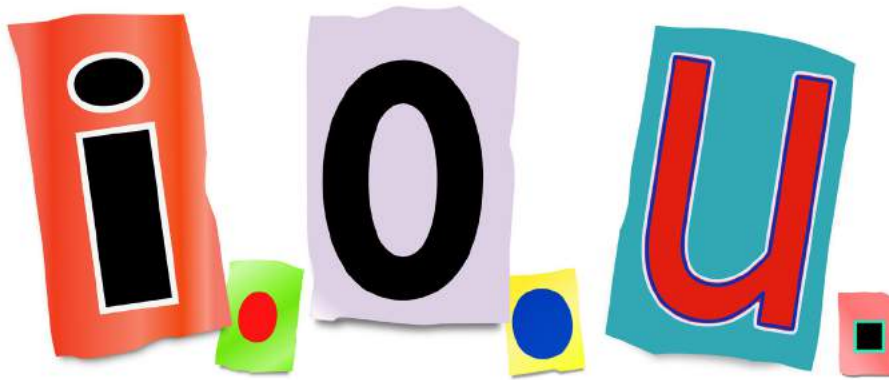
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Useful IoT starts paying back its IOUs

IoT has racked up a significant burden of debt as infrastructure has been put in place to enable use cases. Now though, the Internet of Useful (IoU) has arrived to generate value to reward investors and repay the IOU notes it has relied on to get this far, writes George Malim



George Malim, managing editor

IoT has been a long time coming and pioneers have been required to sustain large investment over the long term in network capacity, multi-access edge computing resources, data processing capabilities and device design and development. Billions have been spent and the mature market is only just appearing over still quite distant hills. IoT has been a

leap of faith supported by the writing of metaphorical IOU notes to suggest that those who invested in the infrastructure, systems and ancillaries that enable IoT would ultimately receive their rewards.

Now, the Internet of Useful is here and the connected things of IoT are demonstrating their worth in increasing volumes across a wide array of industries and disciplines. Routinely now, patients with chronic heart issues utilise 4G connections to enable continuous monitoring of their hearts. At the same time, industry, logistics, transport and education are being transformed by useful IoT and

this is, at last, delivering a return on the invested hopes and money that has got IoT to this point.

The more useful applications we see, the less IoT is talked about. Certainly, heart patients don't go around saying how great IoT is. Instead, they talk about having a 4G device in their body that talks to the local hospital. This is how the future looks for IoT, the more successful IoT-enabled useful apps become, the less IoT will be spoken of.

This is something to be cheerful about and should be celebrated as a significant milestone on the road to IoT maturity. It happens in all technologies and is happening now in IoT and it's an exciting tipping point at which the conversation turns from being about the technology to what it can enable.

For those who have received IOUs written in the shaky hand of early IoT, there's also encouragement. Those brave moves are now looking likely to generate a return and IoT is enabling those who kept the faith to cash-in on their early commitment to turning IoT into reality.

The IoU is truly enabling IoT to repay its IOUs and as volumes increase to make massive IoT real, more and more IOUs will be honoured.

Enjoy the magazine!

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PTC to acquire Intland Software in US\$280m deal

PTC has reached a definitive agreement to acquire **Intland Software** for approximately US\$280 million. The Industrial Internet of Things (IIoT) specialist, which operates in the UK from its base in Farnborough, is looking to broaden and deepen its application lifestyle management (ALM) footprint across safety-critical and regulated industries.

Expected to close in PTC's fiscal third quarter, the deal will encompass Intland's Codebeamer family of ALM software products, including cloud-ready, fully integrated offering. "The addition of Codebeamer will broaden and deepen our ALM portfolio and enable us to further support our customers' efforts to incorporate sophisticated software systems into their products," said Jim Heppelmann, the president and CEO of PTC. "This acquisition will also complement our strengths in product lifecycle management (PLM) and model-based systems engineering as part of our Digital Thread portfolio strategy."

Intland, which is headquartered in Stuttgart, Germany, serves a wide array of global enterprise ALM customers operating across the automotive, life sciences, consumer electronics, and aerospace and defence industries.

PTC plans to offer Codebeamer as a standalone product and in conjunction with both its Windchill and Arena PLM



Jim Heppelmann, PTC

offerings, and to continue to enhance and support its existing ALM solution.

"The entire Intland team is proud of the success we have had developing and delivering a modern ALM offering that has been widely accepted in the market," said Janos Koppány, the chief executive of Intland Software. "Our Codebeamer offerings are a perfect complement to PTC's portfolio of product development solutions, and we look forward to continuing our journey as part of PTC."

The transaction will be funded with cash on hand and amounts borrowed under PTC's existing credit facility. ■

NTT launches IoT services for sustainability

NTT has announced the launch of its IoT Services for Sustainability offering. The new end-to-end stack of services will help businesses advance progress against global sustainability initiatives and make data-driven decisions to reduce their carbon footprint through the intelligent use of IoT connectivity. The offerings include services to aid optical meter reading, water leak management, predictive maintenance and environmental monitoring.

NTT's IoT Services for Sustainability stack incorporates a secure IT/OT integration and end-to-end support. The company claims this will help organisations to quickly see benefits including energy cost savings, faster reduction in emissions, advanced operational excellence and better work enablement across the organisation. The stack of services is also supported by NTT's new LoRaWAN network, and its

catalogue of sensors to measure, monitor and collect data to drive sustainability objectives.

"Almost two-thirds of CEOs say they're aligning business strategies to the UN's Sustainable Development Goals yet only two out of five businesses have the solutions needed to meet the organisation's immediate objectives," said Devin Yaung, the senior vice president of group enterprise IoT products and services, at NTT. "Therefore, it is more critical than ever to prioritise and deliver sustainability solutions for our enterprise customers. Our new stack of solutions will help organisations reach their sustainability goals and improve operations across their business, whether it is reducing waste from manufacturing defects or understanding the carbon footprint of their supply chain." ■

News in Brief

Arm expands IoT Total Solutions

Arm has added to its Total Solutions for IoT portfolio with two new solutions for Arm Cortex-M and Cortex-A processors, streamlining and accelerating the IoT and embedded development process. As part of the expanded roadmap, Arm is launching the Arm Cortex-M85 processor and expanding Arm Virtual Hardware to more platforms, including third party devices, to make the development process more accessible.

"Developers drive the future of the IoT, but they face an ever-increasing demand for higher performance, increased security and less complex development flows," said Mohamed Awad, the vice president of IoT and Embedded at Arm. "IoT runs on Arm, and we have a responsibility to create greater opportunities for IoT innovation and scale by continually raising the bar on performance, simplified development, and software reuse for our ecosystem." ■

Global Telecom launches IoT device management platform

Global Telecom has launched a universal IoT management platform for organisations to manage, optimise and accelerate their networks of wireless devices and sensors. The GTIoT Management Platform offers a cloud-based, low-cost IoT solution for enterprises with thousands or millions of expected wireless devices in their network, as well as small businesses trying IoT for the first time.

At a price point of pennies per device, the GTIoT Management Platform includes more than 400 key performance indicators (KPI) to gain a 360-degree perspective on data usage, efficiency, health, location, power usage and reliability of devices at the macro and micro levels. Continuous assessment and evaluation of every device provides trend reports and recommendations on potential actions. The ability to rapidly identify and diagnose problems with underperforming or power-draining devices enables clients to realise immediate and long-term cost savings. ■



News in Brief

eSIM connections to exceed 4.5bn in 2027, says Kaleido

Kaleido Intelligence, a connectivity market intelligence and consulting firm, has published its latest embedded SIM (eSIM) Market Outlook report, which examines **GSMA**-compliant eSIMs across consumer and IoT markets. It has found that active x universal integrated circuit card (xUICC) eSIM/iSIM connections will grow over 1,400% between 2022 and 2027, with growth heavily driven by smartphone users.

Meanwhile, more than 630 million devices will be iSIM-compatible in 2027, based on GSMA-approved standards for that technology. While this represents only 20% of xUICC enabled devices overall, the power- and space-saving capacities will mean that the adoption rate is higher in IoT, where these are more vital to device performance than for smartphones. This simplified architecture will mean that by 2026 over half of all cellular IoT devices will either be using the consumer or IoT eUICC specification, with active connections growing at a CAGR of 80% between 2022 and 2027. ■

Smart homes in Europe and North America reached 105m in 2021, says Berg

The number smart homes in Europe and North America hit 105 million in 2021, according to analyst firm **Berg Insight**. The most advanced smart home market is North America which had an installed base of 51.3 million smart homes at the end of the year. This represents a penetration rate of 36%. During 2021, the number of smart homes in North America grew by 13.0% year-on-year.

The European market is still behind the North American, in terms of market penetration. There was a total of 53.7 million smart homes in Europe at the end of 2021. The installed base in the region is forecast to reach about 100 million homes at the end of 2026, representing a market penetration of 42%. The most popular smart home products include smart thermostats, smart light bulbs, smart security cameras, smart door locks, smart plugs and smart speakers. These products, which combined have sold in the hundreds of millions, are marketed by incumbent original equipment makers (OEMs). ■

Stellantis selects Qualcomm Snapdragon to power new vehicle platforms

Stellantis and **Qualcomm Technologies** have announced a multi-year technology collaboration to utilise the latest Snapdragon Digital Chassis advancements to deliver intelligent, customisable and immersive in-vehicle experiences to millions of vehicles across Stellantis' 14 automotive brands beginning in 2024. Using the Snapdragon Cockpit Platforms and 5G capabilities for telematics systems, Stellantis will have the capability to meet customers' evolving expectations for personalised and cutting-edge experiences that are continually upgradeable.

"Our technology collaboration with Qualcomm Technologies is another example of how we are identifying industry leaders to work alongside our passionate and talented internal teams as we transform our vehicles through a software-defined approach," says Carlos Tavares, the chief executive of Stellantis. "This will ultimately better meet the needs of our customers' lifestyles through safe, personalised, and always-connected features."

Cristiano Amon, the president and chief executive of Qualcomm, added: "By creating open, scalable, and



Carlos Tavares, **Stellantis**

comprehensive automotive platforms that encompasses semiconductors, systems, software, and services, we are empowering Stellantis, as well as the broader automotive ecosystem, to lead the transformation to the digital era of automobiles."

The first application will be in the **Maserati** brand to power the next generation Stellantis infotainment system. ■

HERE collaborates with AWS on supply chain solutions

HERE Technologies, the location data and technology platform, announced it has entered a five-year strategic collaboration agreement with **Amazon Web Services (AWS)** to help organisations improve their supply chain visibility, transportation and logistics, fleet routing and estimated times of arrival (ETAs) from the first-to-last mile of delivery.

As part of the collaboration, HERE will list its Supply Chain Solutions that are utilised by transport and logistics companies globally in AWS Marketplace, a curated digital catalogue that customers can use to find, buy, deploy, and manage third-party software, data, and services to build solutions and run their businesses. In addition, HERE will work with AWS to bring to market advanced capabilities for transport and logistics participants to use, such as warehouse and yard management, predictive ETA calculations and CO2 fleet emission solutions.

"At the centre of supply chain visibility is location intelligence," says Edzard Overbeek, the chief executive of HERE Technologies. "We have seen now that deep insights on the where and when

dimensions of operations deliver tremendous value, from optimising inbound and outbound logistics to middle and last mile delivery execution. We are proud to work with AWS on deploying these cost and time saving systems." ■



Edzard Overbeek, **HERE**

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Can we realise the promise of IoT, and tame the complexity? Yes, says Eseye

Massive IoT is on a long journey that is yet to reach its destination. Early deployments have barely scratched the surface of the opportunity and we're still waiting for tens of billions of IoT connections and more importantly the value they create to arrive. Excess complexity, weak standardisation, geographical fragmentation, and different technologies have all played their parts in slowing adoption but simple access to connectivity has been among the leading drag factors to IoT's progress.

This is changing with the introduction of eUICC-enabled embedded SIMs (eSIM) but there is still too much inconsistency, lack of flexibility and poor management visibility and control when it comes to IoT connectivity. What's needed is a universal platform for managing IoT connections that is mobile network operator agnostic and can be applied across all the networks devices use, Nick Earle, the chief executive of Eseye, tells IoT Now managing editor George Malim ►

SPONSORED INTERVIEW



There are more than 800 mobile network operators (MNOs) and all have the same business model of offering a proprietary SIM that locks you in to a contract with them

Nick Earle
Eseye

George Malim: Everyone understands that the predictions of there being tens of billions of IoT connected devices by now were overcooked but even so, the potential of IoT and massive IoT in particular hasn't been met. What has been the hold up?

Nick Earle: First, there is a complete lack of interoperability. There are more than 800 mobile network operators (MNOs) and all have the same business model of offering a proprietary SIM that locks you in to a contract with them. They connect you to their network and if your device is out of their coverage zone they choose and manage the roaming partner.

The problem with this is that under this model no operator, no matter what size they are, can offer anything like 100% global coverage for IoT devices. There are always geographical coverage gaps ranging from 20%-40% depending on the country. And when a roaming profile – an international mobile subscriber identity (IMSI) – is used there is no cast iron guarantee that a network will always be available. This is because roaming quotas between operators are set in advance and often inadvertently exceeded, in which case permanent roaming can be limited or made unavailable. And finally, permanent roaming is prohibited by the regulator in many countries.

What this means is that if you want to embed global connectivity capability in your IoT devices, you must use multiple MNO SIM cards and patch coverage together yourself. This creates huge overheads in manufacturing and supply chain logistics. If you want to embed a SIM card in a device you either have to ship cards from the MNO in the country of deployment to the factory or manufacture without any SIM in the device, and deal with the local SIM installation logistics at the point of deployment.

By adopting a global embedded UICC enabled eSIM, you can solve one component of the puzzle. A single global product with a single stock-keeping unit (SKU) number that can bootstrap to the optimum available network automatically when deployed.

GM: Does eSIM solve the complex management challenges that are stifling IoT growth?

NE: On its own, no. eSIMs are not consumer SIMs, they need specific hardware capabilities and firmware settings to enable effective communication between the modem and the SIM, power management and IMSI rotation. Customers don't have these skills – they need their IoT partner to solve these issues for them upfront before they deploy and have challenges.

In addition, many MVNOs say 'we use eUICC enabled eSIMs now so we can do global IoT' but the provision of global connectivity is more than just switching between roaming contracts, providing a single management dashboard and consolidated billing. Your IoT partner needs its own SM-SR (the switch that controls the remote SIM provisioning) that can work across any MNO as well as an SM-DP (the list of IMSIs you can switch to) and in most MVNO solutions this functionality is not owned by them as it is resident in each MNO. So, if that global single SKU is reliant on four MNOs to ensure complete coverage, you could then be in a situation where each has its own platform, pricing, application programme interfaces (APIs) and support systems which the user has to glue together. This doesn't provide what enterprises need for their IoT projects – they want it to just work, not to have to act as if they are an MVNO or systems integrator. We believe 80% of market adoption hasn't happened yet because agnostic operator interoperability and a true single global platform management capability has not yet been enabled.

GM: How will the IoT industry eliminate the crazy and enable the massive IoT opportunity to become reality?

NE: We've approached this by asking our customers: if you had a blank piece of paper, what capabilities would you ask for to help simplify IoT deployments?

When we do this, they consistently say it comes down to enabling them to use one eSIM to connect any device anywhere with maximised choice of network localisation, not just roaming. They want the ability to switch networks based on their rules; not the operators and all devices, new and legacy, to be managed via a single platform which gives the choice to either buy data from the IoT partner or directly from any operator. On top ►



We also have the Eseye AnyNet Federation which now has 16 MNO members with more being added

of this they want a single set of APIs to create new managed services to allow them to create new customer experiences.

The only way to achieve this is to design the architecture and the solution specifically to solve these IoT problems. That's what we've done at Eseye, and we call this 'IoT that works'.

GM: That's easily said but how is Eseye able to provide this level of simplicity to your IoT customers?

NE: A few years ago we bought a specialist IoT hardware design company, DataFlex. This has become a hugely important part of our value proposition as we are able to either design a device for an edge router to meet a specific use case, or analyse a customer's existing device to identify the firmware changes that need to be made to enable full eUICC functionality and global deployment capability. We own the problem, so the customer doesn't have to.

To solve the management issue, we have built the **Infinity IoT Platform**. A full stack of cloud-based capabilities encompassing the access layer, network layer, BSS & OSS, RSP (rules-based remote SIM provisioning via our own SM-SR and SM-DP), device management, API enabled analytics and a security and policy engine. This enables the capability for a device to rotate between operator IMSIs either from up to 10 pre-loaded IMSIs or through an over-the-air (OTA) transfer from our cloud platform.

And we enhance these mobile virtual network enabler (MVNE) type capabilities with device design, testing and certification professional services to help our customers with the complete

IoT lifecycle – from idea to implementation. The functionality is truly global as it is native to **AWS** and runs across our 20 data centres, enabling local breakout using our own private cloud-based, software-defined network. Furthermore, all data is encrypted with access point name (APN) access and does not terminate on the public internet.

We also have the **Eseye AnyNet Federation** which now has 16 MNO members with more being added. It's like the **Star Alliance** airline model but for IoT and gives us a great localisation footprint across the globe. What this means is that our platform rules engine can switch the device connection between networks OTA, across all of these operators and localise the connection when doing so. When this happens, we avoid roaming and so protect our customers from the risk that a single operator plus a pre-determined list of roaming options can present. We like to think of ourselves not as an MVNO but as a VMNO – i.e. a virtual mobile network operator delivering 100% global connectivity via an abstracted, operator-agnostic software capability based on cloud federated network orchestration.

GM: What other features does the new platform offer to help IoT service providers manage their devices?

NE: Enhanced security. It's great that eSIM makes the SIM agnostic to the operator but an eUICC-enabled IMSI change means that when the device moves from operator A to operator B the IP address also changes. So if your application uses fixed IP addresses you can lose device visibility. And if you have implemented your security via **Vodafone**, for example, but the device rotates to **Three**, for example, you have to implement another security solution integration. ▶



NE: A key feature is BYOC – bring your own contract. For example, if customers have a great data rate from **Verizon** for the US, then they can use that contract, and if they need connectivity in remote locations like Brazil or Turkey, for example, they can buy that data from us. In both cases we manage it all through one platform for which they pay a small fee per device, per month. This has resonated very strongly not just with the initial large enterprise customers who see it as a best of both worlds option, but also with the MNOs who want to maintain their relationship and revenue with the customer in their key markets.

We also offer the ability to manage private LTE and 5G networks across our platform

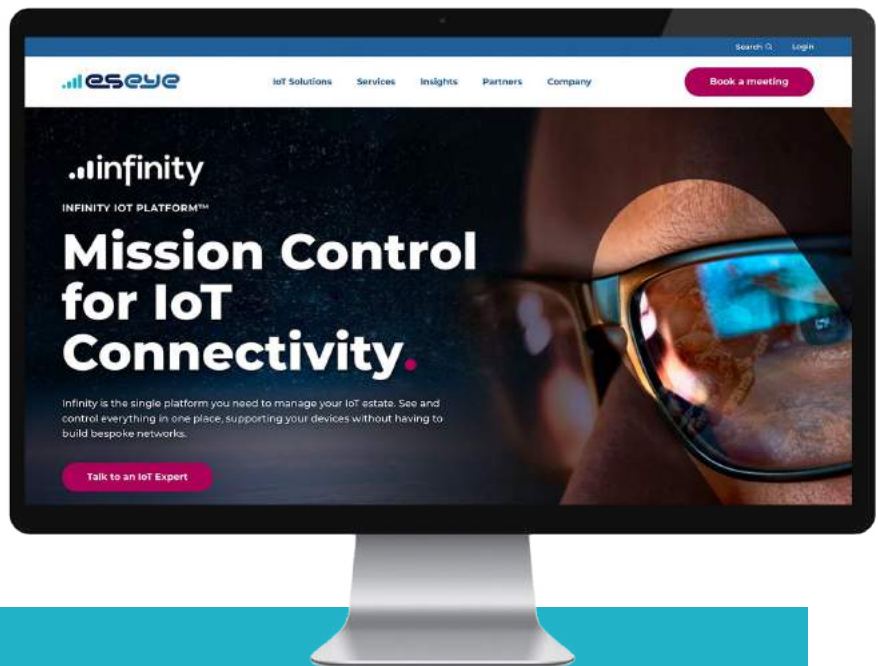
We also offer the ability to manage private LTE and 5G networks across our platform. This allows seamless switching across both public and private networks, which opens further dimensions for large enterprise deployments and customer choice. This is going to be hugely important as devices move seamlessly between private and public deployments. It will be the MNO switching problem on steroids. ■

www.eseye.com/infinity

Our single MPLS network architecture for all connections allows developers to extend connectivity to all eSIM devices. For example, we have signed a deal with **Armis**, the leading agentless IoT security company, to extend security to the edge via an API to our network. Without this capability they'd have to do multiple MNO integrations.

Another compelling aspect is that Infinity has the capability to not only manage Eseye SIMs but legacy SIMs as well. What this means is a single platform solution for all customers' devices - not yet another platform.

GM: What's Eseye's business model for the platform?



How IoT service providers are using Infinity

The Infinity IoT Platform is being used by many large enterprises as they grapple with the challenges of managing their global IoT device estates. Most want to simplify management while enhancing flexibility, control, and security. Some companies take Infinity directly from Eseye, but others take white-labelled versions of the solution from providers such as **TELUS** under the TELUS Global Connect brand.

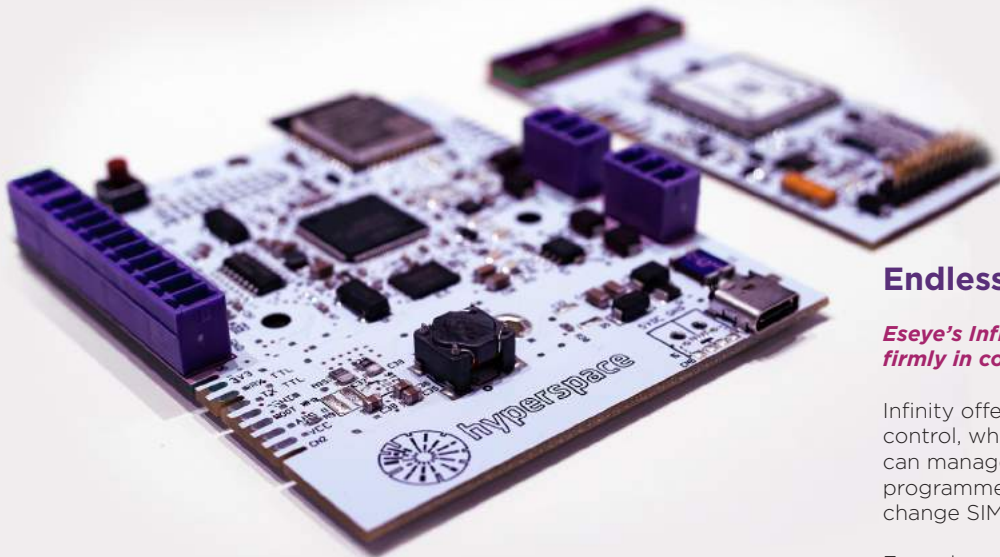
The platform is currently in use by **Amazon** for its Lockers and Key for Business (KFB), the business version of the Ring doorbell, devices. In the case of Lockers, they have implemented a globally dispersed network of physical drop boxes being enabled by Eseye. Similarly, KFB devices are being used by Amazon Prime drivers to gain automated access for parcel drop offs around the world. Infinity is utilised to ensure global, reliable connectivity so they can put a Locker on any street corner in the world or a Key for Business device into any door or gate and it just works – first time and with 100% connectivity.

Shell Recharge Solutions has long been an Eseye customer but also utilised another operator SIM card in the European chargers. With the Bring Your Own Contract offer; Shell is free to contract directly other MNOs as necessary while deploying a single Eseye SIM across all its charging points and in so doing gain visibility and management of all its devices from a single platform - Infinity.



IoT connectivity for now and what's next

Micro Systems specialises in cutting-edge embedded electronics solutions. It designs and manufactures process control and user interface boards for original equipment manufacturers (OEMs) across a variety of sectors, as well as developing management software



One of its core capabilities is building complete, customised IoT ecosystems that help customers to evolve from product-based businesses to service-based businesses. These integrate the required connectivity hardware and software, plus a portal and app, into a unified solution. To better identify its IoT dedicated offering, **Micro Systems** created **Hyperspace**, its new IoT brand.

Micro Systems needed a dedicated partner with easy integration into its custom-developed IoT portals, global connectivity options, and critically a single IoT platform to manage devices and contracts in one place to free end customers from the hassle of dealing with multiple vendors.

“Since we operate on a global scale, we need, and our customers need, one single worldwide operator to deal with,” says Francesco Melegoni, the key account manager at Micro Systems. “Dealing with multiple operators for any country would be an impossible task and **Eseye** is solving the problem by providing this unified global solution that can work anywhere in the world.”

Endless connectivity options

Eseye's Infinity IoT Platform puts Micro Systems firmly in control of its connectivity

Infinity offers a single view and way to gain control, while reducing overall risk. Micro Systems can manage its network, update application programme interface (API) integrations and change SIM preferences within a few clicks.

Eseye has roaming agreements with leading mobile operators across 190 countries, providing access to more than 700 networks. This enables any IoT device equipped with Eseye's AnyNet+ SIM to connect dynamically and seamlessly to the best available network, wherever it's being used.

Devices can also be localised over-the-air post-deployment, on power-up, through Infinity which provides near 100% uptime globally. This breaks down the permanent roaming barrier for customers and improves latency speeds for a superior quality of service.

“Eseye is the partner that completes Micro Systems' IoT offering,” explains Tiziana Tosi, the marketing manager at Micro Systems. “The ability to operate on a global scale, at a fixed price, is very convenient for our customers.”

Since 2014, Micro Systems and Eseye have partnered on countless projects. These include the development of **Fassi Gru's** Internet of Cranes – an innovative IoT system designed to provide Fassi and its users with real-time information on a customer's fleet of cranes. ►

SPONSORED CASE STUDY



IoT mission, controlled

Micro Systems' customers expect IoT solutions that are tailored to their specific needs: standard software or hardware products always bring compromises and limitations. Partnering with Eseye has helped the team to meet this challenge in one key area: IoT connectivity management.

Infinity is built for seamless integrations and extended connectivity. Eseye provides APIs that enable its IoT Platform to interoperate with third-party enterprise applications – such as **AWS** IoT Core and Micro Systems' IoT custom web portals.

Micro Systems has a direct API feed from Eseye's platform to its custom web portals which allows it to extract value from its IoT data and futureproof projects.

What you can see, you can control. This integration unlocks complete oversight and control of Micro System's and its customer's estates. With the ability to manage global devices with one system, wherever they are.

Enabled by Eseye's APIs and data lake, data from the Infinity IoT Platform is ingested into Micro System's Hyperspace portals to feed into customers' reports and applications.

Although you can't predict the future of IoT, you can build for it. Using Infinity, Micro Systems can optimise connectivity quality of service and price, device-by-device, customise its carriers and add new direct interconnects and localisation options. And prepare for what's next, with the option to add new connectivity options such as private LTE/5G networks, satellite, and other wireless technologies.

Benefits include:

- **Reliable global connectivity.** Infinity enables Micro Systems and its customers to operate worldwide, managing data traffic and localising network connectivity in any market with a single device.
- **Simplified management.** Customers needn't worry about setting up their IoT-enabled devices correctly. Micro Systems' electronic boards are shipped with the Eseye SIM card pre-installed – the customer simply activates and deactivates connectivity as required via the IoT platform. This makes connectivity management easy and user-friendly – even when a customer has thousands of devices worldwide.
- **Revenue and value growth from IoT-enabled services.** Infinity enables Micro Systems to extend its IoT offering – a valuable differentiator – to more OEM customers. In turn, the low cost of connectivity helps its customers to introduce IoT-enabled services to more users, for example through integrating IoT technology into entry-level products.

"We couldn't imagine a different or better solution to manage thousands of SIM cards deployed all over the world," adds Melegoni. "Now we sell the connectivity as a service for our customers, and, thanks to Eseye's Infinity IoT platform, we can provide a full solution with complete management over the connectivity."

Infinity's key features

- **All in one place** – a single IoT platform to manage existing legacy SIMs, Eseye AnyNet SIMs, and emerging iSIM solutions.
- **Bring Your Own Contract (BYOC)** – bring existing preferential MNO contracts and billing, supplemented with Eseye's AnyNet infill.
- **Global coverage** – fill any coverage gaps with Eseye's AnyNet federation providing access to over 700 networks around the world.
- **Connectivity and network optimisation** – dynamic network switching as a managed service to provide redundancy and increase device uptime.
- **Support new technologies** – protect IoT investments by adding private 5G/LTE networks and other wireless technologies as the market evolves.
- **Enterprise policy control and management to the edge** – API integrations with security and other enterprise applications, such as Micro Systems' Hyperspace IoT portal.
- **Centralised reporting, analytics and AI** – reduce service and cost overheads across global IoT estates.
- **Secure and compliant** – reliable, low-latency device-to-cloud connectivity, security and routing. Additional support for GDPR, data sovereignty and other regulatory requirements.
- **Single global invoice** – generate one bill for an IoT estate, simplifying financial management and administration. ■

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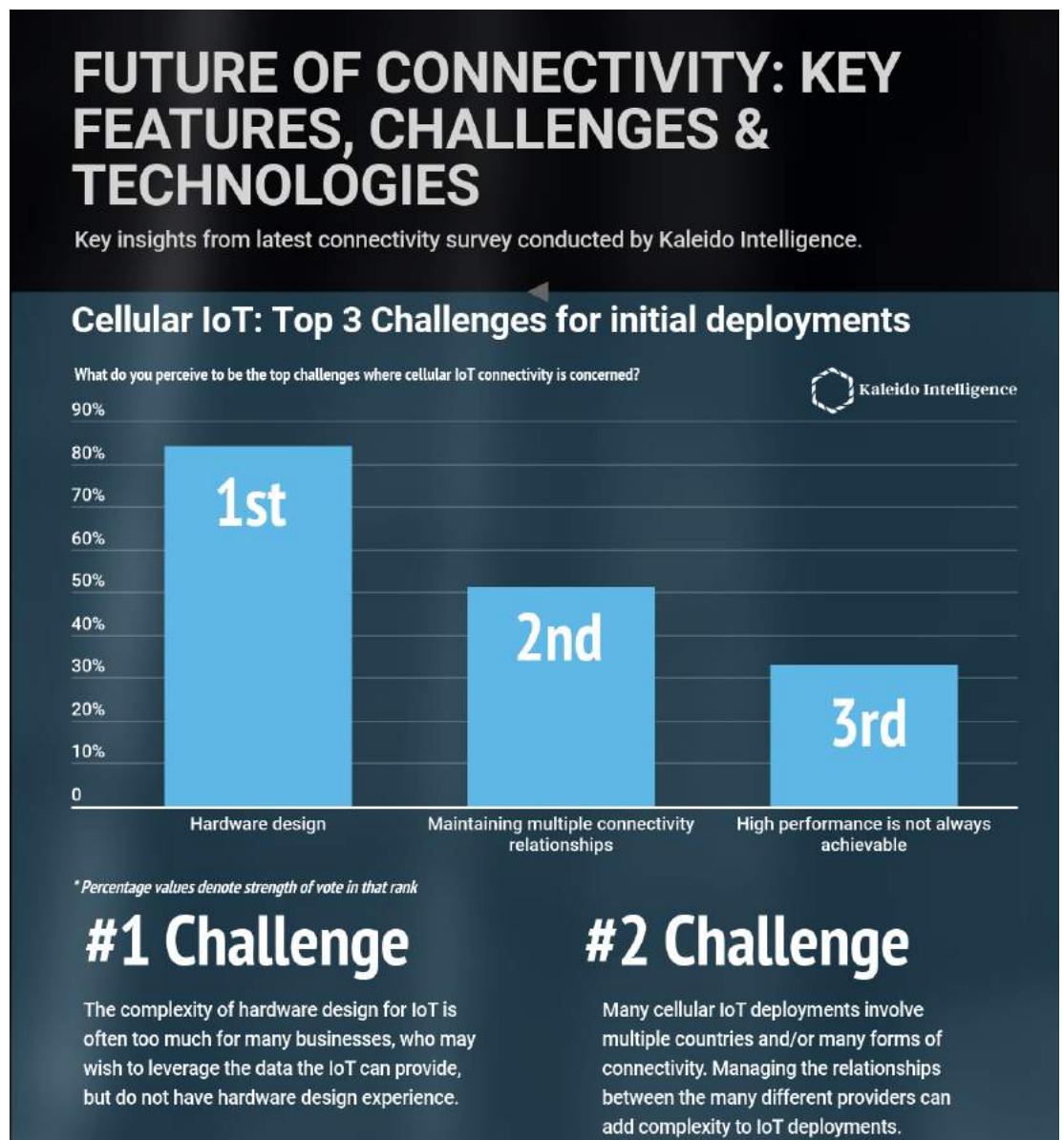
The results are in from the largest-ever IoT connectivity survey

The results of Kaleido Intelligence’s IoT Connectivity Survey show that security and hardware design are the biggest knots to untangle

The largest-ever survey of IoT connectivity, commissioned by **Kaleido Intelligence**, is now complete. Surveying more than 750 IoT professionals, it investigated the most important factors for IoT connectivity firms to provide, as well as uncovering painpoints for both those currently deploying IoT and those looking into it for the future.

The survey is one of the most far-reaching of its kind, covering topic areas such as how IoT projects are managed, what the biggest concerns are, and what they need from IoT service providers. In addition, we also examine the drivers for adoption of a range of promising technologies, such as embedded SIMs (eSIMs) and private cellular networks. ▶

The largest-ever survey of IoT connectivity, commissioned by Kaleido Intelligence, is now complete



SPONSORED ARTICLE



Security, availability and roaming the top three concerns for IoT connectivity

The survey has found that cellular IoT deployments continue to be issues of concern for businesses, with persistent concerns about security and service availability continuing to plague the space. Both current and future IoT deployers ranked end-to-end security as their number one concern, followed by keeping multinational solutions safe from permanent roaming restrictions.

The focus on security is one that is paramount to connectivity providers, as all respondents expect connectivity providers to offer some form of security, with over half wanting advanced options, such as IP restrictions, traffic burst detection, unconfigured ports and more. This is increasingly a requirement, and connectivity players may stand to lose business if they do not provide these services now.

Meanwhile, consultative services will help to bring in new business; the survey found that hardware design and support is seen as the biggest challenge by non-adopters of the technology, and vertical-specific solutions are increasingly expected. These findings are a re-emphasis to connectivity providers that they need to provide more specific services, tailored to clients' individual needs, and that while turnkey solutions are often desired, custom solutions are often more valuable.

Join the webinar

The survey findings will be presented and discussed in detail in a webinar on 9 June, presented by Kaleido Intelligence and a range of industry leaders, including **Eseye**, **FloLIVE**, **iBASIS**, **KORE Wireless** and **Truphone**. Sign up for the webinar and a whitepaper detailing the results here.

If you are unable to join the webinar, please sign up here to get access to an on-demand recording available after the event, and the attendant whitepaper.

About Kaleido Intelligence

Kaleido Intelligence is a specialist consulting and market research firm with a proven track record delivering telecoms research at the highest level. Kaleido Intelligence is the only research company addressing mobile roaming in its entirety, covering:

- Data forecasts by market
- Historical and forecast viewpoints
- Competitive intelligence
- Strategic insight
- Trend analysis

Research is led by expert analysts, each with significant experience delivering telco research and insights that matter. ■

Top 3 Most Important Factors Influencing Cellular IoT Deployment



End-to-End Security

End-to-end security is the most important factor in IoT connectivity, for both those looking to deploy and those deploying already. Many respondents expect this to be part of a connectivity provider's services. Connectivity providers need to be ready to provide a variety of security measures to reassure their clients of their capabilities.



Avoiding Roaming Restrictions

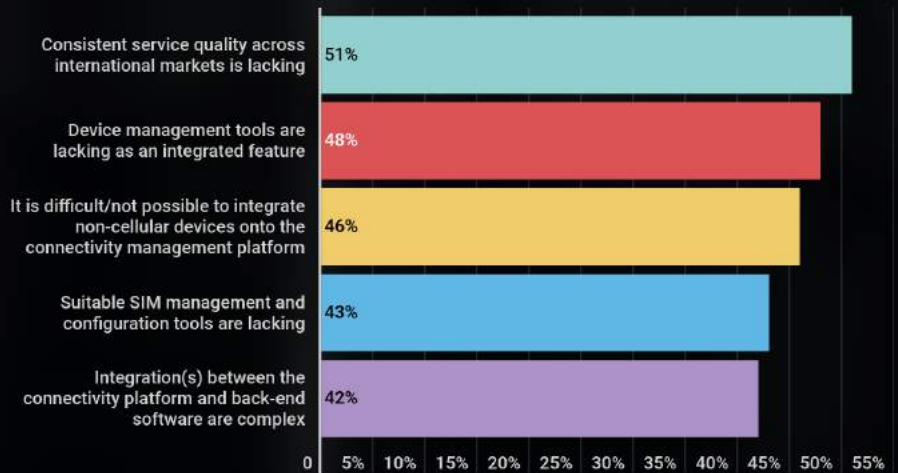
Restrictions to permanent roaming can seriously curtail international cellular IoT deployments, forcing different countries to have different deployment characteristics. As a result, many respondents, whether currently deploying IoT projects or not, consider how to avoid these restrictions a key part of a cellular IoT strategy.



Robust coverage

Having to navigate multiple network operators and connectivity providers is a concern for several businesses, and as such finding partners that can offer robust coverage without the need to switch network operators is a strong priority.

What are your biggest issues with your current cellular IoT connectivity solution? Top 5 responses



About the survey

Kaleido Intelligence surveyed over 750 respondents from enterprises either deploying or looking to deploy IoT projects during April-May 2022 to learn more about their perceptions surrounding IoT connectivity, including key factors influencing choice of connectivity provider, perceived challenges with deployment and factors driving the choice of particular connectivity technologies, from eSIM to private networks.



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**Spotlight on
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Industrial IoT simplicity is complexity resolved: It's relayr's secret sauce

IoT Solutions World Congress, Barcelona

As I'm asking Andrei Ciobotar, **relayr's** chief technology officer (CTO) to rewind to 2014 and the start of the company, I'm struck by how far and how quickly the Industrial Internet of Things (IIoT) has come, says IoT Now's Jeremy Cowan. Even just eight years ago companies like this didn't exist. There were diverse departments within a few giant enterprises, but mostly they weren't talking. Hey, sometimes they didn't even know one another!

Fast forward from its founding and relayr now numbers about 300 people, mostly in Germany, USA and Poland. But it's what they do that emphasises IIoT's evolution; today relayr delivers complete solutions for a risk-free, digital transformation and it is supporting customers moving towards Equipment as a Service (EaaS). The company enables industrial businesses to shift from capex to opex-based offerings by combining IIoT technology and solutions with critical business services. So, customers including manufacturers, network operators, and industrial equipment service companies have a single source of IoT financial services or relayr's own bespoke transformation de-risking instruments. Whatever their starting level of IIoT sophistication, customers can deploy interoperable IIoT solutions that enable their digital and Equipment-as-a-Service transformation.

Jeremy Cowan: Relayr may not be known to all of our readers. What has the company been doing since it was set up?

Andrei Ciobotar: It was started in 2014 and relayr has gone through quite a few transformations. Back then the company focused on more consumer-driven use cases. In 2016 we made the switch to heavier, industrial-driven use cases. The business of IoT is, in general, not very tied to the flavour of asset that you're connecting to, but you do have to think about an entirely new user experience for industrial customers. And you also have to think about new capabilities that are very relevant in the industrial space.

That led to two acquisitions that are relevant. In 2017 relayr acquired **Proximity**, an established name in Poland in IoT, with 10 years-plus experience in edge

management and edge devices. So that brought on capabilities to manage gateways and then to roll out software updates to the edge.

And the other acquisition was a company I had co-founded, **Neokami**, which had machine learning capabilities, infrastructure to operationalise artificial intelligence (AI) models, and obviously the know-how to develop these capabilities. Neokami means 'new spirit' in Japanese. That also was a pretty big shift for relayr culturally, because it had graduated from being a Berlin-based establishment to being a distributed company. With Proximity we opened a new office in Katowice, Poland and with Neokami we opened the Munich office. So, it was a new stack, new capabilities and also new culture, moving to a distributed set-up was quite a change for the organisation to absorb. ▶



AC: As you know, when you dabble in IoT there's a huge amount of potential use cases and applications, and they tend to be asset-specific. Connectivity and collecting data may be a little more asset-agnostic. But once you drill into the user experience and the insights that drive decisions and value, then it gets really asset-specific. That made us focus a little bit harder on product lines, and gave birth to SKYLER, the product focused on predictive maintenance and remote monitoring for rotating equipment.

Another product is Franz, a remote monitoring tool for elevators. And Equipment-as-a-Service (EaaS) is also something that that relayr is working on. You can think of Franz, SKYLER and Equipment-as-a-Service all sharing the same common IoT foundation, but also introducing new capabilities. And we're uniquely positioned as part of the **Munich Re Group** to bring financial structuring and risk services into play. (relayr was bought by Munich Re in 2018.)

Part of the proverbial 'secret sauce' in our EaaS stack is this ability to bring expertise together. And to offer a simplified experience to the user base, because, of course, you can't go shopping for an IoT platform and go shopping for an ERP system and glue everything together. It tends to be a bit of a mess, and you have to look for partners that don't necessarily click together like they do within the Munich Re Group.

JC: Was that one of the key moments when you shifted your structure to have a financial services company behind you? ▶

Andrei Ciobotar
relayr

“You can't go shopping for an IoT platform and go shopping for an ERP system and glue everything together”



“Any business that wants to get to more sophisticated use cases does have to go through whole connectivity journey first”

AC: What was really interesting is that Munich Re was and continues to look at us as an innovation arm. So, in some sense, relayr has actually carried on business as usual with the same speed, same aggressiveness, just with, obviously, more structure. And, as you mentioned, with the capabilities Munich Re brings to the table specifically around risks, and services, or financial structuring.

That was a huge opportunity for us to bring departments that normally are very unlikely to work together into creating this comprehensive Equipment-as-a-Service package. One of our colleagues in Munich Re very aptly called it ‘Simplicity is complexity resolved’.

JC: Why do you think so many companies fail to understand their customers’ pain points?

AC: I think there’s multiple reasons, one is language. When you have IoT folks sitting together with business folks at the table, it’s very difficult to find a common vocabulary and make sure that the same message comes across. Ultimately, if you’re a software company selling to customers in the industrial space then that problem is only exacerbated. You need to have one foot in the software world, but definitely one foot in the production.

Also, digitisation is a big topic these days, and Industry 4.0, and cyber physical systems, and then there’s a lot of buzz around all of these activities. Sometimes there is a tendency to put a solution in place that looks for a problem rather than the other way around, and maybe be prescriptive with your partners about what kind of solution you would like to have. That may not necessarily address the root cause of your challenges or address the fundamental needs of your business if it’s on a transformation journey. That lies partially on an unrealistic expectation on the customer side, but it also sits with the companies like relayr, IoT companies and service providers have to guide the customer. It’s a journey, and that’s not always in the foreground. A transformation, especially in this business, is more of a joint partnership and a journey rather than a pure software services play where you throw a SaaS platform over the fence and hope that something good comes out of it.

Naturally, there’s also a lot of unrealistic expectations in the market. And sometimes the unfortunate truth is that some of the

outcomes that are expected cannot be delivered either by lack of data, lack of tooling, lack of process, any number of reasons.

JC: I think sometimes in IoT we overlook what industrial businesses are actually looking for. Is that fair?

AC: Industry 4.0 and digitisation are really at the forefront of these transformation journeys in the industrial space. And you see these diagrams describing the different facets of what the industry 4.0 set-up looks like and you look at big data and IoT, at machine learning and cyber-physical systems, augmented reality – there’s an entire hat of magic words that you can pull on the topic. But what is maybe not so obvious is that all of these concepts are intertwined. Maybe IoT is not the kind of differentiator that it was a decade ago, the ability to connect assets today to the cloud infrastructure. But I would argue that IoT is really still the barrier of entry and the main stepping stone to get to the rest of these capabilities. And when we talk about big data and machine learning, we cannot deliver any insights that are data-driven without an infrastructure to collect data.

When you’re talking about cyber-physical systems, and we have COVID these days, there’s a lot of buzz in the market around how do we make collaboration easier for remote employees, and also another factory line. How do we interact with the cyber-physical systems? It still boils down to how do I create digital twins of my IoT devices? How do I feed them with data? How do I create a digital representation of these assets? And these are fundamentally IoT problems to solve.

So, in some sense, any business that wants to get to more sophisticated use cases does have to go through this whole connectivity journey first.

JC: Can you give examples of the pain points experienced by your customers? I know customers are wide-ranging but sometimes the problems cross barriers.

AC: Well, I think there’s, there’s the usual suspects. Predictive maintenance is something that everyone’s thinking about. But predictive maintenance is also an ethical, interesting topic to think about more deeply, because when you want to predict if an asset will go offline, for whatever reason, unplanned downtime, you do have to calibrate your system to recognise the behaviours that lead ►



to that time. Most of the time, our customers and partners don't have this data foundation to even get such a system in place. So, a pain point is not only the need to reduce unplanned downtime, but it's also the needs to create this foundation of data, which I would argue is even more fundamental. Other customers have had a data collection strategy in place for years but have not had the chance to interact with the data in any way. And that leads to, first of all, unrealistic expectations to what can be achieved with the data.

Secondly, it leads to quite a lot of frustration when the data that's been collected for years cannot be used in meaningful ways for the use cases that had that they had imagined when they started the collection process. These are all topics that are intertwined. Other topics are operating efficiency, obviously, how do you benchmark your asset against other similar assets and field? How do you turn the knobs, proverbially speaking, to get the performance out of the asset? These are really the most common ones we see out there.

But then, there's also a fair number of customers that already have some sort of infrastructure in place, they have a reasonably high digital maturity, or a reasonably high sophistication already in their infrastructure, data collection strategy, or even capabilities on the machine learning side. For these customers, you have to go a little bit higher up. They start thinking about topics around improving efficiency of a process as an example. You're looking at fingerprinting data for liability purposes, it gets a little bit more sophisticated.

JC: If you're receiving data coming from your customers' machinery, and you're analysing for predictive maintenance purposes, you're engaging at such a high degree within their company and their data. How many companies you're competing with have similar levels of engagement?

AC: I think that depends on the business model. When we look at use cases around SKYLER as an example, looking at issues with

the rotating equipment based on vibration data as an example. It goes without saying that the data we capture belongs to the customer. So, in some sense relayr is a steward to the data.

If you look at this model, there's quite a few companies that operate from with a similar principle. I think this model is quite ubiquitous these days. But when you look at a set-up like Equipment-as-a-service, things get a little bit more interesting, because many times you're buying the assets, which essentially makes the data yours. But at the same time, this asset is deployed to an end customer site that may or may not be comfortable with the OEM or relayr, being exposed to their production data. Sometimes, maybe it's even a trade secret. When I look at a bottling plant, **Coca Cola** is an example. I think that's where we relayr and Munich Re are in a more privileged position in the market and can be trusted to be stewards of the data. In my opinion there's very few actors out there that would enjoy this level of trust.

JC: You've talked about the shift from capex- to opex-based IIoT services. Could you expand on that?

AC: It's lowering the barrier of entry for acquiring equipment. It's the ability to offer services, additional services across the lifetime of that asset, bundle the asset for data-driven services. And capture more of the value chain ultimately. And I think that's the fundamental part of it. But it comes with a lot of side effects.

If you look beyond what it means, on a balance sheet, and you look at the side effects of this capex- opex transformation, it brings with it quite a few interesting challenges to solve. One is that the focus moves to the performance of the asset. It has an intrinsic need for remote monitoring and IoT solutions, having a fleet of assets in the field that you potentially own or liable for? I think that's a no-brainer for IoT systems. It really boils down to the partners capturing more of the value creation chain. ■

“IIoT transformation is more a partnership than a pure software services play, where you throw a SaaS platform over the fence and hope something good comes out of it”

Andrei Ciobotar joined relayr in 2017 as director of Analytics. A former CTO and co-founder of the AI start-up Neokami, acquired by relayr, he brought with him a wealth of knowledge and expertise. Today, in his role as CTO, Ciobotar is the driving force behind the success of relayr's three engineering disciplines - cloud development, edge development, and artificial intelligence. A computer scientist by trade, Ciobotar firmly believes that automation has the potential to address some of the critical global challenges as well as allow us to shift from routine tasks to creative ones. Besides playing drums and being passionate about music, Ciobotar has developed a deep interest in cinema and video games.



Equipment as a Service – a business model innovation driven by industrial IoT

The emergence of Industry 4.0 and the adoption of the Internet of Things (IoT) impact every economic sector – from manufacturing to healthcare and mining to retailers. This is especially true for businesses in legacy industries that need to embark on a business transformation journey to stay relevant

The EaaS model changes traditional business models in high investment sectors

According to a report published by **IoT Analytics**, the global spending on Industrial Internet of Things (IIoT) platforms will surge at an annual growth rate of 40%, reaching US\$12.44bn in 2024. Why does the IIoT see such growth? The power of the IIoT lies in its ability to create a unique competitive advantage for industrial businesses by bringing together connectivity, embedded intelligence and unprecedented levels of analytical insights. It comes as no surprise that the IIoT has become a stepping stone for building innovative business models and opening new revenue streams.

The rise of the Equipment as a Service model

The term Equipment as a Service (EaaS) describes the process in which production systems, machines, or equipment are not purchased but are provided by a third-party company for a certain period and billed to end customers for usage.

The Industrial Internet of Things lies at the heart of its success – enabling equipment uptime and reliability. It helps the service provider adapt maintenance intervals flexibly to the actual usage of machines and production systems and use complex data analysis and evaluation to detect possible damage in advance and avoid it proactively. Furthermore, networked systems can recognise additional usage options based on production data, thus allowing the IIoT to make previously untapped potential visible and usable.

Equipment as a Service has much to offer, not only in cost savings but also in new modes of flexibility, scalability and operational efficiency. Because the EaaS model entirely covers maintenance and service, operation becomes

more efficient than the conventional operating models, such as procurement, installation, testing, validation and maintenance of the assets.

Beyond products

The EaaS model changes traditional business models in high investment sectors. Outgoings for fixed assets, such as machines and equipment, are no longer needed in this model or can at least be reduced significantly. There is value created for the companies that are operating equipment when shifting from a capital expenditure model to an operating expenses model. Then there is value created for the original equipment manufacturers (OEMs) – capturing much more of the asset value itself.

What are the benefits of the opex model? It is easier for customers to buy when they can mark a purchase as an operating expense rather than capex. Switching to opex leads to higher customer satisfaction and an increase in revenue. One big advantage of IIoT technology is transforming products into services. Furthermore, the services can be adapted to various variables, for example, levels of usage and types of usage. The Industrial IoT is a powerful tool for making the pay-as-you-go model available for physical equipment.

Sensors in the equipment can detect and record usage, sending the data to a central accounting and control system, either in the cloud or elsewhere. There are even more benefits – levels and types of usage are logged, and the equipment's location is always known. The opportunities are endless. Hydraulic presses, generators, turbines, earthmovers, and even jet propulsion engines – all can be offered as a service. ►

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The EaaS transformation journey

One important point to consider is that unlocking the value of digital in manufacturing has been centred around disruptive technology and tools rather than business outcomes. Technology cannot provide value if there is no profound understanding of how and why to use it. Even when the companies know how to use technology, they are hesitant since they realise it brings a shift in mindset and changes the whole company. The transition to the EaaS model affects the entire organisation – shaping the whole value creation chain of planning, research, development, manufacturing, marketing, sales and services. It is essential to create a bulletproof strategy to reap the benefits and avoid financial risks.

Here are some possible approaches:

- Establish digital transformation as a CEO-driven agenda
- Carry out a careful risk assessment
- Calculate customer-specific price points based on a realistic analysis of the lifecycle costs
- Draw up contracts that take your customers' specific situations into account
- Think big – external capital can help your organisation focus on transforming the entire business model instead of focusing on single initiatives and pilot programmes.

Partner to win in the digital age

How can you make sure that your EaaS transformation is successful? When embarking on a business model transformation journey, get ready to face the build versus buy dilemma. You will inevitably need to decide whether to implement IIoT solutions alone or bring an expert partner onboard. Even if your business instinct

leads you to an in-house solution, you should take your time to weigh the options carefully.

There are numerous questions to consider before deciding which road to take. These are tough questions to answer – particularly for businesses implementing business transformation for cost-cutting, streamlining or efficiency reasons. Bringing a third-party IIoT partner on board may appear an unnecessary expense and one that's difficult to justify.

There are also other points to consider, for example, the time required to select the appropriate technologies and train teams to work with the new systems. Let's not forget the time needed to maintain and update these systems. And what about the time that you will lose on your core business as you redeploy resources?

All in all, the factors playing a decisive role in the business transformation journey can be placed into two categories – the human component and the technical one. Finding an answer to the build versus buy dilemma means considering both elements.

Bringing in a partner is, at its core, opening new horizons, embracing new ideas and, above all, fostering innovation. For example, IIoT partners with a proven track record bring experience and knowhow to each project, thus enabling successful planning, implementation and maintenance. Deciding for a third-party partner means that you will receive constant support – a valuable asset for a successful business transformation. ■

www.relayr.com

One important point to consider is that unlocking the value of digital in manufacturing has been centred around disruptive technology and tools rather than business outcomes

A THREE-FOLD INDUSTRIAL EVOLUTION FROM THE IIoT POWERHOUSE



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SKYLER 

SKYLER, a remote condition monitoring solution, leverages machine data to optimize planned downtime, improve uptime, and provide greater TCO.

 **Franz**

Franz, a digital elevator servicing solution, analyzes the root causes of elevator faults around the clock to ensure high efficiency and reliability.



IOTSWC in Barcelona reminds the industry how important it is to talk face-to-face

This year saw the welcome return of IoT Solutions World Congress (IOTSWC), held in Barcelona (May 10-12) at the Fira Gran Via venue. The IOTSWC event, organised by Fira de Barcelona, was growing annually until Covid came along. Two years later, the return of one of the Internet of Things best European shows was greeted enthusiastically by a claimed 12,000 visitors, 330 exhibitors and 270 speakers from around the world. Barcelona's sunshine made a welcome addition to the mix, as Jeremy Cowan, editorial director of IoT Now, reports.

The event has always been well-supported by national and regional exhibitors, and this year was no exception with large stands taken by Barcelona (unsurprisingly), Catalonia, Spain, France and the Swedish IoT Pavilion.

At the risk of stating the obvious, IoT is only as good as the tracking of mobile assets or staff, for safety, security and efficiency. So, it was helpful to hear **Traxmate's** chief operating officer, Rikard Windh, describe the work his privately-owned, Lund-based company is doing to make asset tracking as simple as possible.

Greater location accuracy

These systems are used in geofence alerts (for thefts, danger and no-go zones), but it can be critical to locate and identify the nearest available asset or staff member, as well as measure asset use. Traxmate (www.traxmate.io) is designed to make tracking as painless as possible. It supports more than 1,000 pre-integrated device types, using hybrid positioning technologies indoors and outdoors, its features are easily

extended via application programme interfaces (APIs), and can be deployed as a cloud service or on your own premises.

Tracking accuracy depends on your application needs; you can locate to within 4-5 metres using traditional infrastructure (for example, monitoring patient flows in hospitals). By adding extra beacons it can be cut to 2-3 metres, indoors as well as outdoors. Windh reports that Traxmate is now working with Switzerland's **u-blox** (www.u-blox.com) on an Angle of Arrival solution achieving sub-1 metre accuracy for uses such as warehouse picking of packages. Traxmate is solution-agnostic and can be white-labelled for customers to host in their own infrastructure.

Another company at IOTSWC connecting people, plant and materials was **36Zero** (www.36zero.io) focusing on construction, utilities and mining. Felipe Barreto, head of operations, says that his company is protecting workers by avoiding accidents, speeding evacuations and only permitting movement to safe zones. One home developer customer, ►



“Standards are like toothbrushes. Everyone says they’re a good idea, but nobody wants to use anybody else’s!” - Ali Nicholl, Iotics



“Women need to see more women,” says Jessica Poliner (left), CEO of relay, pictured with her marketing colleague, Nikola Vorlova.



36Zero blacks out human images for GDPR compliance



Owen Wei, AAEON: Abandoned object solution costs have dropped by 3:1.

Berkeley Homes, brought 36Zero in to support a London brownfield development.

This involved on-site support, with a focus on productivity, profitability, worker health and wellbeing. The in-app service offered workers one-to-one communication with a dedicated health specialist, and 24/7 access to specialist counsellors and even provided nutritional guidance. Over time, the system learns worker behaviour, and uses the data to create real-time risk profiling, enabling anticipation and pre-warning of potential incidents. Productivity was boosted by site-wide communication, and was made easier with messaging, audio and video calls and advanced reporting capabilities.

Berkeley has since reported an 11% productivity gain and 12% improvement in workers’ health associated with this property development. Just as importantly, the developers found that their team was more motivated and had greater job satisfaction.

Staff black-out for GDPR

36Zero has developed a new smartphone-based, general data protection regulation (GDPR)-compliant defect detection system for manufacturing industries. It is currently detecting deformities in steel castings for car brake and seatbelt production. No human data is detected or stored (staff images are blacked out automatically). IoT Now will bring you a case study report on this as soon as it’s available.

There’s been a lot of talk in the industry of democratising the Internet of Things, which generally means making the benefits of IoT available to all. **Iotics** - www.iotics.com, based in Raleigh, North Carolina and London, UK - saw from its launch in 2012 that the internet had democratised data for people but the same people lost control of their assets, according to

co-founder Paul Green. He envisaged an architecture that would allow ecosystems of dissimilar services, diverse real-time data and unrelated things, to interact safely at a global scale.

Standards are like toothbrushes

Scroll forward to 2022 and Iotics has developed a “safe space” where digital twins of anything can securely interact to exchange data across partner ecosystems. For example, the company has worked for **Rolls-Royce Power Systems** to analyse train operations. “If we’re seeing a problem with the train,” says Iotics’ head of engagement, Ali Nicholl, “we can share this data with Network Rail (the infrastructure operator), and Hitachi (the train maker). It’s showing which trains won’t arrive or which order they’ll arrive in.” These are tiny bits of data brought together safely in a digital twin dashboard for train makers, track makers, and footfall monitors, servicing the needs of a long tail of ecosystem partners.

It’s clearly about a lot more than sharing industry standards. As Nicholl memorably put it, “Standards are like toothbrushes. Everyone says they’re a good idea, but nobody wants to use anybody else’s!”

Comfort and safety

Passenger comfort and safety are also key considerations for **AAEON EUROPE** (www.aaeon.eu), subsidiary of AAEON, an ASUS association company. At their stand, Owen Wei, marketing and business development manager, demonstrated a people-counting application that has various uses. In retail it guides customers into key areas, optimising both sales and the customer experience by avoiding crowds. In traffic monitoring the application can monitor vehicle density, measuring the number of cars, the vehicle types, or busiest times of day, and then redirecting them to less busy roads. ▶



Safety management in public spaces is also a vital capability for AAEON's application which can alert the operator to an abandoned object, such as an explosive device. The technology is already deployed in Italian train stations. Another use is for objects removed from a retail store, an application now in use in some Austrian stores.

Visitors to shows like IOTSWC may have seen similar technology exhibited over the last few years, as IoT Now has, but, as Wei points out, "in the past, these systems needed powerful computing. Now software algorithms are getting better, so it's more cost-effective. The cost has dropped in the last two to three years by a ratio of 3:1."

Diversity in tech

There was also a strong theme of diversity running through the Conference and Exhibition. In a brief chat between her appointments, IoT Now asked **relay** CEO, Jessica Poliner, why there aren't more women in IoT.

"Women need to see more women," she said. The industry needs to show women and minorities that IoT is more interesting than IT has historically been portrayed, adding: "My human resources officer (HRO) would say 'Inclusion starts at the top'.

Asked about her own career path, she has clearly bucked the usual trend. "I'm an M&A (mergers & acquisitions) lawyer. The relay Board wanted someone who would speak our customers' language," she said. Poliner has worked in manufacturing and industry for **Thermo King** and **Caterpillar**, among others. ■

IOTSWC returns in 2023, from 31st January to 2nd February. It will be held again in Barcelona's Gran Via venue, Hall 4.

Aim of the game is to scale

Many companies in IoT are helping their customers shift from providing products to services, or as **Siemens Advanta** puts it, curated solutions. The subsidiary of German-headquartered industrial giant, Siemens AG, provides digital twin services. It's only three years old but in 2021 its 8,000 experts worked on more than 1,000 projects for over 300 clients.

Some of these are for Siemens businesses but externally Siemens Advanta is currently optimising a plant in China before it has even been built. That's a neat trick if you can pull it off. As Siemens Advanta's CEO, Aymeric Sarrazin (pictured below) told IoT Now, this requires three characteristics; deep domain knowledge, a strong technology stack, and a powerful partner ecosystem.

Bettina Rotermund, head of strategy for Siemens IoT, acknowledges the paradigm shift in her company's portfolio of skills which now includes digital services, software development, connected hardware, edge to cloud capabilities, and professional services. There are four key design principles; as-a-Service design, interoperability, flexibility and openness. All of which must be cybersecure.

"As-a-Service is lowering the cost of ownership," says Rotermund, "and helping in the shortage of data scientists, who clients say all go to Amazon or Google."

Siemens Advanta (www.siemens-advanta.com) has found that breaking down problems and therefore solutions into building blocks is helping its customers and draws a parallel with Lego™. "The beauty of Lego™," according to Rotermund, "is it's all a common standard. You're assured it's always going to fit."

Asked by IoT Now how much you can break down problems into building blocks that are common across diverse industries, she replied, "IoT is not IKEA™. You need to find commonalities, to find something workable for lots of customers. If you have a solution that fits you 70% you can use Mendix (a digital execution solution: www.mendix.com . Ed.) to help it better fit your situation. The aim of the game is to scale."

What does this mean in practice?

Siemens Advanta is working with organisations such as the **University of Birmingham** in the UK, with the goal of creating the smartest university campus in the world. It has created a Living Lab where research, teaching and learning all benefit from access to new data and connectivity.

They aim to drive behaviours and technologies that will enable Birmingham's campus to become Net Carbon Zero by 2050. The university has achieved its 2020 target of cutting emissions by 20% and is constantly looking to improve the environmental performance of its buildings. This includes an annual reduction of 2,856 tons of CO2. ■



"As-a-Service is helping in the shortage of data scientists," says Bettina Rotermund.

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Business transformation now more driven by Proof of Value than tech change, says Siemens

IoT Solutions World Congress (IOTSWC 22, May 10-12) in Barcelona carried with it a positive vibe, reports Jeremy Cowan, editorial director of IoT Now. The conference and exhibition was back with a bang, as a reminder of pre-Covid networking days and a glimpse of a future in a more integrated industry with greater focus on diversity and sustainability. Having seen Bettina Rotermund in a panel discussion on Women & Diversity in Technology the day before, it was time to talk face-to-face on all IoT matters with, Siemens' head of IoT Strategic Marketing.

Digital transformation (DX) is rightly on everyone's lips these days, and without the Internet of Things (IoT) extracting data it can't happen. But, as Rotermund points out, DX is only one of the changes that Siemens' customers are tackling.

"The majority of decision-makers in the industry would acknowledge there's a need to change, because there are stricter regulations kicking in for sustainability." She continues, "Aymeric Sarrazin (CEO of Siemens Advanta) said yesterday, investors are making informed decisions by taking a keen look into companies' ESG (Environmental, Social and Corporate Governance) policies. Furthermore, governments and global institutions like the UN, are setting goals to ensure a successful net-zero transition. Sustainability has become a business imperative.

Sustainable, diverse recruitment

She believes society is driving big companies in this direction. And with recruitment of the best staff getting ever harder, Rotermund adds, "that also has a big impact on your employer branding. You want people that are extraordinarily sharp, creative, good in bringing people together. These days, in the scarcity of talents, you want to present yourself in the best possible manner. They drive companies into this more eco-friendly, sustainable track. That's why we look into not only digital transformation, but into a digital and green transformation."

Then you see the 'art of the possible', says Rotermund. "I started small, I planned it, I deployed it, I learned from it, and I see it's successful. So, I can do another track in my factory or smart building." ►

SPONSORED INTERVIEW



“At Siemens we want to move away from this only technology-centric, product-centric logic into a solution-based and customer-centric approach”

Three business goals

Most people start by looking to save resources, become more sustainable, and decarbonise. Siemens advocates gradually doing more and more, until you find you can cut your costs, start a new business model, increase your revenues.

“Then we say, let’s look into the data, and whether we can build a new business model out of it.” Siemens looks for three things; being more resource-efficient, increasing your top line through new business models, and differentiating from your competition.

Of course, there are always some customers who want to transform their entire business at once. Having waited for a long time, suddenly there’s a trigger, and they want to decarbonise and digitalise all their factories around the globe right now. “To our perspective,” Rotermund maintains, “that is not reasonable, because every project is very individual in its implementation.”

On a whiteboard you may say this is exactly what you should do. And then you look into the existing local legacy systems and see they are different. The regulations are different from location to location, as is the mindset of the people, local needs, local processes in 20 factories around the globe. Rotermund advises, “So, you want to start small, maybe with one or two of your factories, learn from it, and then scale it up. The scaling part seems to be a very hard part for most of our customers. They all run into several proofs of concept (POCs). We call it the POC purgatory, you never move out of it. Maybe they should have done a proof of value (POV) in the first place. Is it creating value? And are you able to capture the value?”

She cites the example of 5G networks; they can create value, but are telecommunications people the only ones capturing the value out of 5G? No, because others have found the opportunity and have hopped onto this highway. They have created their “own cars and drive on the highway that you thankfully built for me.”

Don’t lose sight of the risks

It’s also better to scale step-by-step from a risk management perspective, to have controlled conditions, and not to overstretch the organisation. Rotermund reports that this is something people often forget. “It’s not about technology, it’s about the people and the change you want to do. You need to have a very clear vision of where this should lead to.”

This is so you can take all your people on board and say, “This is the vision of how we want to be in the future, ... and that’s why we’re pursuing this track.” Make sure that your people understand why you’re doing it, their stake in the game and how they can contribute to the success of this project.

Then you apply technology that helps you, but it’s not the main topic that you’re centred around.

Business case first, tech second

So, IoT Now asked, is the sector at last focusing more on analysing the business value of proposed IoT projects, instead of the technical challenges? Sometimes in the industry we’ve had a technology and then searched for a solution for it, which is completely the wrong way around. What we obviously need is to see the problem, and an understanding of how a solution might tackle it. All of which requires a conversation with the financial sector, either within your company or in the financial community to get the necessary investment. IoT Now asked, is this a new focus we’re seeing?

Rotermund nods. “Yes. That’s why also at Siemens we want to move away from this technology-centric, product-centric logic into a solution-based and customer-centric approach. And why is that so if you go out and then you say, ‘I have a new product that is XYZ and then has these 22 features to it’, 90% of customers would not even know what you’re talking about, because they cannot build it, they cannot see how that product is solving their business need.”

“What we are asked for is a curated solution that brings together the needed products, software or hardware, but also more and more professional services. Professional services come in from the consulting space, like we have in our digital industries, and with **Siemens Advanta**, that help you to understand these are your opportunities. But also more and more financial services. We have an offering called Building Efficiency-as-a-Service. That means Siemens pay for it upfront, we finance it ourselves, and then we take a share of the gains that come afterwards.”

This removes a lot of the burden that people feel on their shoulders to finance it, bringing it to the CFO and making huge pitches internally possible.

Broader diversity

In the previous day’s Diversity panel discussion there had been much to talk of gender diversity, but less on other aspects of diversity. What is Siemens doing in regard to race, culture, sexual orientation?

For us, she says, diversity is about inclusion and belonging. “If people belong, they can be their true selves in the workplace, it’s the psychological safety that you feel, and the backing that you feel. Research proves that diverse teams are much more successful than monocultures.

“I truly believe in swarm intelligence, if done right, to bring everybody together to the table. So, for us also in the LGBTQ community, we are proud to celebrate Pride. You should not be judged by what your sexual orientation is, whether you’re male or female, it is your smartness, your creativity, your attitude, it is everything you bring to the table,” concludes Rotermund. “That does something good to the company, and then eventually, to the customers, and in the end to the whole of society.” ■



Bettina Rotermund
Siemens



University of Birmingham turns to Siemens to achieve net zero carbon footprint

The journey to decarbonisation should always start with data. The more you know, the smarter you get. Working together, the University of Birmingham and Siemens are creating a living lab that will capture data from the University's building technologies, estates infrastructure, transport and energy plants. What makes this challenge so exciting is that the combined campuses have the footprint of a large town and the energy requirements to match

The University's estate in Birmingham's Edgbaston area covers 672 acres (272 hectares), with more than 200 buildings of different ages, complexities, physical condition and use, ranging from grade one and two listed properties of historical significance to brand new state-of-the-art learning and research spaces. The community is made up of 8,000 staff, 38,000 students plus a wide range of visitors attending short courses and events, using the libraries and study facilities as well as the shopping, eating and leisure amenities.

IoT at scale

A vast range of technologies in the fields of energy; IoT and data; smart transport and smart building technologies, are being evaluated for the development of a Living Lab and ultimately to create a roadmap to a net zero carbon campus. The University of Birmingham will become the first university in the world to roll out Internet of Things (IoT) technology at scale. Started in Autumn 2021, the first phase of this major energy efficiency project includes the roll out of 23,000 IoT sensors from **Enlighted** – a Siemens company – across the UK and Dubai campuses. The Living Lab will use the data generated to create, for example, a digital twin of the university so that innovative ideas can be developed and quickly tested and evaluated in the virtual realm; research can be carried out on the use of buildings, down to individual rooms, as well as the effectiveness of strategies to change patterns of use or adoption of energy saving activities.

Scrutinising energy demand and production – from systems to anonymised individual consumers', producers' and prosumers' usage – with live data from across the sites provides a unique opportunity for applied learning for students and creates a platform for cutting-edge research. A team of PhD students, based in the UK and Dubai, are being sponsored for research projects, co-designed by Siemens and the university, to gather new insights, test and develop new technologies and create efficient and sustainable energy infrastructure. This will be used to address the important challenges in data, technology, urban systems and the net zero goal and requires multi-disciplinary teams to combine digital sensor and analytic technologies, artificial intelligence, decentralised energy generation and storage, renewable energy and concepts that help change user behaviour.

The goal is to deliver the campus of the future, enhancing the student, staff and community experience and accelerating the university's path to net zero through energy and digital transformation. Opportunities will be uncovered to make carbon savings by managing resources more efficiently, in a system that is instantly adaptable to changing demand met by decentralised energy generation and storage, renewable energy and changing users' behaviour or automating energy saving activities. A ten-year bureau for energy and IoT services is being established to ensure that the University reaps the full potential of both the technology and industry expertise being deployed and developed through the course of the ►

The goal is to deliver the campus of the future, enhancing the student, staff and community experience and accelerating the university's path to net zero through energy and digital transformation

SPONSORED CASE STUDY



The University anticipates a quick minimum 5% reduction in annual carbon emissions

partnership project, where research, teaching and learning all benefit from access to new data and connectivity. Partnerships like this are extremely important for gathering new insights, testing and developing new technologies and creating efficient and sustainable energy infrastructure.

Immediate steps

Whilst gearing up to the collection and utilisation of data from sensors and the IoT platform, some steps are being taken immediately on the campuses, including: switching to LED lighting, installing building management systems (BMS), utilising energy management software and fitting thermostatic radiator valves. The implementation of these technologies is guaranteed to deliver a material impact on the university's emissions, as well as achieve significant cost savings.

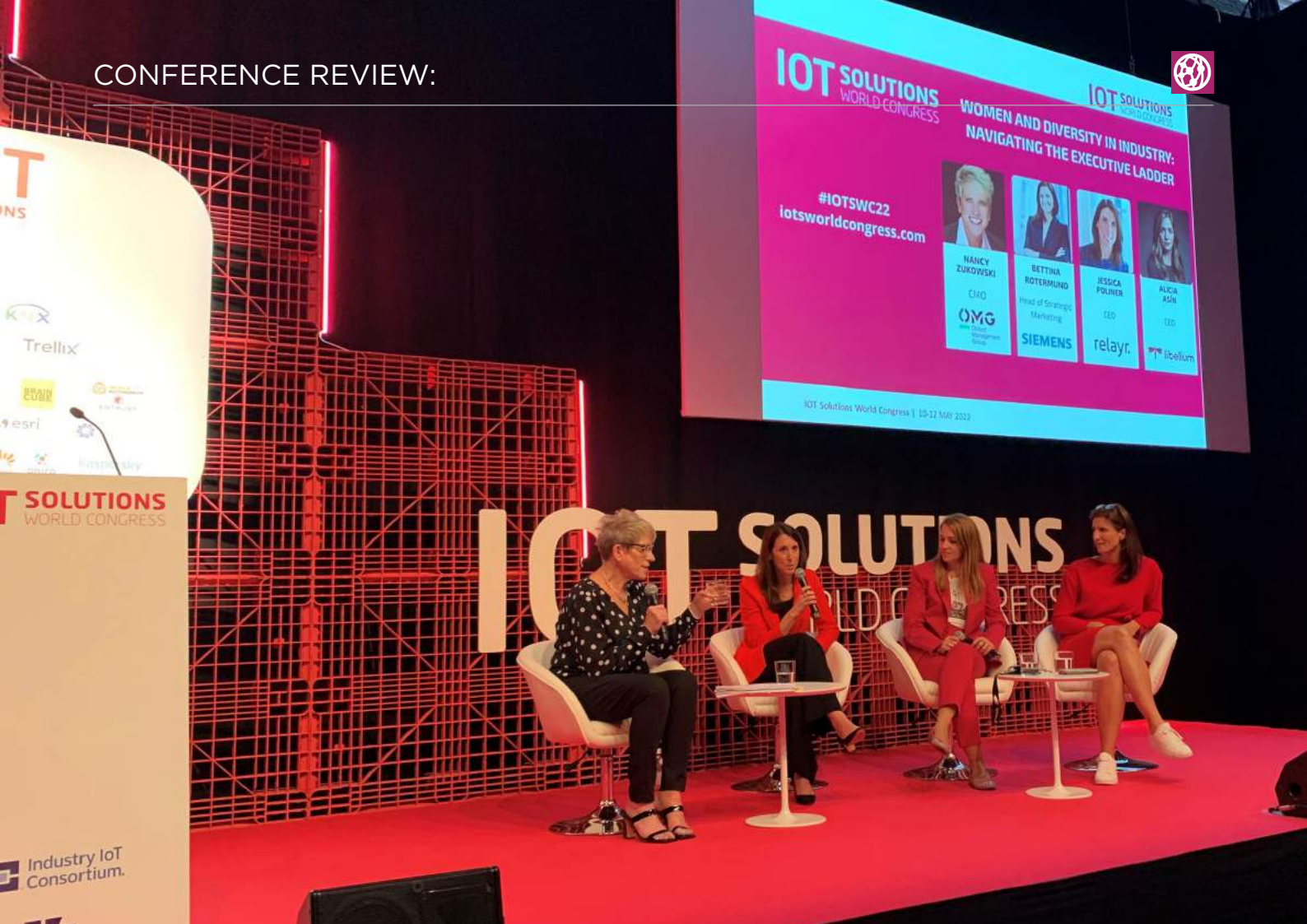
The building management system – the backbone of smart infrastructure that will increase comfort, efficiency, resilience and safety – provides controls to maintain air conditioning and temperature requirements, as well as controlling the IoT sensors that adjust lighting based on occupancy and environmental changes. The energy management system gives full transparency and reporting through the inclusion of both consumption and production data, enabling the optimisation of energy generation and usage across the whole campus. The University anticipates a quick minimum 5% reduction in annual carbon emissions, which is the equivalent of approximately 2,856 tons of CO₂. This will save the University money, ensure compliance and will

support the first phase of the University's transition to net zero carbon. Siemens will oversee the design and delivery for this first phase of the major energy efficiency project with support from the University's Estates Office and IT Services.

All of this is happening in the context of University of Birmingham being in the midst of one of the most transformational campus redevelopments since the first phase of building was completed in 1909. The ten-year development programme started in 2016 is creating outstanding new facilities for students, staff and the community. Research, teaching and learning all benefit from access to new facilities, data and connectivity. The University has already made significant progress in making its operations more sustainable, including achieving its 2020 target of reducing carbon emissions by 20%.

Leading the way

The University of Birmingham has joined Siemens, and some 12,000 business and non-business participants in 160 countries, in signing up to the United Nations' Global Compact. This pledges us to not only make every effort to create sustainable operations that will achieve net zero carbon by 2050 at the latest, but to report every two years on progress and to making the agreement's principles an integral part of decision-making, day-to-day operations and operating culture. Concepts that are developed and applied at University of Birmingham will ultimately lead the way for all of us on the journey to net zero. ■



Chair (pictured left): **Nancy Zukowski**, chief marketing officer, Object Management Group. Panellists (left to right): **Jessica Poliner**, chief executive officer, relayr, a Munich Re company. **Alicia Asin Perez**, co-founder & chief executive officer, Libelium. **Bettina Rotermund**, head of strategic marketing, IoT, Siemens AG.

IoT SWC, Barcelona. 10-12 May 2022

Women & Diversity in Industry and Technology: Navigating the executive ladder

Nancy Zukowski of **Object Management Group (OMG)** kicked off the discussion asking simply, "Why aren't there more women in technology?"

Siemens' Bettina Rotermund cited diverse reasons. She said that she had skipped Maths in 12th grade, and felt the perception was that you needed to pass the subject if you wanted to be in tech. "I couldn't code - but I'm learning now! So much more is needed in envisioning a future business model."

Tech companies tend to display a hard core, nerdy look which is not the first choice for many women, she believed. Rotermund's now looking for hospitality, customer experience and other broader skills that are needed.

"We're not telling the whole story to girls," **Libelium's** founder, Alicia Asin Perez commented. "If you hate Maths you don't see yourself in a lab or coding. But if you want to lead a tech company you need to go to business school as well."

Jessica Poliner, the CEO of industrial IoT (IIoT) solution provider, **relayr**, stated that there's no one right career path. "I've lived in India, Panama, Belgium, and Germany and this diverse culture tells me there's no one right way. I didn't have a woman role model," she added.

Rotermund described how she is now mentoring two bright women. "I was asked, do I need to take a more male approach?" ▶

"I don't need men to be allies; I'd challenge men to be advocates not allies"

- Jessica Poliner, relayr CEO



CONFERENCE REVIEW:



When **Bettina Rotermund** first entered a Board room one guy said, “The Decoration’s walked into the room.” She replied, “In four weeks’ time the Decoration’s going to tell you how high to jump!”

“You need to ask if people 1) feel safe, 2) are happy, and 3) have some options to balance their work and personal life”

- **Alicia Asin Perez, co-founder, Libelium**

Her reply was, “No, be as authentic as possible. Don’t copy males, we need diversity of opinions.”

Poor advice

A guy once told Alicia Perez not to wear a dress, but instead to “dress like one of the rest” – in other words, like men.

Her response was, “I won’t waste my energy to think about that, instead of focusing on my messages. I don’t care what other people are thinking.”

The key issues facing women in tech, according to Zukowski, include lack of equity in pay, opportunities, professional development, and work-life balance. What can women do about it?

Poliner said, “Keep doing what you’re doing. I don’t need men to be allies; I’d challenge men to be advocates not allies. We should all feel the responsibility to advocate for women as senior staff. A lot of what women need to succeed is what men need. Allow flexible working – men want it as much as women, make it gender-neutral.”

Rotermund agreed that split time and flexible hours are very important. She believed many people ask themselves, “Can I pursue the career that I plan if I do have kids?”

Check for any hidden road blocks

So, she said it’s important to start “grass-rooting”; start with tech colleges. You should look into your organisation to see if there are any hidden road blocks.

“I never had any female mentors,” Rotermund continued. “I had a great male mentor. I need to pass the baton on to the next generation, so the females in our organisation have someone to have a dialogue with. Leverage your platform to help females thrive.”

Measuring diversity?

Nancy Zukowski asked the Panel, “How does your organisation measure diversity?”

Perez replied, “In Spain it’s not legal to ask an employee or a candidate’s sexual orientation, or gender, etc. And it’s not the point. You need to ask

if people 1) feel safe, 2) are happy, and 3) have some options to balance their work and personal life. Last summer we surveyed our staff – most of them are men. And 95% of staff said they felt totally safe at work.”

Zukowski wondered what the panellists believed was the role of chief diversity officers. Some companies, she pointed out, have had these for 15 years. “Sometimes the role goes to HR (human resources) or the CEO, sometimes it gets a bit lost.”

Said Poliner, “I’ve worked for big companies with the role reporting to the CEO. It’s symbolic. We don’t have a CDO at relay, it’s everybody’s responsibility.”

“In the first mining sales organisation I led,” she continued, “the feedback I got was that I’d never be a good leader. Why? ‘Because you’re very smart but people will never like you.’ And I went to every EQ (emotional intelligence quotient) coaching, I led bigger and bigger organisations. I wish I’d said ‘Not everyone will like me, I don’t need that’. Pick the battles you choose to win.”

Alicia Asin Perez was down to earth about this, saying, “Nobody has THAT big an impact. Nobody can ensure you’ll succeed. Sometimes the feedback is useful, sometimes it’s not.”

Bettina Rotermund recalled that when she first entered a Board room one guy said, “The Decoration’s walked into the room.”

“I said, ‘In four weeks’ time the Decoration’s going to tell you how high to jump!’ Don’t take it all too seriously,” she added. Build good relations and trust and show you’re here to help.

IoT Now asked if the Panel plan ahead for diversity and benchmark where they would like their organisations to be.

Jessica Poliner replied, “I’d like it not to be a topic. I’d like to have a situation where I don’t have to measure it.” ■

Report by Jeremy Cowan, editorial director, IoT Now.



Packing it in at this year's embedded world

From 21-23 June 2022, the 20th edition of the embedded world Conference in Nuremberg, Germany will bring together experts from all areas of research and applications of embedded systems. Antony Savvas speaks to movers and shakers in the field and asks what they expect from the show

The conference will take place in parallel with the embedded world Exhibition, with the two offering more than 200 product presentations, and expert panels providing an opportunity to interact and share knowledge during the three-day event.

"The range of themes covered by the embedded world Conference is constantly growing, just like the challenges that developers are facing," says embedded world Conference chairman professor Axel Sikora of **Offenburg University of Applied Sciences**, and of the **Hahn-Schickard Institute**. "We can look forward to knowledge input on key themes such as the Internet of Things, wired and wireless data transmission hardware, operating systems, software and system engineering, autonomous systems, safety and security, system-on-chip design, embedded vision and human-machine interaction."

"It's nice to see experienced developers gathering in Nuremberg every year to share their knowledge and help others turn their ideas and innovations into actual products," he adds. "Previously, embedded intelligence was essentially a vision of the future, but now it's increasingly becoming a reality that impacts more and more systems, from autonomous vehicles to image recognition, and preventive and needs-based maintenance in Industry 4.0 systems, covering everything from small computers to high-powered cloud servers."

Event delegates can look forward to six discussion rounds on various days, including Embedded Security - The Reality Check/How Much Security Do We Need?; Integration of Embedded Vision: Plug and Play or Plug and Pray?; and How Companies Can Drive Innovation. There is also Embedded AI: Why the Big Future of Machine Learning is Embedded; Chip Shortage; and AI Ethics: From Principles to Engineering.

Martin Garner, COO at research and consulting firm **CCS Insight**, says of the growing need for IoT: "The pandemic shone a very bright light on the need for IoT across a range of sectors as companies realised they had to keep things running, without having to have people present. This has driven investment in IoT systems strongly, and many IoT players are experiencing good growth rates as a result."

"As demand builds, there is a lot of innovation going into the architecture of IoT systems, driven by the strong growth of

edge computing in various forms, and by the use of cloud-native technologies within the IoT system," he explains. "This will make IoT systems more scalable, and able to take on a broad variety of use cases, rather than be installed only as specialist systems."

Of the show, he adds: "As one of the world's larger, and most complete industrial trade shows, we expect to see major product updates at embedded world helping IoT across the full spectrum, from sensors to data centres, from ethernet to 5G, and from real-time operating systems to AI frameworks."

Artificial Intelligence

Vijai Shankar, the vice president of product and growth marketing at **Uniphore**, says of AI developments: "In the AI sector, and in particular how it is being deployed within customer services, we are at a watershed moment. Even before Covid, the writing was on the wall: customers were expecting companies to be more accessible, available and adept at handling their questions and concerns. In fact, a report from analyst **Forrester** found that customers were 2.4 times more likely to stay with a company that could solve their issues quickly."

"Then came 2020. Inbound calls spiked. Complex and difficult calls doubled and depleted customer service teams soon found themselves overwhelmed," he adds. "Companies responded by accelerating their digital imperatives, using the power of AI and automation to fast-track digital self-service and live chat initiatives."

Shankar says interaction analytics have reached a "never-before-seen level of maturity", delivering highly accurate, real-time feedback on customer emotion and intent. At the same time, advances in natural language processing (NLP) have made non-human conversations as seamless as their live counterparts," he maintains.

"This is where AI gets exciting," he says. "This isn't about the ability of computer technologies to automate tasks, but rather their abilities to augment human capabilities. The paradigm is not human versus machine - it's really machine augmenting human. At embedded world we'll be seeing plenty of discussion around some of these exciting developments." ►



Martin Garner
CCS Insight

CCS Insight's Garner says: "At the same time as IoT systems are becoming more general-purpose and scalable, there is also a strong shift to focus on how to use the data they generate more effectively. Integration with other corporate systems, as well as workflows, advanced analytics and AI, are quickly becoming the key tools for extracting value and powering digital transformation."

"The growing scope of IoT systems, and the layers of analytics and AI are bringing a huge expansion in the attack surfaces for hackers," Garner explains. "So, suppliers are also investing heavily in IoT system security in tandem with their product innovation. IoT has a reputation for lax security, but the picture is improving quickly. And it needs to because most of the systems installed from now, will still be operating as we move into the era of quantum computing, in which much stronger encryption algorithms will be needed."



Vijai Shankar
Uniphore

Security

David Maidment, the senior director for the secure device ecosystem at **Arm**, says there has been progress in embedded security since the last show took place before the pandemic.

He says: "The pace at which the pandemic connected our digital and physical worlds through data has underlined the huge potential for the Internet of Things to be an agent for positive change. But it has also exposed and exacerbated the severity of digital risks within our more connected world."

"Encouragingly, during this time, IoT security has also moved well beyond the stage of early adopters, and the direction of travel in the industry is clear: security is foundational, not optional," he adds. "We've seen first-hand that security must be integrated into every device, process, company and culture if we are to take advantage of its potential as an enabler of digital transformation. Continued industry collaboration around security best practice is critical to driving this forward."



David Maidment
Arm



Mohamed Awad
Arm

Progress on security is borne out by recent research from the **Wi-SUN Alliance**, a global member-based association made up of companies driving the adoption of interoperable wireless solutions for use in smart cities, smart utilities and other IoT and industrial IoT applications. The report questioned 300 IoT decision-makers at UK and US companies, and found that a quarter (24%) of all respondents still believed security is one of the top three barriers to IoT adoption. But this is down from 58% five years ago in similar research. However, security and safety remains the most common technical challenge among respondents (42%).

Maidment added: "We look forward to meeting with our industry peers and partners at embedded world to reinforce best practice guidelines, a common language around security, and the use of trusted components to help streamline costs and further level the security playing field in 2022 and beyond."

Standards

Marc Canel, the vice president of strategic business development at **Imagination**, says standards are continuing to drive forward the IoT industry. "Many industries have adopted IoT as it enables so many different new use cases such as early maintenance, security, manufacturing process optimisation, automated driving and smart homes," he explains.

"Connectivity technologies played a key role in the growth of IoT, and the development of standardised security models, such as the Security Evaluation Standard for IoT Platforms (SESIP) allowed companies to harmonise solutions for specific use cases," says Canel. "All these innovations in IoT have brought forward the effectiveness of integrating IoT solutions from the device to the edge of the network and to the cloud."

According to the Wi-SUN Alliance research, the biggest change for IoT adopters when considering a smart cities solution has been the importance of industry-wide open standards for IoT deployments. In its report, 86% of respondents feel that this is either 'very important' or 'absolutely crucial', up from 78% five years ago. While 84%, up from 79% in 2017, believe the same when considering a smart utilities solution.

Also, more respondents are demanding no vendor lock-ins as a specific feature in 2022 (78%, up from 66% in 2017), reinforcing the need for open standards, which make it easier to integrate new IoT solutions, devices and software with existing infrastructure.

Canel says of the show: "embedded world is a great platform for industry leaders to highlight the benefits of IoT across applications – be it accelerating manufacturing SME growth, advancing the connected car data architecture or driving digital transformation in digital twin use cases."

Whatever the embedded debate, you can certainly find them all at embedded world. ■



IoT service providers harness the power of consumer eSIM to drive simplified, resilient, secure, global and flexible IoT connectivity

Embedded SIM (eSIM) provides an efficient means for IoT organisations to achieve resilient global connectivity at the same time as streamlining device manufacturing and simplifying deployments. Much of the focus has been on utilising eSIMs that have been designed for M2M use cases but, by harnessing consumer eSIM functionality, more flexibility and enhanced connectivity management capabilities are enabled especially for massive IoT deployments. This approach, which has been formalised in new Thales Adaptive Connect solution, accelerates time-to-market, saves cost and strengthens security, Stephane Quetglas, the director of marketing for embedded products at Thales, tells George Malim, the managing editor of IoT Now

George Malim: Do you think it's fair to blame cellular connectivity for the delayed deployment of massive IoT?

Stephane Quetglas: Cellular introduces significant differences in comparison to other connectivity technologies; that can hold back some players but in reality there is great potential. There are multiple aspects to cellular adoption and different organisations experience these in different ways. Companies that are used to Wi-Fi, for example, think it is difficult to embrace cellular connectivity because it is new to them.

Others find the need to have a subscription with a mobile network operator and having to have a service contract an obstruction. Even those that are comfortable with both these aspects still need to insert a physical SIM into a device that has been manufactured elsewhere and the cost of doing this locally can make IoT use cases unviable.

A solution to this problem is roaming so a global SIM can be inserted at the place of manufacture and the device can then roam when it is deployed. Roaming works for consumers when they travel but it's often expensive and this is a problem for IoT because the cost can be too high for a given use case.

GM: Is cellular difficult for IoT deployments because it was designed for consumer communications?

SQ: No, in fact the technology itself is ideally suited for both IoT and consumer markets but in some new use cases such as the massive IoT market you have simpler devices. A smart water meter that you want to connect in order to remotely collect water consumption data is a far simpler device, costs less and runs for a long time, often ten years, on a battery without recharging. If you wanted to use this in the same way as a ►

Cellular introduces significant differences in comparison to other connectivity technologies; that can hold back some players but in reality there is great potential

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The cellular industry has also put forward embedded SIMs (eSIM) for the past ten years to bring flexibility to the marketplace

smartphone, you'd need to charge the battery every day and this is the reason why low power wide area (LPWA) networks exist and power saving technologies have been developed. Cellular connectivity plays its part here with LTE-M and NB-IoT designed specifically for IoT.

The cellular industry has also put forward embedded SIMs (eSIM) for the past ten years to bring flexibility to the marketplace. You can use an eSIM to avoid relying on roaming because it means you can change your subscription to a mobile operator network at any time.

This technology is fantastic in terms of the flexibility it delivers to IoT. It was developed first for M2M applications and its most successful use case to date is in the automotive sector in terms of adoption. Another area of wide eSIM adoption is in consumer electronics with smartphones and smart watches.

The technologies used are similar but not exactly the same because the M2M eSIM has been designed to enable remote management of unattended devices while consumer applications rely on the end user to download the mobile subscription.

Now, the next step for the industry is to use eSIM to specifically address massive IoT deployments.

GM: So, what do the companies that deliver IoT services and applications really need?

SQ: If you look at the new enterprises that are introducing IoT – the IoT service providers – they need a system that is simple. Some companies have low experience of cellular technologies and are not able to invest a lot of time and money in understanding connectivity. They want to focus on their offerings and their business models, not to become cellular experts.

Flexibility is also important because companies want a choice in terms of connectivity. It could be, for example, that a company has connectivity provided by a certain mobile operator in France while, in the US, it uses another operator. From a device manufacturing process perspective, you would need to manufacture a device that is specific to France and a device that is specific to the US. You would then have to manage new product references and stock-keeping unit (SKU) numbers. That's a challenge to achieve and it's hard for companies to predict what volumes of which country-specific device they need. They could end up with huge demand in France but a warehouse full of devices configured for the US market. Having one SKU for all markets is far easier and cost-effective. It's ideal to have a single SKU in order to simplify manufacturing and logistics.

Companies need flexibility that allows them to pick the right connectivity and avoid roaming charges and be very lean in terms of manufacture.

GM: Where does this leave the connectivity service providers?

SQ: The mobile operators and connectivity service providers that specialise in IoT could miss an opportunity if they are not able to provide global and resilient connectivity to IoT service providers. They want to serve their customers with connectivity which makes use of roaming agreements. Indeed, these take a lot of effort to set up and operate and are subject to change.

For mobile operators and connectivity service providers being able to complement or avoid roaming agreements is also a very interesting proposition: it allows them to become more agile and true enablers of massive IoT. They can use eSIM to help reach this goal and provide fast time to market globally for their customers. ►



Adaptive Connect is really about providing this flexibility and a very fast way of connecting devices with the best connectivity service available

GM: You've recently launched Thales Adaptive Connect. How does this help?

SQ: Adaptive Connect is really about providing this flexibility and a very fast way of connecting devices with the best connectivity service available. Most of the time this is local connectivity where the device is deployed. Adaptive Connect relies on the consumer-oriented eSIM technology that is usually applied to smartphones with an end user but instead this is for unattended IoT devices.

The innovation here is to adapt the consumer eSIM technology so IoT service providers get a simple way to get proper connectivity for their devices by utilising the existing eSIM infrastructure deployed for consumer devices while keeping the M2M capability of remotely managing unattended devices. Thales Adaptive Connect enables you to get the best local connectivity for your IoT devices in a very simple manner: the device equipped with our eSIM is managed via rules defined by the IoT service provider which enable it to use the best-suited connectivity profile depending on its location. In terms of achieving resilience, Adaptive Connect makes it very easy to maintain an always-on connectivity for ►

Stephane Quetglas
Thales



In IoT, eSIM brings the flexibility that is really needed

Further Information:

Globalgig selects Thales for massive IoT deployments

Thales Adaptive Connect

Thales implementation of GSMA IoT SAFE

Thales Instant Connect

www.thalesgroup.com

fleets of devices. Where connectivity with a device is lost, the typical solution is a costly, on-site intervention.

With Adaptive Connect, when there are conditions on the device side that are causing problems such as loss of connectivity, the eSIM contacts the Adaptive Connect server for instructions. For example, if a device in the US lost connection with a given operator, it could then download a profile from another local US operator with better coverage, using Adaptive Connect's fallback bootstrap connectivity.

Our business model is subscription-based because IoT devices may need to be managed at any time in their lifecycle. Note that we don't sell operator connectivity in this solution, we provide a temporary bootstrap connectivity service.

GM: How do you see eSIM adoption progressing and what impact will this have on future IoT?

SQ: eSIM itself is standardised and our belief is that is key to bring scalability and security required by IoT. Thales Adaptive Connect is an innovative offering that is ahead of the standards but similarly to eSIM it is meant to become standardised. This process is taking place within

GSMA: we believe this type of solution is what IoT

needs to ensure it is a massive success.

Once the standard is ready we'll make sure our solution is compliant. To achieve this we are using our experience to finalise standards work at the GSMA and drive the industry forward.

In IoT, eSIM brings the flexibility that is really needed. We see eSIM adoption growing but there are several inputs still needed. First the Adaptive Connect approach is a requirement for simple management of massive IoT deployments and second, in more traditional verticals where eSIM is well-adopted already, we will see further growth. For example, an early eSIM market was to enable emergency calling in cars with eCall regulation. Now that has expanded to connectivity for entertainment.

Thales Adaptive Connect is available commercially and mobile network operators such as **Globalgig** have made live deployments. It's clear to see the industry is interested.

The eSIMs initially designed for M2M use cases are still being used and will continue but this is more about enabling a broader portfolio of eSIM solutions that can adapt to the needs of specific verticals. In IoT there is no one-size-fits-all solution and Adaptive Connect specifically accommodates this. ■



The IoT M2M Council (IMC)

25,000 enterprise users and product makers that deploy IoT technology – a platform for thought leadership, lead-generation, promotion, and research.

IMC EVENTS COVER...

- Edge-to-Cloud
- Private Networks
- IoT Security/Privacy
- LP-WAN, LEO Satellites
- AI/Machine Learning
- Low-/No-Code Platforms
- Industrial IoT
- Hyperscale Consumer IoT
- IoT Public Policy



<https://www.iotm2mcouncil.org/iot-library/event/imc-events/>



Where does the industry stand as we approach Hannover Messe and the 2022 halfway point?

Internet of Things (IoT) has been a popular technological trend over the last decade, writes Fred Yentz, the chief executive and co-founder of Tartabit, as he introduces our special report previewing Hannover Messe, one of the world’s largest trade fairs dedicated to industrial innovation. Although the term IoT was first introduced in 1999, it did not accelerate in popularity until 2010/11 and only reached mass market in 2014. But the IoT connection predictions have been mostly overhyped, predicting between 25 to 50 billion connected devices before the end of 2020. In 2021 there were 14.6 billion IoT connections, including cellular IoT (1.9bn), wide-area IoT (2.1bn) and short-range IoT (12.5bn). The market is expected to exceed 30 billion connections, growing 13% (CAGR) annually and reaching 30.2bn IoT connections by 2027



Fred Yentz
Tartabit

The global Covid-19 pandemic forced lockdowns in early 2020 and is still a major factor in our daily lives but it has accelerated the digital transformation significantly. In this rapid digitalisation era, companies are looking for ways to innovate and offer better services as well as to save money. IoT has benefited from this major force as well. IoT is being increasingly adopted by companies to innovate. Thanks to the major investments in cloud technologies, even mission critical systems can be moved to cloud, and are now being dominated by a handful of hyperscale ecosystem providers.

A few months ago, I looked deep into the space, talked with key industry members, and tried to identify some of the most important topics that should take shape in the IoT domain this year. Today, as we are well into the second quarter of the year and many of us prepare to attend Hannover Messe, I thought it would be good to dive a little deeper into a few of the most active topics and see what others within the IoT Now subscriber base think.

With the digital transformation wind behind the IoT growth, let’s look at some immediate trends that will shape the market in 2022.

1. Shift to hyperscalers

The shift to cloud for IT has been dominated by hyperscalers. Industry 4.0 requires the full digitisation of production processes and enterprise workflows, hence increasingly IoT implementations are also now shifting towards these hyperscalers as scalability and robustness become major requirements for these

applications. IoT deployments are becoming more sophisticated and large scale. These complex applications need more data processing power as well as advanced tools such as analytics, artificial intelligence (AI) and machine learning (ML). Hyperscalers provide low-cost on-boarding, scalable software tools, and robust management platforms.

AWS, Microsoft, and Google have been investing heavily and dominating the hyperscalers market. Increasingly more players are trying to imitate the hyperscalers to provide these advantages. But the leaders will continue to maintain their grip and drive the market.

The hyperscaler shift is one of the most easily identified trends which is materialising before our eyes. Amazon and Microsoft are the leading hyperscale cloud providers, dominating the market with combined market share of over 50% and still going strong. In the last quarter of 2021 Microsoft had reported US\$22.1bn in revenues and 46% growth for Azure and other cloud services, which demonstrates the strong demand for its hyperscale services. Amazon Web Services (AWS) revenues were also up by 40% to US\$40bn in the same period, but Microsoft has been narrowing the gap for the market share. Google also benefitted from the trend with US\$5.5bn revenue in the fourth quarter of 2021, also up 44% year-over-year, maintaining its position as a distant third. The end is nowhere in sight. Analyst firm **Dell’Oro** predicts this trend will continue with data centre spending to increase 61% by 2026. Dell’Oro forecast data center capex to hit US\$350bn by 2026 compared to US\$218bn in 2021. ▶



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What makes hyperscalers so strong and attractive for businesses is a collection of advantages. At the minimum they provide massive computing, storage and networking capabilities which their clients can scale as needed. The performance and scalability parallels between hyperscalers and the needs of today's 5G centric communication service providers (CSPs) are becoming more common. As such, we see many CSPs and hyperscalers beginning to collaborate in the areas of virtualised core and multi-access edge computing (MEC) services. IoT applications in particular start with a small set of devices and can scale rapidly in number and geographic deployment. Management of large IoT deployments and hyperscaler data ingestion results in the collection of big data which in turn brings additional requirements such as analytics, AI and cyber security to name a few. But hyperscalers can provide additional services such as IoT connectivity, which will expedite the process from idea to production, helping companies gain an advantage over competitors. Global cloud providers have additional offers, such as localised connectivity, commercial and regulatory compliance, low-touch provisioning, interoperability, centralised management and visibility. Hyperscalers do this with optimum effectiveness thanks to the amazing engineering behind these technologies.

The hyperscale cloud providers have been listening to the needs of Industry 4.0 customers, and we are seeing a strengthening of hybrid cloud environments which are essential for critical operations where plants, substations, and distribution centres need enough autonomous functionality to operate even when disconnected from their central networks.

Due to the importance and focus the hyperscaler cloud companies have placed on the Industry 4.0 marketplace it should not be surprising to see the presence throughout Hannover. Even if you don't see them front and centre to many application and use cases all you need to do is take a peek behind the curtain and they will likely be found within the partner or vendor pages of many exhibitors.

2. Surge in utilities, logistics and asset tracking will drive adoption of LwM2M

It is easy to understand the growth in low power IoT when you we look at the high-volume use cases which could not be successfully deployed in the past due to power usage or data plan costs. That said, new low power (LP) technologies fit the requirements which can be summarised as follows:

- Low cost (capex and opex)
- Small form factor
- Low energy consumption
- Long distance connectivity (including challenging locations)
- High capacity
- Strong security

Only by meeting these requirements, the deployment of many IoT devices will be feasible and the IoT applications will make business sense. The LPWAN technologies provide the ability to deploy a large volume of battery-powered, low-cost constrained devices covering a wide area including challenging urban and rural terrain.

These IoT applications are also referred as massive IoT applications. ▶

Due to the importance and focus the hyperscaler cloud companies have placed on the Industry 4.0 marketplace it should not be surprising to see the presence throughout Hannover



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Even though LPWAN technologies provide necessary tools for massive IoT applications, the connectivity landscape is still very fragmented

Even though LPWAN technologies provide necessary tools for massive IoT applications, the connectivity landscape is still very fragmented. No connectivity technology has ubiquitous coverage. When it comes to spectrum used for LPWAN we can talk about two options: licensed and unlicensed. The licensed spectrum is the cellular connectivity provided by the mobile network operators (MNO) which own these spectrums for which they have paid billions of dollars in auctions to their governments. The LPWAN technologies used for cellular IoT applications are mainly narrowband IoT (NB-IoT) and long-term evolution for machines (LTE-M) within the 4G standards specified by 3GPP and the emerging 5G New Radio (NR).

In the manufacturing domain message queuing telemetry transport (MQTT) protocol has been used predominantly for IoT connectivity. MQTT is a TCP based protocol, which has a persistent connection and allows industrial applications that require acknowledgements to function more reliably. LwM2M is, however, a UDP based protocol and has much lower overhead (up to 95%).

LwM2M works quite well in lightweight industrial applications, such as energy and utilities for smart meters, asset tracking and logistics. While LwM2M will not replace MQTT, a surge in such applications will drive the adoption of LwM2M. One application that is frequently talked about are overlay monitoring networks that can monitor and measure industrial processes without interfering with existing critical or real-time control networks. LPWA networks also allow direct sensor-to-cloud applications to be deployed for critical sense point monitoring without the high capital cost of gateway hardware. LwM2M will also benefit from the evolution of LPWANs, both on unlicensed spectrum, such as LoRaWAN, and licensed spectrum, such as NB-IoT and Cat-M, which provide lower data packet transmission loss compared to MQTT.

As these licensed technologies took time to mature, we saw several unlicensed technologies emerge to fill the need. Unlicensed technologies typically use the regional ISM frequency bands. On the unlicensed spectrum front, there have been many proprietary radio frequency solutions provided for various niche machine-to-machine (M2M) applications for a long time. Within the last decade several standards have emerged as leading LPWAN technologies, LoRa being the most prolific. While other technologies such as Sigfox have been available to the market, the open standard LoRaWAN protocol has become the dominant non-cellular technology. **ABI Research** predicts that by 2026 LoRa will account for over a one-fourth share of all LPWA network connections and more than half of all non-cellular.

During the first half of this year, it has been very interesting to see such a focus on LwM2M based IoT product and service roll outs. LwM2M has been seen as the product life cycle / device management protocol but now we are seeing a shift for LwM2M to be the data transport protocol of choice for low power devices. In our opinion, this is one of the most exciting spaces to watch as we move through the balance of the year.

3. Mobile edge computing (MEC)

As the IoT solutions get more complicated, data processing becomes an important function of the implementation. Specifically, where the data processing takes place is a key consideration. To optimise applications, data processing can be pushed to the edge which requires more computing power at the edge. For some use cases, especially when real-time response is crucial, it is necessary to have the data processing and data storage to be near the application and end-device, cutting the round-trip delay time to the cloud. Although this is in contrast to the cloud-computing, MEC has seen an increasing demand.

Hyperscalers are also extending their capabilities to the edge, which will be the next frontier for the dominant players. More to be seen as the year unfolds with regard to MEC but you can be sure that edge processing, atomic ML and AI applications are emerging in the industrial sectors where latency and persistent cloud interaction could be viewed as a liability.

4. Mobile private networks (MPN)

5G deployments are increasing every year and by 2027 it is expected to cover 75% of the world's population. 5G New Radio (NR) promises high throughput, low latency and large data volumes. While the push to deploy 5G globally continues, 2022 might not be the year that IoT applications shifts to 5G. Massive IoT technologies, such as NB-IoT and Cat-M, which are primarily low on complexity, low-cost devices with long battery life and low throughput are expected to grow at a higher rate than broadband IoT next few years.

Private implementations of 4G/5G are ready to take advantage of these massive IoT technologies. The spectrum allocated for MPNs will create a more immediate demand in 2022. And, this demand will most likely come from factories, warehouses and ports.

5. The emergence of satellite

As the need for IoT becomes global for applications such as asset tracking, logistics and even smart agriculture in very rural areas, global network coverage becomes a necessity. Since the early 1990s deployment of low earth orbiting satellites (LEO) initially launched by **Motorola** backed **Iridium**, satellite coverage has been an intriguing venture. With the cost base of launching the LEO satellites now much lower, interest has been growing in these ventures and a bunch of companies are going after this satellite IoT market. Although 2022 will not be the year that satellite IoT will become mass market, we expect to see satellite emerging as an alternative to the IoT needs of the geographically remote areas.

The first half of 2022 we have seen the new satellite LEO and Sat-IoT companies really make a play to get the exposure we feel they deserve within the IoT ecosystem. Many of these companies have had additional influx of capital investment, published expanded launch plans, and are seeking approvals to operate in expanded geographies. When global coverage is achieved and IoT device network attached or reporting ▶



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frequencies become 30 minutes or less the promised new sought after use cases will start to emerge. Once viewed as a competitor to terrestrial IoT operators, satellite is becoming a sought-after roaming partner or solution partner for large MNOs who have a backlog of customer requirements needing connectivity over sea and in the most remote locations.

Perhaps one of the most exciting sectors to watch will be the advancements on the 5G-NB-IoT direct to satellite connection models which is supported by the newest releases of the 3GPP standards. When this becomes a commercial reality, many of the current devices can be affordably designed for both terrestrial and satellite networks which will reduce the cost of entry as well as the operating expenses of satellite centric IoT solutions.

6. Unlicensed LPWA national networks emerge

As the need for low power and low cost IoT devices emerged before the licensed wireless technologies matured, we saw several unlicensed technologies emerge to fill the need. **SigFox** and **LoRa** are commonly recognised as being two of the most prolific. While the unlicensed technologies were being deployed in controlled private networks at the beginning of their lifecycle, we have seen a shift over time toward more National deployments. Interoperability between networks was seen as problematic and often viewed as a downside of LoRa versus the licensed spectrum or the traditional 2G,3G and 4G LTE networks.

This year we will continue to see build out and accelerated adoption of National LoRa networks such as **Everynet's** US national network which

satisfies the long-standing need of an unlicensed LPWAN network in the US. At the same time the **LoRa Alliance** has continued to release technology improvements which promise easier transition of devices from network to network to solve some of the highest volume use cases within asset tracking.

7. Low code/no code

Implementing enterprise focused IoT centric solutions means rapid integration of IoT Sensor Data into the markets most prolific enterprise applications. IoT can no longer stand alone in vertical stove piped applications. As such IoT integration and rapid solution development is driving the demand for easy-to-use low code solutions which can be quickly and easily used by developers who may not have deep IoT device and network understanding. Mass adoption of IoT demands that every developer should have access to real time IoT information without the pre-requisite IoT deep knowledge. Low code and no code solution integration is here today and here to stay.

While we have watched the IoT market grow for a few decades, we seem to be sadly aware of the market lagging behind the expectations of many industry analysts. This year as we emerge from the grips of the global pandemic, in combination with perhaps more rational market expectations, with the exception of global logistics issues and supply constraints, I think the IoT sector might surprise us with better-than-expected results. It has been a long time in the waiting, but I believe more strongly that as we reach the midpoint of 2022 it is safer to say that significant growth and innovation will come from the LPWA side of the IoT market. ■

Perhaps one of the most exciting sectors to watch will be the advancements on the 5G-NB-IoT direct to satellite connection models which is supported by the newest releases of the 3GPP standards



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Make the right IoT business connections in a changing market

Amy García, the chief marketing officer of IoT services and connectivity player Pod Group, speaks to Antony Savvas about key issues in the evolving market, and how providers can effectively serve the needs of businesses

Tony Savvas: Big things have been predicted for the IoT services market for many years, how has it panned out in reality?

Amy García: We can all see the huge potential of IoT, but it hasn't grown as quickly as predicted. There are several reasons for this, but although the technology is there and has been for some years now, the market is still very fragmented and for the enterprises deploying IoT solutions, very complex to manage.

The main challenges we come across time and time again for our enterprise customers is that the connectivity options on offer are not customised to IoT.

Mobile network operators (MNOs) provide IoT connectivity options, but their networks were for the most part designed for consumer applications with higher average revenue per user (ARPU). This means that the bandwidth, low latency and flexible data packages required for IoT applications are often not available.

For SMEs, there is also the issue of commitments that may be unachievable, and the lack of global coverage from one provider, which means making agreements with many different operators worldwide: a huge challenge to manage.

TS: Do mobile virtual network operators (MVNOs) have any advantage in the market, when taking account of the current state of play?

AG: MVNOs often provide more flexible packages and have more in-depth knowledge of the different applications for vertical sectors, but they often rely on the MNO for infrastructure and support, which means they offer the enterprise very little visibility and control over their connectivity.

For this reason, we introduced the term Enterprise Network Operator (ENO) about two years ago to describe the solution that we offer the enterprise.

We believe it better fits our offering because we have deployed our own core network, which includes both a private and public core, plus our

own global international mobile subscriber identities (IMSIs) to provide coverage worldwide.

TS: What are the advantages for enterprises when using your model?

AG: Our services are deeply integrated with our platform, we provide managed services to the enterprise which are customised and tailored to each use case.

The enterprise has full visibility over its connectivity, whether on public or private networks - or a combination, but it doesn't need the skillsets in-house to run and manage the network.

Everything is provided as-a-service. This is our ENO concept (www.whatisaneno.com).

TS: Last year, you were acquired by Giesecke+Devrient (G+D), a specialist in eSIMs and eSIM management, what advantages does this ownership offer you in the market?

AG: This puts us in a very interesting position in the market, since we are the only provider of both eSIMs and an eSIM management platform, and the global connectivity both on and off the private network.

This means we can provide a very advanced eSIM solution, which includes the widest range of profiles, both native (in-country) and roaming.

These can now be combined on a single stock-keeping unit (SKU), meaning that enterprises need only one provider, one SIM and one platform to manage all their global connectivity.

In addition, since we have control over the SIM card, we can provide customised SIM applets to enhance security and device management, and enable massive deployment of IoT devices, such as zero touch provisioning - this allows the SIM to securely download the profile over-the-air (OTA) once it is switched on in the destination market.

This greatly reduces device manufacturing costs and complexity of rolling out global IoT deployments. ▶



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Our strategy is currently aligned with telco go-to-market strategies, in fact we work more as a partner or channel for the operators rather than competing with them

TS: Your company will be at the forthcoming Hannover Messe event in Germany, what are you focusing on there?

AG: The combined offering as mentioned above is called ENO ONE, and at Hannover Messe we will be launching our ENO ONE Global eSIM, which is the main reason for our presence there.

TS: You mentioned previously that the IoT services market is very fragmented, do you believe it will become more consolidated, with further acquisitions generally, for instance?

AG: Yes, I think we will see more consolidation in the market, but also more partnerships and the development of ecosystems to provide end-to-end solutions to the enterprise. I think it is clear that IoT applications are so diverse, and there are so many different variables, that no one size fits all, particularly for connectivity.

It is also important for all players to work together to integrate their solutions, for example, hardware and platform providers with connectivity providers. This is why we have designed our connectivity management platform, Pod IoT Suite, to be fully compatible with a wide range of IoT hardware and software. And we are continuing to grow our ecosystem through partnerships, so we can provide one pane of glass for the enterprise to manage their IoT applications end-to-end.

TS: The competition for the supply of IoT services to companies seems to be between traditional telcos and companies like yours, do you see a time when telcoms operators will perhaps get closer to Pod Group and others, as part of joint go-to-market strategies - rather like operators are beginning to get closer to big public cloud service companies in the joint provision of services to end customers?

AG: Our strategy is currently aligned with telco go-to-market strategies, in fact we work more as a partner or channel for the operators rather than competing with them. Our focus has always been on SMEs and enabling the long tail of enterprise IoT applications, an area telcos are not necessarily targeting due to lower ARPUs, and the need for more customised solutions that they are often not

equipped to provide. At Pod this has been our core business for over 20 years, and we have worked side by side with our enterprise customers in different sectors to develop connectivity solutions that solve specific problems in the field.

TS: In terms of contract values for IoT services to organisations of all sizes, are they now proving to be more lucrative for providers like you, considering the continuing global roll-out of 5G, for instance, and organisations seeking to connect more things to support mission-critical data, processes and apps?

AG: Yes, the advent of IP-based connectivity technologies such as 4G and 5G have helped to drive growth among enterprise IoT applications. It is now easier for enterprises to manage their IoT connectivity as part of their overall enterprise network. This is also a driver for private LTE and 5G enterprise networks that provide increased security and lower latency, particularly for mission critical applications.

The deployment of these networks, and particularly the ability to roam on and off both private and public networks, will be a key factor in the growth of enterprise IoT. The main objective of Pod and G+D here is to simplify and secure these connections for the enterprise, giving them one point of contact for their IoT connectivity solution and one pane of glass to manage their devices.

TS: Finally, we have covered some key industry areas here, and you are taking part in a business conference and expo which has a rich heritage in driving industry trends. What would you like to say to Hannover Messe attendees and industry watchers in summing up?

AG: IoT is on the cusp of massive growth as technologies and market conditions converge to allow enterprises of all sizes to deploy IoT solutions globally.

Pod and G+D are in a unique position to provide simple, scalable and secure IoT connectivity for the enterprise. To find out more, I would encourage people to visit us in **Hall 5, booth G42**, or check our website at **www.podgroup.com**. ■



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Dashcam connectivity keeps fleets safe and enables improved driving

idrive's IoT video telematics dash camera measures driver behaviour, records video, tracks vehicles, and uses artificial intelligence to correct drivers in real-time. Providing professional transport fleet clients, who are continually on the move, with live in-cab feedback, GPS tracking data and video file uploading immediately on a global scale, requires reliable connectivity at a competitive rate so idrive turned to Pod Group's embedded SIM (eSIM) offering to ensure seamless and secure global connectivity across different networks at competitive rates, while managing devices across the world with just one stock-keeping unit (SKU) number

By 2035 it is estimated that there will be more than two billion vehicles on the world's roads, commercial vehicles making up a quarter of these drivers. Currently thousands of people are killed daily throughout the world by road accidents and many of these accidents involve some type of human error.

For companies that employ fleet drivers, there is a huge responsibility to ensure both the safety of their drivers and others on the road, as well as the reputation and safety of their business. At a time when businesses must strive to remain viable, unforeseen additional costs through damage,

injury or harm to their business' reputation are hard to bear.

To help alleviate some of this responsibility for transportation professionals, idrive has developed an artificially intelligent (AI) dash camera system that reduces accidents by well over 50% and provides in-cab coaching to prevent accidents in real-time.

The application

The idrive AI is a professional video event recorder that simultaneously captures two HD videos, one of the driver and one of the front of the vehicle, to ▶



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SPONSORED CASE STUDY



Solve the problem

When devices are installed in busy, continually moving vehicles, it is essential that they can constantly transmit GPS and telematics data to HQ, and that changes can be made without having to interrupt the workflow of the fleet. Added to this, idrive devices need to be deployed anywhere in the world, without losing connection or having to manually access devices.

With Pod Group's eSIM solution, global connectivity is ensured by enabling seamless connection to both native (in-country) and roaming network profiles, with more than 600 networks in 185 countries covered. The combination of Pod Group's multi-international mobile subscriber identification (IMSI) applet on the eSIM bootstrap profile and multiple additional profiles on the SIM also adds resilience in the event of network issues or future rate changes on one of the profiles, as the SIM can still switch between multiple core networks.

These profiles can be swapped and updated over-the-air (OTA) when the devices are already in the field. This helps to optimise costs when rolling out global deployments, as devices can be shipped and then configured once they reach their destination.

Not only that, the capacity to pick and choose different networks for different situations means that native (in-country) profiles can be used for lower latency and cost. Using just one SKU to customise their coverage plan ensures that idrive can use the most cost-effective network in any given area, essential when dealing with large and expensive packages of video data.

Facilitated by the unique connectivity solution and flat data rate provided by Pod Group, idrive is able to enhance its service and offer the reliable devices its customers require. "Working with Pod Group allows us to provide excellent global coverage for all of our fleet customers worldwide," explains Kelli Cosio of idrive Global. "We chose Pod Group as our provider because of the ease of use and competitive pricing."

idrive's hardware is perfectly complemented by Pod Group's resilient eSIM technology, OTA provisioning and flat-rate roaming across borders. Together these technologies will grow and improve as the IoT expands.

As an additional service, idrive offers in-house data analysis for customers, relieving managers of the task and ensuring that their fleet data is being professionally monitored. idrive, in turn, knows that it can rely on Pod Group for 24/7 expert technical support from a team with 20 years of first-hand experience in the IoT sector.

"We have received excellent service and support," says Cosio. "idrive's association with Pod Group means that the company can confidently supply a sophisticated service integrated via reliable, intelligent and continuous connectivity, and future proof its devices however much the company's business expands." ■

idrive's hardware is perfectly complemented by Pod Group's resilient eSIM technology, OTA provisioning and flat-rate roaming across borders

give fleet managers a full picture of what is going on inside a vehicle. The idrive AI is an intelligent camera system that features machine learning and driver recognition capabilities to capture detailed data for driver behaviour coaching.

"When a driver is being monitored they pay more attention to the rules of the road," says Sean O'Neil, the chief executive of idrive. "Our artificially intelligent system can also watch the driver for active distractions or drowsiness and alert them if those behaviours are detected. This is critical to preventing potential accidents from occurring." idrive uses advanced artificial intelligence to help in fleet monitoring. The idrive AI Cam helps companies identify and correct risky driving behaviour. Machine vision can detect distracted driving, drowsy driving, safe following distance, and driver recognition via facial recognition.

Using AI and in-cab alerts combined with **Pod Group's** telematics data transmission allows idrive fleets to reduce risky driving events by as much as 70%. Sensors incorporated in the device can detect different driving patterns such as hard braking and acceleration, aggressive driving, swerving, speeding, and open doors. Any of these trigger events will cause the device to save the video recording immediately before and afterwards, providing a clear picture of the moments surrounding an incident.

When combined with the cellular connectivity module, the video cameras provide real-time insights into the vehicle, so clients can monitor and observe their entire fleet securely from any desktop or mobile device immediately. All of the data collected is uploaded via Pod Group's eSIMs and is critical to generating driver reports that are used to coach drivers and get them back out on the road in a safer manner.



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Wireless connectivity leads the charge to EVs

While there is huge uptake in electric cars and interest in newer technologies, such as contactless charging, the reality is electric vehicle (EV) charging points are facing high demand and increasingly need to be connected in order to ensure maximised uptime, enable bookings and to bill users accurately for their consumption. You might think this is a wired world because of chargers' connections to the power grid but this isn't the case and charge point operators value the speed, cost efficiency and universal standards of mobile connectivity, writes Richard Hart, the global connectivity director at Quectel Wireless Solutions

EVs are here to stay and we are seeing enormous projected growth in their uptake. **BloombergNEF** estimates that 2021 was another record year for EV sales with more than 5.6 million sold worldwide, in spite of pandemic-related supply chain constraints. This is 83% higher than sales in 2020 and an increase of 168% over 2019 sales, the firm has reported. Yet this only scratches the surface and the firm predicts there will be 60 million EVs adopted per year in 2040. With ultra-low emissions zones and countries banning sale of fossil-fuel powered vehicles, EVs will be everywhere but where will they charge their batteries?

A large proportion will manage the vast majority of their charging on domestic driveways and in private garages. The convenience cost and limited battery degradation due to slower charging at home makes this the most attractive option but, for those that need to take longer journeys than their vehicle's range, public charging is the only option. In addition, those that park on-street will have to use public charging.

There's therefore growing demand for charging points to meet future demand. **IHS Markit's** EV charging infrastructure forecast predicts that the global deployment of EV charging stations will increase at a 31% CAGR to more than 66 million units by 2030. The preferences for the type and location of the charging infrastructure are remarkably different across the major regions, the firm says, with the Greater China region expected to account for more than 60% of the global public and semi-public charging stations deployed by 2030.

In Europe, the focus is more on domestic charging with consequent lower need for connected public charging stations, although some domestic chargers will contain cellular connectivity as a back-up or because it is simpler to connect to this rather than home networks. IHS Markit forecasts that the cumulative deployment of EV charging stations will increase at 24% CAGR during the 2020-30 period. By 2030, circa 20 million houses within Europe are expected to be equipped with domestic charging stations, while public or ►

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Already working with leading EV CPOs across the globe, Quectel's extensive module portfolio and its comprehensive range of antennas can offer CPOs the capabilities they need to facilitate connectivity for their charging points

semi-public charging stations will increase eight-fold on the 2020 deployment level.

Why is wireless the way to connect?

You would think that charging points which are typically located in easily-accessible public places that are well served by infrastructure would find it straightforward to access communications capabilities from the fixed network alongside electricity connections to the power grid but this does not take into account the deployment complexities. Large car parks at highway service areas are seldom networked by cables and those that are would need substantial work to connect to an area that contains 50 charging points, for example.

Wireless is simpler, faster and cleaner to deploy and more robust in deployment because it has no cables that can be damaged or cut. In addition, charging points typically have no need for the bandwidth of fixed line fibre networks. Connectivity is needed so the charge point can meter usage, identify users and bill accordingly. It is also essential so charge point operators (CPOs) can monitor site status in real-time in order to book maintenance, understand demand and ensure payment.

Even in cases where fixed line connections are available, a wireless back up makes sense because, it can help ensure a charge point remains operational. In this competitive market in which customers rely intensively on access to charging downtime is unacceptable and CPOs can't afford reputational damage nor lost revenue from non-operational sites. EV chargers need to collect information including the vehicle ID, service type, charging volume and state of charge (SOC), capacity of charging and recharging current and the vehicle departure time. All these inputs and data need to be passed together with the charging point or pile's ID and location information to the CPO and then from the pile to the EV itself.

From a communications perspective, none of this is complex and relatively small amounts of data are involved with limited requirements for low

latency. Services can readily be supported by highly available 3G and 4G cellular connections, with higher speeds and lower latency enabling improved performance for new versions of charging piles which could be updated over-the-air, for example.

The race for charging space

With a race for charging spaces underway alongside major roads and in cities, there is a need for deployment speed but also to keep the cost of every charging point to a minimum. In addition to this, there is a perception that cable connections offer better reliability of data transfer than cellular options and, when usage of charging points becomes higher, the speed of data transfer could suffer. At the moment, wireless connections represent a small additional cost in terms of construction and maintenance of charging points and come with cellular data usage fees. The versatility and ease of deployment across the globe makes wireless connectivity attractive to enable rapid deployments, usage of global products, and to support interaction between EVs, users and charging points.

Already working with leading EV CPOs across the globe, Quectel's extensive module portfolio and its comprehensive range of antennas can offer CPOs the capabilities they need to facilitate connectivity for their charging points. Our LTE Cat M1, Cat NB1 and soon to be added Cat NB2 modules have significant attractions for EV charging and, alongside our comprehensive portfolio of antennas form part of a complete package which is brought to life with global connectivity provided by Quectel's Connectivity-as-a-Service offering.

For CPOs offering access to public charging, the functionality of wireless connectivity adds further dimensions to their offerings. They can use it to enable immediate site roll-outs thanks to equipment that can automatically connect wirelessly anywhere in the world. In addition, this connectivity foundation sets them up for future additional, connectivity-enabled revenue streams that charging sites, with their captive audiences, are preparing to offer. ■

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How eSIMs are securing paths to new revenues in smart metering

Smart metering of water, gas and electricity are to play a vital role in how utilities and energy grid players modernise, enhance sustainability and improve customer service. The key to achieving these outcomes boils down to timely, accurate and secure data to meet the demand for energy efficiently, write James Moar and Steffen Sorrell from Kaleido Intelligence

The energy industry is being transformed by the need to reduce environmental impact. According to the **IEA**¹, the energy sector contributed to 40% of global emissions in 2019. Concerns over the increasing levels of carbon emissions have driven political commitments globally to invest in more renewable sources and infrastructure that includes smart meters and opening more distributed energy generation as well as electrification of the transport sector. The global expansion of smart meters is driven partly by such regulations, due to the need to use data around power consumption and demand to better manage renewable energy sources.

Surprisingly, the biggest blocker in decarbonising the electric grid is the lack of connectivity and shared standards, not the lack of new renewable energy resources. The energy sector needs a secure, scalable way to identify the growing number of clean energy resources, verify attributes about them such as location, capabilities and financial relationships, and manage permissions and/or behaviours based on those attributes.

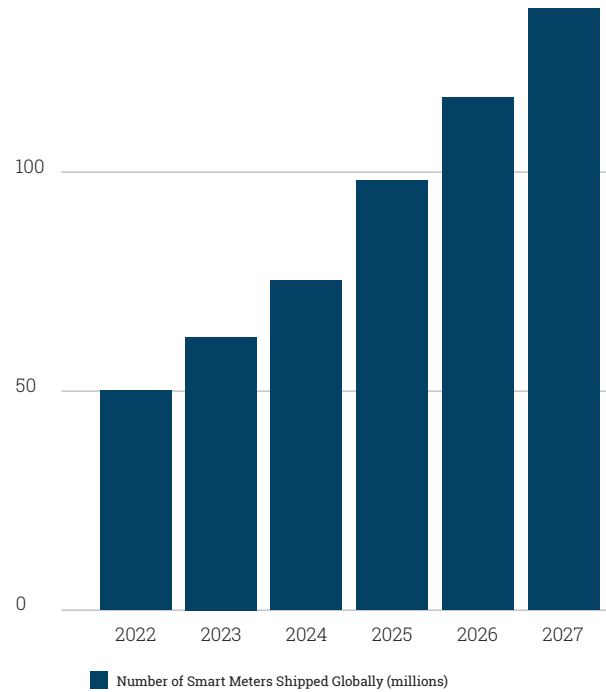
In many cases, this means expanding the Internet of Things (IoT) into many corners of the energy market for this efficient use of data. In the metering arena, ►

¹ IEA (2021), Greenhouse Gas Emissions from Energy: Overview, IEA, Paris
<https://www.iea.org/reports/greenhouse-gas-emissions-from-energy-overview>



Global Smart Meter Shipments, 2002-2027

Source: Kaleido Intelligence



smart meters have emerged to provide this data to utility companies. While the utilities sector is no stranger to technology, the connectivity and data boom of recent years has the potential to provide reliable, real-time data, often in many contexts where this may not have been possible before. As more governments mandate the use of smart meters across the globe, we expect more than 136 million smart meters to be shipped in 2027.

At the core of a smart meter is the application that provides accurate readings of the energy consumed. This reporting can be real-time data and being able to reliably monitor energy usage allows a range of benefits. For utility companies, these devices bring the ability to re-distribute with demand, sending energy to where it is needed within the grid. The richness of meter data, and crucially its transmission helps electricity grids to avoid brown-outs, in which energy is constrained, as well as identification of fraud and wastage. In the water and gas industry, meter data is used to identify leakage and frauds to enable accurate charging.

Smart meters roll-outs are multi-year programmes with the metering device needing to serve long service lifespans of 10-15 years. Through this service lifespan, physical maintenance and updating of smart meters can also be costly, typically amounting to between US\$70-100 for a call-out fee per meter. As a result, device manufacturers and grid operators need to embrace how best to choose connectivity, administer over-

the-air updates and maximise data exchange – all of which can ease the challenges involved in maintaining and utilising smart meters. Further, there is a fine balance between provisioning solutions with enough capacity to meet the needs of increased data traffic in the future. A primary consideration hence becomes battery life, requiring a power-efficient mix of hardware, applications and network. embedded SIMs (eSIMs) are one technology being implemented to address all the above considerations and bring more of IoT's benefits to the utilities industry.

What is eSIM?

eSIMs are a form of SIM which do not take the form of a removable card, but an embedded chip that is soldered directly onto the device circuit board. Typically known as an embedded universal integrated circuit card (eUICC) in its hardware form, it also brings standards-based functionality to allow the subscriber profile to be changed via remote updates, without the need to change any physical component on the device.

Why eSIMs in smart metering?

eSIM technology is widely regarded as the next evolutionary step in smart meter cellular enablement. The removal of a physical SIM card brings the following operational features and benefits:

- **Remote provisioning and updates:** With eSIMs, smart meters can be deployed globally with ▶



Drivers for adoption of eSIMs in smart metering



ease without requiring local MNO SIM cards as the connectivity can be provisioned over-the-air at any point in the deployment. This means meter manufacturers need to maintain a single stock keeping unit (SKU) that streamlines production and reduces costs.

- **Profile changes:** eSIMs allow the remote manager to switch the meter’s connection between mobile network operators (MNOs) as required, ensuring the longevity of the device regardless of the cellular or energy suppliers involved, as well as providing additional coverage where necessary to enhance connectivity reliability. The ability to update SIMs over-the-air means that physical access to the SIM is not needed to enable and manage the meter’s connectivity.
- **Increased device reliability:** eSIMs do not need to be physically changed, removing the need for a SIM tray. This not only greatly reduces possibilities for tampering, but also helps to make the meter more durable by removing a source of possible ingress for dust or water where environmental conditions may demand so – for example in water meters. In other metering devices, eSIMs bring benefits to reduce corrosion and vibration. These combine to increase overall device reliability.

eSIMs can enhance smart metering deployments by providing that continuity of service, as well as simplifying deployments. The ability to change cellular profiles means that it is possible to

manufacture a single line of meters for deployment anywhere in the world, and then configure them for local deployments after manufacture, typically when deployed. Should a given operator provide poor coverage or stop providing coverage for a given location, then the eSIM profile can be changed to another operator that does provide coverage there with ease, and no physical contact is required. The device can support multiple cellular technologies (2/3/4/5G/LTE-M), and being able to switch profiles means that the device can stay in operation for a longer time.

Accelerating scale with the rise of new connectivity

Remote SIM provisioning (RSP) enables late-stage personalisation – meaning smart meters can be shipped, on a mass market scale, directly to the installation locations, where the correct network profile can be downloaded over the air (OTA) upon connection to the GSMA Remote SIM Provisioning for M2M system. If a change of MNO is subsequently required, OTA remote provisioning can again be used to remove an existing profile and download a new network profile directly to the device. Smart metering manufacturers and utilities should look for a fully GSMA-accredited SAS platform like **Kigen’s**.

The dispersed and often inaccessible nature of smart meters once deployed means that energy efficiency is a critical consideration. The ability to switch from an international or roaming ►



When metering data can be trusted and available in real-time, a whole range of new business models and opportunities are available for the smart metering ecosystem

connection to a local connection allows for more consistent use of power saving mode (PSM) and extended discontinuous reception (eDRX), which are often not included in roaming agreements. eSIMs can allow these modes to be deployed for LTE-M IoT devices much more readily than narrowband IoT (NB-IoT), which cannot utilise eSIMs without modification, and thus relies on roaming capabilities.

This has implications for power consumption, as only 25% of NB-IoT roaming agreements tracked by **Kaleido Intelligence** support either PSM or eDRX modes of operation. Therefore, being able to switch to a local profile through an LTE-M smart meter can bring power savings over NB-IoT in the long run, where devices are not needed to be continuously connected. This can be taken even further if the eSIM is replaced with an integrated eSIM (iSIM), and made part of the overall chipset rather than being its own standalone silicon requiring additional power from the board.

Where low bandwidth is an issue there are some challenges in NB-IoT limitations, but this is actively being progressed through the work of WG7 (GSMA Working Group 7) development to enhance eUICC accessibility and reduce pain points. In particular, the upcoming SGP32 specification from WG7 is looking into removing the dependence of the standard on SMS, which

NB-IoT requires custom adaptations to support. This will allow eSIMs for NB-IoT, already a key technology in smart metering. In addition, the SGP32 can make switching between eSIM providers simpler, making multi-stakeholder deployments easier to manage and reducing dependence on a single RSP provider. This is vital in the smart metering space to ensure meters spread over large areas can be connected, which a single network partner may not be enough for. The ability to switch providers will in turn reduce the need for fallback technologies to be built into the devices, a common feature of low power wide area network (LPWAN) connectivity to date.

Use of eSIM in smart meters also provides strong benefits for the end-user of the smart meter as well, as profiles can easily be switched when changing energy suppliers, avoiding the need for hardware changes and removing another cause of vendor lock-in for consumers as well.

Beyond connectivity

As we discussed earlier, ultimately connectivity and eSIMs are a means towards the outcome to reduce wastage of resources whose societal value is becoming ever more important. Data thus transmitted from the smart metering devices need to be secure at source, in-flight and for use by applications beyond the point-to-point, single-▶



player or individual systems. To unlock the full potential of data it needs to be authenticated and uniquely identifiable. This opens up a broader set of IoT assets – particularly those generating and also transmitting renewable energy back to the grid. Such value-add from data is only possible if the reporting instruments in the network are fully trusted.

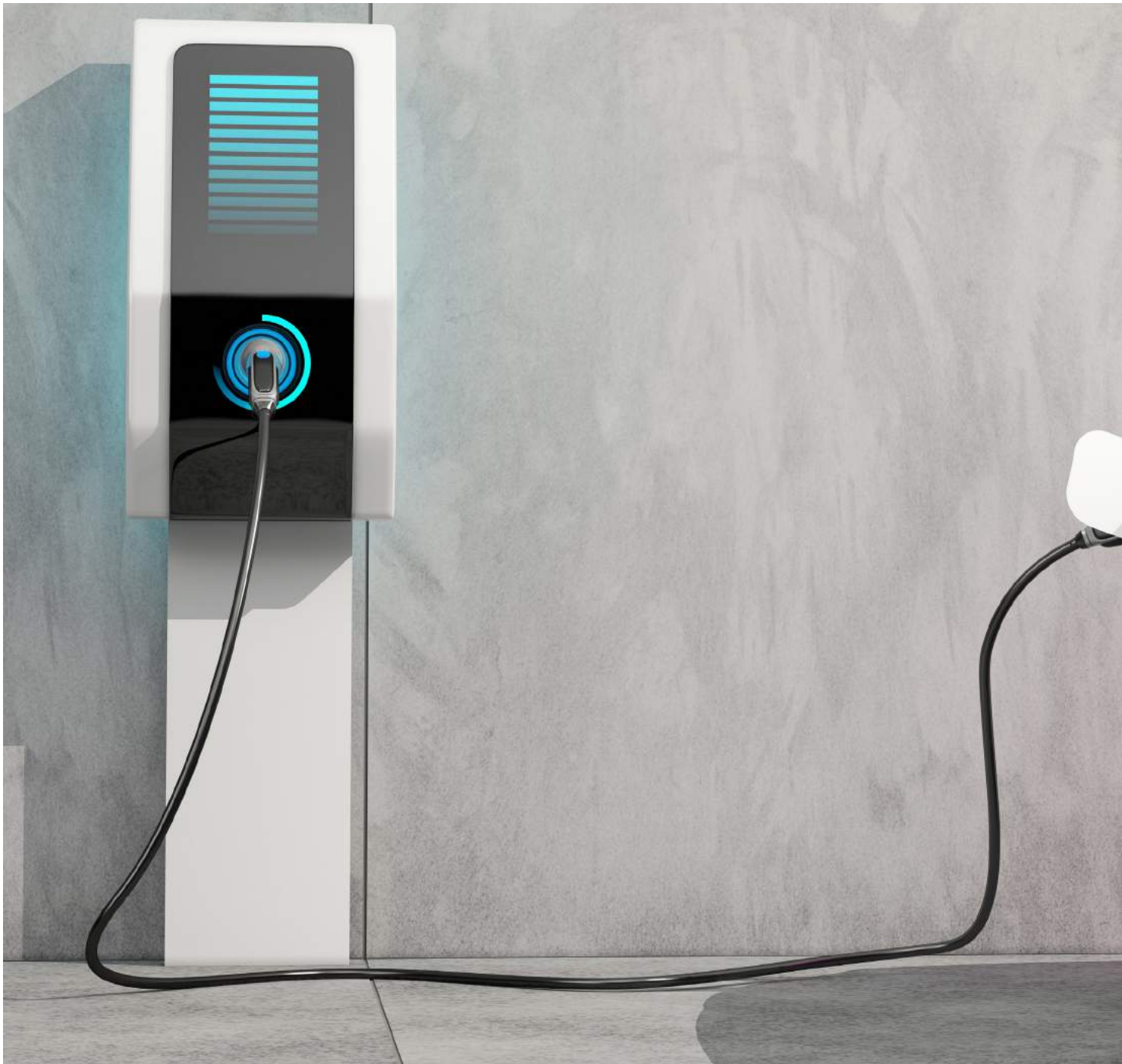
This is another benefit for eSIMs and iSIMs: eSIMs offer tamper-proof, robust security that can be leveraged in other portions of the device, most particularly in the form of a root of trust for secure device identity management. The GSMA IoT SAFE standard is one such way of ensuring that continuity. In addition, because it relies purely on the SIM itself and public-private key cryptography, IoT SAFE's security layer adds minimal data overhead for the transmissions.

Typically such authentication has involved a high degree of custom or proprietary approaches which are not suitable for all IoT devices; increasingly, security by design is becoming something of a mantra for IoT. However, proprietary design solutions to security problems may impede connectivity, so using the eSIM as a root of trust is a strong and scalable alternative to bespoke processes. This can then provide end-to-end encryption and security of smart metering transmissions. Making use of a technology

standard such as IoT SAFE for the identity of smart meters and other connected assets within the grid is a vital verification tool to allow trusted and scalable use of these technologies, and simplifies device management.

When metering data can be trusted and available in real-time, a whole range of new business models and opportunities are available for the smart metering ecosystem. The recent partnership between Kigen, **KORE** and **Energy Web** is a strong example of this kind of a model – Kigen innovated with its eSIM operating system to use the eSIM's root of trust with an on-board secure key generation coupled with the IoT SAFE approach as part of its OPEN IoT SAFE initiative, which combines IoT SAFE with the **IETF's** Enrolment over Secure Transport publication. Supported by the widely used transport layer security (TLS) stacks across all embedded, auto and Linux class devices, this solution brings the best practices from the internet and combines with Energy Web's crypto token to enable global connections via KORE's networks.

IoT SAFE forms the basis of the system, but several use cases will need to be additional features on top of the specification's provisions. IoT transactions that have financial implications particularly need advanced forms of security. In the case of the Kigen-KORE-Energy Web partnership, the tokens and associated meter readings are then registered ►



on the blockchain by Energy Web to provide a mechanism to track renewable energy credits registered to the electricity grid. In bringing this capability to other verticals, eSIM users should still be aware of the data security requirements of any particular industry, which may require additional security features to those provided by IoT SAFE. However, with mechanisms similar to OPEN IoT SAFE, these can be added with minimal disruption to the overall transaction process.

The ability to secure and individually identify energy transactions can also enable new business models through the data provision process. For utilities, real-time monitoring of supply and

demand can enable dynamic pricing, giving end users the truest possible picture of the cost of their energy. This can both save users money based on the price of energy usage at the time, and enable the incentivisation of energy usage when the grid is at its greenest. On the supply side, Energy Web's blockchain system allows the supply of green energy to be treated as a financial asset, making the supply of green energy something that energy suppliers can bid for, increasing competition and the amount of green energy supplied to the grid.

eSIMs can also help save utility companies money earlier on in the value chain. The ability to produce a single product and localise it in the field via eSIM ►



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can bring large efficiency gains on its own, but these are magnified with the use of an iSIM. Without the need for a separate component from the main system-on-a-chip (SoC), iSIMs can save metering companies on material costs of manufacture, as well as consuming less power than a standalone eSIM chip. This makes iSIMs particularly attractive for longer-term deployments, but in the short term will require the metering company to determine its connectivity relationships earlier in the device design and deployment cycle. However, the involvement of connectivity management in the overall device design process should be a priority in any case, as the data is valuable in many ways to both the meter manufacturer and the energy supplier. ■

Conclusion

eSIMs can provide a large number of benefits to the smart metering industry, bringing operational efficiencies to the energy grid, as well as giving utility companies and meter providers the tools they need to simplify both service provisioning and meter roll-out. However, the nature of smart meter deployments presents challenges that will require a change in many business models, which providers need to be prepared for to make the best use of this technology.

This is particularly important with future-proofing and the longevity expectations of the utilities industry. The need to have meters in the field for more than ten years presents a challenge for long-term connectivity and lifecycle management, with many companies struggling with the business models required for such long-term deployments. eSIMs can simplify this by allowing the connectivity and any attendant data provision to be offered on an as-a-service basis. This simplifies the inclusion of any additional data requirements, as with Energy Web's use of blockchain to record energy usage, because connectivity can be part of a more flexible form of service provision without affecting the overall deployment.



The world's first eSIM for secure data exchange for smart grids

How Kigen, KORE and EnergyWeb have enabled decentralised, secure data exchange for smart grid with embedded SIM (eSIM)

Building on IoT SAFE, Kigen's OPEN IoT SAFE offers a solution for Energy Web to use the eSIM as a hardware wallet anchored to an open-source, publicly accessible blockchain

Energy Web is a non-profit organisation focused on building open-source, decentralised operating systems to help decarbonise the global economy. Energy Web offers its open-source stack to organisations to build their applications, or Energy Web will assist organisations in developing applications of the open-source stack.

The EW-STACK is a suite of open-source tools built off the Energy Web Chain, the world's first public, enterprise-grade blockchain tailored to the energy sector. With this technology, the Energy Web community has grown into the world's largest energy blockchain ecosystem, developing 46 projects of impactful action in 21 countries for 41 partners.

As more IoT devices are deployed in the field and distributing energy assets becomes increasingly common, protecting the infrastructure security of these systems is of utmost importance. Energy Web wanted to provide a highly secure solution for energy assets that is just as simple as their EW-STACK when it comes to security at the device level.

Energy Web has partnered with Kigen, a pioneer in IoT security through eSIM and iSIM hardware and KORE Wireless, an MVNO, to implement the OPEN IoT SAFE based solution

Three methods to achieve security

Targeting aggregators and original equipment manufacturers (OEMs), Energy Web identified three methods of storing private encryption keys within a device - firmware, which is not safe and easy to tamper with; or an embedded secure element or trusted platform module (TPM), which would place the onus on OEMs to add integrated circuits and that was a burden Energy Web didn't want to pass down.

The **GSMA** initiative IoT SAFE addresses how the SIM or eSIM can be employed as a secure hardware element for chip-to-cloud security. It still needs to go further to meet the needs of OEM and aggregators. Building on IoT SAFE, **Kigen's** OPEN IoT SAFE offers a solution for Energy Web to use the eSIM as a hardware wallet anchored to an open-source, publicly accessible blockchain.

Energy Web has partnered with Kigen, a pioneer in IoT security through eSIM and iSIM hardware and **KORE Wireless**, an MVNO, to implement the OPEN IoT SAFE based solution, which is an open-source method for third parties to use Energy Web cryptocurrency features to store their private encryption keys and sensitive credentials in the crypto-safe enabled through OPEN IoT SAFE infrastructure.

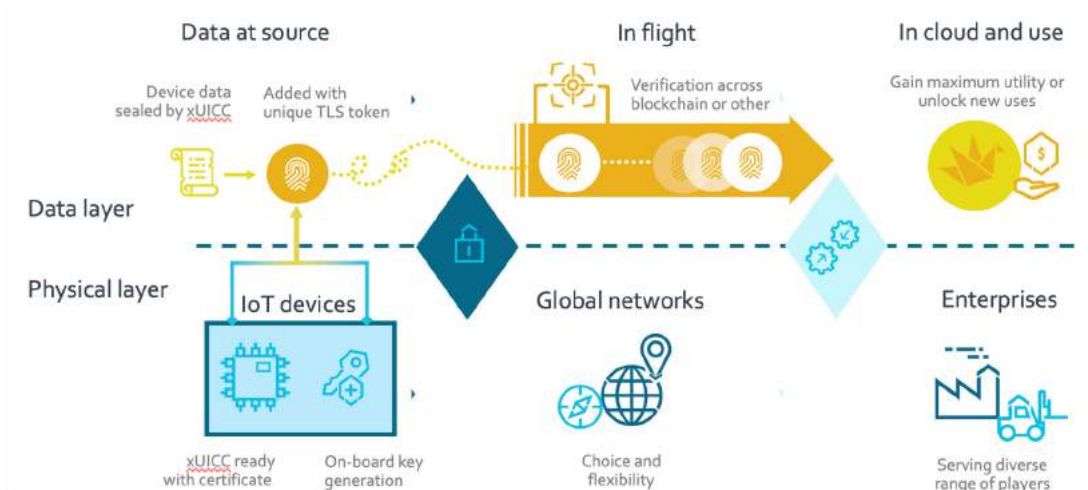
This provides the device with the same kind of tamper-resistant protection as the storage of authentication credentials used at the network level. It also secures data communications at the packet level and, as Energy Web operates in a blockchain environment, the solution offers a decentralised approach to device-level security.

The result

This opportunity, created through the partnership of Kigen and KORE and used by Energy Web, is a means by which an enterprise can essentially own the SIM card. Before eSIM and integrated SIM (iSIM), SIM cards were removable and treated primarily as property of the mobile network operator (MNO) distributing the SIM connected to its network. ▶



Kigen OPEN IoT SAFE Overview



Now it's an open platform that allows the organisation delivering the use case to own the SIM for its purposes. Specifically, in the case of Energy Web, OPEN IoT SAFE enables an enterprise - a third party - to store its credentials and own the encryption key, which genuinely makes this a multi-tenant solution.

OPEN IoT SAFE initiates a secure channel, based upon (datagram) transport layer security ((D) TLS), using credentials - a private key - stored in the OPEN IoT SAFE applet to sign as part of the handshake. Then, once the secure channel is established, Kigen also plays an additional role in authenticating transactions by signing them with its private key, held in IoT SAFE, and sharing

Kigen-signed transactions back to the validation nodes for verification.

Organisations using Energy Web's technology can build their applications via the world's first open-source technology stack focused explicitly on the energy transition towards efficiency and renewables. This enables the ability to provide information to third-party IoT providers via a SIM card which in-builds device-level security and can authenticate data for a user's cloud service.

Securely communicating data at the packet level and authenticating transactional data flowing through the secure channel is a significant step toward creating end-to-end security. ■

Organisations using Energy Web's technology can build their applications via the world's first open-source technology stack focused explicitly on the energy transition towards efficiency and renewables

To find out more about OPEN IoT SAFE and this solution available to all smart grid players, contact Kigen at: <https://kigen.com/contact-us>

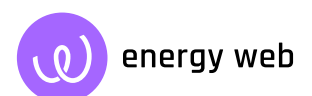
About Kigen
 At Kigen, we are making the future of securing connectivity simple. As simple as can be. Together with our partners and customers, we are at the forefront of unlocking a new era of secure IoT as Integrated SIM (iSIM) and eSIM becomes the mainstream choice for connected devices. Our industry-leading SIM OS products enable over 2 billion SIMs. Our GSMA certified remote SIM provisioning and eSIM services drive this momentum, placing us among the top 5 SIM vendors globally. As an Arm founded company, we bring an ecosystem approach to driving innovation and collaboration. For more information, go to kigen.com or speak to us on [@Kigen_Ltd](https://twitter.com/Kigen_Ltd) on Twitter and LinkedIn about [#futureofSIM](https://twitter.com/futureofSIM).



About KORE
 KORE is a pioneer, leader, and trusted advisor delivering mission-critical IoT solutions and services. We empower organisations of all sizes to improve operational and business results by simplifying the complexity of IoT. Our deep IoT knowledge and experience, global reach, purpose-built solutions, and deployment agility accelerate and materially impact our customers' business outcomes. For more information, visit www.korewireless.com.



About Energy Web
 Energy Web is a global, member-driven nonprofit accelerating the low-carbon, customer-centric energy transition by unleashing the potential of open-source, digital technologies. We enable any energy asset owned by any customer to participate in any energy market. The Energy Web Chain — the world's first enterprise-grade public blockchain tailored to the energy sector — anchors our tech stack. For more information, visit www.energyweb.org.





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.



IoT Inspire Zurich
 9 June 2022
 Zurich, Switzerland
<https://www.iot-now.com/event/iot-inspire-zurich-2022>



IoT Evolution Expo 2022
 21-24 June 2022
 Fort Lauderdale, Florida, USA
<https://www.iot-now.com/event/iot-evolution-expo-2022>



IEC 62443 Week 2022
 13-17 June 2022
 Edinburgh, UK
<https://www.iot-now.com/event/iec-62443-week-2022>

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



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



The Edge Event 2022
 15-16 June 2022
 London, UK
<https://www.iot-now.com/event/the-edge-event-2022>

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

IMC Summer IoT Days: Transforming Technology Focus
 15-16 June 2022
 Virtual Event
<https://www.iot-now.com/event/summer-iot-days-transforming-technology-focus>



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

IoT at the Edge: Enabling the Real Time Enterprise



aping the IoT future

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

94% expect to implement edge by 2025

81% expect edge to improve operations by 2025

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

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

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

For **27%** regulations require local control

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

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

Chief Operating Officer
Edge Computing Virtualization and Orchestration

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

What does this mean for enterprise use of IoT?

What does it mean for use of IoT connectivity?

What part does 5G play in this?

What does it mean for security of IoT solutions?



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