

# IoT Now Enterprise Buyers' Guide Which IoT Platform 2021?



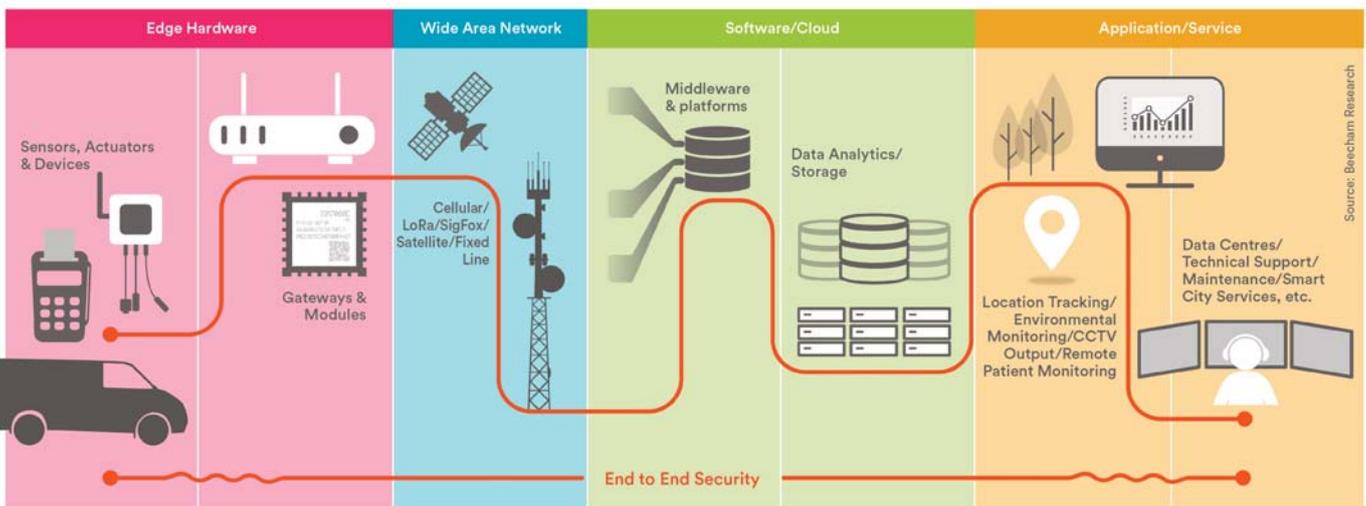
SPONSOR





# IoT Now Enterprise Buyers' Guide - Which IoT Platform 2021?

There are several different parts in a complete IoT solution, all of which must work together to get the result needed, write IoT Now Enterprise Buyers' Guide - Which IoT Platform 2021? authors Robin Duke-Woolley, the CEO and Bill Ingle, a senior analyst, at Beecham Research. Figure 1 shows these parts and, although not all of them are necessarily required for any particular solution, most are and there may be many alternatives for each depending on what is needed



**Figure 1: Typical parts of an IoT solution**

This illustrates that an IoT solution covering just one major application is likely to have several moving parts and can be quite complex to construct. It follows that a solution that needs to cover several applications is likely to be more complex still, with more moving parts and more challenges to overcome in order for it to operate effectively. The IoT platform sits within the IoT solution in software/cloud and manages each part. Here is a bit more about each of these parts:

### 1. Edge hardware

#### Sensors, actuators, devices

Hardware, at the edge of the network, are the things of IoT. These are equipped with sensors that gather data which will be transferred over a network, or as intelligent devices they

have an embedded processor from which useful data can be gathered. This category may also include actuators for control applications, for example, opening and shutting a door or opening and closing a valve in an industrial application.

#### Gateways

These provide an aggregation point for the data from the things and connectivity to the wide area network. They are connected to the things using a variety of connectivity alternatives, such as LoRa, Wi-Fi, Bluetooth, mesh and fixed line. Aggregated data is sent for analysis and the gateway may pre-process data first. Field gateways are located near the remotely located objects. A cloud gateway facilitates data compression and secure data

transmission between the field gateways and the cloud IoT servers. It also ensures compatibility with various protocols and communicates with field gateways using different protocols.

A gateway may enable data preprocessing and filtering before moving it to the cloud, for example to reduce the volume of data for detailed processing and storing and for edge compute requirements. A streaming data processor ensures effective transmission of the input data to a data lake, and to control applications.

#### Modules

Cellular modules, for example, when embedded in edge devices provide an alternative to gateways for single devices. ▶



## 2. Wide area network

A number of options are available regarding wide area connectivity technologies. They include:

### Licensed cellular wireless

2G and 3G are both legacy cellular options and subject to being discontinued depending on local mobile network operator (MNO) plans. 4G includes high bandwidth and low bandwidth low power wide area (LPWA) narrowband IoT (NB-IoT) and LTE-M options. 5G has similar options and will gradually supersede 4G, but not for a while.

All cellular options use either a standard subscriber identification module (SIM) card, a plastic card that must be physically inserted into the device, or a newer embedded/integrated SIM (eSIM/iSIM) solution where the SIM itself is embedded in the device during manufacture and updated over-the-air (OTA).

### Unlicensed LPWA wireless

LoRa, SigFox and others. Operating in unlicensed bands and offering low power, low data rate connectivity options

### Landline

xDSL, leased line. Fixed line alternatives

### Satellite

Operating in licensed bands and offering connectivity to locations literally anywhere worldwide, generally at higher cost than other wireless options.

## 3. Software/cloud

For any IoT solution involving remotely connected devices, where data is transmitted from or to the device, there are three key elements that must be managed:

**1. The connected device** may be one sensor measuring temperature, location or some other parameter or an asset such as a vehicle that has many sensors each measuring something different. Device management aspects may include device identity in the network, provisioning for use of the network and secure over-the-air update of device firmware. These and other related areas are part of device management.

**2. The connection** from the device to a server to which the data is transmitted for processing. That may be a short-range or long-range connection, wired or wireless, or a combination of both. The server may be at the network edge or in the cloud, or a combination of these for different needs. Some of the parameters that

need managing are: connectivity uptime, routing options, coverage, network protocol support and billing/usage. These and other related areas are part of connectivity management.

**3. The data generated** needs to be stored and processed using data analytics and storage capabilities – sometimes in real-time – either on its own or in combination with other data, to create information for the user application. Additional areas that need managing include: data workflow handling, visualisation, orchestration and data analytics. These and other related areas are part of data management.

In addition to these three elements is the user application that utilises the data created. This requires a further element – a development environment for creating and evolving the application over time. In addition, all of this must be carried out in a secure environment end-to-end so that the data can be trusted – the fifth element. This is becoming increasingly important as IoT applications become more mission-critical and essential parts of operations. IoT solutions operate in real-time, so any security compromise represents an immediate risk. Security needs to bind together all the other elements so that potential attack surfaces are minimised.

These five elements are the essential layers of an IoT platform that form the heart of an IoT solution. As illustrated in **Figure 2**, they form a stack that sits above the sensors and network infrastructure and below the user applications. Since device management requires the connectivity to be in place before it can function for remote devices, it sits above connectivity management.

IoT platforms have been created for the express purpose of reducing the time and cost of getting new IoT solutions built and implemented. They take advantage of the fact that the majority of what is needed in IoT solutions is the same and does not need to be redeveloped for every application. This is particularly the case at the connectivity management layer, which is essentially a series of connectivity-related features that are independent of the data running through the connection. As a result, such features can be applied horizontally across many different sectors. On the other hand, this is less the case at the application development layer for example. User applications tend to be specific to a particular vertical and often require more customisation. ►

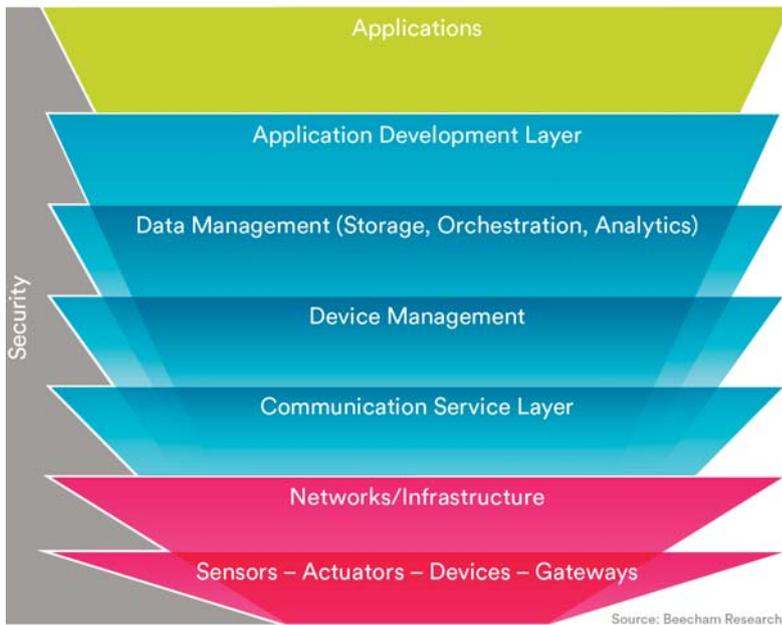


Figure 2: Architectural view of an IoT platform, as part of an IoT solution

As a result, the vast majority of platforms available do not cater for all layers, at least not yet. For example, providing connectivity services is a completely different task from application development or the detailed analytics of device data. Each platform vendor has their own expertise.

To some extent, this is why there are so many IoT platforms on the market – well over 600 at this time. Some have a narrow market focus and specialise in particular application areas – such as smart city, smart energy or smart home – while others provide a more horizontal capability that aims to satisfy requirements across a wider range of vertical sectors. In reality, what has been found is that those with a narrow market focus typically have less customisation to do for any one project. On the other hand, those with a more horizontal platform often find more customisation is required. Either approach is still far preferable to building a new platform from scratch for each new IoT solution required.

In addition, there is an increasing need for IoT solutions to share data from different sectors. Smart city is one example, where data from public safety, transport and buildings sectors may need to be brought together to form an overall view. The IoT platform needs to cater for that.

More recently there is a growing need for some data to be processed at the edge – near the devices collecting the data – with some data then being forwarded to the cloud. This is particularly the case where artificial intelligence (AI) is required in real time for operations activities. All of this needs to be catered for by the IoT platform, which must therefore be capable of evolving over time.

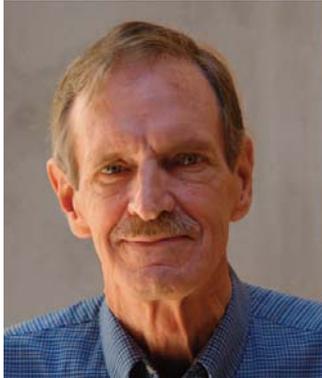
4. Applications/services

**User applications** are software components of an IoT solution, through which business users are connected to the solution with the aim of monitoring and controlling their things, usually in near real time to achieve a real business outcome. Users can analyse operations and send commands to control applications or set options for automatic behaviour by triggering predefined actions on receipt of certain data from sensors. As noted earlier, such applications are often required to evolve over time as business conditions change or as operations evolve and new data needs to be considered.

For more information on planning your IoT solution, see Beecham Research's new 100+ page report – How to Succeed with IoT. Available to download free of charge at [www.succeedwithiot.com](http://www.succeedwithiot.com).

Beecham Research's Platforms to Watch 2021

The hundreds of IoT platform providers, which comprise all of the largest ICT companies, cloud providers, telcos, system integrators and hardware OEMs make up a varied market with wide choice. If a large company in this space doesn't have its own IoT platform, it will inevitably acquire one, demonstrated by deals such as **Twilio's** acquisition of **Electric Imp**, or partner with one that does or offer a white-label version of another company's platform. ▶



**Bill Ingle**  
Senior analyst  
**Beecham Research**

IoT platforms are also offered by cellular module manufacturers, vertical specialists, and as always, new start-ups. Some of the companies that offered M2M platforms long ago still exist, staying current with ever new features and using the IoT acronym; others were acquired – surprisingly, relatively few platform providers have gone out of business. A major factor is the continuing increase of IoT connections as IoT expands, with new applications arising in every vertical sector and vast numbers of smaller companies adopting IoT.

IoT cloud platforms continue to gain market share, especially those offered by the major cloud providers.

It's hard to keep up with the full featured IoT cloud platforms offered by cloud leaders **AWS** and **Microsoft** – features are being continuously added to both AWS IoT Core and Microsoft's Azure IoT. At a time when data analytics, machine learning, and AI are being increasingly used in IoT and cloud to edge has become a frequent phrase, these platforms have an inherent advantage. Each has edge offerings – AWS IoT Greengrass and FreeRTOS, Azure IoT Edge – that complement their cloud services. AWS now has integrated voice technologies. See also AWS IoT Core for LoRaWAN.

Cloud to edge capabilities are also featured in platforms offered by cellular module manufacturers **Sierra Wireless** and **Telit**, with Octave and OneEdge, respectively, in their platform offerings, although edge to cloud might be more appropriate. As cellular connectivity experts, both companies have years of experience with IoT solutions. Cellular and positioning module manufacturer **uBlox** acquired IoT communication-as-a-service **Thingstream** and its platform last year. Also cloud-based is **FloLIVE's** Global Connectivity Management Platform.

Softbank-owned **Arm** announced the setting up of its **Pelion** IoT platform as a separate

subsidiary company, as well as related enterprise customer data platform **Treasure Data** and eSIM/iSIM OS unit **Kigen**, last year, before announcing a merger with **Nvidia** that is now awaiting approval. Pelion united Arm's mbed IoT device management platform with the connectivity management platform of **Stream Technologies** (acquired in 2018). Looking further at connectivity, See also **Eseye's** AnyNet Connectivity Management Platform that has a particular focus on multi-international mobile subscriber identification (IMSI), embedded universal integrated circuit card (eUICC) and eSIM.

## Some newer IoT Platforms

Glen Park, California-based **Particle** offers an IoT platform featuring connectivity and device management and a range of hardware to work with it, including development kits, production modules, and asset tracking devices. It just announced **EtherSIM**, which provides cellular access for devices on its platform to more than 350 cellular global carriers, automatically switching networks as necessary. Fees are included in its platform subscription – there are no separate charges for connectivity.

**Insight Direct Worldwide**, a large IT services and system integrator provider in business since 1998, now offers the Insight Connected Platform. Insight's huge ecosystem, with more than 3,500 partners, is worth taking into account when looking at this platform.

A cloud-based telematics IoT platform is at the heart of start-up **Autocavo's** fleet management solution. Fleet tracking and management solutions have existed for decades, but customers tend to be large trucking and freight concerns with major resources. What about smaller firms with much smaller fleets? Autocavo has seized the opportunity presented by changing technology to offer its affordable cellular-based fleet solution. ■



## Company profile: Eseye

Robin Duke-Woolley, the chief executive of Beecham Research, speaks to Paul Marshall, the chief customer officer and co-founder at Eseye, to understand how the company has developed and to learn about its platform propositions

**Robin Duke-Woolley: Can you start with a bit of background on Eseye's history?**

**Paul Marshall:** My background, and that of co-founder Ian Marsden, was in ZigBee, which provides short range connectivity between devices. We recognised that the ability of devices to employ wide area connectivity was going to change the way that businesses were going to operate. This development was driven by chipset technology that made it economic to embed connectivity in devices. It was clear that the business value of device connectivity was going to outweigh the cost. However, for regulatory and historic reasons, wide area cellular connectivity as

provided by mobile network operators (MNOs) is country-centric, which made it hard to deploy IoT devices globally and thereby realise the full potential of the IoT. That was the start of Eseye's journey back in 2007 and why we developed our AnyNet next generation embedded universal integrated circuit card (eUICC) and multi-international subscriber identification (IMSI) SIM and our Connectivity Management Platform.

**RD-W: How has that journey progressed?**

**PM:** It's no secret that many organisations have historically struggled with IoT devices and creating their IoT ecosystem. We set out to ►

SPONSORED PROFILE



simplify this too. We developed in-house specialist device expertise and our own IoT hardware, plus we have developed key partnerships with the likes of **AWS** and **Thales**, with a view to simplifying the IoT journey from device to cloud.

In terms of connectivity – we launched the AnyNet Federation, which brings together the largest network of leading mobile network operators (MNOs) and localisation options available in the IoT connectivity market. We can seamlessly localise to over-the-air, thanks to our subscription manager, secure routing (SM-SR) and other unique technology – providing organisations with near 100% reliable connectivity.

Ultimately, organisations want their IoT connectivity to be easy and seamless. Our solution was designed to be almost invisible and to remove the pain points that so many organisations have previously encountered. Reliable and seamless global connectivity is why we are currently working with four of the top ten in the Global Fortune 500.

**RD-W: So why is localisation important?**

**PM:** More and more networks around the world are introducing restrictions for IoT devices permanently roaming onto their network, which makes it extremely challenging for organisations to deploy devices in multiple countries for any length of time. These roaming restriction changes can also be implemented at short notice, meaning if there is no fall back connectivity solution then the device could be disconnected. However if the connectivity service can be localised to a network, meaning the SIM looks just like one of the operators, then it is treated just like a local operator SIM and the issue of permanent roaming restrictions can be avoided. We do this by transferring new mobile network profiles that match the local network requirement over the air. The new profiles are stored on regular eUICC SIMs that employ our unique multi-IMSI technology. As a result, the SIM can be localised while retaining multiple fallback options from a choice of over 700 mobile networks around the world. These options are provided by our AnyNet Connectivity Management Platform. Because Eseye has its own

SM-SR, we can manage the entire profile transfer process between MNOs and offer a seamless global connectivity solution to our customers.

**RD-W: Is latency an issue that you have seen in the market?**

**PM:** It certainly can be. There are countless areas where latency could cause problems with the data the IoT solution is trying to capture or a service the solution is trying to provide. One area, for example, is commercial transactions, such as vending machines and contactless payment terminals. There is a certain amount of time that users are prepared to wait for a transaction at a remote terminal to be completed before it becomes an irritation. Transaction delays due to latency in the communication can build up because there are several back-and-forth messages to authorise a payment. Wherever possible, that delay needs to be minimised.

**RD-W: How does Eseye deal with this latency issue?**

**PM:** We have ten data centres deployed around the world. Those provide egress to the internet close to the customer’s cloud or private data facility, thereby minimising latency. Being able to localise a SIM to the appropriate network of choice not only reduces latency, it also improves connectivity resilience and boosts uptime. It also serves to future proof the deployment of the device network.

**RD-W: How would you summarise the company’s connectivity solution?**

**PM:** Eseye offers an agnostic, eUICC compliant IoT hardware and connectivity service from idea to outcome that utilises localisation options to deliver the highest quality of service. This includes having an abstracted virtual mobile network that sits above any mobile network operator to provide high levels of connectivity service provision – as close to 100% availability as possible. We provide a tailored, zero-touch out-of-the-box IoT-enabled solution as a service to enterprises deploying devices anywhere in the world. We make connectivity invisible. ■

[www.eseye.com](http://www.eseye.com)



## ***Internet of Cranes provides intelligent control through real-time data***

The monitoring and maintenance of crane fleets have traditionally involved the operator fielding a team of technicians who – armed with tool bag and logbook – needed to travel to the site to carry out the necessary work, often responding reactively to incidents



The Fassi-F545RA2.2.6-xe-dynamic

***Combining localisation and roaming partners, Eseye has access to more than 700 networks, and holds roaming contracts with all of the world's major mobile phone operators covering 190 countries***

A leading manufacturer of articulated and hydraulic cranes, **Fassi Gru**, has customers all over the globe and the ability to produce 12,000 cranes on average per year. As a pioneer in its sector, it has always sought to create innovative services to support operators. In 2015, Fassi began developing a unique system that would take advantage of IoT technology to provide intelligent control for the remote management of cranes, by making all information related to operation, performance and status available in real-time.

The goal of the system – christened the Internet of Cranes (IoC) – was to enable operators to create efficiencies and improve crane performance. Remote access to vital data would enable rapid response diagnosis and assistance, from either the operator or the Fassi support team, and swift resolution of malfunctions.

Fassi Gru needed hardware and connectivity expertise to bring this dedicated IoT system to life, so turned to cellular connectivity specialist, **Eseye**, and IoT solutions provider, **Micro Systems**, for design, development, and deployment support.

### **Open dialogue between operator and crane**

Fassi's vision for its IoC system was that operators should have up-to-the-minute data at their fingertips, and the ability to rely on a permanently active assistance service. This required constant, dependable internet connectivity.

This was a challenge: Fassi has customers in all corners of the world, and its cranes are operating in myriad demanding operational environments. When the IoC project was initiated, cellular coverage was fragmented across the globe – with a mix of 2G and 3G networks, and carriers using a range of communication frequencies. The network management task involved would be monumental.

Fassi needed to find a reliable, ubiquitous connectivity solution with a single IoT data gateway and a single SIM card that would enable its cranes to communicate wherever they were deployed in the world. In addition to simplifying management, this would allow it to standardise on one IoT board instead of having to manufacture several regional versions. ▶



### Seamless global cellular connectivity

Already a long-term systems integrator partner of Eseye, Micro Systems partnered with Eseye to take advantage of its AnyNet SIM cards with multi-international mobile subscriber identification (IMSI) technology to deliver the universal connectivity required to operate Fassi's IoC system to its full potential, through a single device.

Combining localisation and roaming partners, Eseye has access to more than 700 networks, and holds roaming contracts with all of the world's major mobile phone operators covering 190 countries.

The global mobile network alliance Eseye has built allows it to offer the widest range of interconnects and provide the most comprehensive localisation strategy in the IoT market today. This grants the AnyNet SIM the unique ability to connect directly and automatically to the best available network.

The bespoke electronic board designed by Micro Systems is fitted with a **Thales Cinterion** UMTS 2G/3G cellular module with GPS, which is connected to the web by Eseye's AnyNet SIM card. The SIM is installed directly on the board during the production phase, and easily activated by the end customer.

The board also has an integrated shock detection sensor via accelerometer, as well as an SD card for storage of firmware updates and software update of the crane control unit. The board control software collects data from the crane's control unit, interfacing via control area network (CAN) communication, then transmits it to the **AWS** data cloud server. The cloud server collects and securely stores data from the entire Fassi machine fleet around the world.

A dedicated web portal allows operators and the Fassi support centre to view and manage the data from each crane. The integration of Eseye's SIM Information and Account Management (SIAM) portal allows the operator and Fassi to monitor SIMs in a single virtual space - including details on the activation/suspension date, phone number, monthly traffic and location. Eseye provided device onboarding services and rigorous connectivity testing to ensure Fassi's IoC system could be deployed, managed and supported successfully.



Fassi Gru's F65 crane

### Optimised operation across the entire fleet

Through the development of its Internet of Cranes, Fassi Gru has been able to offer operators around the world an exceptional value-add service that enables them to monitor their machines remotely, in real-time.

#### Benefits include:

- **Improved performance and uptime**

Immediate access to usage statistics brings operators a more accurate knowledge of their machines, with a full understanding of how they're being used, how they're performing, and their condition.

The availability of detailed usage data supports predictive maintenance and estimate of residual life, as well as the planning of scheduled maintenance. Fassi's support team can monitor cranes during operation on request, to provide rapid remote diagnosis and assistance to resolve breakdowns and malfunctions.

- **Greater efficiency**

Operators have been able to move from a scenario where maintenance was carried out in person by technicians to one where information is verified and managed remotely by a single operator.

- **More precise control**

Operators can remotely set and modify crane parameters, such as the electronic moment limiter, and monitor safety. Real-time tracking of a crane's position means they can pinpoint its location in case of theft.

- **Low technical burden and simplified operations**

For the end customer, no configuration of the AnyNet SIM is required - they simply activate connectivity when they start using the IoC service. The fully GSMA-compliant AnyNet SIM has a single stock keeping unit (SKU) code, making it easier for Fassi to track inventory and deploy its IoC in all territories.

"With the Internet of Cranes project, we wanted to propose a product innovation that moves towards a service logic that actively involves crane operators during the support phase of their machines," says Roberto Signori, the R&D manager at Fassi Gru. "Fassi Gru was the first company in the world to develop a remote diagnostics solution, by connecting the articulated cranes to our technical assistance via the internet." ■

[www.eseye.com](http://www.eseye.com)

# Planning an IoT project? **Start here.**

Get the **Ultimate Buyer's Guide to IoT**.  
Everything you need to know about  
planning, developing & implementing  
an IoT project.



**No limits.**

[info.eseye.com/IoTGuide](http://info.eseye.com/IoTGuide)



## Company profile: floLIVE

Robin Duke-Woolley, the chief executive of Beecham Research interviewed Asaf Gigi, the vice president of marketing at floLIVE to learn more about the company and its IoT platform offerings

**Robin Duke-Woolley: What does floLIVE offer that sets you apart from other market players in the IoT market?**

**Asaf Gigi:** Let's start with the technology. Our technology is completely our own. We developed every line of code, every software stack, and we don't rely on third parties for any of the four key components – our core network, business support systems (BSS), SIM management and connectivity management. The fact that we own this technology gives us greater flexibility in our deployment and the business models we can accommodate, which are very unique in today's IoT industry. The entire platform is software and when we say software-defined connectivity, it goes down to bare software infrastructure, built on microservices.

**RD-W: Can you explain what you mean by microservices?**

**AG:** You can look at a microservice as a system, or a function, that exposes a well-defined REST application programme interface (API). When another function or component wants to make use of this function, they simply call the API. This means that if we want for any reason to take out some of the functionality and replace it with a partner, with a customer, with any third party, it's very easy to do. You take the microservice out and you can replace it with another one, without impacting the rest of the service.

**RD-W Can you say more about how this works in practice? ►**

SPONSORED PROFILE



**What's unique about our offering is our ability to use floNET to extend the global reach of MNOs to areas in which they do not have a roaming agreement**



**Asaf Gigi**  
floLIVE

**AG:** We have four main elements – building blocks for our core solution stack. Our core network which is for 2G-5G, narrowband-IoT (NB-IoT) and beyond. Our BSS, which covers our online charging, billing, rating engine, product catalogue and invoicing. Our SIM management, which is highly efficient and includes over-the-air (OTA) remote provisioning and multi-international mobile subscriber identification (IMSI) management, and lastly our connectivity management, which overlays all of these, and orchestrates and streamlines the whole operation.

These are all based on the same software infrastructure; all built on microservices. We took these four main elements and created two types of offering. The main offering is what we call the floNET service. For this, we installed core networks in different regions of the world – the US, Europe, Africa, Latin America, Asia and so on. The fact that we own this technology means we have no licences – we can deploy it anywhere and the only cost would be the cost of the hardware where it is hosted.

We went and deployed these core networks in different parts of the world and in each region we have an agreement with the local operator – the local MNO – that allocates a subset of its IMSI range to that core network. Take **China Telecom** for example, **Telecom Italia** or **MTN** – they allocate a range of IMSIs, and these IMSIs are hosted, managed and controlled in our floNET core networks. In essence, we created an array or a distributed network of local core networks, each hosting a local IMSI range. With these local cores, we can offer many advantages over working with multiple partners, such as the ability to provide robust and innovative self-care capabilities, real-time billing and charging, and proactive troubleshooting, all because we're managing the infrastructure from end-to-end ourselves, so we can pass on that visibility and control.

All of these core networks are managed over the cloud, and in the cloud we have the rest of the elements. These are all exposed as a service. In each region we offer a full core that's needed for domestic service; these networks will soon support 5G as well.

<http://fjolive.net>

**RD-W: If the floNET service is the first of two offerings, what is the second?**

**AG:** The second offering is floCONTROL. This is an IoT platform typically for MNOs and mobile virtual network operators (MVNOs) but also for enterprises and product manufacturers, particularly those with global deployments of connected devices. In many cases it's an on-premises deployment of the full IoT platform.

What's unique about our offering is our ability to use floNET to extend the global reach of MNOs to areas in which they do not have a roaming agreement – we offer them seamless extension using their own SIMs with no capital investment on their end.

**RD-W: With your modular approach, do customers have the opportunity to mix and match with their own systems?**

**AG:** Yes. A mobile network operator (MNO) may say "I have my own core and I'd like to keep that" or "I have my own invoicing system and I'm already invoicing my customers." In this case, we simply take out the microservices related to invoicing and substitute with the MNO's system. This is one aspect of providing software-defined connectivity, and it delivers exactly the benefits we spoke about earlier.

**RD-W: The development of the software in the first place must have been quite a substantial investment and must have taken some time to do?**

**AG:** Yes, we have been in the business for about 15 years. The core network had already been serving MNOs and mobile virtual network operators MVNOs for over a decade; it's a very mature technology. For example, the telco-grade BSS technology was developed by billing experts, so there is strong expertise in that area. Today our network operations centre (NOC) is managing around 26 different core networks in different parts of the world, all essentially managed and controlled, orchestrated – so the platform we have created is quite unique. ■

# Your Customers Aren't One Size Fits All. Why Should Your Connectivity Be?



Campus network  
with serious security,  
privacy, or latency  
needs?

**Private Core and  
Private RAN**

Logistics or tracking  
solution that relies  
on mobility?

**Private Core and  
Public RAN**

Looking to enforce  
requirements across  
multiple locations?

**Global Private  
Network**

Connect with us to learn about our 5G Network Solutions  
[info@folive.net](mailto:info@folive.net) | [www.folive.net](http://www.folive.net)

flo.  
LIVE



## Company profile: Twilio

Robin Duke-Woolley, the chief executive of Beecham Research, spoke to Tobias Goebel, the principal product marketing manager for IoT at Twilio to learn more about the company and its approach to IoT platforms

**Robin Duke-Woolley: Twilio is known for its communications application programme interfaces (APIs). What made you enter IoT and what is your vision for it?**

**Tobias Goebel:** Twilio set out to help democratise access to communications technologies, now at the fingertips of any developer that can call an application programme interface (API). Today, we have achieved massive scale in communications – more than 100 billion messages, over 25 billion phone calls, more than one trillion emails go through Twilio each year.

The move to IoT is fueled by the same desire, to help democratise access to communications

technologies. This time it is about communications with things.

Our vision is to make the physical world programmable. Just as we did with human-to-human communication, we want to empower developers to turn problems of the physical world into software problems so that we can unleash the creativity of the developer community.

**RD-W: What were some of the issues or challenges you saw in IoT and how does Twilio IoT address them in a unique way?**

**TG:** We saw that a huge challenge was getting reliable cellular connectivity for devices – especially when they are leaving your home ▶

SPONSORED PROFILE



***Our Super SIM product comes in all form factors, from standard size to micro and nano, but also pre-soldered, such as MFF2***

territory. That includes testing and prototyping, deploying internationally with low data latency, and managing connectivity without the hassle of manual work such as emailing spreadsheets of SIM IDs to mobile network operators (MNOs).

To address these issues, we built Twilio Super SIM, our cellular IoT connectivity platform, going to general availability this summer. With Super SIM, we offer powerful APIs to developers. IoT device builders will be able to provision new SIMs and manage fleets across a large array of roaming networks through a single SIM, and therefore a single product stock keeping unit (SKU), but without the contractual bindings and headaches of managing multiple MNOs for different regional connectivity needs.

IoT use cases such as fleet or asset tracking rely on having consistent connectivity when moving. Our communications products rely on the Twilio Super Network that collects, consolidates and delivers hundreds of networks across the world as a single reliable and resilient global communications network – with multiple redundant network paths, allowing us to complete more than 14 million calls and messages per month that otherwise could have been lost.

Super SIM utilises the Twilio Super Network to provide access to more than 300 networks globally. But most importantly, we let our customers use our API or our web console to choose exactly which network to assign to which device or fleet of devices – in just a minute, and 24/7/365.

We built our own cloud-based Distributed IoT Mobile Core, distributed around the world and solely serving IoT use cases. We have deployed it in the US, Germany and Singapore, with Brazil and Sydney following. We can now provide much lower latency when devices are deployed internationally.

**RD-W: Who is the target audience for your IoT offering?**

**TG:** We target companies of any size who want to solve a business problem with an IoT solution, and IoT solution providers – including original equipment manufacturers (OEMs) – whose business is based on selling reliable IoT products and solutions.

Among the key industries for us are transportation and logistics for fleet and asset tracking, healthcare

for wearables, real estate for smart buildings and remote monitoring, micromobility, and energy for smart meters.

**RD-W: To what extent is eSIM part of your cellular connectivity offering now and in future?**

**TG:** Our Super SIM product comes in all form factors, from standard size to micro and nano, but also pre-soldered, such as MFF2. eSIM is also supported. eSIM/eUICC removes the dependency on physical SIM swapping, which reduces cost; but more importantly, it allows for more prototyping and experimentation with new business ideas, which should foster overall growth of the industry. Twilio offers Super SIM as an eSIM, and we chose to support the more customer-friendly consumer profiles architecture over M2M profiles, as that means zero vendor lock-in and full flexibility. The name consumer profiles is actually misleading, and we believe it is a better fit for IoT than the M2M model.

**RD-W: What's next for Twilio IoT?**

**TG:** There is so much more to simplify and democratise in IoT than just access to reliable and scalable cellular connectivity. We also need to help embedded engineers who are faced with solving foundational infrastructure problems before they can build solutions. So in addition to our cellular IoT connectivity platform, we invested in device builder platforms, by acquiring **Electric Imp** in late 2019. The team at Electric Imp has been helping businesses such as **Eaton** and **Pitney Bowes** connect previously unconnected hardware for years. That team has also enabled us to introduce our IoT professional services, IoT Accelerator.

A new hardware architecture, TrustZone by **Arm**, allows us to decouple firmware from the code that provides Internet connectivity. When this became available for microcontrollers (MCUs), we introduced a new platform for connected device builders with a focus on MCUs, Twilio Microvisor. Microvisor gives embedded engineers a simple way to get their device connected securely while leaving everything else in place as it was, so they can re-use any existing firmware code already in place. We now partner with **STMicroelectronics** and support its brand-new microcontroller, the STM32U5, with Microvisor. ■

[www.twilio.com](http://www.twilio.com)



# How Twilio's Distributed IoT Mobile Core powered contactless access during the pandemic

With half of US renters in 2019 under the age of 30, it's no surprise the demand for smart technology is on the rise. Surveys show these renters will pay more for smart apartments, electronic access and other digital amenities. With SmartRent, property managers can easily deliver these enhanced tenant experiences, while also adding operational efficiency and achieving cost savings. Better tenant experiences turn into faster rental close rates, longer lease terms and higher tenant retention

**SmartRent's** cellular-connected smart home solution brings locks, lights, thermostats, sensors and access control systems under a single enterprise application to help property managers more efficiently manage their assets and offer delightful experiences to their residents. Even during the pandemic, SmartRent scaled up to 850,000 connected IoT devices around the world. And this global scale was fueled by **Twilio's** Distributed IoT Mobile Core.

## What is a mobile core?

The mobile core is effectively the brain of a network. At a high level, the core runs processes to operate the mobile network and subscriber devices.

The mobile core determines if a device may attach or connect to the network. If the device is approved, then the mobile core passes data through the network to external networks and determines the path that the data takes as it moves around a country - or around the world. The mobile core also authenticates the subscriber identity module (SIM) inside the subscriber's device. After authenticating the SIM, the core authorizes various services for the user device, and allocates an IP address to the user device to route data traffic as mentioned above. All of this happens in a matter of milliseconds.

## What does this have to do with IoT?

IoT deployments demand more flexibility, control, monitoring and scalability than a carrier's mobile core can provide; after all, carriers initially designed and built their networks for our phones. In the world of cellular connectivity, there are two types of carriers:

1. Traditional carriers, or mobile network operators (MNOs)
2. Traditional resellers, or mobile virtual network operators (MVNOs)

A third type of provider is emerging: Cloud software companies who build and run their own mobile cores, dedicated to IoT, like Twilio.

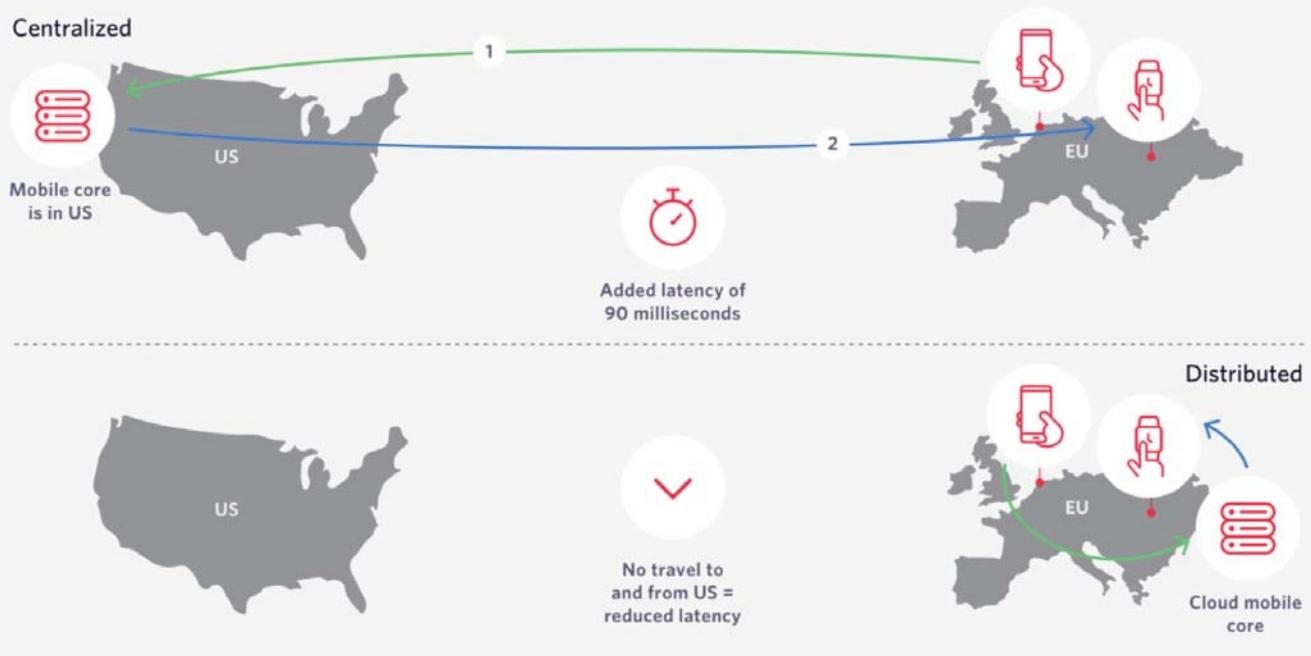
## What is a distributed IoT mobile core?

A distributed IoT mobile core is a virtual, cloud-based, pure-software mobile core architected specifically for the needs of IoT devices, and deployed globally with regional internet breakouts. Two of the biggest values of a distributed IoT mobile core are consistent device behaviour and low latency.

If you have a cellular IoT solution deployed in multiple countries, then you're probably used to modifying your device behaviour based on the underlying network characteristics. Distributed IoT mobile core eliminates the need for ▶

## SPONSORED CASE STUDY

**Figure 1: Distributed IoT mobile core vs centralised mobile core**



modifications and gives you consistent device behaviour across the world. This translates into lower operational overhead and a more seamless customer experience everywhere.

Now, let's say you're using a traditional carrier-owned mobile core physically located in the US, and that core is serving an IoT device physically located in Germany. The round-trip latency would be roughly 90 milliseconds. This is a significant problem for mission-critical IoT solutions. Now imagine the same IoT solution, but in place of a US carrier, you use a distributed IoT mobile core that is virtualised on a server in Germany. As you can see in **Figure 1**, compared to a centralised mobile core, a distributed mobile core orchestrating data greatly reduces round-trip latency.

**SmartRent optimises contactless access**

During the rise of the COVID-19 pandemic in early 2020, infections forced nearly every business to adapt quickly to shelter-in-place and social distancing protocols. In many cases, technology played a major role in those adaptations, and the real estate industry was no exception. Prior to the pandemic, walk-throughs with property managers and agents were commonplace. In order to keep operating, property managers and agents needed to give prospective tenants a way to tour properties while maintaining social distancing. In response to this need, SmartRent

utilised the Twilio Super SIM, a global cellular connectivity platform, to build and rapidly deploy an IoT-based electronic access and monitoring solution. This IoT-powered service empowers property managers to continue working with prospective tenants by giving them the option to view properties on their own, and optionally provide a self-guided tour functionality, making safe real estate transactions possible even during a pandemic.

SmartRent's technology consists of traditional smart home technologies including sensors, cameras, and door locks communicating via a centralised wireless hub. The hub allows property owners and managers to monitor properties for issues, while also allowing selective access to properties.

**Need for rapid and reliable access around the world**

There was just one problem for SmartRent. Its wireless hub needed to work out of the box, with simple installation, anywhere in the world. And it needed a cellular connectivity provider who could deliver a consistently high-quality tenant experience. Even seconds of latency on their devices would result in frustrated tenants, who may start calling the facility managers with complaints. SmartRent had to ensure that tenants did not have to wait outside apartments wondering why their apartment doors were not opening.

By using the Twilio Super SIM – powered by Twilio's Distributed IoT Mobile Core – SmartRent was able to deliver a trusted and fast customer experience. And since Super SIM is a multi-carrier platform with access to more than 300 networks via one SIM, SmartRent could also consider expanding their solution to new countries, without having to manage carrier relations.

"Super SIM with Twilio's Distributed IoT Mobile Core works seamlessly across the world," said Mitch Karren, the co-founder and chief product officer of SmartRent. "This has enabled us to expand to completely new geographic regions. Today we are operating our solution nationwide, with expansion efforts in Canada, Europe and Asia."

**Distributed IoT mobile cores are critical to IoT success**

When it comes to your IoT solution, the mobile core is a key component that can make or break your project. While your end users may not care about the mobile core, they do care that your IoT solutions work instantly and reliably.

Learn more about the role of Twilio's Distributed IoT Mobile Core and how it can help you meet the performance demands of an IoT solution in the white paper, Mobile Cores for the Internet of Things, here:

<https://tinyurl.com/47whya5d> ■

[www.twilio.com](http://www.twilio.com)

With Super SIM,  
you can connect

Wearables

Field Tablets

Utility Meters

**Buildings**

Vehicles

Healthcare Devices

Assets



Learn more by visiting [twilio.com/supersim](https://www.twilio.com/supersim)