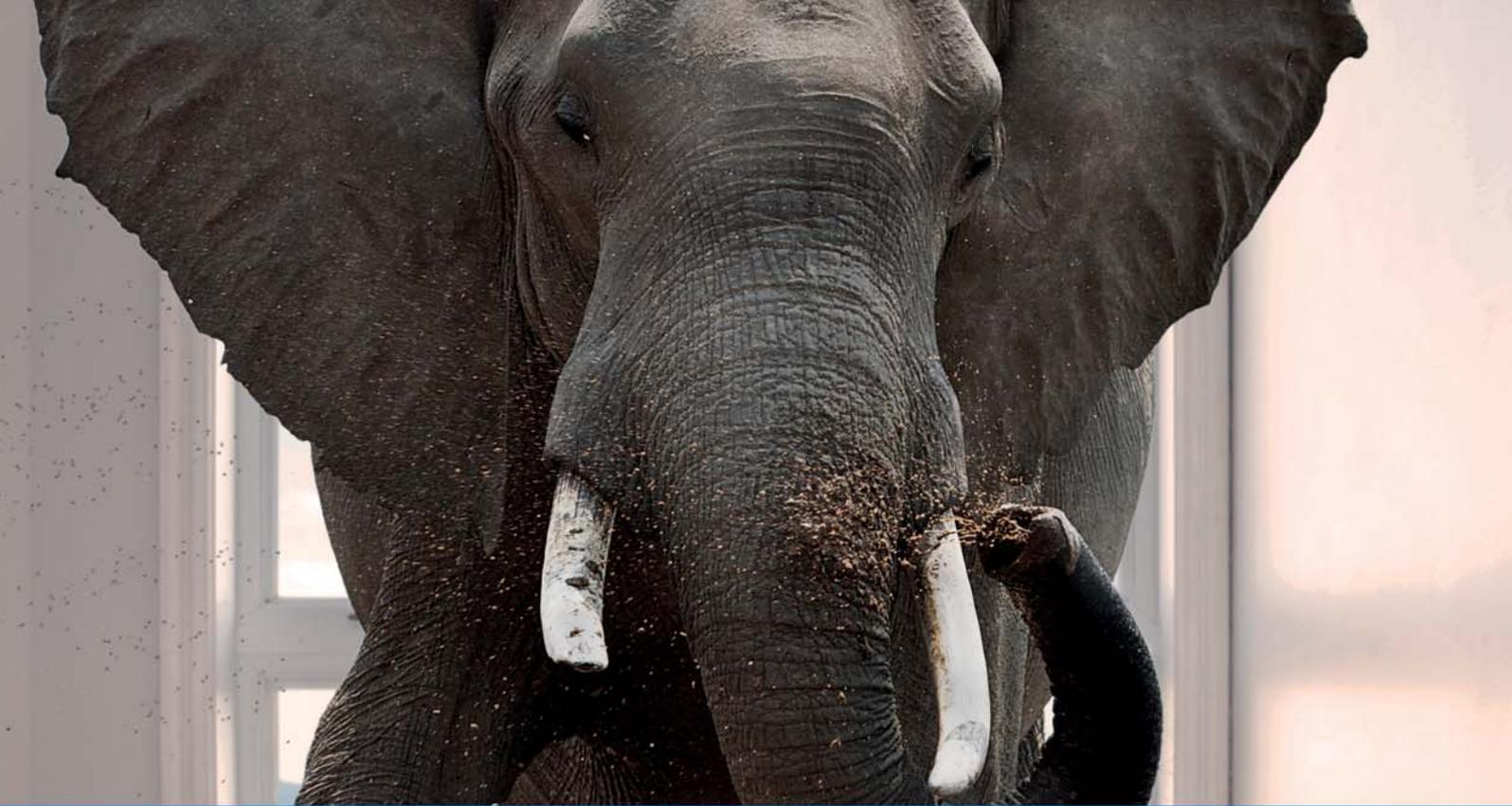


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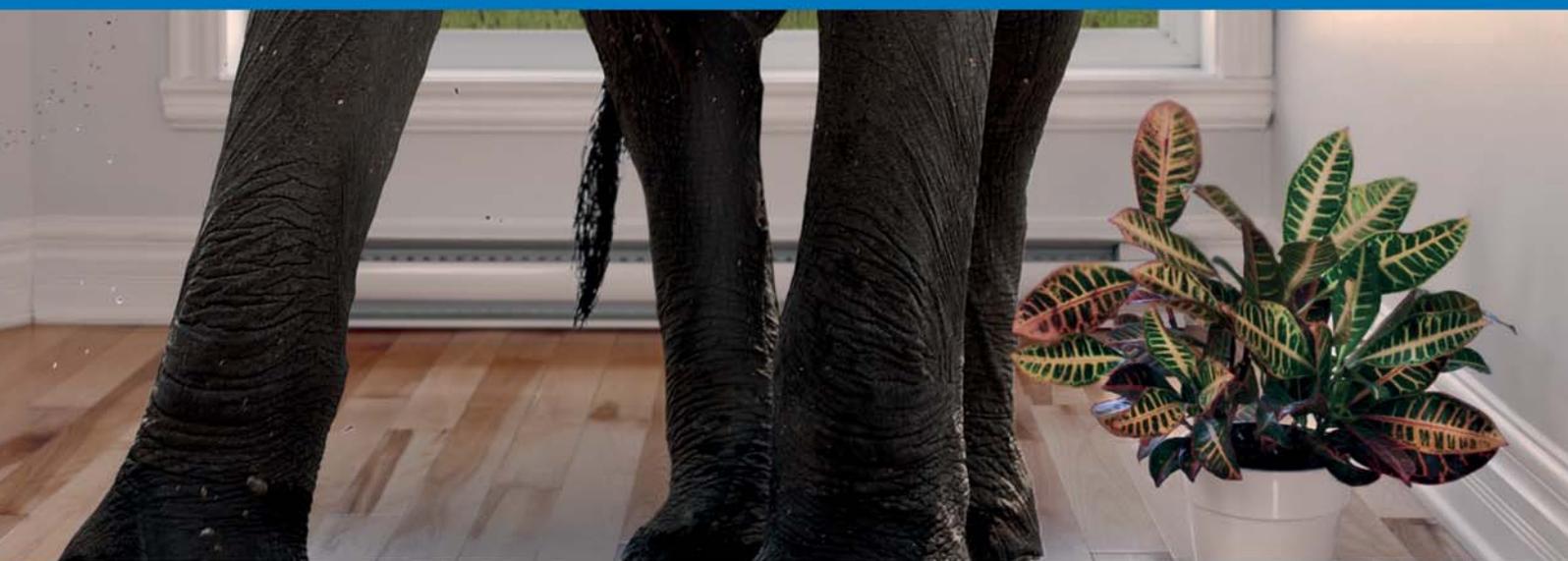
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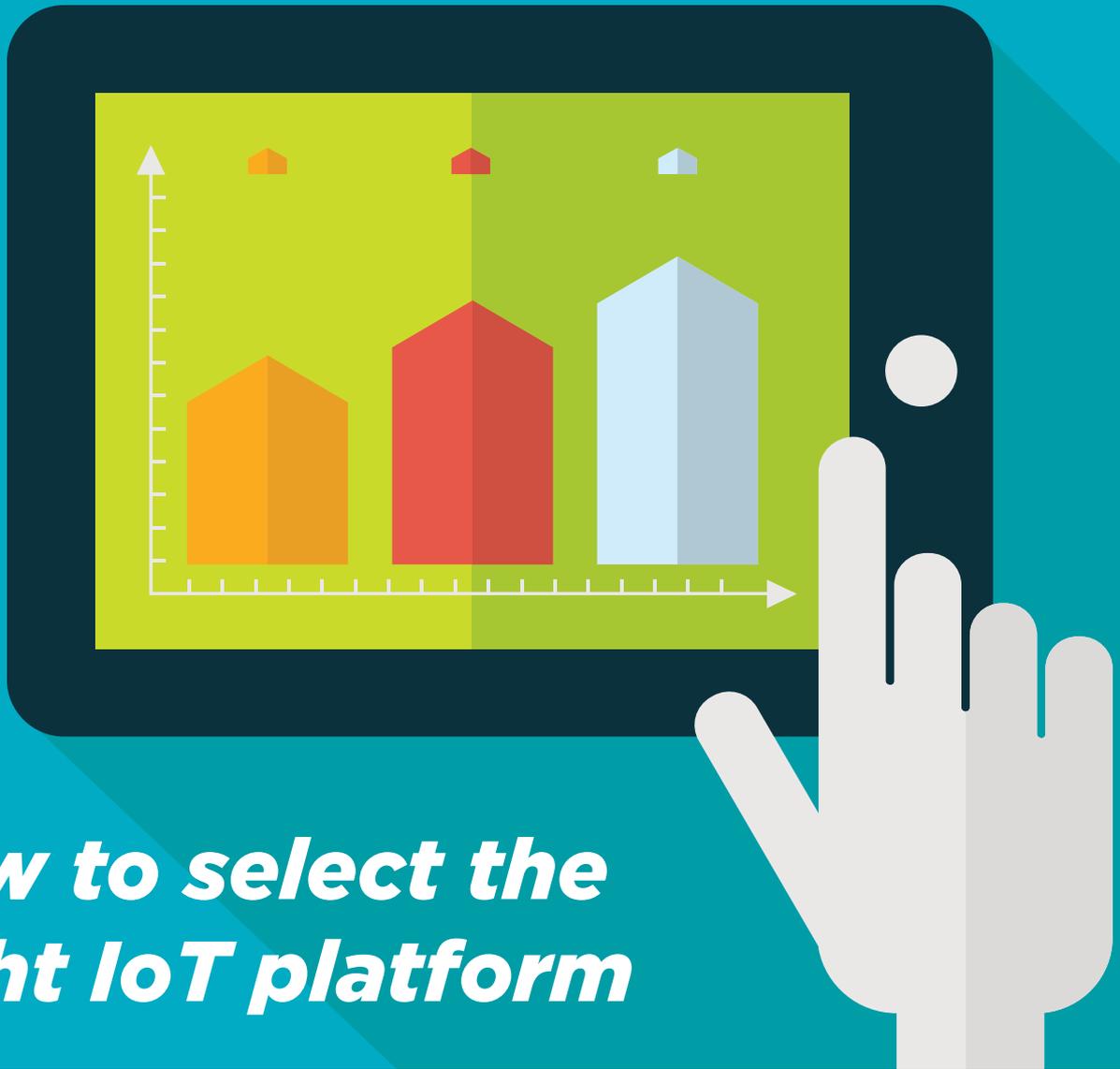
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# How to select the right IoT platform

For an increasing number of businesses, IoT is rapidly moving from a nice-to-have to a strategic necessity. At its simplest, an IoT solution provides the opportunity to save operational costs, introduce new service revenue opportunities, or help to ensure compliance with new regulations, writes Robin Duke-Woolley. In practice, IoT platforms are therefore becoming more and more a combination of these dressed up in a wide range of business needs, some more urgent than others

Decision making in respect of which IoT solutions and platforms to select gets more challenging when successful IoT engagement means processing large amounts of data in real-time to support current business operations. It can be more challenging still to integrate these new real-time data flows with traditional batch update data typical of IT systems already in use. Those challenges increase further when these data flows need to interoperate smoothly and securely across several different business operations, all in real-time.

To cater for these and other challenges and create an IoT solution that will stand the test of time, IoT platforms are increasingly being viewed as the starting point to build on. Put simply, the aim of

an IoT platform is to reduce the time and cost of getting new IoT solutions built and implemented by using components already available and being used in other IoT solutions. An IoT platform takes advantage of the fact that the majority of what is needed for most IoT solutions is the same and does not need to be reinvented for every application: it can be pre-designed and made available through a platform. The platform then also provides the means for implementing those elements that are specific to the particular application, as well as customising and configuring the solution for the specific need.

So how does a business user, also referred to as an adopter, go about choosing the right IoT platform for them? ►



The author, **Robin Duke-Woolley**, is chief executive of Beecham Research





*There are several layers to an IoT solution and these are becoming increasingly complex as market needs develop. The architecture can be shown in a variety of ways*

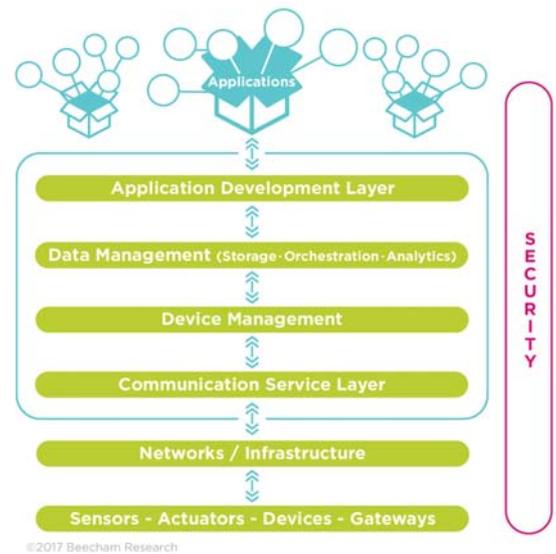


Figure 1: Elements of an IoT platform architecture

**What actually is an IoT platform?**

An IoT platform is a software middleware suite that facilitates secure monitoring, control and analysis of device and sensor behaviour in the field. In essence, it provides an enabling layer between these connected devices or sensors and user applications. There are two main parts of a complete IoT platform – the part that manages the physical connectivity to the devices and other systems to ensure that essential data is collected, and the part that processes the data. Although both parts are required for a complete IoT solution they are often provided by different vendors, reflecting their different areas of expertise.

There are several layers to an IoT solution and these are becoming increasingly complex as market needs develop. The architecture can be shown in a variety of ways, with Figure 1 illustrating the main elements: the external sensors/actuators/devices/gateways connected to the platform via networks and other infrastructure.

Within the platform itself, there are essentially four layers – communication services, device management, data management and application development. Above those layers are the user applications themselves – the elements the user actually sees. Across all of these layers is security, which binds them together to ensure there are no weak points either within each layer or across the layers. Indeed, that security capability must also bind the sensor and network layers not included in the platform itself – a further crucial consideration in platform design.

While this describes how IoT platforms are structured, the vast majority of them do not cater for all layers, at least not yet. For example,

providing communication services is a completely different task to application development and to detailed analytics of device data. Each platform vendor has their own expertise and to get a sense of what they offer, Beecham Research has defined seven IoT platform categories, as follows:

1. **Communication centric** – offering a strong focus on connectivity management capabilities
2. **Device management centric** – offering a strong focus on device management
3. **Data management and analytics centric** – designed to provide strong data management, orchestration, and analytics capability
4. **Application development centric** – enabling application development on different types of devices.
5. **Vertical centric** – designed to support the development of IoT solutions in specific sectors or sub-sectors, examples could be smart city, manufacturing.
6. **Consumer IoT centric** – similar to vertical centric above, but with a strong focus on consumer IoT applications such as smart home.
7. **IoT developer centric** – offering solutions for IoT developers including software and hardware.

These categories are not mutually exclusive, so that a vendor’s offering may belong to more than one of these. To take one example, Living PlanIT is vertical centric because they are focused on smart city solutions. However, for those solutions they also focus on data management and analytics centric capabilities. ►

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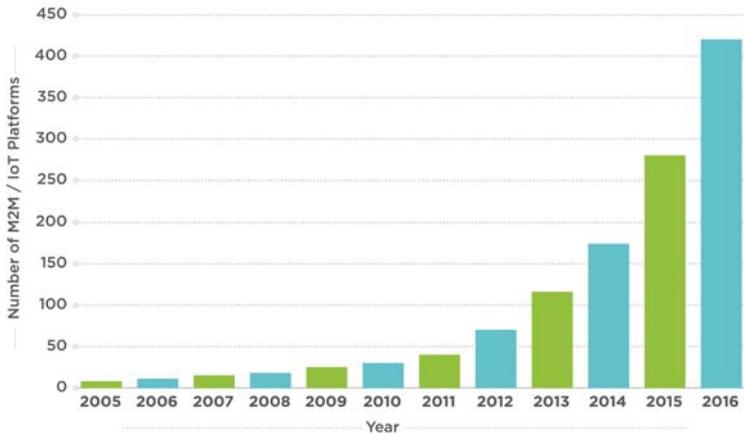


Figure 2: The number of IoT platforms on the market



### Choosing the right platform

Beecham Research has been tracking the M2M/IoT platforms market since 2008, when there were just 14 of them on the market. Now there are over 400, by our count around 420 at the end of 2016. The chart in **Figure 2** shows this growth and it is clear from this that the number of new platforms is going to continue growing for a while.

As noted above, the IoT platform is an important starting point for adopters planning their IoT solutions. However, with so many of them now on the market, it is a highly confusing one. In addition, such platforms are going through a fast rate of development with updates, acquisitions and re-brandings occurring frequently. They are becoming increasingly sophisticated as well as more specialised. For those who do not understand the subtleties, this adds greatly to the confusion. It also increases the prospect of adopters making incorrect choices for their needs and only finding out the consequences of these after much time and financial resources have been spent.

The IoT navigation tool, created by Beecham Research and **IoT Global Network** acting in partnership and featured on [www.iotglobalnetwork.com](http://www.iotglobalnetwork.com), is designed to address this confusion by enabling adopters to better understand the options available to them. It is the first fully-independent online tool to match adopter needs with IoT platform capabilities.

The aim of the system is to assist adopters to make informed decisions about which platforms are most likely to meet their requirements at any particular time. It does not seek to recommend one platform over others, but does seek to

narrow the field to a level that adopters can manage effectively. It means they can commence a more valuable dialogue with the most appropriate vendors at an earlier stage.

The user accesses the IoT navigation tool through an authentication process. It then asks the user to answer a set of questions that cover the needs of the IoT solution the user is exploring. These questions are via drop-down menus. The system then matches those requirements with the information about the platforms and selects those most likely to be of interest. The user is then guided to a short list web page. He or she can click on each platform individually, through to a web page that describes it in more detail.

### Making a final choice

Having got to a short list of potentially suitable platforms, the user then needs to discuss with potential vendors in more detail the IoT solution that is to be catered for. Depending on need, such discussions may be straightforward but increasingly we expect these to become more involved as the user requirements become more sophisticated. To illustrate what that means in practice, Beecham Research has identified upwards of 100 questions that may need to be covered for a more complex solution. It is here that a framework of the topics that need to be covered is particularly useful. One such framework is currently being devised by the IMC (IoT M2M Council) as a set of RFPs (Requests for Proposal) for IoT platforms. These documents will provide adopters with checklists of the fundamental elements that should be covered for any IoT solution. ■

**Having got to a short list of potentially suitable platforms, the user then needs to discuss with potential vendors in more detail the IoT solution that is to be catered for**

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# Which IoT platforms are best meeting organisations' needs?

The IoT platform landscape could resemble a university course for the richness and diversity of the offer, writes Saverio Romeo. If the adopter wants to pass the exam by selecting the right platform, a great deal of study may be necessary. Here, we do not want to cover the entire landscape, but we do want to give some suggestions for starting that study journey. That journey strongly depends on the requirements and the context, but there are some themes and features worth highlighting that are common parts of the decision-making process

**Companies formed in the dynamic Irish tech start-up scene have managed to scale up fast in the highly competitive environment of Industrial IoT**

The subject of connectivity is receiving renewed focus at present. This is due to the increasing interest in low power wide area network (LPWAN) technologies, the advent to 5G cellular, and growing acceptance in the market that connectivity is often still a challenge to get right. As a result, platforms with a strong focus on connectivity features are in the spotlight. Those come from well-known mobile network operators like **AT&T**, with its AT&T IoT Platform, and **Vodafone**, but also managed IoT services providers or IoT mobile virtual network operators (MVNOs) such as **Stream Technologies**, with its IoT-X platform.

The world of LPWAN is also gathering attention, with platforms like **Actility's** ThingPark. There are then companies historically involved in mobile communications such as **Nokia**, with its IMPACT (Intelligent Management Platform for all Connected Things) platform that has a strong focus on connectivity, but also looks at other layers in the stack such as analytics and application development.

Climbing the stack towards device management, we find dedicated platforms to device management such as **Wind River's** Helix. Continuing further up the stack, dynamic companies such as **Cumulocity** – recently acquired by **Software AG** – are focusing on analytics and application enablement services with a strong focus on integration with third parties and ecosystem formation. The analytics and application development layers have different offers based on different factors such as extension of analytics features and engagement with developers through a clear open software-based approach. At these layers, **IBM**, with its **Watson** IoT unit, is a strong market player setting the trends in emerging areas such as machine learning and artificial intelligence. On the analytics side, **Hitachi** with **Lumada** is another interesting case, building on the deep industrial operation technology knowhow of Hitachi and combining with superb analytics capabilities gathered through acquisitions such as **Pentaho**. ▶

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The author, **Saverio Romeo**, is principal analyst at Beecham Research



There are then companies that could be labelled as vertical centric, but that have the clear intention to expand their vertical footprints. **Bosch** with its IoT Suite is a case in point. Although originally a mobility components producer, Bosch has advanced quickly into the area of software and has recently shown strong potential for the smart cities, smart home and smart transportation areas, with a high level of focus in the IoT and artificial intelligence capabilities. Bosch seems to be leaving behind its traditional culture as a 'manufacturing everything' company and starting to be open to collaborations and partnerships. Among the most interesting signs is its recent-announced partnership with **Amazon Web Services** (AWS).

Another established player such as **PTC-ThingWorx** is moving from an almost solely industrial focus towards other verticals such as retail. PTC-ThingWorx is getting great attention on the use of virtual reality (VR) and emerging concepts such as digital twins.

However, the IoT platform landscape is not only made of large enterprises and established players. The innovative contribution coming from small and medium-sized companies and start-ups continue to feed the space with ideas.

Companies formed in the dynamic Irish tech start-up scene have managed to scale up fast

in the highly competitive environment of Industrial IoT. **EpiSensor**, originally an IoT equipment company, has forged a very strong partnership with **Asavie**, another Irish IoT company which is focused on secure connectivity management, and **Dell**, which adds its IoT Gateway to the overall solution.

**Waylay** of Belgium puts great emphasis on the key topic of data orchestration and integration. **myDevices** with **Cayenne** tries to make IoT solution development easy and rapid. **Carriots**, from Spain, wants to simplify IoT solution development with a step-by-step approach flexible enough to work in several different sectors. **Arrayent** aims at the brands and the consumer IoT space. There are then companies vertical focused in specific areas of manufacturing (such as **Wi-Next**), on the Industrial Internet widely (**CloudPlugs**), smart city projects (**LivingPlanIT**), and smart agri-food solutions (**Yodiwo**).

The sheer variety and scope of activities that IoT platform providers are engaging in demonstrates a vibrant market which provides a sometimes bewildering array of choices to potential customers. Passing the exam of selecting the right platform for your project will certainly require an amount of homework to be completed before a fully-informed decision can be made. The good news is that there is almost certainly an ideal solution out there for you. ■

***The sheer variety and scope of activities that IoT platform providers are engaging in demonstrates a vibrant market which provides a sometimes bewildering array of choices to potential customers***



# IoT platforms must accommodate organisations' needs to operate them at multiple levels

Different organisations require different functionality from IoT platforms in order to operate their services effectively. IoT platforms therefore must be able to operate at a variety of levels in order to satisfy market and end user demands, Mobeen Khan, the associate vice president for IoT Solutions at AT&T, tells Robin Duke-Woolley, the founder and chief executive of Beecham Research

**Robin Duke-Woolley: There are an increasing number of IoT platforms in the market. What is AT&T's place in this market and how do you see your role as different to the many others?**

**Mobeen Khan:** There's all the stuff about being secure, scalable, highly available and all the things you would expect from a carrier-grade service, but let's take that as read. We mainly look at platforms in two different ways. Firstly, there are platforms that AT&T has and continues to invest in that allow us to let customers manage their IoT connectivity solutions in the most efficient and advanced way possible. These platforms enable our Global SIM, they enable policy management, SIM management, multi-network and global connectivity and many other features and we have had those for many years and have been part and parcel of our

differentiation in the marketplace. The umbrella for that today is called our AT&T Control Center. All of our customers use these systems either directly through the portal or using application programme interfaces (APIs) to manage their IoT solution connectivity. This is AT&T's Service Management.

**RD-W: Just for clarification on that, can you explain what you mean by policy management?**

**MK:** There are many kinds of policies, procedures and behaviour that you need to capture. For example, let's say you manufacture a machine in Vietnam and you ship it to Germany and then it gets deployed in Canada. You might set policies that when it's in Vietnam and on the assembly line being tested running diagnostics these would be a no-charge event. When it's in Germany, and ▶

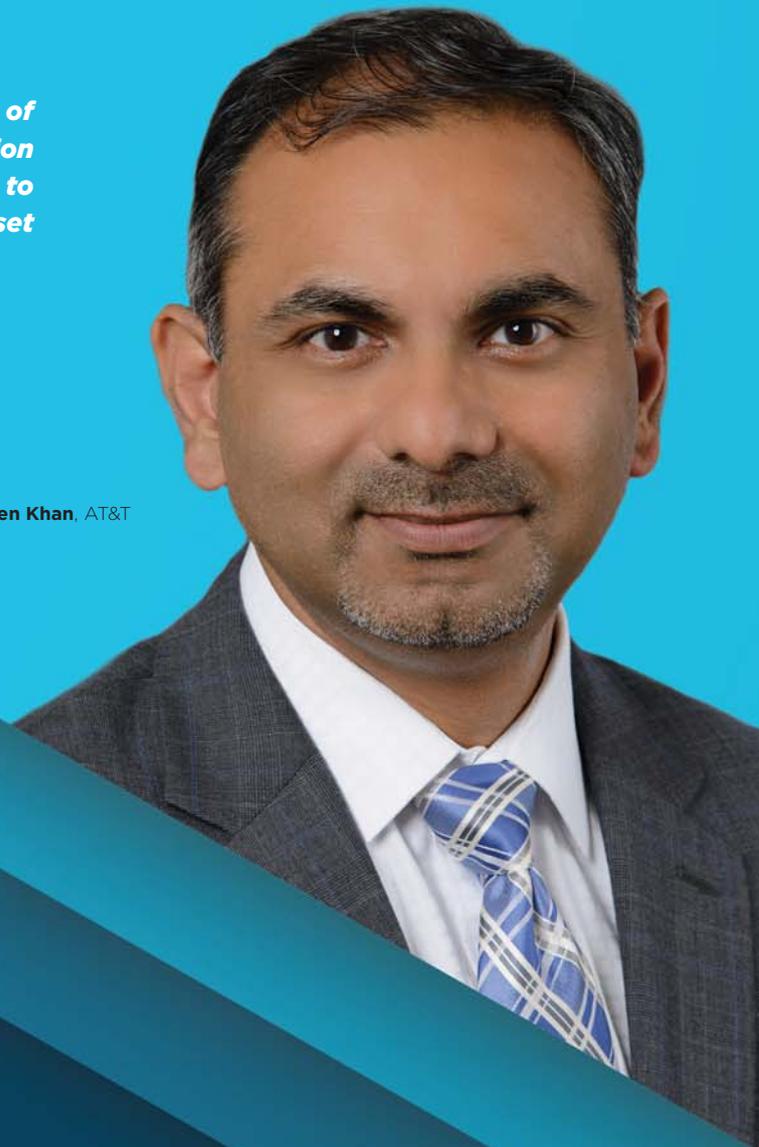
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***There are thousands of variations of operating systems, communication protocols, and chip sets, and the ability to write on top of the device chip set***



**Mobeen Khan, AT&T**

about to be shipped, the geofence of the warehouse it's in knows there will be a separate charge billed to XYZ account because it's not yet been shipped to a customer. Then when it gets activated in Canada, now the billing starts for the customer that bought that machine and activated it. You can pre-programme those procedures as a policy profile in the Control Center in advance so you don't have to do that every time the machine is shipped, or tested or activated.

**RD-W: Is AT&T's second set of IoT platforms then at a higher level than connectivity?**

**MK:** Yes. The second set of platforms we invest in are those that allow systems integrators and developers to build and deploy in a scalable and reliable way the IoT solutions themselves. This is at the application layer. For example, let's say you are an IBM Bluemix developer. Your applications run in Bluemix, and your data is saved in Bluemix. You could go into Bluemix, set up an account and go to their IoT page and what you would find is the AT&T Control Center. You could activate the APIs of that Control Center through Bluemix, which allows you to build the end solution and activate devices and all that. And you will find AT&T's IoT platforms which are called Flow and M2X.

What those allow you to do is basically get data from these IoT devices into an app or into an analytics portal or into the cloud. Why is that important? It sounds simple but getting data from IoT devices is a very complex proposition. It is complex because there are no standards. It's not like you have Android and iOS and everything knows exactly where to go. There is no procedure there.

There are thousands of variations of operating systems, communication protocols, and chip sets, and the ability to write on top of the device chip set. There are literally thousands of combinations. Developers of these IoT solutions have to become experts in device programming but they spend an inordinate amount of time just getting the data. Not so much what they're going to do with the data. IoT solutions are all about ►



***If you look at the cloud world and the apps in the app world, you have essentially a half dozen key players in the cloud world, where CIOs have made an edict to say my data and my apps will live in this cloud***

manipulating the data and making new insights and using it in your processes. But they're spending too much time just getting the data in the first place. What we are trying to solve with our platform is to get you the data in an easy way so you can start to integrate it into your applications. That's the second layer of platforms that we focus on.

**RD-W: What other activities at this application layer are you supporting?**

**MK:** There are five main elements that we focus on from a technical strategy perspective:

First, we integrate with the device ecosystem. As a carrier, we are close to the device ecosystem because we certify every one of those devices on our network. We know how these devices work and we are embedding those capabilities into our platform on the other side of the devices and in the cloud that will extract the data much more easily than anyone else can. Being a carrier, we know those devices, it's a competitive advantage for us in the platform space. There are thousands of platforms out there. They all focus on the data

layer and what to do once you have the data. We're fine with that, with that running somewhere in a cloud or even something like Bluemix running that. But that piece of getting the data, that's really hard. We're focusing on getting you the data.

Second, if you look at the cloud world and the apps in the app world, you have essentially a half dozen key players in the cloud world, where CIOs have made an edict to say my data and my apps will live in this cloud. What we have done is put together an architecture where if you build that IoT solution within the AT&T platform and Flow, you can deploy that in a cloud of your choice. So again, going back to the Bluemix example, if you start with Bluemix, you enter the Flow platform, build your app and extraction of data you want to run and then deploy it in Bluemix. That is important from a policy perspective for our enterprise customers and to offer them choice.

Third, in our platforms we are promoting both internal AT&T add-on products as well as our third-party partner products. For example, we offer a business messaging solution for our customers. Take the example of a machine deployed. When an alarm comes off the machine you can use a business messaging solution to send a secure message to your technicians to go and fix that machine. That is an IoT solution moving into the realm of an operational solution. We have many products there, so we are exposing those products and APIs of those products in our platform. That makes it easy for a developer to have access and use those in one environment rather than going to many different environments. For example, with IBM again, they can use their IoT Watson nodes - the analytic nodes - right inside our IoT platforms. So, if you are going to collect data from this machine, and you're going to pass it on to a Watson analytics engine to give you predictive analytics about whether this engine is about to fail, you could do ▶

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that from within the environment because we are pre-integrated with IBM Watson.

Fourth, this is making sure that the developers have the reference applications and solutions as well as many pre-built components that they can use so they don't have to start from scratch. So, the inventory we have built of those pre-built applets are examples that make it easy for developers and system integrators to start stacking on top of. They can share those among their teams, and they can share them with the community at large.

The fifth and final part is making sure that the underlying architecture and technology is built on open source, and built as you would expect from a network operator. So it's highly scalable - you can deploy ten devices or ten million devices - its reliable, secure, high capacity, a high availability environment.

Those are the five key elements of what we are focusing on to build our platforms and platform infrastructure. These relate to the second layer of AT&T's platforms that is more applications-focused.

**RD-W: Is the first platform - the service management platform - based on Cisco Jasper?**

**MK:** Yes, the first platform - the AT&T Control Center - is based on the Cisco Jasper platform and we continue to make additions and integrations to it to make it more valuable. That is a continuous improvement cycle. The second platform - the application platform - has nothing to do with Cisco Jasper. It is an AT&T set of products that we have built and it is based on open source technology.

**RD-W: Have you invested more in the second than the first?**

**MK:** We are investing in both but the first one we have a partner and the second one we are building it on our own.

**RD-W: As far as customers are concerned, do you bring together those two platforms as one solution, or do you separate them out?**

**MK:** They are separate. The two platforms are

separate in the sense that the AT&T Control Center is used by every single customer regardless of how they build the application and whether they use AT&T platforms to build their applications or not. They will use the Control Center to manage their services, which means all of their connectivity. On the other hand, the application level platforms are optional in the sense that a customer can build their application in IBM Bluemix starting from first line of code and do not need to access AT&T's application layer platforms as part of that. If they do, they have those additional services. On the other hand, the Control Center is something that every customer touches and uses.

**RD-W: Does that mean you have separate pricing for the Control Center platform and then Flow and M2M?**

**MK:** Regarding the Control Center, the standard pieces are part and parcel of our connectivity services. You can add other managed services on top of that, which are paid services. The Flow and M2M platforms are an added layer of charge that are based on price per month charges in top of connectivity.

**RD-W: Are all platforms available worldwide?**

**MK:** The Control Center is available everywhere. Our customers manage their Global SIMs anywhere in the world from the Control Center. Flow and M2X are available in North America today and we are looking at deployments in Europe and elsewhere.

**RD-W: There is maybe a perception in the market that other companies bring the IoT solutions. This strategy that you have outlined indicates that is certainly not the case.**

**MK:** Exactly so. The question we get asked is - what does AT&T bring? The answer is - we play at every layer of the IoT stack, in ways that other companies just do not play. From all the things we're talking about, from multi-network, to service management and to the software platform, it's all about our accumulated knowledge. We have been in this market for a long time and understand the complexities of making IoT solutions really work. ■

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The prototype created using the AT&T IoT starter kit

# IoT Starter Kit enables enhancements to Snow Melt system

In the City of Holland, Michigan, USA, the board of public works has turned to IoT to manage its Snow Melt system for clearing foot paths of snow and ice around the city more effectively. Here, we explore how AT&T’s Flow was utilised to enable the city to design and develop a wireless sensor network

In Michigan winters are tough with extended periods of snow and sub-zero temperatures. The City of Holland has sought to keep pedestrians safe from slipping on ice and snow by installing a Snow Melt system which uses waste heat from the city’s power generation plant to thaw pavements across the municipality. Whilst ideal for its purpose, the system is costly to operate requiring heat to be pumped around the city to ensure all areas receive heat to enable thawing to occur.

temperature sensor in a [paving] brick and the project blossomed from there.”

Hoffswell began experimenting to develop a way to measure temperature throughout the city, turning to the AT&T Starter Kit to create a prototype device. “Our first prototype is a box with the AT&T IoT Starter Kit and a set of sensors,” he explains. “At the heart of the system is AT&T Flow which makes the development process very easy.”

**“With Peter’s prototype we’re looking at making a smart brick where we reduce the size of the prototype and package all of the electronics in the back of a brick,”**

“The Snow Melt system has been of tremendous value,” confirms Peter Hoffswell, the broadband services manager and technologist at the Holland Board of Public Works. “Without the Snow Melt system, our downtown would basically shut down. It’s using waste heat from the process of producing power in our power plant but we do have to run pumps. These pumps are very large and the less we can run them, the better so I was wondering if there could be a way we can optimise our Snow Melt system by adding a sensor system to it.”

“One of the great things about Flow is that there is an online code sharing component to it so the example code that other people have developed out there and are willing to share is available,” Hoffswell adds. “That’s like a goldmine because you don’t have to figure it out yourself. Someone else has already done it for you.”

The project swiftly gathered pace. “With Peter’s prototype we’re looking at making a smart brick where we reduce the size of the prototype and package all of the electronics in the back of a brick,” says Thorwall. “We’d then monitor the temperature of the brick that is inserted into the paver slabs, giving us the actual temperature of the various areas downtown.”

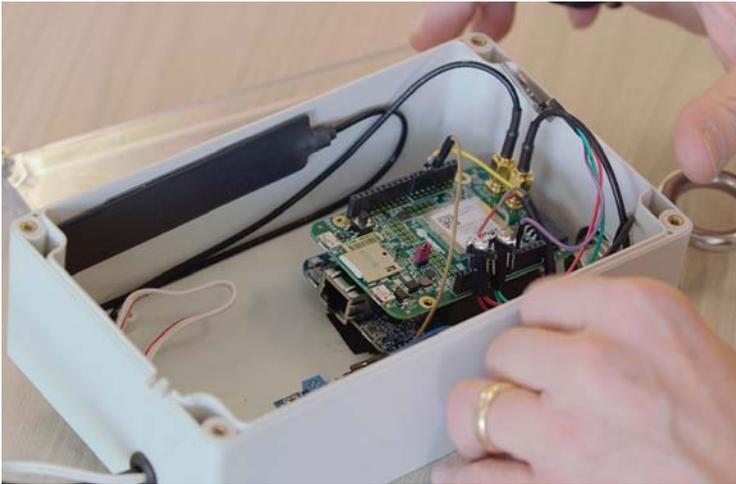
Colleague Carl Thorwall, an electric power engineer at the Board of Public Works, takes up the story: “We never really had a good way of measuring temperatures and performance,” he says. “The challenge was always how do you get the wires back to the powerplant but Peter had the idea of using wireless and connecting a

In this way a network of sensors covering the downtown areas of Holland will be created. “If I didn’t have Flow then I would have to hard code ▶

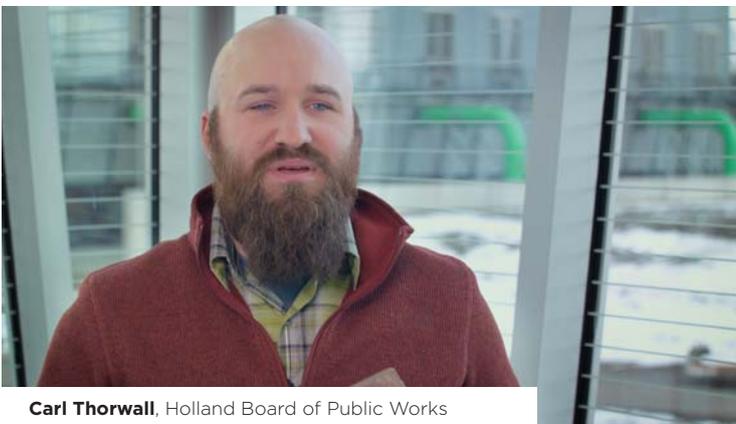
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**Peter Hoffswell**, Holland Board of Public Works



**Carl Thorwall**, Holland Board of Public Works

it myself," adds Hoffswell. "It is great because I can bring the raw data from our sensor out in the street and react to it. My AT&T Flow has a Twitter integration so if the temperature falls below freezing at street level, we're in trouble and we'll actually get a tweet alerting us."

This translates into operational cost savings, as Thorwall explains: "Having the ability to monitor the temperatures of bricks gives us the capability to reduce the pumping load and this saves money on energy and pumping costs for the city."

For Hoffswell, the ease of development offered by AT&T Flow has been a key enabler of the project. "The AT&T IoT Starter Kit really gives you the full set of tools," he says. "Not only the hardware but the software that allows you to go from an idea to a prototype to an actual running production device." ■

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### About the AT&T IoT Starter Kit

The AT&T IoT Starter Kit comes with everything a developer requires to start their next IoT project: hardware, services, data and integrations.

The kit contains the following items enabling developers to get started with systems to address many different types of IoT applications. These include:

- Prepaid SIM
- Humidity sensor
- Fast LTE connectivity
- Temperature sensor
- I2C port
- Arduino-compatible pinout
- Cellular shield
- Host board

The AT&T IoT Starter Kit is a complete developer kit with all the tools, services and integrations needed for design, build, deploy, manage and scale-up of IoT projects. All the capabilities that are needed for a project to scale up from prototype to production come in the kit, so users can: prototype, build and host IoT applications with AT&T Flow; launch, manage, and scale a connected device business or enterprise deployment from the AT&T Control Center; and access the data plans and SIMs required to fully address each project. The AT&T IoT Starter Kit comes with 300MB of data and additional data can be added as projects grow.





[www.starhomemach.com/products/CLM](http://www.starhomemach.com/products/CLM)



[www.stream-technologies.com/iotx/](http://www.stream-technologies.com/iotx/)

## Company summary

Starhome Mach is headquartered in Zurich, Switzerland and Stream Technologies is based in London, UK. Starhome Mach has 300 employees and Stream has 33. Both companies do not disclose their financial information.

Stream enables more than 700 global enterprises, including Fortune 500 companies, and Starhome Mach has an exceptional customer base that encompasses more than 300 global mobile network operators in over 130 countries, including many of the tier-1 operators and 24 leading telecom groups. Both companies are private and don't publicly disclose customers.

## IoT platform offering

In order to develop a strong and healthy IoT business, and in order to differentiate themselves in the very crowded IoT connectivity space, mobile network operators (MNOs) need a robust and feature-rich connected devices platform (CDP), at a reasonable total cost of ownership (TCO). Many operators that implemented a CDP in the past, realise now that the solution is not flexible enough to support their new connectivity business needs, and is also too costly to manage.

Starhome Mach and Stream's joint offering covers the complete IoT connectivity lifecycle. The IoT Connectivity Lifecycle Management platform delivers a real-time, worry-free experience for the IoT-engaged MNO and their enterprise customers.

The offering includes:

- IoT device provisioning (2G, 3G, 4G, LoRa and NB-IoT)
- Real-time device monitoring
- Real-time alerting and troubleshooting
- Steering of roaming to optimise QoS and coverage in IoT
- Multi-tiered account structure capabilities
- Powerful application programme interface (API) integration capabilities
- GSMA eUICC compliant

One of the stand-out synergies of the joint offering is service continuity. This enables MNOs to balance between wholesale agreements constraints and quality of service needed for each connected device.

## Key differentiators

Unlike other solutions in the market, Stream and Starhome Mach integrate their solution directly into the MNO's core network which increases the reliability and puts the companies in the best position to identify and handle the quality of service issues of the MNO's end customers in real-time and cost effective manner.

The companies claim their joint offering consists of several unique features including :

- Multi-tiered accounts to support complex enterprise environments
- Technology agnostic platform (eUICCID, LoRaWAN , LTE-M, NB-IOT)
- Real-time device monitoring, alerting and troubleshooting
- Easy integration to the network (the companies have many years of successful integration experience addressing hundreds of network solutions in all types of networks)
- Steering of roaming to optimise QoS and coverage in IoT
- Powerful API integration capabilities
- Multi-tiered accounts
- Modularity – can integrate on top of, or side-by-side existing CDP
- Short deployment time
- eSIM subscription and download ready

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IN ASSOCIATION WITH STARHOME MACH AND STREAM TECHNOLOGIES



# Digicel Group uses IoT-X to manage customer connectivity

When Digicel required a connectivity management platform to enable it to provide connectivity services to the 33 M2M markets throughout the Caribbean, Central America and Asia Pacific regions, it turned to the IoT-X platform from Stream Technologies – which now benefits from additional technologies from Starhome Mach

Digicel Business required a connectivity management platform that could be integrated into existing network components such as provisioning application programme interfaces (APIs), billing and the core network for the Digicel Group roaming SIM card offering. The central requirement was to enable the Digicel Group to offer its roaming SIM solution to its subsidiary networks and enterprise customers via individual instances of the connectivity platform. This would allow each local Digicel operator to on-board and manage its own customers.

In addition to subscriber management and billing services, Digicel required an element of managed connectivity to facilitate the creation of private access point names (APNs), segregated customer traffic and intelligent IP routing in order to open up new business opportunities in the M2M and IoT market.

## What was the answer?

The IoT-X solution involved deploying a Digicel branded instance of IoT-X onto Stream and Starhome Mach's existing US infrastructure and integrating all of Digicel's core components to fit its business processes and requirements for multi-tenant architecture for their 33 subsidiary networks.

"Progressive carriers like Digicel are hungry for multi-technology, access agnostic solutions because IoT requires more than just activating a SIM card," says industry analyst James Brehm. "The adoption of IoT-X places Digicel squarely among the most innovative network operators in the IoT marketplace."

## The deployment included:

- The IoT-X Enterprise Interface, which allows Digicel's end customers to manage their account and subscribers.
- The IoT-X Customer Management interface, which allows Digicel support representatives to create, manage and support customers and their SIM cards if required.
- RESTful Enterprise APIs, which allow customers to integrate elements of the platform into their own applications. This includes custom branded API documentation which is hosted online for ease of use.
- RESTful Management APIs, which enable the automation of provisioning and customer account creation.
- IaaS (Infrastructure as a Service), which facilitates managed data transit and RADIUS services.

## These core components were then integrated into Digicel's core network through the following means:

- Integration into Digicel's existing billing system to facilitate the provisioning of SIM cards onto the home location register (HLR) and produce call data records (CDRs) for each subscriber.
- Integration between Digicel's core network and Stream's APN infrastructure to facilitate authentication, authorisation and accounting for each subscriber.
- Integration into two packet gateways to provide a geographical and resilient connection to facilitate the transit of data from each subscriber to the internet or customer-application. ▶

***"Progressive carriers like Digicel are hungry for multi-technology, access agnostic solutions because IoT requires more than just activating a SIM card,"***

IN ASSOCIATION WITH STREAM TECHNOLOGIES AND STARHOME MACH



**How was IoT-X delivered?**

The platform was deployed within an eight-week time-frame, which ranged from the project kick-off to the first Digicel customer being deployed on IoT-X. The rapid deployment of the solution was accomplished through tight project management and clear requirements gathering supported by the agile integration properties of IoT-X. Following on from the deployment and integration of the platform, Digicel is provided with managed service support around successful onboarding and billing of Digicel's end customers during a crawl, walk, run phase.

**What Were the Results?**

As a result of deploying IoT-X, the Digicel Group is now capable of targeting previously unattainable markets through its Jamaica based sales teams or via any of its 33 subsidiary networks.

Each network can easily create new customer accounts, apply flexible tariffs that can be tailored and allocate SIM cards to customers. The end customer is able to manage their account and subscriber lifecycle process themselves. At the end of each month, billing information is reported to each Digicel network and this information can be integrated into third-party invoicing systems to generate the end invoice for M2M services.

These capabilities have allowed Digicel to create the following business offerings:

- M2M Managed Connectivity
- M2M Security Services
- M2M Smart Metering
- M2M Vehicle Services ■

**About Digicel**

Since launching in Jamaica in April 2001, Digicel has become one of the fastest growing mobile telecommunications operators in the Caribbean region. Today Digicel is known for its strong commitment to providing consumers with the best value, best service and best network across Jamaica and the Caribbean. This commitment led the company to establish Digicel Biz in 2005, which later grew into Digicel Business in 2006.

Digicel Business was established to meet the business demands of Jamaican organisations such as government ministries and agencies, private and publicly listed companies as well as small and medium sized enterprises. Digicel Business provides customers with customised products and services to suit their business needs and helps them to improve efficiencies across their operations while achieving savings.

Today, Digicel Business serves more than 70% of corporate Jamaica, offering a wide variety of products and services ranging from voice, data, IP-PBX, roaming, closed user group service, BlackBerry solutions, ICT, plus business continuity solutions from its Tier III Certified data centre. Digicel Business continues to integrate the best people, the most innovative solutions, the strongest coverage in Jamaica and superior customer service to deliver on their strategy and create value and growth for companies.



[www.stream-technologies.com](http://www.stream-technologies.com)  
[www.starhomemach.com](http://www.starhomemach.com)



[www.actility.com/products](http://www.actility.com/products)

## Company summary

Actility is located in Paris, France, with regional offices in the UK, Benelux, USA, Hong Kong, Singapore, China, Taiwan, Japan, Korea and Australia. The company has 150 employees and does not disclose financial information, although it recently raised \$75m in a Series D funding round. Customers include: Orange, Swisscom, KPN, Comcast, Proximus, Digita, Netzikon, APT, Softbank, Inmarsat, Comsol, du and NTT

## IoT platform offering

Actility's ThingPark is a carrier grade solution enabling scalable low power wide area (LPWA) networks and interoperable IoT applications and services.

ThingPark Wireless is a core network management and supervision solution for LPWA connectivity, designed from the beginning for carrier-grade solutions.

ThingPark OS is a central IoT management service which enables operators to manage services and offers, and monetise their network.

ThingPark X is a data analytics and control framework which exposes data from connected things to applications and connects with cloud platforms, and also offers off the shelf IoT industrial applications.

ThingPark Market is a B2B ecommerce platform for buyers and sellers, aggregating, distributing and connecting IoT devices and applications to the ThingPark platform.

ThingPark is fully modular and can be optimised to specific customer requirements. In particular enterprise customers can benefit from highly scalable solutions from small campus deployments managing a few gateways and tens-hundreds of connected objects for a solution addressing a single use case, right the way up to national-scale private networks covering multiple locations for a wide range of use cases (such as a smart city platform). The platform also offers additional services such as international roaming management and a location/tracking application programme interface (API), if required.

## Key differentiators

Actility is a pioneer in LPWA technology, and being a leading innovator in the space brings an early to market advantage in developing and deploying solutions. For example, earlier this year Actility announced the availability of roaming between networks for IoT devices based on early implementation of the standard designed and ratified by the LoRa Alliance. This technology leadership position has helped Actility win many major deployments, and also drives the recruitment of partners to the ecosystem.

Although expertise in LoRaWAN is at the heart of Actility's success to date, we have recently announced that the ThingPark platform will support devices connected over the 3GPP cellular technologies, LTE-M and NB-IoT. Through partnership and acquisitions, Actility is also extending the capabilities of the ThingPark platform in other directions. For example, working exclusively with Abeeway, Actility is now offering ThingPark Location, a unique service combining the capabilities of GPS, network based location technology, Assisted GPS, beacons and WiFi sniffing into a single flexible capability to find, track or geofence any connected IoT sensor.

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IN ASSOCIATION WITH ACTILITY



# Discovering *IMPACT*, the Nokia horizontal IoT platform

The IoT platform landscape is among the most dynamic and rich areas in the IoT community. Here, Saverio Romeo, the principal analyst at Beecham Research, interviews Marc Jadoul, the market development director for Internet of Things at Nokia to learn about the company's view on the IoT and its IMPACT (Intelligent Management Platform for All Connected Things)

**High availability and low latency will be required for many critical IoT solutions**

**Saverio Romeo: What strategic argument is leading Nokia in the Internet of Things arena?**

**Marc Jadoul:** Nokia creates the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers (CSPs), governments, large enterprises and consumers with the industry's most complete, end-to-end portfolio of products, services and licensing. Our company mantra is all about shaping the future of technology to transform the human experience. We strongly believe that IoT networks, platforms, applications, and ecosystems are instrumental to realizing that vision. We enable that through four key areas: mobile broadband and 5G networks for the IoT, cloud and software solutions, security solutions, and connected devices.

**SR: How do you see the status of the IoT market?**

**MJ:** The term IoT is used all around, but there is no single definition for it. IoT is an evolution of machine-to-machine (M2M) communication, which enables networked devices to exchange information and perform actions without the manual assistance of humans.

There is an essential difference between M2M and IoT: how the data is generated by all these devices and how it is used to create value. IoT is fuelled by the convergence of M2M communications and big data analytics.

While traditional M2M applications often target the automation, and industrial systems and processes, the IoT provides companies with innovative means for new products and services. Today, we are basically still very much in a M2M era, but things are moving fast towards the IoT vision. The IoT Community, which is the name of Nokia's IoT ecosystem, has all the tools for enabling that rapid transition.

**SR: Besides different interpretations and forecasts of the future of IoT, the consensus is that we are moving towards fully connected environments. Which is the key element for enabling that evolution?**

**MJ:** Nokia considers IoT technologies as a means for realizing the programmable world vision, which is an ultra-connected environment in which massive numbers of objects will become bound together with intelligence that is built upon vast amounts of data processed in the cloud and used to automate and simplify processes, and to create new services.

Connectivity is a key feature for the programmable world. Connected devices need robust and scalable connectivity. Today there are many different access technologies, but not all are addressing the critical needs for IoT connectivity, security and battery life. This is the key reason for the emerging 3GPP standards - NB-IoT, LTE-M, EC-GSM - in low power wide area networks (LPWAN).

High availability and low latency will be required for many critical IoT solutions. Extended coverage will be essential to penetrate deep into buildings, while Multi-access Edge Computing (MEC) allows to rapidly process content at the very edge of the network. And, finally, 5G will enable the data-rich applications of the IoT.

**SR: Connectivity is then a building block for your vision of the IoT. Can you tell me more about the role of software and platforms?**

**MJ:** Technological developments in storage, processing, visualisation, cloud networking and artificial intelligence (AI) are opening new roads for application innovation and new value creation. By adding software intelligence and automation into every connection, process and service, new opportunities are becoming possible. The value of the IoT lies in the data, its manipulation and its representation. Therefore, IoT-specific IT and operations technology (OT) platforms play a crucial role.

Eventually, IoT is going to become an integral part of the evolving enterprise IT environment. Enterprise architects will be looking for common off the shelf (COTS) components, and work with system integrators that can make them fit with their current IT infrastructure, rather than ►

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Marc Jadoul, Nokia

deploying vendor-driven end-to-end solutions. In this scenario, data integrity, privacy and security are prime concerns to take into consideration.

**SR: How does IMPACT help the move towards fully connected environments?**

**MJ:** A horizontal platform breaks the silos of the M2M world facilitating development of different applications just reusing the platform features. The connected environments are then developed quickly and more cost efficiently. IMPACT does that. It enables application developers, device manufacturers and service providers to use common infrastructures, and share platform functions and data.

**SR: Can you then describe the key features of IMPACT?**

**MJ:** IMPACT stands for an Intelligent Management Platform for All Connected Things. It provides customers with a standards-based platform for securely managing any device, protocol, or application. The key elements of IMPACT are:

- IMPACT's device management function already provides lifecycle management for more than 1.5 billion managed devices and 80,000 device types are recognised.
- Data collection layers between the devices or aggregators and the applications facilitate data acquisition as well as fault and power monitoring, provisioning, configuration, remote diagnostics
- IMPACT securely onboards devices. It collects and analyses the data gathered from these devices. These are exposed through an application programme interface (API) layer with an extensible object model that allows for flexible devices and use cases to be added without programmatic change.
- It also provides a console for remote monitoring data and event. It provides an application enablement component that helps platform users to develop applications.
- The platform also includes network, cloud and end-point security. It implements the latest Lightweight M2M (LWM2M) security model for IoT device management and is backed by Nokia's extensive security portfolio.
- Finally, a connectivity management component manages high volumes of connections from sensors and devices, including those that with embedded SIMs and eSIMs and LPWAN devices. It also offers flexible deployment and modules for billing, mediation and customer relationship management (CRM).
- IMPACT is agnostic from a connectivity point of view.

- IMPACT can be simply integrated with third party application enablement and connectivity management platforms.

**SR: Can you share some examples of how IMPACT can serve different sectors and applications?**

**MJ:** In the applications layer, we have a two-sided approach. On one hand, we are building-out our ecosystem, which already has over 340 partners. But we are also implementing several use cases that focus on a selected number of verticals, for which we see clear market drivers and viable business cases. These include examples in the automotive, utilities, public safety, smart cities and healthcare industries.

**SR: Does IMPACT enable those applications or does the offering include a set of pre-developed application services as well?**

**MJ:** The latest release of the IMPACT platform comes with a starter pack of pre-integrated applications that allow customers to deploy a initial set of secure revenue-generating IoT services for smart cities and fleet managers: video analytics powered by Nokia Bell Labs' machine learning algorithms, smart parking application, smart lighting application, and vehicle applications.

IMPACT is also a component of the Nokia smart home solution, based upon our Z-Wave and ZigBee enabled residential gateway, and a mobile application for your smartphone or tablet to control and manage the devices.

**SR: On what type of business model is IMPACT based? Do you offer related services such as support and integration with other solutions?**

**MJ:** The IMPACT platform is multi-tenant and can be provided as an on-premise as well as a cloud-based solution. It enables secure XaaS hosting of devices, applications and data from different IoT service providers.

IMPACT combines with our NetGuard security portfolio to monitor IoT devices, detect malware, draw correlations between events in different parts of the network, and set security parameters to minimise the chance of successful attacks. Furthermore, our Global Services people have the expertise to design, plan, integrate and customise the connectivity, platform and application layers to meet the needs of different customers. And finally, we have recently launched the Nokia Worldwide IoT network grid, our global managed connectivity service that enables CSPs to quickly become IoT providers. ■

**The IMPACT platform is multi-tenant and can be provided as an on-premise as well as a cloud-based solution**

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



## ***Nokia horizontal platform positively IMPACTs productivity at Chorus New Zealand***

Today's widespread use of field service technicians and vehicles – coupled with the speed of technological innovation – calls for a transformational technology solution that changes the face of field services and the supply chain. Many types of enterprises depend on a field service force to set up, install, enable and maintain their products, services and applications. Almost any type of product or service that requires a reasonably complex setup and installation process on the customer's premises will utilise a field service technician to perform the associated tasks

To complete their work efficiently, technicians usually require a service vehicle, an inventory of parts, mechanical tools, measuring and testing devices, a laptop and a mobile device. Standard solutions often only address pieces of the problem in silos and these kinds of enablers do not necessarily address the problem of creating an efficient workday. Work orders are generally provided in paper form and ensuring that the right inventory and tools are in the vehicle is often a manual process involving a degree of guesswork. Further inefficiencies are likely because dispatchers are usually unaware of work order status, inventory usage, tool status, and so on, until a technician returns to the depot with reports and paperwork for the day or week. In addition, many equipment activation processes may require interaction with a central operations centre and/or demand that a technician contact a call centre and enter a queue to have someone

activate a product or service to test it. The streamlined automation made possible by today's technology is clearly absent.

A recent example of the application of the Nokia IMPACT horizontal platform for IoT into the field service segment was market trialled in New Zealand. This case study example had multiple standalone vertical applications that were integrated and centrally managed due to the capabilities of the IMPACT IoT platform. The horizontal integration of fleet management, customer premise equipment provisioning, inventory management, as well as technician video communications and training, enabled business value to be unlocked by greatly improving the productivity of the entire broadband installation process for Chorus, a New Zealand national broadband service provider. Beyond productivity improvements, there was an ►

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**The value chain and players that perform the installation process may sometimes be complex. The more complex, the more important transparency and access to real-time status become**

**Figure 1 – Nokia IMPACT platform applied to the field service segment**



additional revenue opportunity identified by offering a new provisioning service for the communications service providers (CSPs) with direct customer contact.

**The solution**

Figure 1 shows how the IMPACT IoT platform was deployed to solve the problem by integrating management of sensors and devices, workflow and inventory, enhanced communications, support for material delivery and management, and real-time visibility to system status by the key players within the value delivery chain. Such a solution could save time, reduce errors, minimise cost, increase collaboration, and provide better documentation while simultaneously improving the experience of the most important player in the chain – the end customer. Improving customer experience along the entire value chain and providing a positive return on investment (ROI) in the process makes such a solution an obvious choice to create and implement.

**Business benefits**

The value chain and players that perform the installation process may sometimes be complex. The more complex, the more important transparency and access to real-time status become. As an example, in the case of this market trial the network provider uses third-party installers. There are numerous relationships and much complexity built into the value chain that performs broadband installations under the Chorus brand. This has clear benefits in efficiency and time-to-market, but requires all players to have a common ability to share data and have real-time visibility of installation status – which

can be provided by the IMPACT solution. In this case, the benefits flow to the entire chain, but even if the relationships were simpler, the concept still provides value because even within a single company these organisational boundaries and resulting challenges exist. Deployment of IMPACT with the visibility to data enabled greatly reduces complexity of the installation process.

**Results summary**

- 30% to 40% of the warehouse manager’s time was saved via IMPACT inventory management application integration to enable inventory automation and tracking.
- Errors and mistakes due to use of paper and manual inventory tracking were eliminated by automating workflow and integration with IMPACT.
- Total installation time was reduced by between one-third to one-half.
- US\$77 dollars (NZ\$102, €71) per update per vehicle can be avoided utilizing IMPACT device management to perform OTA vehicle and device updates.
- Training documentation was simpler to find and track. ■



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



[www.vodafone.com/business/iot/managed-iot-connectivity-platform](http://www.vodafone.com/business/iot/managed-iot-connectivity-platform)

## Company summary

Vodafone is one of the world's largest telecommunications companies and provides a range of services including voice, messaging, data and fixed communications. Vodafone has mobile operations in 26 countries, partners with mobile networks in 49 more, and fixed broadband operations in 17 markets. As of 31 December 2016, Vodafone had 470 million mobile customers and 14.3 million fixed broadband customers. Vodafone Group has 108,000 employees and Vodafone IoT has 1,400. For more information, please visit: [www.vodafone.com](http://www.vodafone.com).

## Vodafone IoT

Vodafone IoT was established as a separate line of business within Vodafone Group Enterprise in 2010. The Vodafone Managed IoT Connectivity Platform is fully owned and managed by Vodafone IoT. Vodafone IoT currently has over 50 million IoT connections as of Q3 16/17.

## Financial information

Vodafone is publicly listed and the company's latest results can be viewed in detail here: [www.vodafone.com/content/dam/vodafone/investors/financial\\_results\\_feeds/tradingupdate\\_31december2016/q3-16-17-presentation.pdf](http://www.vodafone.com/content/dam/vodafone/investors/financial_results_feeds/tradingupdate_31december2016/q3-16-17-presentation.pdf)

## Customers

Vodafone IoT customers include: BMW, Porsche, Amazon, Yamaha, Ekso Bionics, ASD Healthcare, Somfy, Moocall, Kärcher, TomTom, Globe Tracker, Philips, Ford, Kone, AntTail, Atlas Copco, Mobike, DriveNow, Medtronic, Polar Krush and Feintool.

## IoT platform offering

The Vodafone Managed IoT Connectivity Platform is a comprehensive platform comprising of advanced connectivity management software integrated with Vodafone's dedicated

IoT core network and global SIM. This provides a high-level of performance and security in over 200 destinations. The core network is entirely dedicated to IoT so Vodafone has control of its availability, security and service levels, offering a service that addresses mission critical IoT use cases and standards.

The Vodafone Managed IoT Connectivity Platform is highly customisable which means that we can shape and configure solutions to address the needs of different customer verticals. For instance a large multi-national automotive company may need distinct and different services and configuration for different markets.

In the automotive sector, the platform is at the heart of the Internet in the Car service that provides diagnostics, infotainment, Wi-Fi hotspot and consumer billing to many of the world's leading vehicle manufacturers in accordance with local market regulations.

For the utility sector we introduced various features and the capability to support the mass roll out and provisioning of services, including quality of service over 4G for smart grid, IPv6 for smart metering as well as customer specific development to support the change of supplier.

## Key differentiators

- A dedicated global SIM, network and platform. The network is not shared with the consumer mobile network and has specifically dedicated international mobile subscriber identity (IMSI) ranges for IoT
- The underlying design of the platform is highly secure because of its close integration with the IoT core network and the global SIM
- Complete control of the roadmap enables Vodafone to rapidly develop and enhance the platform to be reactive to new industry and customer requirements
- The Vodafone Managed IoT Connectivity Platform has demonstrable scale in terms of process and technology - important for customers deploying large numbers of devices across the globe as well as for medium and small organisations that want a platform that is proven and established
- Vodafone is the only mobile network operator that offers its IoT platform to CSPs/MNOs, in addition to selling directly to Vodafone customers. For operators, our platform is accompanied by an IoT Partner Enablement Programme that delivers immediate competitive advantage in the rapidly expanding IoT market

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IN ASSOCIATION WITH VODAFONE



A Feintool employee processes transmission components  
Source: Feintool



Testing disc carriers for transmissions  
Source: Feintool

# Feintool works tirelessly to eliminate manufacturing downtime

Feintool is a manufacturer of presses for fineblanking. The company has created a monitoring system that refines data into actionable insights. The solution, called FEINmonitoring, promises to ensure the smooth running of Feintool machines, optimise production uptime for Feintool customers and provide them with a web portal access to its machine data

If you drive a modern car there's a good chance you've come into contact with a Feintool product. Feintool is a world leader in fineblanking, a production technique for complex steel parts commonly used in the automotive sector. Whether it's a seatbelt or a transmission part, there's a good chance that it is a Feintool product.

### 100 million items a year

Feintool produces around 50 of its large presses a year, each taking several months to build. Once in service, each machine works hard. A press producing clutch parts for an

automotive manufacturer could produce up to 100 million items a year, working around the clock.

"These machines typically operate 18-21 shifts a week," says Marc Schneeberger, the business development manager at Feintool.

"Maintenance has to be carefully planned. There is limited downtime."

For Feintool this challenge represents an opportunity. How to keep its presses running longer, reduce maintenance costs and get closer to its best customers? ►

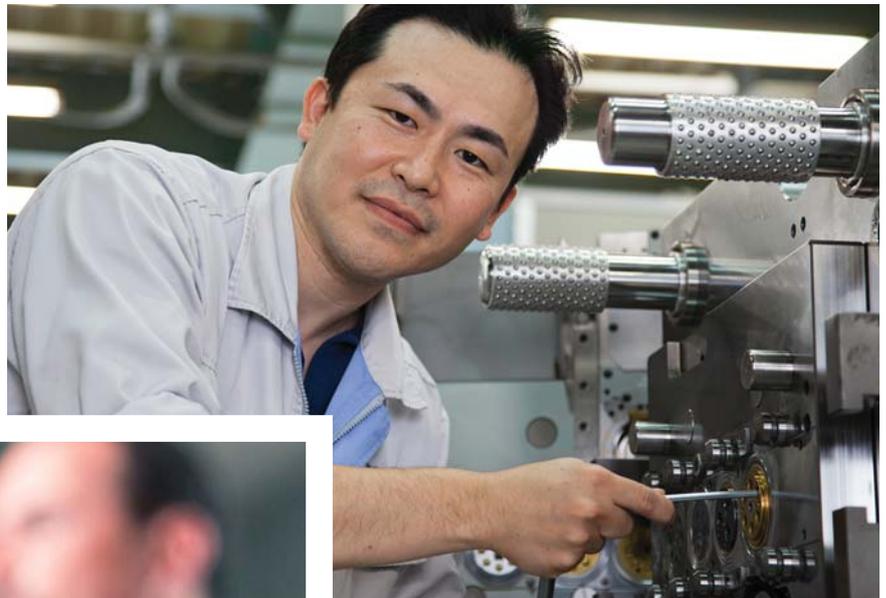
***"Maintenance has to be carefully planned. There is limited downtime"***

IN ASSOCIATION WITH VODAFONE



**Tool maintenance is essential for ultra precise parts production**

Source: Feintool



**Quality checking for a disc carrier**

Source: Feintool



Schneeberger. “Also, we wanted a platform on which to manage this service, and for customers to make sense of the data. Finally, we wanted a solutions provider expert in data security matters. This is not our area of expertise, and we will not risk our customers’ data.”

**The solution**

Mitch Greeley, a condition monitoring engineer at Feintool, explains that Vodafone came along at the right time. “We had the idea and our service team were very keen on extending our offer to customers, but Vodafone came with the expertise,” he says.

The Vodafone IoT service sees a Machinelink 3G device connected to all new Feintool presses. This device is then connected via Vodafone global IoT SIMs; customers can then monitor Feintool presses via Vodafone’s Remote Monitoring and Control Service (RMCS). Feintool can ship presses to anywhere in the world and activate the connectivity when necessary. Vodafone, Greeley continues, met every requirement for the successful roll-out of the connectivity. “The 3G connectivity stands separate to the customers’ network, Vodafone understands data security, and it is the complete solution,” he adds. “Since we decided on Vodafone we’ve had to do very little work.” ■

**Keeping the presses running**

Creating a stand-alone condition monitoring solution locally on the press failed to address the problem. “We still needed an engineer to visit or download the data with a remote maintenance tool and assess the press,” says Schneeberger. “Often we were arriving too late. To be really effective we needed to get the data sent from the press, in near real-time, to an engineer off-site.”

Feintool needed connectivity independent of the customers’ network and it needed a global solution. “We’re global, our customers are global, efficiency is a global concern,” adds

***“We had the idea and our service team were very keen on extending our offer to customers, but Vodafone came with the expertise”***

To read more Vodafone IoT case studies visit: <http://www.vodafone.com/iotcasestudies>



## Company summary

Cumulocity is the leading Internet of Things (IoT) device management and application enablement platform. Cumulocity is used by global brands, including Deutsche Telekom, Software AG and Gardner Denver, to power IoT solutions in manufacturing, fleet management, consumer electronics and many more verticals.

Cumulocity's headquarters is in Dusseldorf, Germany with regional offices in Boston, USA and Singapore. As a member of the Software AG group (Frankfurt TecDAX: SOW), Cumulocity is supported by 1,800 consultants in 70 countries. It is fully aligned with the Software AG Digital Business Platform and spearheads the exploitation of IoT in our customers' digital transformations.

The Cumulocity IoT platform is a white-label product that allows IoT solutions to be built by end-users in minutes and freely extended with open publicly documented application programme interfaces (APIs) and software development kits (SDKs). As a result, Cumulocity is one of the most widely used IoT platforms in the market with customers including: Telstra, Telia Company, Etisalat, NTT Communications, Teleena, QuarkloE, Tieto, Sensor Technik Wiedemann, Octo, PayPal, E.On, Lyreco, Certuss, Winora and Trackerando.

## IoT platform offering

Cumulocity is an open IoT platform that allows users to develop IoT solutions in minutes and deploy them with carrier grade security, reliability and scalability. Our mass customisable IoT platform incorporates device management, real-time analytics and visualisation, which can be easily tailored via publicly documented APIs, an open user interface (UI) framework and open source device apps. The platform is device, network and use case agnostic with more than 150 pre-integrated devices, connectivity management platform integration and industrial fieldbus support.

As a horizontal platform, Cumulocity is used in a wide variety of solutions across all industry segments including: vehicle monitoring, preventative maintenance, supply chain optimisation, consumer electronics, energy grid management, insurance, building management, traffic monitoring, structural monitoring, logistics and mobile payments.

Cumulocity can be deployed across more than 160 global cloud data centres, on-premise, on-site or as a multi-layered hybrid. Our active partner eco-system and 3,000 strong developer community ensure that our customers' IoT initiatives are successful.

## Key differentiators

- **Full IoT solution platform** with connectivity management adapters, device connectors, device management, real-time analytics, visualisation, application hosting and integration.
- **Power user focus** allows office IT skilled end-users to build their own IoT solutions in minutes.
- **IoT domain model** enables device establishment on connection, automatic management of changes and device abstraction in applications.
- **Open, publicly documented and extensible** through plug-ins, APIs and hosted applications which means that there is no vendor lock-in and a 3,000 strong developer community available for support.
- **White-label product, rebrandable and fully industrialised** with advanced automation processes which ensure that customer and end-customer branded IoT solutions can be developed and maintained with ease.
- **Carrier grade for security, reliability and scalability** with flexible deployment across geo-distributed cloud, on-premise, on-site and multi-layered hybrids with high availability options. We are regularly assessed against the stringent security and operational regulations of our many telecommunication operator customers.

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IN ASSOCIATION WITH CUMULOCITY



# Compressed air assured with Cumulocity IoT platform

Gardner Denver performs condition monitoring on its industrial air compressors to give customers remote visibility of operation and to allow proactive servicing. The company turned to Cumulocity to provide an IoT platform to enable it to innovate and diversify from selling products to selling services

Rising consumerisation, regulatory constriction and increasing global competition are driving economic change. Organisations must learn to grow, reduce risks and simplify their operational practices with alarming speed to avoid disruptions to their businesses. As organisations face change, they are proactively choosing to digitise their products and assets to exploit new opportunities and take advantage of operational efficiencies.

Companies like Gardner Denver have harnessed innovation in their businesses to take advantage of the connected, digital future. By embedding technology in its solutions, Gardner Denver is able to redefine the relationship between itself, its partners and its customers. The company is no longer strictly reliant on product-based sales and has used Internet of Things (IoT) technology to innovate and diversify.

The Cumulocity IoT platform allows Gardner Denver's business-to-business customers to rapidly, efficiently and securely improve the reliability of equipment, co-innovate with new customer offerings and create long-term relationships between partners in its ecosystem. Businesses are changing their strategies and technologies to be ahead of the disruptions they are facing.

### About Gardner Denver

Gardner Denver is a leading, global provider of high-quality industrial equipment, technologies

and services to a broad and diverse customer base through a family of highly recognised brands. The company was founded in 1859 and has 40 manufacturing facilities located in the Americas, EMEA, and Asia Pacific with offices in 32 different countries. With an extensive network of dedicated sales companies and distributors, Gardner Denver offers global expertise with truly local service capability, ensuring their advanced technologies are backed up with full support.

### Improved machinery performance

Gardner Denver's customers rely on the continuous operation of their industrial equipment. Eliminating downtime is the ultimate goal for industrial equipment and Gardner Denver partners and customers take pride in the quality and performance of their equipment. So Gardner Denver wanted to find a cost-effective way to increase machine quality and reduce downtime. Gardner Denver sells its equipment through a strong, global set of partners and distributors, so it needed a way to capture operational information from its machinery and provide it to the organisations best placed to support its customers. Each partner and distributor takes pride in, and ownership of, its customers, so having a solution that is secure and unique to each partner and distributor is very important.

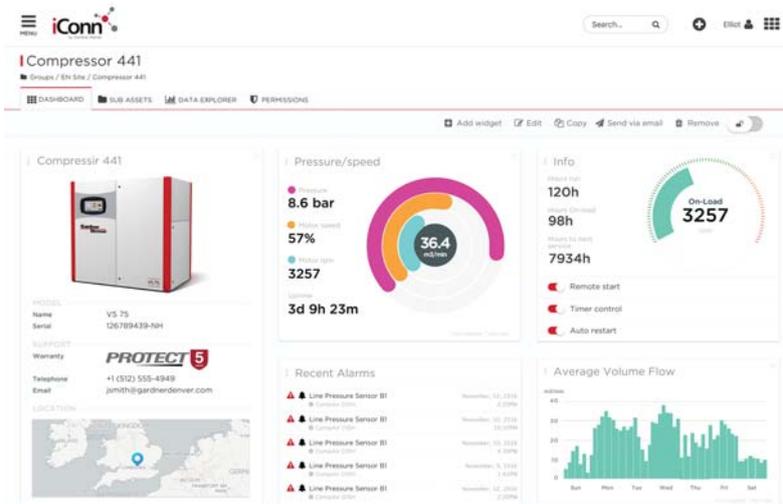
### Gardner Denver adopts the Cumulocity IoT Platform

Gardner Denver adopted and configured the Cumulocity IoT Platform to provide condition ►

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## Air compressor operation is displayed on dashboards



monitoring for its highly important industrial air compressor business. Gardner Denver chose air compressors as a first deployment for the Cumulocity platform because of the need for a secure, unique IoT platform for the distributors and service partners for each of its 16 brands. This IoT solution provides Gardner Denver with real-time monitoring of various operational parameters on its air compressors; real-time detection of fault situations; online storage and on-demand distribution to the correct Gardner Denver service partner; remote configuration of the industrial air compressors; and customised management, operational and technical dashboards. And equally important, each Cumulocity IoT Platform is fully rebranded for each Gardner Denver brand, providing a uniquely branded customer experience that distributors and service partners can offer.

### Results

Cumulocity's IoT Platform allows Gardner Denver to successfully offer its IoT-powered condition monitoring service to its global customers through its extensive network of distribution and service partners. Proactively monitoring equipment, identifying faults and sharing that information in real-time with partners increases the value that these distribution and service partners can offer to their customers.

End-customer benefits of an IoT-powered Gardner Denver air compressor include:

- **Equipment downtime minimised:** Proactive monitoring increases equipment reliability which improves operational efficiencies of customer organisations.
- **Reduce time for servicing:** Information about the detected faults, that couldn't be resolved remotely, are used to prepare service engineers

and proactively source spare parts.

- **Remote usage visibility:** Real-time visibility of operating statistics provides a transparent view of the customer organisations' needs and possible requirements for early equipment replacements.
- **Extensible for additional equipment:** Future-proofed and can be used with any additional equipment and for customer specific requirements.

Key benefits to Gardner Denver of using the Cumulocity IoT platform include:

- **Very fast time to market:** Adoption of the fully customisable, tailor-made Cumulocity software allowed the Gardner Denver condition monitoring service to be available in weeks.
- **Multi-brand and multi-partner support:** The flexible Cumulocity IoT Platform provides sophisticated user-access controls that align to the eco-system of distributors and service partners for each of Gardner Denver's many compressor brands.
- **Cost-effective pricing model:** The usage-based monthly Software-as-a-Service (SaaS) fee grows with customer additions. And set-up fees were fully transparent.

Sia Abbaszadeh, the vice president of global marketing and technology at Gardner Denver, describes the value that the company has found from its IoT solution. "Cumulocity allows us to provide a uniquely branded, secure IoT platform monitoring solution to each of our compressor distributors and service partners," he says. "This allows them to offer a high-quality, real-time monitoring solution to their customers." ■

**Cumulocity's IoT Platform allows Gardner Denver to successfully offer its IoT-powered condition monitoring service to its global customers through its extensive network of distribution and service partners**

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



# One platform does not fit all IoT operations so organisations will mix and match

What an IoT platform is and what it should do plagues the greatest minds in IoT. In short, a platform is simply something to base something else on but that doesn't necessarily help organisations looking to decide which platforms to use, writes George Malim

**Whether the term IoT platform is helpful is open to interpretation but it has created a marketplace that is extremely wide and difficult to understand amid conflicting definitions and marketing**

An IoT platform is actually something that does what a user wants it to do and the definition is increasingly fluid and determined from the perspective of the user. "An IoT platform needs to not have not only the technical capabilities to enable businesses to adopt IoT with minimal capex and with maximum agility and reach, but also the business capabilities that allow businesses to generate new revenues from IoT services," says Mick Higgins, the vice president of Mobility at **Tata Communications**. "It needs to be underpinned by global ubiquitous connectivity and partnerships in the world's mobile ecosystem."

Others take a similar view, identifying a blend of technical capabilities augmented with flexibility and reach. "An IoT platform is really any cloud-based product that can connect with IoT devices to provide interconnectivity or functions that would otherwise be significantly more complicated to achieve," says Craig Foster, the managing director of **HomeServe Labs**. "As a standalone term IoT platform doesn't mean that much, but it is useful to have a category so that IoT developers know that it's something targeted towards them and could help them add more functionality more quickly. Like anything, the term can be widely used and abused and shouldn't be relied on as clear definition of exactly what to expect. There is no reason why one device couldn't use multiple IoT platforms."

For Jason Kay, the chief commercial officer at **IMS Evolve**: "A platform that can unlock access to useful data from existing and future

infrastructure, enabling the ability to make better business decisions and release continuous and evolving value across your estate," he explains. "An IoT platform needs to be able to use existing data and contextualise against existing systems, giving an organisation the ability to automate or distribute useful and actionable information efficiently and effectively. An effective IoT platform needs to be delivered by a solutions provider that is able to work with an organisation to gain the maximum value from the solution and continue to recognise, as well as have the ability to implement, new value opportunities."

It's really a case of horses for courses. "For companies aiming to solve real world problems using the IoT, there are usually two focal points to consider: the thing itself and the analytics being applied to the data. This helps define the purpose of an IoT platform," explains Iain Woolley, the head of technology at **Breed Reply**. "In turn, this helps the business manage their things, such as identifying and authenticating, on-boarding new things, keeping track of the status of things, updating firmware, and transferring data to and from things. It also assists in managing the analytics, such as receiving and storing data, processing data into useful information, identifying and authenticating users and presenting information to users."

Whether the term IoT platform is helpful is open to interpretation but it has created a marketplace that is extremely wide and difficult to understand amid conflicting definitions and marketing. "IoT is a fragmented ecosystem, with a broad set of ►

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***“From the perspective of IoT connectivity, the need is for secure, low cost, controllable and global network coverage”***

requirements including devices, BSS/OSS, connectivity, analytics, applications and related services,” confirms Higgins. “In a similar way to the way that a universally accepted definition of the scope of service delivery platforms has never been clearly defined, there is a risk the same thing will happen to IoT platforms. It would be helpful if an industry definition or map of what an IoT platform is could be agreed upon.”

Others see the applicability of the IoT platform tag. “The term IoT has proved to be both useful and confusing within our industry,” acknowledges Kay. “It has enabled us as an organisation to quickly and effectively describe what our solution can do through a recognisable term that previously, was a challenge to condense. With this common understanding of the term however, comes the challenge of overcoming preconceived ideologies and misconceptions led by misleading marketing and PR within the industry. Some industry players have fallen for the temptation of re-badging old technology in order to jump on the bandwagon or define IoT in context of very linear applications, because it suits their delivery capability, rather than platforms that can be transformative to value creation in the enterprise.”

Yet, while some platform vendors have comprehensive platform propositions, others are specialised so consensus is hard to find. This leaves organisations sifting through marketing information to find what they need. The idea of a one-size-fits-all, holistic platform is probably wrong too.

“Anyone who thinks they’ll be able to use an IoT platform to solve all of their problems is going to be sorely mistaken and will hit walls in the future as they want to adapt their software to do more interesting things,” says Foster. “However an IoT platform can be a good way to accelerate the initial development. Generally, the best tip would be to go for one of the most famous platforms but don’t over rely on their functionality. Make sure you have intelligent, experienced and capable developers who can build their own functions so that you’re always able to switch away if or when needed”

Higgins acknowledges the challenge: “It is difficult to sift through the noise, but the starting

point should be the aims and objectives that an organisation wants to set for its IoT initiative,” he adds. “From this the requirements can be defined, which will help to identify the appropriate IoT platform or services that the organisation wishes to use.”

Nevertheless, there are common capabilities and attributes that make up an IoT platform and most offerings will encompass at least some. “The key attributes should be the ability to build more quickly and to provide better interconnectivity between devices,” says Foster. “This is especially important for sensors and triggers that operate in real-time and need a central control. By using a platform you should make it easier to integrate your device and therefore remove a lot of potential barriers.”

Even within the relative confines of an IoT connectivity platform, Higgins identifies a series of core capabilities. “From the perspective of IoT connectivity, the need is for secure, low cost, controllable and global network coverage,” he says. “This ensures guaranteed connectivity for businesses’ IoT devices, regardless of their location around the world. You need a comprehensive set of applications programme interfaces (APIs) that can be used to access and integrate with the platform and services, so once a business is on-boarded, they can quickly make use of the global connectivity via the platform. You also need an online portal to be able to monitor and control devices.”

For Kay, it’s simple, IoT platforms should be: “Proven at scale, rapidly deployable, involve minimal capital expenditure, integrate with existing infrastructure, utilise existing data and systems, deliver value directly to your core purpose and provide an evolving solution through continuous engagement, delivering new value.”

That statement in a nutshell forms as good a shopping list as any for an organisation looking for an IoT platform. However it would be wise to recognise that a single platform is unlikely to address all an organisation’s needs and, even if it did, an organisation probably should consider platforms from more than one vendor in order to access sector specialisms most effectively. ■



**Mick Higgins**, Tata Communications



**Jason Kay**, IMS Evolve



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[www.windriver.com/products/helix/device-cloud](http://www.windriver.com/products/helix/device-cloud)

## Company summary

Wind River, an Intel company, is headquartered in Alameda, California, USA, and has more than 2,000 employees. For more than 30 years, Wind River has helped the world's technology leaders power generation after generation of the safest, most secure devices in the world. The company's software runs the can't fail computing systems of the most important modern infrastructure, including mission critical aircraft, trains, automobiles, medical devices, manufacturing plants and communications networks.

Wind River technology is in more than two billion devices throughout the world and backed by our industry-leading professional services, award-winning customer support and robust partner ecosystem.

## IoT platform offering

Wind River Helix Device Cloud, an IoT device management platform, enables users to reduce the complexities of building and operating large-scale device deployments. Device Cloud solves the problem of connecting and managing devices remotely. It automatically collects and integrates data from thousands of disparate devices, machines, and systems, enabling operators to track device status and content, be aware of issues, and proactively determine when updates are needed.

With its ability to connect machines and devices, manage machine-generated data, and remotely execute software updates, organisations can lower development costs, accelerate deployment timelines, and free resources to work on creating differentiated products that stand up to the competition.

### With Device Cloud, organisations can:

- Maintain secure two-way connectivity to gateways and embedded systems that power intelligent devices
- Keep mission-critical IoT devices fully operational, with immediate notification of issues and tools for remote diagnosis and repair
- Manage the inventory of device configurations and software to stay on top of what is running in the field
- Upgrade new devices when first activated in the field and push new updates out as released
- Integrate with other enterprise systems to monitor and share device status

## Key differentiators

### With Device Cloud, customers can:

- Rely on Wind River's expertise to accelerate IoT project delivery and reduce project risk
- Avoid spending time and resources on building device management functionality
- Achieve predictable operating costs through a pay-as-you-grow hosted service
- Make use of 24/7 hosting operations and security provided by Intel.

## Contact Information

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



# Why device management matters in IoT and how to achieve it

For most enterprises, the compelling case for IoT is the ability to access valuable data being generated by hundreds or even thousands of field devices. That can happen only if the devices delivering that data and the gateways that direct data to enterprise systems are continually performing as expected

Data may be the hero of the IoT story, but the real workhorses are devices at the edge of the IoT system – the things in the Internet of Things. They're out in the field either generating and transmitting data to a centralised platform or performing automated tasks that generate data. A mundane job, perhaps, yet the overall performance of a system often hinges on the health of field devices. If a device, sensor, embedded agent, or gateway begins faltering, the consequences can be dire.

## Life on the edge

The challenge of maintaining devices may sound basic compared with aggregating and analysing data, but it's essential to a successful IoT strategy. At a minimum, device manufacturers and system operators need a way to monitor the health of devices in the field to prevent system disruption and downtime. More importantly, they need to have an action plan: how to remedy those problems that will eventually occur.

With IoT, change is constant. Business priorities will shift as companies gain insights about their operations from the data. So system operators need an efficient, scalable way to provide updates across a large fleet of devices. Security,

too, is a major concern. If a vulnerability is discovered in device software, patches must be deployed quickly – before intruders can exploit the gaps.

## Remote control for the device lifecycle

Device manufacturers and system developers need to plan for these contingencies at the design stage. It's not feasible or cost-effective to rely on truck rolls for fixes and updates. Instead, what's needed is a way to perform these tasks remotely, at scale, and over the internet.

But IoT data collection typically runs just one-way – from device to cloud. Even when operators detect device anomalies, they typically don't have the tools to push commands back to the device and fix the issue. So the initial design of an IoT system must consider the entire operating lifecycle, from deployment to decommissioning.

Several distinct but interrelated issues must be addressed:

1. **Commissioning and provisioning:** Once devices are deployed and connected, operators need a way to activate and provision them efficiently. Today, that often means physically going from device to device and loading applications or performing upgrades manually. IoT system operators need to be able to configure, provision, and manage field devices remotely.
2. **Security:** Device security is critical to an IoT system. Hackers often target endpoint devices as a means of gaining entry. And security breaches at the device level can have severe consequences: financial losses, damage to credibility, even endangerment of human life. But securing devices is challenging since they're vulnerable to both physical tampering and network-borne threats.
3. **Monitoring and management:** System operators need the right tools to monitor remote device performance and check for security ▶

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## SECURE DEVICE MANAGEMENT ACROSS THE LIFECYCLE

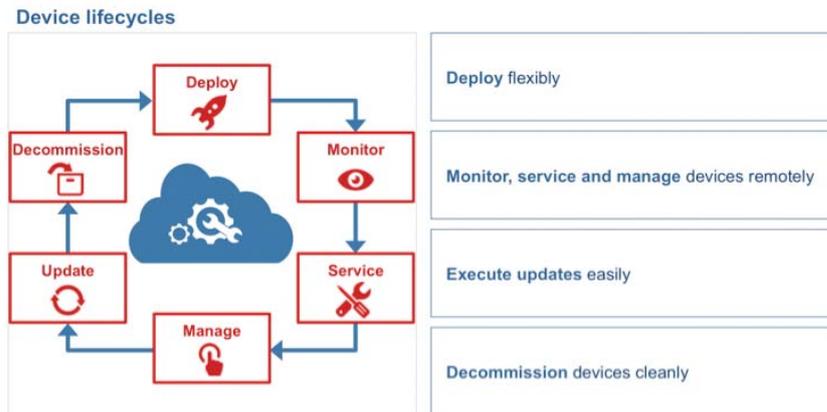


Figure 1: IoT system operators need to manage devices across their entire lifecycle

vulnerabilities. They also need to be able to send instructions to those devices to correct a problem or change a function. This requires full two-way communication, where responses to devices can be completely automated.

**4. Integration:** Historically, information technology and operational technology systems have been kept separate. But IoT systems need to be integrated, with a centralised place to aggregate, analyse and store data.

**5. Updates and upgrades:** While the devices in enterprise applications can perform for years, the software running on them will require regular updates and upgrades: from bug fixes to security patches to overall software improvements. And once an upgrade or a new application is ready, operators need to be able to deploy it quickly and cost-effectively to many devices at once.

**6. Decommissioning:** Developers must plan for end-of-device life at the design stage so operators can easily and remotely remove a device from service.

The challenge facing every IoT system developer and operator is how to gain consistently reliable and secure remote control over devices typically far away and connected via the public internet.

### The answer in the cloud

Device management should be part of an IoT strategy from inception. But trying to build device management and two-way communication capabilities into a system from scratch can take time, devour resources, increase costs, and delay deployment.

A more practical solution is to use technology designed specifically for IoT device deployment and management. Wind River Helix Device Cloud

is the ready-built platform that makes it possible, enabling operators to safely and securely monitor, manage, service, and update devices in the field.

Device Cloud automatically collects and integrates data from disparate devices, machines, and systems, enabling operators to track device status, share data, and proactively determine when updates are needed. Using an embedded software agent, device properties and operating data can be transmitted securely to the cloud. Operators can easily view device information through a web-based management console, perform diagnostics, and take prompt corrective action.

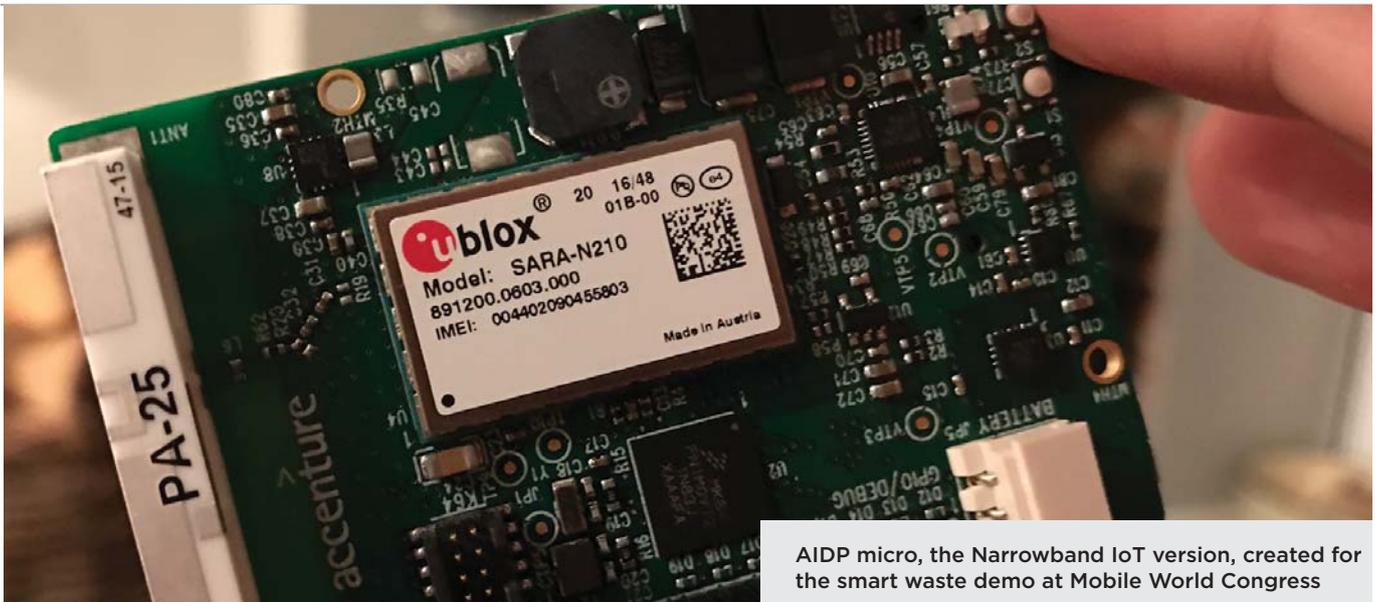
The cloud-based platform is also designed to integrate with enterprise systems that utilise or analyse data from IoT networks. Device Cloud data and event forwarding ensures that device health issues will signal other systems of potential problems, allowing them to respond accordingly and prevent ingestion of potentially bad data.

### Optimised operations

With IoT adoption becoming widespread, a growing number of enterprises are unlocking the valuable data generated by their everyday operations: gaining business insights, optimising operations, improving profitability, and uncovering new business opportunities. But IoT can only be effective if connected devices are actively monitored and managed. Fortunately, technology exists that makes it easier to build that capability into IoT devices and systems. Utilising Device Cloud, device manufacturers and IoT system developers can accelerate device deployment and close a critical gap in IoT operations, ensuring that the devices enterprises depend on for crucial business data are secure, responsive, and performing at the highest possible level. ■

**Device management should be part of an IoT strategy from inception**

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AIDP micro, the Narrowband IoT version, created for the smart waste demo at Mobile World Congress

## Accenture creates IoT device platforms in four flavours, demos NB-IoT smart waste collection with Vodafone

The cost of devices and connectivity can make or break an Internet of Things (IoT) business case, but now a professional services firm is working with a Tier-1 network operator to test clients' use cases before bringing them to market. Jeremy Cowan reports

Using accelerators like the Accenture IoT Device Platform (AIDP) in its Connected Device Design Studios, **Accenture** is testing potential use cases for its clients on a variety of networks including LoRa, Sigfox, narrowband-IoT (NB-IoT), Wi-Fi, Bluetooth and cellular. The tests are said by Accenture to be reducing overall programme costs by showing which technologies will help create innovative solutions offering the right quality of service, bringing them quickly to market and ready to scale.

Working with **Vodafone**, Accenture claims it is among the first companies to rapidly prototype and test an IoT use case on the operator's live commercial NB-IoT network. For example, with the AIDP accelerator tool, Accenture's Studios have been able to build a smart waste solution which went from design through prototyping to testing on Vodafone's NB-IoT network in less than six weeks.

AIDP is a product of Accenture Mobility. Phil Vann, managing director of Accenture Mobility, told **IoT Now**, "Accenture has formed the Connected Devices & Embedded Software global practice which I lead out of London. It represents about 1,200-1,300 engineers. That allows us to address device manufacturers across a suite of industries. Telecoms is a core part of what we do. We expanded in the early days into automotive, medical equipment, industrial equipment, as well as horizontals like the semi-conductor industry, aerospace and defence."

Accenture Mobility has set up a number of device design studios around the globe. As well as paper-based consulting, the company offers rapid prototyping to prove that a technology really does what it says it will do for a particular application. It is also important to see if it meets the commercial needs of that particular device manufacturer or IoT use case.

"We became an ARM Embed cloud partner," said Vann. "We needed our own prototyping platform to take clients from the advisory stage into a world where we could rapidly prototype new device types, and consider the economics of doing so. We built a roadmap of different AIDP devices, in four brackets; gateways, which comes from technology and clients such as Intel. In that case we're adopting OEM devices and modifying those. When it relates to edge-constrained devices, wearables or ultra-constrained devices there wasn't anything that would meet our needs. So we started building the first AIDP, which is the edge-constrained version, the big brother of the AIDP suite with all of the functionality. It's got a suite of communication protocols; Wi-Fi, Bluetooth, naturally, but also support for the emerging LPWAN technology modules ... Sigfox, Ingenu, LoRaWAN, and more recently, Narrowband IoT."

The edge-constrained version of AIDP is the size of a small open hardware development platform, like a Raspberry Pi, with all of those technologies pre-integrated.

This year at Mobile World Congress Accenture Mobility had a smart waste demo on the Vodafone stand, as the operator had just turned on the NB-IoT network in Spain and could demonstrate a number of solutions.

The response was apparently good, with the technology now being real. "There's been a lot of anticipation of narrowband-IoT or the 3GPP solutions to the LPWAN problem. Having it physically working at MWC was a real mental shift for the people that saw the demo, it stopped being an academic (exercise), and became a real-world discussion where there was a physical device that was genuinely connected to the network, that was communicating data, that was starting to demonstrate some of the promises of the technology," said Vann. ■

This interview with Phil Vann of Accenture Mobility can be seen in full at: [www.iiot-now.com](http://www.iiot-now.com) (Search "Vann").