

**DEVICE
INSIGHT**

...eseye

WHITEPAPER

HOW TO BECOME A SMART VENDING PIONEER

Integrated IoT and
Connectivity Solution
for Intelligent
Vending Machines

www.eseye.com

VENDING MACHINES – CONVENIENT FOR THE CUSTOMER, DEMANDING IN OPERATION

16 billion

euros in total turnover are generated by around 4 million beverage and food vending machines in Europe each year.*

*Source: European Vending and Coffee Service Association

Whether in shopping centers, at train stations and airports or in factories and offices – vending machines are everywhere. They supply customers with coffee, soft drinks, snacks and much more, at any time of day or night. It's easy and convenient for the customer, but it also works for manufacturers and operators. Compared to stationary sales in supermarkets with the corresponding personnel costs, vending is much more efficient. According to the European Vending & Coffee Service Association, there are more than 4 million vending machines in Europe generating a total annual turnover of over €16 billion.

But the business model also presents numerous challenges. Manufacturers and operators must keep track of the mass of vending machines: Where is which vending machine located? Is it operating as expected or is there a technical fault? Are all products still available or does the vending machine need to be refilled? It is precisely the advantages of the vending machines for the customer – fast and consistent accessibility and easy handling – that places correspondingly high demands on manufacturers and operators. Because only perfectly functioning machines can generate revenue. Accordingly, business success is entirely dependent upon a reliable IoT connectivity service and platform solution that delivers high machine availability, wherever the machine is located.

At the same time, customer demands on the buying experience are increasing. Coffee from vending machines is now also expected to be of high barista quality. The same applies to the user-friendliness of the machines. Experience and habits from e-commerce are increasingly being transferred to the customer journey at the vending machine. Customers are looking for simple operating elements, multi-functionality, and comprehensible and attractive (audio) visual communication and, above all, the ability to order and pay contactlessly via app.

The solution to master these challenges and at the same time take advantage of new digital opportunities:

SMART VENDING

THE VENDING MACHINE BECOMES INTELLIGENT

Thanks to modern IoT technology, vending machines can now be networked, controlled and optimized with one another – regardless of location and in any quantity. **The next generation of vending machines have become intelligent.**

// Sales and Condition Data at a Glance

This is the basis for smart vending and all the benefits that come with it, both for manufacturers and operators and the customer: data. **With the help of the Internet of Things (IoT), sales and condition data for every machine can be collected, processed and forwarded**, in real-time and completely independent of the machine's location. Which product was purchased, how frequently, by who and at which location and at what time of day? What is the maintenance status and condition of the machine and when do certain consumables need to be refilled? These data can now be interrogated, analysed and presented in real-time to inform commercial and operational decision making.

// The Machine Signals Itself When It Needs to Be Serviced

Based on this data, service and resupply can be performed only as needed on these machines – and even ahead of time using preventative maintenance techniques. This is because the machine itself signals when something is wrong or about to go wrong. With the help of intelligent notifications, messages can reach the right person directly and promptly to ensure remediation action is performed. In addition, the operator can use the data to decide remotely whether an on-site service visit is actually necessary – and if so, to better guide the service technician at the point of sale. **The result: lower costs for service and maintenance, higher availability of the machines and a corresponding increase in sales.**

// New Revenues Through Digital Services and Innovative Business Models

IoT technologies not only make it easier to monitor vending machines, but also **enable completely new digital business models and services**. For example, apps can be used to place contactless orders at vending machines or collect loyalty points. If a customer is looking for the nearest vending machine, this can also be easily mapped via an app. This is only made possible by linking IoT-enabled vending machines with other app-based services.

Thanks to the Internet of Things, new flexible business models such as the **rental or leasing of vending machines, as well as pay-per-use models**, can now also be implemented in the vending machine business, opening up improved opportunities for manufacturers and operators to scale the vending machine fleet and achieve significantly faster growth overall.

// Improved User Experiences Driven by State-of-the-Art Technology

Until now, vending machines resembled a black box. Operators had hardly any insight into customer behavior and, above all, no opportunity for interaction. **Smart vending takes customer communication and the buying experience to a whole new level**. Thanks to modern, easy-to-use user interfaces, the customer not only gets an overview

of the product range, but also helpful additional information, for example on ingredients. Customers can be informed about special offers and discounts or collect loyalty points via vending machine displays. Thanks to integrated display marketing, controlled via the IoT solution, this is a further sales driver. In the future, customers could even be recognized directly by the vending machine using digital fingerprints or intelligent facial recognition and navigated to their favorite products and individual product suggestions. Smart payment methods via card, customer account or app round off the personalized retail experience.

At the same time, operators and manufacturers gain valuable insights into customer behavior – data which in turn serves as the basis in building a regular customer base and developing new products and marketing campaigns, and thus becomes a key factor for future business success.

SMART VENDING IN PRACTICE: COSTA EXPRESS

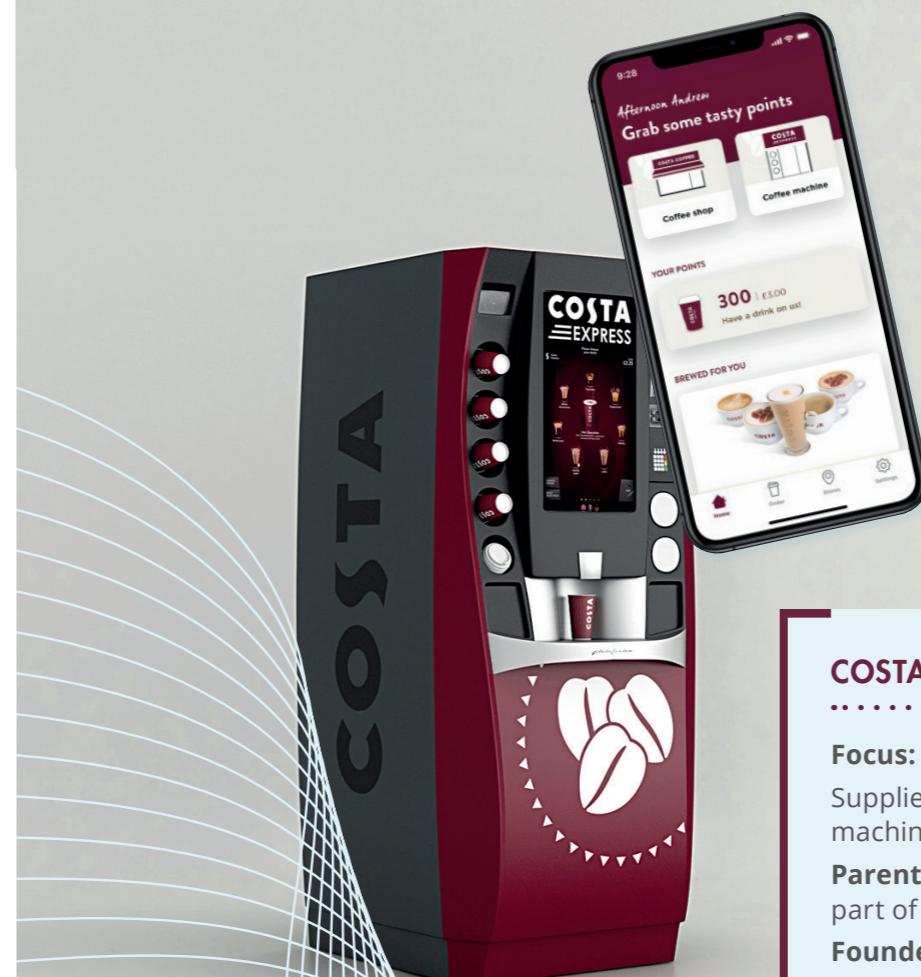
The example of Costa Express shows how smart vending can be implemented in practice. The international supplier of smart self-serve coffee machines based in the UK has succeeded in taking coffee to go to a completely new level – **thanks to a unique combination of premium coffee, individual customer experience and smart IoT technology.**

// The Challenge

Costa Express has set itself the goal of offering premium barista coffee – for which Costa Coffee and its approximately 3,400 coffee stores worldwide are known – in the same first-class quality also via high-end coffee machines, in locations including gas stations, shopping centers or airports. As a premium brand, however, it is crucial that the machines match the quality, service and experience offered by the coffee prepared by the barista in the store.

The technological prerequisite for this was the integration of a flexible, scalable and reliable end-to-end IoT solution that seamlessly connects in any location. **Costa Express relied on the many years of experience and IoT know-how of Device Insight in conjunction with the flexible, reliable cellular connectivity solution from Eseye.**

In this way, not only can all Costa Express coffee machines worldwide be reliably and ubiquitously connected, but machine and sales data can also be made transparently accessible, enabling intelligent condition monitoring and alert notification. At the same time, the IoT solution offered Costa Express a wide range of additional business potential, such as the delivery of integrated marketing campaigns via machine display and new digital services.



COSTA EXPRESS

Focus:

Supplier of smart self-serve coffee machines

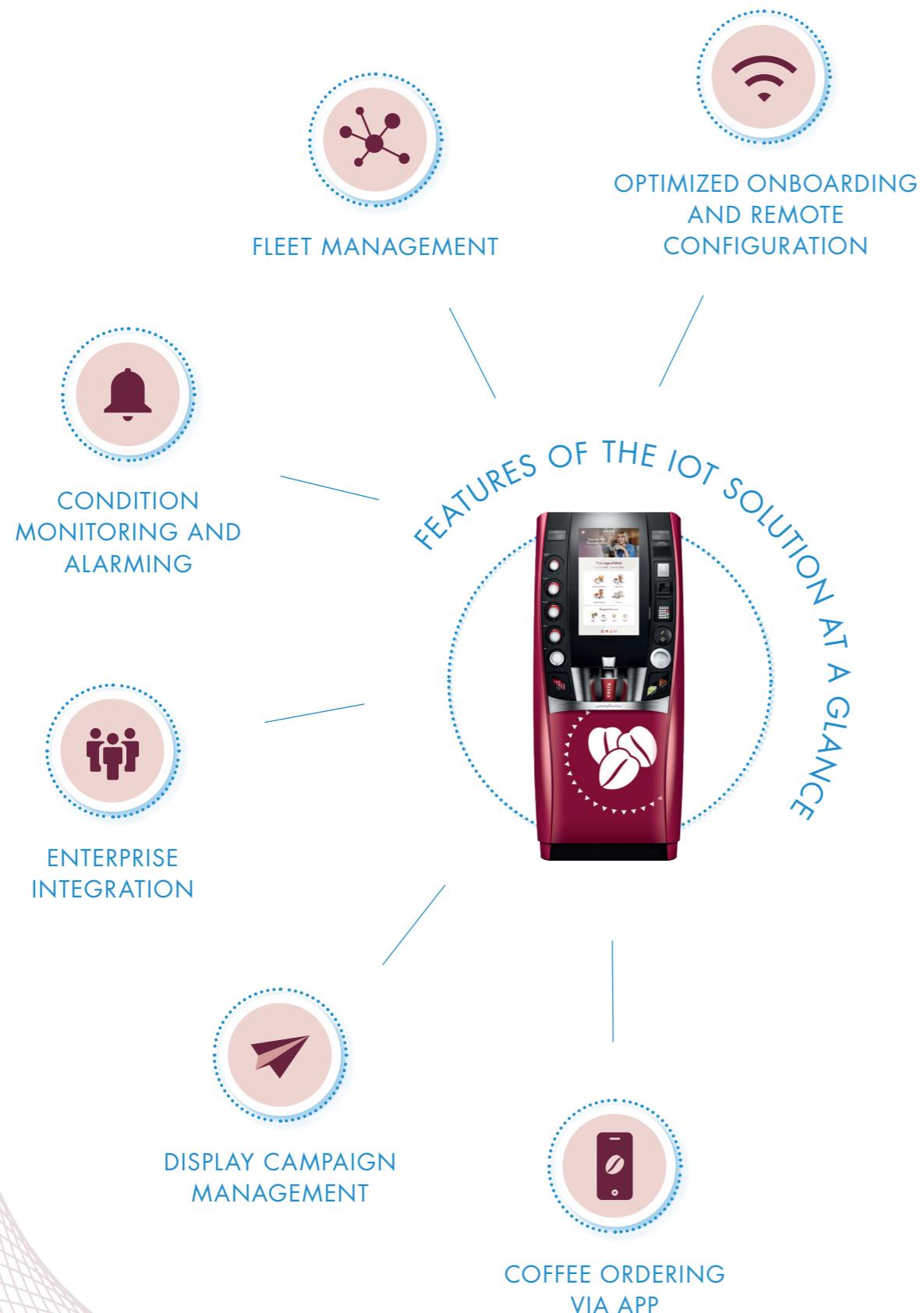
Parent Company: Costa Coffee, part of Coca-Cola since 2018

Founded: 2011

Location: Loudwater, Großbritannien

Represented internationally with around 11,000 coffee machines in over 17 countries

www.costa.co.uk/business/costa-express

**// The Solution at a Glance****The IoT Solution as Central Control Element**

Costa Express' IoT solution acts as a central control element and link. The platform enables the exchange of information with third-party systems, above all the recording and forwarding of machine sales data. How many drinks of what kind, in what size were sold per day or hour is recorded in conclusive reports. For this purpose, machine and customer data from the Customer Relationship Management System (CRM) are integrated into the IoT solution. Similar to all other relevant back end systems, this was realized via an Enterprise Service Bus (ESB).

Condition Monitoring and Alert Notification

The IoT platform allows the status and use of all coffee machines to be viewed and managed centrally. The coffee vending machines report problems directly within the platform, making diagnosis and problem solving quick and easy. The basis for this is an elaborate alarming system: Detected error messages from the machines are pre-processed and then transferred to the IoT platform according to priority. In the event of a malfunction, such as a disrupted water flow or when coffee beans and milk run out, the IoT solution immediately triggers the appropriate alerts. These alerts are addressed directly to the right contact person, which reduces the time needed to solve the problem.

Detailed reports on downtimes and troubleshooting times also enable Costa Express to communicate optimization suggestions to operators and service partners, thus making the machines more profitable in the long term.

Easy Onboarding

Thanks to the centralized and globally connected IoT solution, new coffee machines can also be commissioned much more efficiently. Depending on the installation location, Costa Express determines the appropriate machine parameters in advance, such as the available languages and the desired price configurations. An installation partner only has to connect the Costa Express coffee bars on site and is guided step by step through a setup process. The machine then automatically adopts the correct settings during installation and at the same time transmits all picking information relevant for the control center.

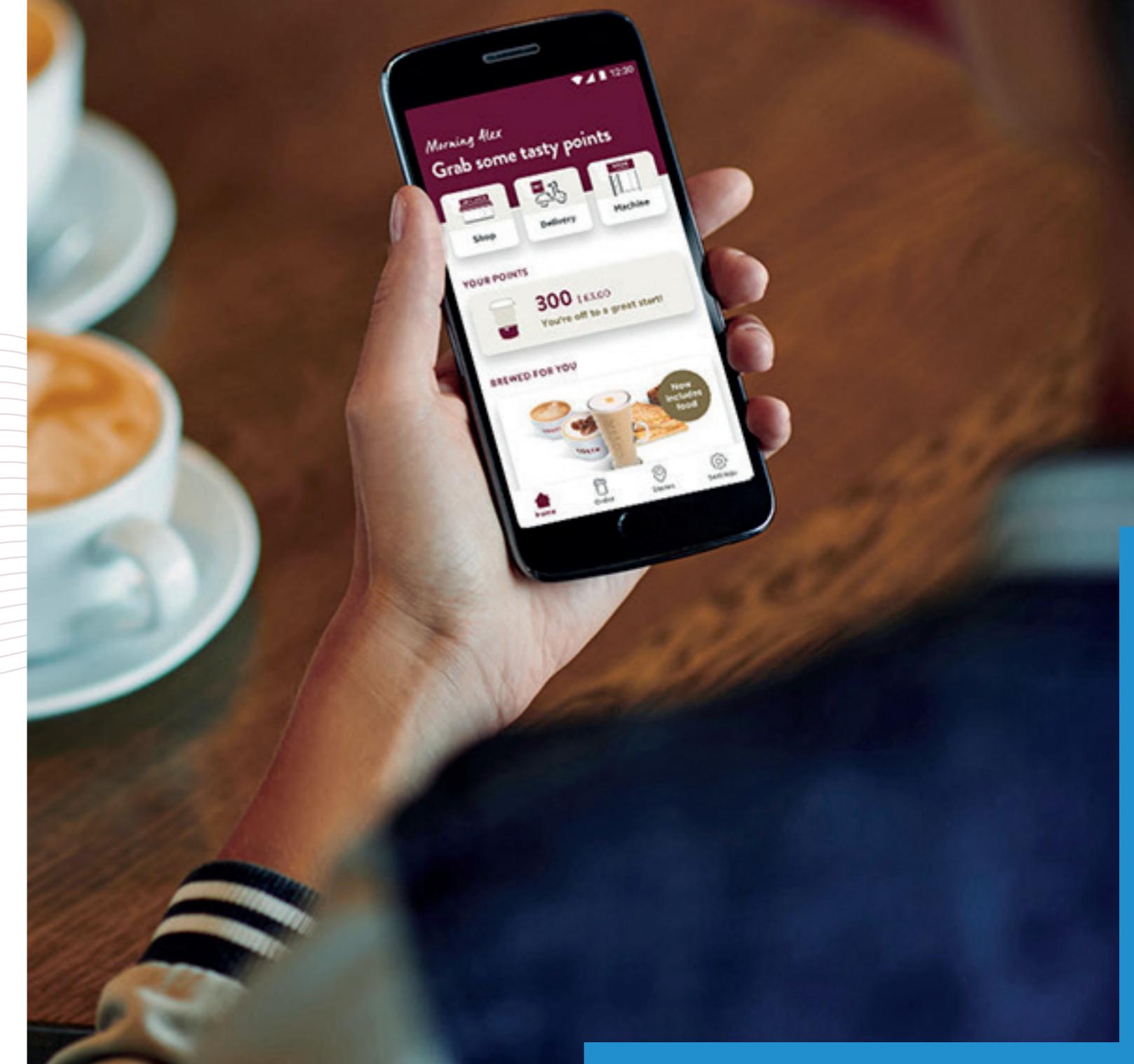
Integrated Marketing via Touch Screen

Costa Express also uses the IoT solution to create an additional interface for its customers via display marketing. In this way, customer and discount campaigns as well as new coffee creations can be communicated and marketed in an integrated way. Prices, start and end dates for promotions and the content of the displays can be adjusted directly via the platform. For example, special offers and campaigns for Christmas or for the 'World Coffee Day' can be displayed on the large touch screen of the mobile coffee bars. In addition, customers can also collect loyalty points based on the IoT solution when making purchases at the coffee vending machines or via the app – an advantage that customers have so far only been able to enjoy at the local café. Costa Express is thus building up a regular customer base via smart vending and securing long-term market share.

Contactless Ordering via App

The latest feature integrated into the solution is the possibility of contactless ordering. Here, the customer can enter his order via the app instead of via the display of the coffee machine. A link to the machine is established via a QR code, so it is no longer necessary to touch the display itself. This function aims to prevent the virus from being transmitted via the touch screen in times of the corona pandemic.

Based on the IoT solution, customers can collect loyalty points via app or order contactless at the vending machine.



// Technological Implementation

To implement this ambitious overall IoT solution, Costa Express relied on the combined expertise of Device Insight and Eseye. While Device Insight is responsible for developing the various components and features of the IoT platform, Eseye provides the necessary cellular connectivity infrastructure.



IoT Hardware and Connectivity Management by Eseye

- An **Eseye Hera 604 IoT router** with over-the-air switching as standard is deployed.
- An eUICC compliant, embedded **multi-IMSI AnyNet Secure eSIM** enables automatic mobile connectivity to deliver near 100% connectivity uptime, across 190 countries.
- Ability to deploy **firmware updates to routers over-the-air** when new functionality is developed and made available.
- **Real-time telemetry** supports continual operational monitoring at sites.
- Seamless integration between Eseye devices and the IoT platform by Device Insight enables **proactive monitoring of connectivity services**.



IoT Operations Management and Vending Services Platform by Device Insight

- Device Insight developed a **scalable and intuitive IoT solution** for Costa Express, consisting of an Edge component, middleware and a web portal.
- The **Edge component** maps the interface to the coffee machine and enables pre-processing of the data to reduce connectivity costs.
- A **central communication hub** manages the secured connections to many thousands of machines and enables bi-directional communication.
- A **sales and reporting service** validates all received sales data and makes it available in a redundant reporting system with a resolution to the second.
- An elaborate **alarm rule and escalation service** ensures that alerts are sent to the right contact person and that errors are processed within defined time periods.
- The **application core** is the heart of the architecture and coordinates all other services, especially the role and rights model, which controls access down to the data level.
- To further accelerate development, the **user interface** is based on a ready-to-use UI portal framework, but can be modularly extended with individual visualizations and applications.
- The **campaign service** connected to the content management system is responsible for the roll-out of the content to be displayed on the touch screens of the machines.
- In addition to the development of the solution, Device Insight also takes over the **operation** for Costa Express.

DEVICE INSIGHT AND ESEYE: COMBINED KNOW-HOW FOR SMART VENDING

The example of Costa Express shows that IoT-based smart vending offers enormous opportunities for manufacturers and operators – from cost savings in maintenance and operation, new revenue opportunities and growth potential to better customer understanding.

At the same time, smart vending concepts are associated with high technological requirements. **To make smart vending a success, a solution is needed that is flexible and scalable.** Only in this way can an increasing number of machines be managed and the IoT solution grow along with new customer requirements. In addition, smart vending solutions must be absolutely robust and reliable in order to cope with peak loads. After all, delays and failures lead to frustrated customers who may not come back. Reliable connectivity therefore becomes a key success factor.

Device Insight and Eseye have joined forces as project partners to **help guide companies in the smart vending sector through the complexity and deliver IoT successfully.** The two partners combine many years of IoT expertise and innovative and reliable connectivity solutions to create a joint smart vending approach that guides companies **from the planning and development of the solution architecture to the actual deployment, roll-out and operation of the solution.**

DEVICE INSIGHT

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Focus:

IoT and IIoT solutions

HQ: Munich, Germany

Founding year: 2003

Employees: 100

www.device-insight.com

ESEYE

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Focus:

IoT Connectivity Solutions

HQ: Guildford, Surrey, UK

Founding year: 2007

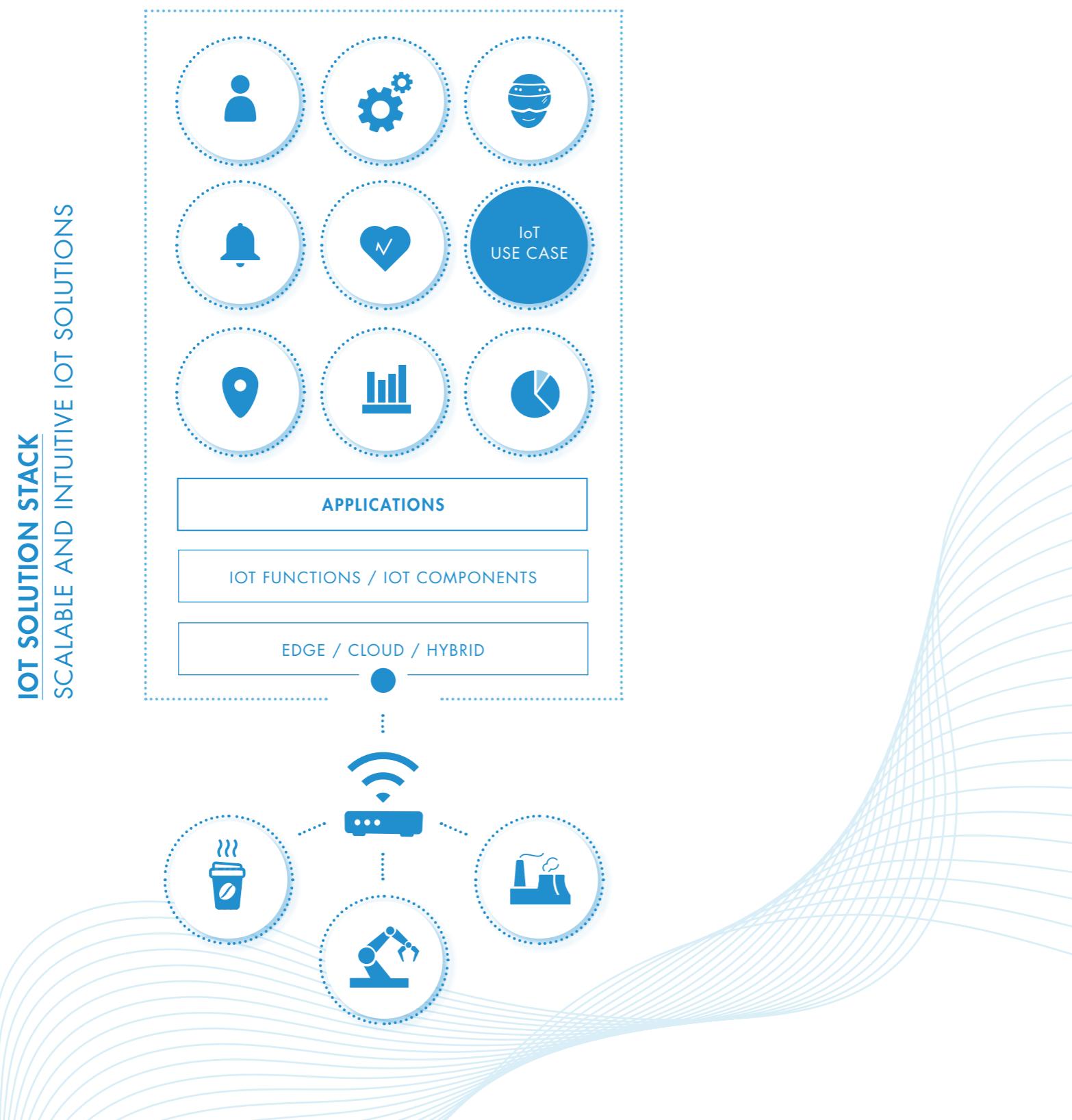
Employees: 110

www.eseye.com



// The Device Insight IoT Framework – Fast, Tailored, Scalable

Our 360-degree service enables us to accompany companies from business case analysis and implementation to secure IT operations. For this, we rely on a flexible IoT framework: ready-made IoT components, system integration and software development are combined to create tailor-made and at the same time flexibly scalable IoT solutions.



Our approach is based on the principle "think big, start small". Based on major hyperscaler IoT platforms and using ready-made IoT building blocks, we enable companies to achieve a fast time-to-market for their IoT solution as well as measurable proof of value within the shortest possible time. At the same time, our open infrastructure enables us to flexibly expand IoT solutions and tailor them precisely to the respective requirements with new, individual applications.

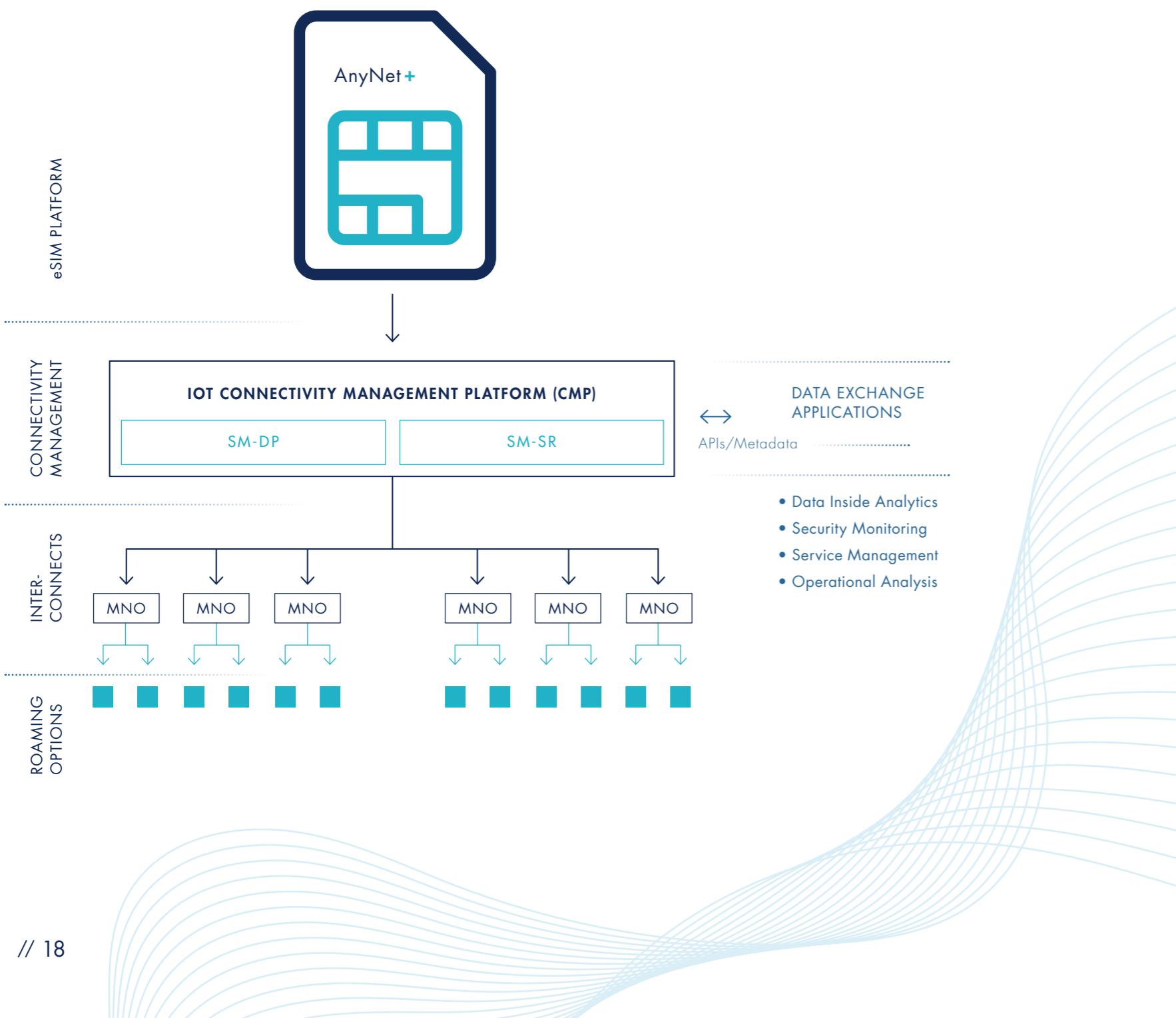
YOUR ADVANTAGES

- Fast time-to-market**
Our easy-to-use and ready-made IoT building blocks enable you to quickly implement your first IoT use cases within a few weeks and achieve a directly visible ROI.
- Flexibility and openness**
New functionalities and features can be easily added, following the success principle "think big, start small". The IoT solution grows with your individual requirements.
- Real user centricity**
Our IoT building blocks can be individually adapted to your use case and the needs of your users – real user focus instead of feature overload.
- Data sovereignty and design freedom**
We offer you our IoT solution in a flexible subscription model. This not only guarantees you full sovereignty over your data, but also offers you the possibility to operate your IoT solution completely independently. Full freedom of design instead of vendor lock-in.
- Basis for real innovation**
With the smart combination of system integration and customized IoT applications, we provide the basis for your long-term digital roadmap and new digital business models.

// Eseye Connectivity Solution – Reliable, Seamless, Flexible

Eseye empowers businesses to embrace IoT without limits. We help them to visualize the impossible and bring those solutions to life through innovative IoT cellular connectivity solutions that enables our customers to drive up business value, deploy differentiated experiences and disrupt their markets. Our pioneering IoT cellular connectivity solutions, versatile hardware, technical consultancy and round-the-clock support allows businesses to overcome the complexity of IoT design, development and deployment.

We guide them every step of the way, so they can move forward with IoT projects without the fear of getting it wrong. Supported by our unique AnyNet Secure® SIM technology, Connectivity Management Platform and a powerful partner ecosystem, we help more than 2,000 customers to seamlessly connect millions of devices across 190 countries, agnostic to over 700 available global networks.



YOUR ADVANTAGES

- **Limitless connectivity**

Deliver IoT anywhere in the world with confidence. Enjoy near 100% uptime with our multi-network eUICC AnyNet+ SIM and Advanced Connectivity Management Platform.

- **Unrivalled expertise**

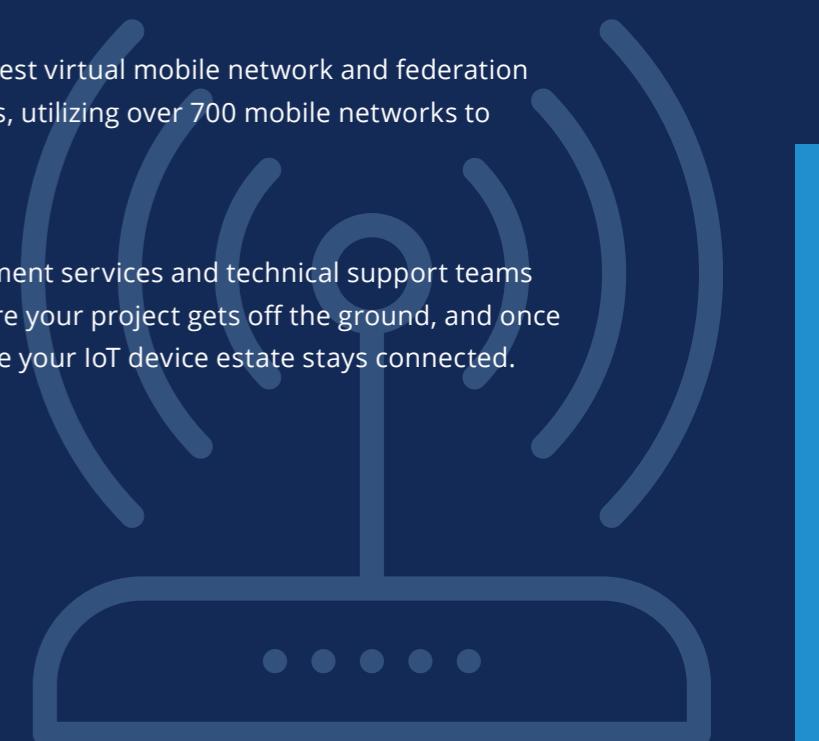
Build better – get to market faster. Our in-house, leading-edge IoT hardware and connectivity expertise accelerates your device design and deployment process.

- **Uncapped potential**

Access the world's largest virtual mobile network and federation of localization partners, utilizing over 700 mobile networks to unlock IoT's potential.

- **Optimized delivery**

Our dedicated deployment services and technical support teams work with you to ensure your project gets off the ground, and once deployed we make sure your IoT device estate stays connected.



ABOUT DEVICE INSIGHT

Founded in 2003 in Munich, Device Insight GmbH is an IoT specialist, accompanying companies in their digitization in the fields of Internet of Things, Industry 4.0 and artificial intelligence. Based on a flexible IoT framework, Device Insight combines ready-to-use IoT building blocks and individual applications for customized IoT services. System integration based on common cloud providers and software development are combined to create tailored solutions that are both fast and scalable. Device Insight supports global networking of machines, vehicles, plants and devices and provides applications in the fields of data acquisition, condition monitoring, predictive maintenance, machine learning, industrial analytics and AIoT (Artificial Intelligence of Things). Device Insight is active in more than 15 countries, working together with large enterprises and mid-size customers from various sectors, including machinery and plant engineering, HVAC, commercial vehicles, vending, transport, energy as well as the Connected Home environment. Services range from business case analysis and implementation to secure IT operations. The company has been awarded "Internet of Things (I4.0 Leader Germany)" on numerous occasions by the ISG Provider Lens study. Since 2019, Device Insight has been a subsidiary of automation specialist KUKA AG.

www.device-insight.com

ABOUT ESEYE

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