eSIM for industrial IoT applications

Streamlined, secure provisioning of IoT devices anywhere

Kigen

White Paper

Learn why IoT device makers are adopting eSIM:

- Benefits of remote SIM provisioning
- Innovating around industrial use cases for eSIM
- Adding end-to-end industrial strength security
- Deploying applications faster and at scale

Benefits of remote SIM provisioning

Adopting remotely provisioned eSIM technology brings more flexibility to managing the cellular connectivity of IoT devices. This, in turn, improves the reach and scalability of IoT applications.

Traditional plastic SIM cards can be a limitation when designing, manufacturing and deploying cellular IoT devices for certain use cases:

- They typically offer a single static SIM profile that affords connectivity to one mobile network operator, fixed for the life of the card. This creates significant bottlenecks in the deployment of devices globally across multiple networks, as physical SIMs for the local networks must be sourced and distributed.

- They require an operative to insert the SIM into the device during initial commissioning and in the event the SIM needs replacing. This increases logistical complexities and makes the management of IoT deployments more costly, especially if devices are located remotely.

- They use precious space in the device, and the need to insert and remove the traditional plastic SIM card means that the device can't be sealed against dirt ingress. Furthermore, their removable nature presents unattended devices as prime targets for physical denial of service attacks and service theft.

The GSMA specifications for eSIM are ideal for globally connected cellular IoT devices:

- eSIM replaces the plastic SIM card with a soldered-down chip in the device. It enables remote SIM provisioning (RSP) of a device wherever cellular coverage exists. SIM profiles are downloaded over-the-air from the mobile network operator's (MNO's) eSIM profile management service.

- Device owners can rapidly change the cellular service provider for their devices at any time by using RSP to switch or deploy new SIM profiles remotely. This removes the need to physically swap SIMs to change network operator, enabling seamless and scalable global device connectivity.

Innovating around industrial use cases for eSIM

As industrial IoT applications grow, eSIM technology is well placed to enable scalable, secure global connectivity. Here are just some innovations underway that are enabled by eSIM. All these applications will benefit from extended device battery life, enhanced signal coverage and support for low-cost devices.

Smart manufacturing

eSIM technology can play an important role in the optimization of multiple global manufacturing processes. Placing remotely manageable eSIMs at the heart of manufacturing plants enables cellularly connected operations regardless of location. This in turn will support improved performance, quality, cost and resource management.

The manufactured product itself can incorporate eSIM technology that may feed quality and other information to manufacturers post-issuance, across different locations.

A smart operation utilizing eSIM technology benefits from flexible and updatable network access, as well as network redundancy, allowing a constant feed of valuable insights back from the factory floors to the operations hub.

Without ubiquitous connectivity, manufacturers cannot gain quick learnings and react to make dynamic improvements to both process and product quality.

Reduce waste and speed up production

Improve yield and the quality of goods produced

Achieve better customer satisfaction and brand loyalty

Shipping and logistics

Knowing the exact location and condition of supply and inventory goods in real-time during shipment is essential. Cellular M2M modules with eSIM technology are very attractive in logistics, especially for use on high-value, condition sensitive and highly mobile assets.

- Ship connected assets anywhere
- Connect as a local subscriber on any cellular network
- Reduce tracking costs
- Avoid physical SIM swapping
- Change profiles immediately with RSP

Item tracking and site monitoring

Within a large and distributed commercial facility, electronic monitoring of facilities and equipment is a necessary and valuable efficiency capability. eSIM enables use of cellular networks to provide a flexible and remotely manageable connectivity option – especially where operators have multiple facilities in different regions.

- Reach across geographies
- Protect sealed devices against harsh environments
- Manage all assets using the same technology
- Change profiles with RSP as items move
- Reduce potential for tampering

Smart energy

By using established ubiquitous cellular networks, utilities benefit from the vast countrywide deployments they own. More available off-the-shelf smart energy devices with cellular connectivity and eSIM technology broaden supply chain choices and reduce lifecycle costs. eSIM technology also provides an insurance policy for utility providers against being locked in with one network operator for the entire lifetime of devices (which is long in the energy sector), as well as against the potential cost and hassle of physical SIM swaps.

- Deploy anywhere within cellular coverage
- Avoid utility-specific dedicated infrastructure
- Register devices securely
- Minimize device costs
- Manage customer service precisely
- Scale service across regions quickly

Agriculture

The sheer geographic scale of modern farming operations limits deployment of many wireless connectivity options. As cellular networks provide excellent coverage even across rural areas, producers can get the reliable connectivity required for smart agriculture applications. eSIM technology offers a cost-effective and flexible option for tracking and monitoring equipment, livestock, and people with many sensor devices across broad geographical areas.

- Ensure reliable and secure connectivity
- Cover indoors, outdoors, flat or rugged terrain
- Aggregate all cellular coverage
- Manage profiles across networks easily
- Reduce tampering and battery changes
- Minimize machine maintenance service calls

Industrial wearables

In industrial settings, workers need information quickly without leaving their post for access. Workers with wrist-worn computers, augmented reality (AR) glasses and ear-worn hearables all benefit from eSIM enabled connectivity as they move locations.

- Register devices and applications for each worker
- Deploy anywhere within cellular coverage
- Decrease power consumption, improve battery life
- Reduce potential for tampering
- Minimize downtime

Adding end-to-end industrial- strength security

The IoT sector is grappling with the increasing number of security questions. These range from avoiding theft of service and preventing disruption of operations to ensuring secure communication links and securing the data from end to end.

Industrial device makers should consider four security aspects: physical device security, virtual device security, device certification and application security.

Physical device security

eSIM technology greatly reduces the physical attack profile compared with plastic SIM cards. Simple attacks based on removing or replacing the SIM card are prevented. Moving the SIM to a soldered-down chip on the printed circuit board inside the device, makes it harder to identify and less accessible for physical inspection-based attacks.

Virtual device security

eSIMs run a similar eUICC software stack to traditional SIMs, offering at least an equivalent level of security.

Device certification

GSMA specification compliance for eSIM technology ensures that subscriber and network security always remain upheld. Without certification, eSIM enabled devices cannot obtain required digital certificates, which prevents them from operating effectively within the GSMA remote provisioning ecosystem.

Application security

eSIMs allow for the secure management of multiple network operator profiles. Additionally, they can be used as a secure repository, that can be managed independently of network operators, for the storage of other sensitive authentication credentials, such as pre-shared keys or certificates. Instead of using weaker methods- such as user name and password or two-factor authentication- the device or application can seamlessly authenticate using the credentials securely stored in the eSIM.

This allows eSIMs to act as a root of trust for devices and applications whilst offering trusted, industry recognized secure remote access to manage credentials through the device lifecycle. IoT device manufacturers, application developers and enterprises can leverage this dedicated capability to bring a new generation of trustworthy IoT devices to market.

Deploying applications faster and at scale

Devices with eSIM technology allow MNOs and IoT application managers to quickly onboard significant numbers of cellular connected devices onto their networks. Deployment and ongoing cellular connectivity costs reduce due to simplified, consistent RSP methods.

Deploying applications at scale means more than streamlining IoT device provisioning. Secure interoperability is critical for faster, broader device deployments within an end-to-end IoT application.

Kigen helps manage device identities with a provisioning server solution compliant with GSMA eUICC specifications. These server solutions implement RSP and over-theair profile programming functionality with APIs for easy integration into management platforms. Kigen OS provides a low-footprint software stack enabling full eSIM functionality. Kigen's solutions supports the principles set out in Arm's Platform Security Architecture (PSA). This allows partners to reach market sooner and with greater confidence in their deployed devices' security.

eSIM technology reduces complexity, increases flexibility and builds in security for accelerating time-to-value in IoT deployments. Industrial IoT device makers adopting eSIM technology can concentrate on innovation for more use cases and growth of market share.

Cellular devices drive scale into massive IoT

The future for eSIM technology in industrial IoT applications is bright. Innovation with eSIM technology from device makers, MNOs, and application providers should lead to more secure, interoperable IoT applications.

Find out more about Kigen SIM solutions at:

❮ www.kigen.com

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