KORE

eSIM 101: An Introduction to eSIM for IoT

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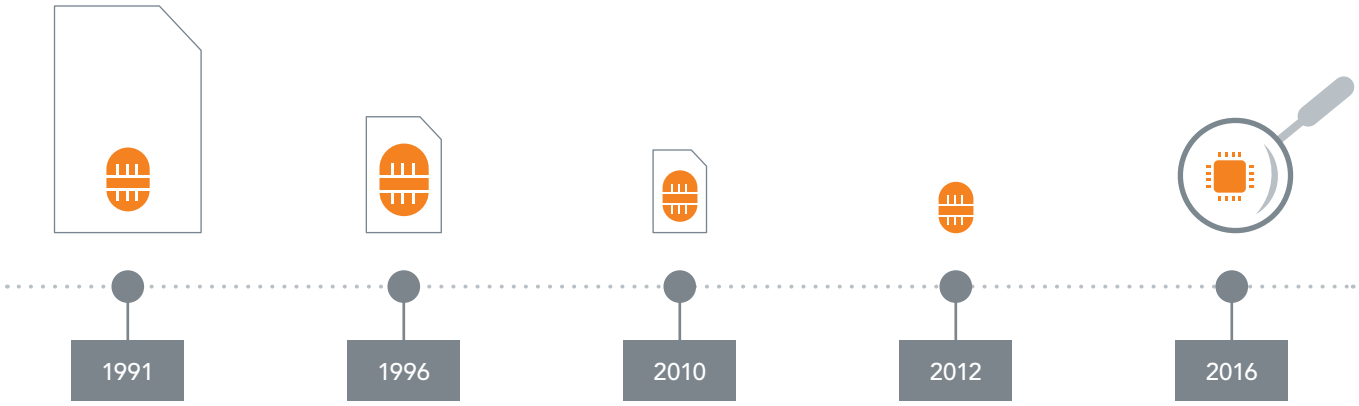
The Evolution of the SIM Card

A SIM (Subscriber Identity Module) card is an integrated circuit that contains unique subscriber information, which is used by cellular carriers to identify and authenticate subscribers and enable access to their networks. Over the last 25+ years, we have seen an enormous evolution in SIM card technologies:



1991

The first full-size (otherwise known as **1FF**, or 1st form factor) SIM cards were introduced, and were approximately the size of a credit card.

1996

The **mini-SIM (2FF)** was launched as a drastically smaller alternative to the 1FF SIM. The small size of the 2FF enabled wide-spread, rapid adoption by mobile phone users.

2010

Manufacturers catering to increased demand for smaller cell-phone devices released the **micro-SIM (3FF)**.

2012

With the emergence of smartphones, the **nano-SIM (4FF)** was created as an even smaller alternative to the 3FF SIM.

2016

The **embedded SIM card** was brought to market, as a non-removable SIM solution that could ideally be provisioned and managed remotely via Over-the-Air (OTA) commands.

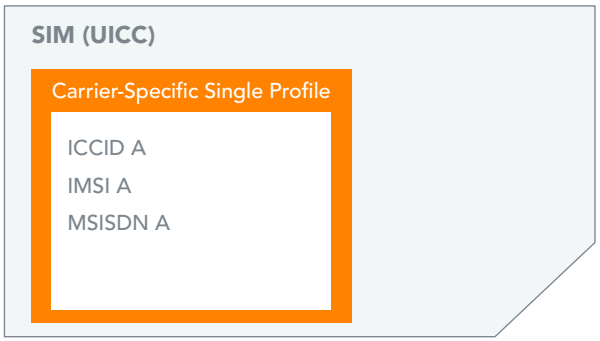
All SIM form factors are used in IoT, and the optimal selection is dependent on factors including the IoT device size, intended application, environment, etc.

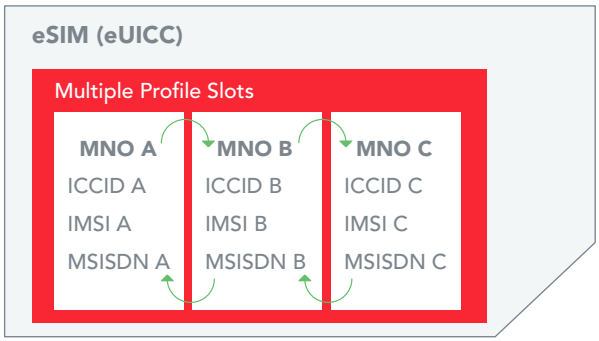
SIM versus eSIM

Although there have been significant advancements in SIM card technologies, traditional SIMs essentially lock users into a single carrier network and technology, making it highly inefficient and expensive to change carriers or upgrade to new cellular technologies. As a result, an increasing number of IoT providers are seeking eSIM technologies.

An eSIM is a hardware-based SIM that alleviates the aforementioned challenges by essentially acting as a single SIM card that is universally compatible with any cellular carrier or technology (2G, 3G, LTE, NB-IoT, etc.), and can support multiple carrier profiles at one time. Standardized via GSMA specifications, eSIM technologies enable users to remotely switch from one carrier profile to another via a series of Over-the-Air (OTA) commands sent to the device, as opposed to physically removing and swapping the SIM card. With all provisioning processes managed remotely, the eSIM enables future-proofed IoT deployments.

Traditional SIMs	eSIMs
Carrier specific & contains only one carrier profile	Operator or OEM specific but can support multiple carrier profiles
Carrier profile cannot be replaced remotely	Remote download & management of additional carrier profiles
Physical SIM swap is required to change network carriers	Eliminates physical SIM swaps. Over the air profile management.
Different SIM for each carrier	One SIM for multiple carriers





UICC: (Universal Integrated Circuit Card) SIM cards, often referred to as traditional SIM cards

eUICC: (Embedded Universal Integrated Circuit Card) SIM cards, often referred to as eSIM cards

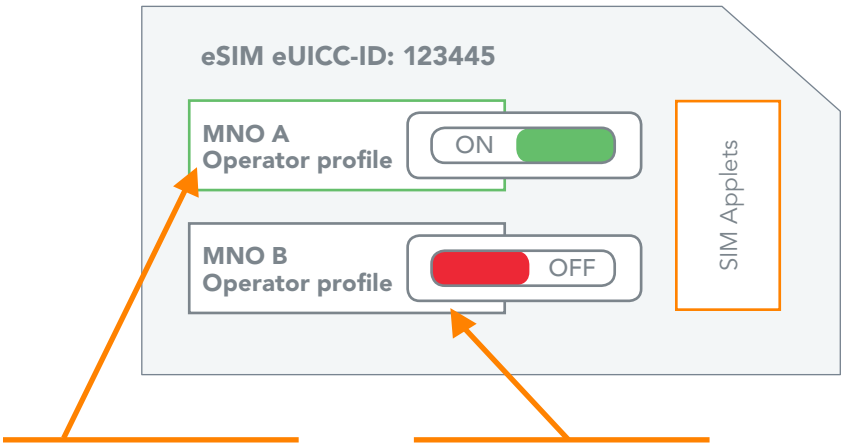
What About Multi-IMSI?

Multi-IMSI connectivity solutions are similar to eSIM in the sense that they are capable of connecting to multiple carrier networks, however with a multi-IMSI solution this is achieved through the support of multiple IMSI ranges on a single, traditional SIM card as opposed to multiple carrier profiles on an eSIM card. Unlike eSIMS, multi-IMSI solutions are proprietary, with limited interoperability among carriers and service providers.

Characteristics of an eSIM

Although "eSIM" technically stands for "embedded SIM", this is actually a misnomer as eSIMs are available in all form factors to meet the unique needs of various IoT devices. As discussed in the previous section, the primary differentiating characteristic of an eSIM is the ability to support multiple carrier profiles and remote provisioning of these profiles. The physical eSIM card is divided into two domains:

- **Profile Domain** – hosts the necessary information for each supported carrier profile, including but not limited to ICCID, MSISDN, and IMSI information.
- **Security Domain** – hosts optional SIM applets that enable enhanced security and QoS via network monitoring, SIM monitoring, and smart roaming steering capabilities.



MNO A Operator Profile

- Ttile
- ICCID
- MSISDN
- IMSI
- Other Information

MNO B Operator Profile

- Ttile
- ICCID
- MSISDN
- IMSI
- Other Information

Benefits of eSIM for IoT

- **Future-Proof Connected Devices** – IoT devices that are deployed over a long period of time are protected from the impact of evolving network technologies, sunsets, or service terminations, by eliminating technical or carrier lock-ins with a single eSIM.
- **Eliminate SIM Switching Costs** – remote provisioning to different carrier profiles or network technologies enables organizations to eliminate the need to purchase new SIM cards and physically replace legacy SIMs.
- **Streamline Logistics' Management** – with no need to physically replace legacy SIMs, organizations eliminate the process of managing costly and time-consuming truck rolls to dispersed geographic locations.
- **Maximize Returns On IoT Investments** – by reducing costs and improving operational and logistical efficiencies, organizations are empowered to minimize total cost of ownership of connected devices and maximize returns on IoT investments.

About KORE

KORE is a pioneer, leader, and trusted advisor delivering transformative business performance. We empower organizations of all sizes to improve operational and business results by simplifying the complexity of IoT. Our deep IoT knowledge and experience, global reach, purpose-built solutions, and deployment agility accelerate and materially impact our customers' business outcomes.

Interested in learning more about eSIM technologies?

Reach out to KORE today to learn how our advanced connectivity eSIM solutions can simplify the complexity of IoT for your organization.