Fact Sheet

Future-Proof Industrial IoT Connectivity Through eSIM

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1 What is eSIM?

An **eSIM (embedded SIM)** is a SIM technology that allows mobile network profiles to be **downloaded, activated, and managed remotely**, eliminating the need to insert or replace traditional plastic SIM cards.

Unlike classic SIM cards, which typically store only a single operator profile, eSIMs support **remote SIM provisioning (RSP)**, enabling devices to switch mobile network providers over the air throughout their lifetime.

In industrial IoT and M2M deployments, this capability is especially valuable when devices are distributed globally, deployed for many years, or installed in locations where physical access is limited or impractical.

More background on eSIM and IoT connectivity can be found at the following resource:
https://techship.com/blog/esim-euicc-and-sgp-standards-enabling-iot-connectivity-2/

2 eSIM, eUICC, and Standards - A Short Overview

The terminology surrounding eSIM technology is often used inconsistently and can therefore be confusing. To establish a common understanding, the following section outlines the most important concepts and distinctions relevant to industrial IoT applications.

eSIM vs. eUICC

- eSIM refers to the general concept of programmable SIM technology that enables the remote provisioning and management of mobile network operator profiles.
- eUICC (embedded Universal Integrated Circuit Card) is the secure hardware element that stores, manages, and protects multiple operator profiles and enables remote SIM provisioning (RSP).

In many implementations, the eUICC is permanently soldered onto the device's PCB. However, in industrial environments this approach is not always necessary or desirable, particularly when flexibility, serviceability, or retrofitting of existing systems is required.

This paper therefore focuses on the use of **physical eSIM form factors** that can be inserted into standard SIM card holders. This approach allows customers to retrofit existing devices while also enabling seamless adoption of eSIM technology in next-generation Syslogic embedded computers.

3 GSMA SGP Standards

The remote SIM provisioning process is standardized by the GSM Association (GSMA) through a set of specifications commonly referred to as the SGP standards. These specifications define the architecture, roles, and security mechanisms required to remotely manage eSIM profiles throughout a device's lifecycle.

The most relevant GSMA SGP specifications are:

- **SGP.02**
  The original M2M eSIM standard, primarily designed for industrial devices and long-lived deployments.
- **SGP.21 / SGP.22**
  The consumer eSIM standards, widely used in smartphones and other consumer electronics with user interfaces.
- **SGP.31 / SGP.32**
  The latest IoT eSIM standards, optimized for devices without user interfaces and for large-scale fleet management scenarios.

These standards define how operator profiles are securely downloaded, activated, switched, and deleted over the air, ensuring interoperability between devices, connectivity providers, and mobile network operators.

More details can be found here:
https://techship.com/blog/esim-euicc-and-sgp-standards-enabling-iot-connectivity-2/

4 What Is an LPA (Local Profile Assistant)?

The **Local Profile Assistant (LPA)** is the software component responsible for managing eSIM profiles on a device. It acts as the interface between the device, the eUICC, and the remote provisioning infrastructure defined by the GSMA.

Typical LPA functions include:

- Downloading mobile network operator profiles
- Installing and enabling profiles on the eUICC
- Switching between connectivity providers
- Deleting unused or obsolete profiles

Depending on the system architecture, the LPA may run entirely within the device's operating system or be partially implemented within the SIM or communication module itself.

For Syslogic embedded computers, the LPA can be **pre-installed** prior to delivery and can also be **updated or deployed on existing devices** in the field, supporting long product lifecycles and evolving connectivity requirements.

More information on LPAs in IoT and M2M environments can be found here:
https://techship.com/support/faq/esim-in-iot-modules-and-m2m/

5 Physical eSIM - Provider Freedom without Redesign

Rather than permanently embedding an eUICC directly onto the PCB, Syslogic relies on physical eSIMs available in standard SIM form factors, such as 2FF, 3FF, or MFF2 adapters. This design choice enables eSIM functionality while preserving maximum hardware flexibility.

This approach offers several key advantages:

- **Plug-and-Play Compatibility**
  Any Syslogic system equipped with a standard SIM card holder can be upgraded with a physical eSIM without requiring hardware modifications. Existing products can therefore be retrofitted easily, extending their usable lifetime and protecting prior investments.

- **Maximum Provider Freedom**
  By using physical eSIMs, customers remain independent of a single mobile network operator. This flexibility is particularly valuable for global deployments, mobile machinery, and long-term industrial IoT projects.
  - Operator profiles can be changed remotely over the air
  - Local or regional providers can be selected as needed
  - Connectivity strategies can evolve throughout the device lifecycle

- **Simplified Logistics**
  The use of physical eSIMs eliminates the need for:
  - Pre-configuring SIM cards for individual countries or regions
  - Physically replacing SIM cards during operation or maintenance
  - Committing to a single connectivity provider at production time

  Instead, devices can be shipped with a neutral eSIM and activated later according to the customer's specific connectivity strategy, simplifying logistics and deployment planning.

- **Lifecycle Management and Scalability**
  Industrial systems are typically deployed for many years. Physical eSIMs allow customers to respond efficiently to:
  - Changes in network availability or coverage
  - Cost optimization requirements
  - Provider changes
  - Updates to roaming strategies

  All of this can be achieved without physical access to the deployed hardware, ensuring long-term scalability and investment protection.

6 eSIM in Syslogic Embedded Systems

Syslogic embedded computers support cellular communication via LTE and 5G modules using standard SIM interfaces. By leveraging **physical eSIM solutions**, Syslogic platforms can be:

- Delivered in a SIM-neutral configuration
- Equipped with customer-specific connectivity at a later stage
- Managed remotely throughout operation

This approach enables Syslogic customers to define and adapt their own connectivity and provider strategies, rather than being locked into a predefined or single-vendor connectivity model.

Whether deployed in robotics, transportation, industrial automation, or outdoor IoT applications, physical eSIM technology allows Syslogic embedded systems to remain **flexible, scalable, and future-proof** over long product lifecycles.

7 Conclusion and Next Steps

eSIM technology is a key enabler for modern industrial IoT deployments. By using **physical eSIMs** in standard SIM card holders, Syslogic embedded systems provide customers with the freedom **to select, change, and manage mobile network provider**s throughout the entire product lifecycle.

Rather than fixing connectivity decisions at design time, Syslogic enables connectivity flexibility at deployment and operational stages, allowing solutions to adapt to evolving technical, commercial, and regional requirements.

For information on minimum order quantities, customer-specific developments, or project consultation, please contact the Syslogic sales team:

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