WHAT IS **eUICC** AND **WHAT DOES IT MEAN FOR IoT** ?

IoT-X, opening up the eUICC opportunity

Having recently rolled out the embedded universal integrated circuit card (eUICC) tariffs in Europe and US, with plans to launch more soon, Stream Technologies is at the forefront when it comes to delivering on the value promised by this technology. IoT-X, Streams eUICC orchestration platform is available to MNO's and enterprise/OEM clients alike – enabling eUICC/eSIM connectivity throughout multiple geographies & MNO's. IoT-X supports multi-subscriptions & tariffs, and can be reprogrammed remotely according to IoT device location.

eUICC opens the door to a range of use cases that cannot be supported by conventional SIMs and offers exciting opportunities to enterprises and mobile network operators (MNOs). This case study outlines the opportunities and challenges presented by eUICC connectivity, and examines how Stream's eUICC offering enables enterprises and MNO's to benefit from serious value enhancements and significant competitive differentiation by embracing this new technology.

eUICC technology is transforming cellular connectivity for enterprises and MNOs. With conventional SIM cards, if a customer wants to change network operator, they need to swap the physical SIM inside their device. The development of eUICC-enabled SIMs means that enterprises can remotely provision SIM profiles over the air, without having to change the physical SIM card. For MNOs, eUICC represents an easy point of entry into the next wave of new, high net average revenue per user (ARPU) Internet of Things (IoT) connectivity revenue.

The terms eUICC and embedded SIM (eSIM) are often used interchangeably, however it's important to emphasise the distinction between the two. eSIM is an embeddable SIM card, while eUICC is a remotely programmable SIM card which is available in a range of form factors. There is a common misconception that an eUICC solution must be an eSIM. This is a miscommunication within the market which has confused operators and enterprises. Contrary to popular belief, eUICC-enabled SIM cards are available in all the standard SIM formats.

Capitalising on the increasing presence of IoT connectivity represents the next big market opportunity for enterprises and MNOs. As IoT becomes commonplace, there will be an acceleration of growth for robust, secure, easy to manage and cost-effective cellular connectivity on a global scale.

Enterprises that embrace this digital transformation will see serious value enhancement and immense competitive differentiation, but only if they are able to address the patchwork and fragmented structure of the current global cellular network. The most agile networks are starting to recognise this, and are enabling access to solutions underpinned by the eUICC GSMA standards and eSIM orchestration platforms such as Streams IoT-X

For enterprises and operators, the adoption of eUICC will require multiple evolved technologies which will open up rapid and substantial scaling in cellular connected devices and the transit of data via existing cellular networks. Coordinating change on this scale is undoubtedly a complex challenge.

Solve the eUICC challenge

To help scale eUICC connectivity on a global basis, two fundamental technologies are required. The first is a platform that enables simple and fast integration with IoT centred subscriptions on in-country MNO cellular bearer services. This must be an evolved agile eUICC orchestration platform, that can provide a single generic control layer of tariffs, (e)SIM connectivity services, SIM connectivity services and data-transit. Ideally this would be provided through a comprehensive suite of application programme interfaces (APIs) and a single private access point name (APN) for multiple MNO bearer services across a range of countries and regions.

IOT-X ALLOWS ANY MNO TO INTEGRATE EASILY INTO AN IOT CMP GLOBAL HUB

The second is a platform, or an integration with a platform, that manages the downloadable profile and secure keys to the SIM. One without the other doesn't provide a solution that delivers the global or multi-country connectivity required by enterprise clients. Through integration between Stream's IoT-X CMP and Idemia's (formerly Oberthur & Morpho) M-Connect profile download platform, Stream provides an eUICC solution that is complete in its delivery.

Manage eUICC connectivity with IoT-X

Through integration with Idemia's M-Connect profile download platform, IoT-X provides seamless management of SIM subscriptions and functionality, irrespective of the MNO bearer service. IoT-X has evolved into an agile and cost effective eUICC CMP, minimising the time, cost and resources required for enabling the onboarding and integration of multiple MNOs.

IoT-X is designed to allow enterprise clients to self-manage connectivity. To this end the platform delivers all the functionality required to manage device connectivity directly into the hands of the customer. If required, Stream can provide IoT-X as a managed service to the enterprise. In terms of the countries needed by the enterprise for cellular connectivity, Stream engages with the MNO in that country and integrates them into IoT-X behind the scenes, at the same time taking care of the commercial agreements to align tariffs, terms and conditions.

An eUICC global hub

IoT-X allows any MNO to integrate easily into an IoT CMP global hub. MNOs that are integrated into the IoT CMP global hub will be able to share in the connections and data traffic that will be generated in their country, on their network, by large enterprise clients who are headquartered in countries throughout the world. This can all be achieved efficiently, quickly and at minimal cost. An MNO could, if it so wished, also choose to utilise IoT-X to develop and manage IoT connections on its own network, generated from its own in-country customer base.

Those very customers could then be offered eUICC service options, alongside the more traditional in-country overseas network options, thereby enabling export opportunities. This functionality utilises a single CMP and single screen view, irrespective of the number of MNO services adopted. The home country MNO also benefits from retaining complete control of the end customer contractual and engagement relationships.

By integrating with the IoT-X CMP, MNOs benefit from a high degree of future-proofing. For example, narrowband IoT (NB-IoT) functionality can be added to the platform as it becomes adopted. Similarly, LoRaWAN subscription and/or server network management capability can be added, as can predictive analytics, concerning network and device performance. Ultimately all this blends into an enhanced service capability around all connected IoT devices and support, resulting in high levels of customer satisfaction.

Benefits for enterprises and MNOs

The addition of eUICC to Stream's existing portfolio of services provides enterprises and MNOs with the opportunity to capitalise on a wide range of benefits. From the perspective of the enterprise, Stream delivers the unified connectivity solution needed to deploy IoT services throughout markets across the globe. Stream's existing partnerships with multiple global operators mean that enterprises have access to low-cost, multinational IoT connectivity, without the headache of integrating and interacting with multiple vendors and their various connectivity management platforms on an individual basis.

From the perspective of MNOs, eUICC connectivity delivers the opportunity to join an ecosystem of partners for global deployment, with each MNO benefiting from increased connections of higher value IoT connections onto their network.

Furthermore, eUICC connections represent a net new market to network operators. By enabling eUICC connectivity to operate on their network, MNOs stand to gain a greater share in the revenue that this opportunity offers, by increasing the number of high-ARPU IoT connections that are trafficked through their network.

Easier and cheaper enterprise IoT, it's all in the SIM

Connecting individual consumers over mobile networks is one thing, but connecting a business's multitude of IoT devices over many different global networks is another challenge altogether. Up to now though, in most cases, the same inflexible SIM technology has been deployed in both scenarios, which isn't ideal for mission critical business data. An alternative solution for business IoT connectivity in the form of eUICC is now coming into play, Antony Savvas looks at whether it really is the game changer it's being described as.

The embedded Universal Integrated Circuit Card (eUICC), also known as an eSIM, is smart technology that supports enterprises in their deployment of IoT devices that offer ubiquitous coverage for indoor, rural and urban environments, and in many cases, across a number of countries and continents.

And the advantage for IoT device vendors is that SIMs equipped with eUICC technology can be hard-wired at source and need never be removed over the lifetime of the device, which in some cases could be a decade or more. This is because eUICC allows customers to make service changes over the air using software, not by changing the SIMs in the device – which can be costly, time consumer and service-interrupting.

Nick Sacke, head of IoT and products at connectivity specialist Comms365, says: "Traditionally, the end user has been tied to a single operator for connectivity without any option to amend tariffs or move to another network – this imposes a punitive, fixed longterm cost for an IoT project that may last many years. But eUICC technology is a game changer as it allows complete network flexibility through a container system, where the best local and global mobile network operator (MNO) profiles are loaded into and managed over the air. This

empowers users as they benefit from the most cost-effective connectivity tariff with no need to visit sites to do SIM swaps."

The technology, says Sacke, also opens up the world of blended IoT connectivity service platforms that incorporate low power wide area network (LPWAN) technologies, such as NB-IoT, SigFox and Cat-M1. These can be easily integrated with LoRaWAN network solutions – long range, low power communications platforms for building and managing IoT networks – like that enabled by IoT-X from Stream Technologies.

Stream Technologies is helping to build citywide and countrywide IoT networks in places including Newport, South Wales; in Jersey; and across Scotland in partnership with local authorities and national governments, with the use of of its IoT-X LoRaWAN platform. Now, eUICC is set to become an increasingly used solution for efficiently and securely transmitting the data public authorities are generating in such networks. Stream's eUICC-enabled SIMs, for instance, can be re-programmed remotely using its IoT-X connectivity management platform.

The connectivity that will underpin the Internet of Things will not be in the form of a single network, but will be a complex mesh of complementary

Nick Sacke: eUICC technology is a game changer as it allows complete network flexibility through a container system

Derek Long: The dominant MNOs are unlikely to volunteer to drive a technology like eUICC, which could ultimately ease [speed] churn

Pierre Lelievre: eUICC can provide a longer life-cycle, and increased ruggedness and resistance to heat or shocks that might be needed in applications such as connected cars or industrial machines

network technologies blended together to offer multi-country, multi-network cellular coverage, and eUICC serves this need. Furthermore a platform such as IoT-X is NB-IoT and Cat M ready thereby futureproofing connectivity management for MNO and Enterprise clients alike.

Service provider alliances

But to give enterprise customers the coverage they need to benefit from such technology, IoT service providers must make alliances to fully serve their customers. Companies have to make sure their eUICC systems – which could be inside moving vehicles, freight containers, utility meters, remote processing stations and other devices - are always available to send data irrespective of global position, business operational changes or indeed service provider changes.

But other service providers are moving in the direction that eUICC requires, partly driven by the release of eUICC version 3.1 by the GSMA last year, which addresses many security and interoperability issues with the technology. For instance, in June this year, China Telecom struck various deals with European-based operators to keep the data coming no matter where the eUICC SIM was located. This included agreements between China Telecom and both Orange and Telenor Connexion.

Karsten Selle, vice president for finance and administration at Orange Mobile Enterprise, said at the time of the agreement with China Telecom: "We are looking forward to creating together with China Telecom true business benefits around the global IoT projects of our respective customers. With this extended footprint in Asia, we further strengthen our IoT and data analytics offering, Datavenue, with enhanced global connectivity capabilities."

Manufacturing success

Whatever the mobile operators are doing though, Long says eUICC may well be more strongly driven by the IoT device manufacturers. "For cost reasons global product manufacturers are compelled to reducing the number of product variants and increasing the addressable market for their products. Being forced into creating regional product variants because of the limited geographical coverage of MNOs does not support this goal." Hence, says Long, the market is seeing increasing interest in embedding eUICC in products for the global market place.

Pierre Lelievre, marketing director for connected and embedded software at Gemalto – which provides eUICC solutions – says practical operational factors will drive any success for eUICC. "By being embedded in the device – as opposed to a removable card – eUICC can provide a longer lifecycle, and increased ruggedness and resistance to heat or shocks that might be needed in applications such as connected cars or industrial machines. Adding an eSIM to a device provides manufacturers and network operators with new design possibilities and opportunities to develop new services and innovative business models," he maintains.

Utility SIMs

Robin Duke-Woolley, the founder and CEO of Beecham Research, says: "The traditional removable SIM card is not suited for the IoT market and particularly not for applications like smart metering – eUICC improves reliability, flexibility, security and trust, while reducing cost and complexity and reducing commercial risk."

He points out that eUICC has already been introduced into the automotive and other sectors and that well over 20 mobile operators worldwide have launched commercial solutions. Duke-Woolley says the utility industry is particularly set to

benefit from the technology. "Utilities face increasing pressures to balance electricity supply and demand," he says. "As well as increased reliability to reduce site visits, the embedded SIM approach allows over-the-air management of operator subscription profiles without the need for a physical change of SIM, solving the problem of operator lock-in."

Powering the market

One utility player adopting eUICC is Aidon, which focuses on metering technology in the European electricity market, including in Norway and Sweden. It helps its utility industry customers ensure the efficient delivery of electricity to end users through smart metering systems and the utilisation of grid data. Aidon's meters constantly collect data on usage and twenty other metrics to ensure accurate billing, reliable diagnostics data and quality distribution.

To enable this, Aidon needed reliable communications between its metering devices in consumers' homes and its back-end systems, including strong indoor coverage and connectivity across both urban and rural areas. And because of the expected long lifespan of electricity meters, Aidon wanted a solution that would provide secure, long-term coverage for more than 15 years, utilising 4G cellular connectivity.

To address all of these requirements, Aidon selected Sierra Wireless' eUICC solution, including its Smart SIMs and the AirVantage IoT platform for device management, which offered the required coverage with multi-operator connections.

eUICC is certainly carving out a significant market niche for itself in the IoT market, and any service provider laggards not endorsing the embedded approach may experience some disgruntled customers jumping ship if they don't move quicker towards the technology.

iotx

**Stream Technologies,
Leading eSIM Technology**