

Assisting OEM's in the M2M market

The SIM is not suited for M2M applications

1. Abstract

This document discusses the issues for a startup company in the M2M industry, which are related to mobile operators, subscriptions, and form factors of the SIM. Apart from above many devices in the IoT ecosystem are affected by extreme temperatures, vibrations and humidity that may cause glitches and limit the lifetime. With a soldered UICC much of the environmental issues goes away, but makes it even more difficult to utilize the service of multiple MNO's.

Therefore the M2M Service Provider (MSP) has a big responsibility in aiding the IoT ecosystem, and is the key to help startups being able to get to the market without being held back by SIM logistics or bad subscription contracts. The MSP has knowledge about the industry, and can assist the startup in selecting the correct subscriptions depending on the type of device/service and should be able to offer the best possible prices. Further the MSP ensures the startup is not locked in with a certain MNO, with life cycle management of the eUICC it is possible to switch the subscription without any physical access to the device, which is critical in many applications.

2. Issues with market penetration due to old ways of working

Today there are many startups in the M2M market, with ideas ranging from blood pressure measurements to lampposts with built in cameras and microphones for surveillance. The innovation is there, but the market penetration is very small. The only major success use-case is energy metering. Why is the market penetration so small? To answer this question we must understand what are the difficult areas for these small start-ups. One of the major pressure points is the connectivity of the device, if the device is to move around a lot it needs to have some kind of mobile connectivity, which means a mobile operator has to be involved, which leads to the next problem; during manufacturing there is no way of knowing where a certain device will end up, it can end up in India, or in Norway, and they will require different mobile operators to work. This leaves the start-up with a choice to make:

- Go with a single mobile operator?
- Sign up with multiple mobile operators?
- Let the user decide which mobile operator to use?

Going with a single operator is probably the first choice that many make, and while it limits the effort spent in discussions and negotiations it is difficult for a small company to much attention. A small company will have to pay up front for the subscriptions, and most probably they will not get the best prices. What is often neglected is the SIM logistics required; the mobile operator will deliver the SIMs to the company, which has to then be manually entered, then each subscription has to be monitored depending on activation date so it can be topped up, or for postpaid the company must check the invoices against their inventory to ensure broken/not activated devices are not paid for. This will effectively lock the company to the mobile operator, and it will be very difficult to break free; as long as old devices exist the payments must continue.



The one mobile operator approach also have an issue if the operator in question does not have complete coverage over the intended area. This may affect the quality of the service offered, and users in one part of the area may have a great service, while other in a different area have a bad service. This difference may well be a killer for a consumer-oriented service where feedback of the service quality is faster than ever using social networks.



It may look interesting to sign up with multiple operators to try to get a better price, and also to protect against poor reception quality areas. This however requires an extended effort in understanding which mobile operators to select (coverage charts are not very useful and don't consider capacity), and then negotiate with each of these. Since multiple operators are involved there will be less volume for each operator, which may affect the pricing to the worse. Choosing to have multiple operators will affect the logistics heavily, no longer can the SIMs be inserted at a single location, but has to be inserted at the purchase, as only at this time is it possible to make the selection based on the user's location. If the device is sold in outlets the logistics for managing the SIMs will be difficult at best, and training of the staff will be required. Making this work with the popular online sales channels may even be impossible.

The final option is to let the user select operator, and insert a SIM into the device. This has the obvious drawback of limiting the design of the device, basically the device must either have a slot accessible from the outside, or must be possible to open up the device to insert a SIM without any dedicate tool. This may affect the appearance of the device, and may also affect the performance of the device. For some devices that are to operate in extreme environments (hermetically sealed) this is not a viable way.

Whilst letting the user procure a SIM and insert it to the devices makes it easy for the startup, it forwards the issues and efforts on the user and a few problems can be identified:

- The SIM has the physical wrong format
- The Subscription is badly chosen by the user

Today there are 4 different physical formats specified for a slot-in SIM, if the user has the wrong format it will not fit in the tray of the device. So having the right format is crucial, the format specified being;

1. The full size (credit card sized), which is hardly used today, but usually comes with a new subscription.
2. The mini, which is the most common form factor today.
3. The micro, which was embraced by apple with the iPhone 4, and has been adopted by many



smartphones today.

4. The final one is nano, which is even smaller.

Today a new subscription may come with a SIM that supports all four formats, but it is difficult to reuse a SIM if it has the wrong format. If the SIM does not fit in the device, the user will be quite disappointed, and additional effort is required.

If the user does not select a subscription wisely the service will be affected. For instance, if the device is a camera for surveillance the subscription must have a large data amount, else it will run out of data quickly and the service will stop. Many mobile operators today rely on USSD screens or SMS to the subscription to show balance, which is not very useful for M2M devices that do not have any screens. If the user selects to use a prepaid subscription he may run out of time without ever being notified. If the subscription is not properly selected the service may stop, which creates a bad user experience.

3. Issues with the SIM in a M2M environment

So far we have discussed the issues for a startup company in the M2M industry that have been related to the mobile operator, subscription, and form factors of the SIM. There are however more issues using a SIM in a M2M environment:

- Extreme Environments
- Theft of the SIM



If the M2M device is fitted to a car it may be affected to extreme temperatures, temperatures above and below what normal SIM are designed for (-25°/+85°), and while there is an industrial grade SIM (-40°/+125°) that can handle the temperature¹, it will still be subjected to extreme vibrations and humidity that may cause glitches and limit the lifetime. It will be difficult for the user to understand if the environment makes the service quality worse, so this has to be monitored.

¹ ETSI TS 102 221 version 11



To replace a SIM is very costly, either the user will have to come to the company to get it replaced, or vice versa. For some companies they can send a new SIM to the user, but for most use-cases the company will have to travel to the device and replace it. To replace a SIM is a logistical nightmare, first a replacement SIM has to be ordered, then this specific SIM has to be transported to the correct location for replacement. For device in extreme environments it may also be a danger to re-open the device to fit a replacement, for instance the device may have been sealed to avoid dust and water to enter the device.

For managing extreme environments a new form factor has been standardized, the MFF1/2 that is not a slot-in card, but a chip that is soldered into place², which eliminates issues with vibrations and humidity. The need for soldering requires the SIM to be included in the manufacturing process, which leaves little choice for the startup, the card has to be ready to use during production.

In case the device is mounted in a isolated place it is easy for someone to steal the SIM and use it for personal use. Not only does it create a problem for the user, it also creates a problem for the startup who may be paying for the subscription. If the device is old the user may just accept the loss and never inform the company; hence the company will have to continue to pay the bills. Replacement is also a hassle, as a new subscription will have to be opened and a new SIM has to be transported to the location; this is if the device itself has not been damaged by the theft.



The UICC has an advantage over the classic SIM cards as it can hold one or more profiles on the card. A profile is equivalent to a subscription (it is a collection of files that are needed to connect to a certain mobile network). For a startup this simplifies, it will allow the user to select a desired mobile operator at sales without replacing the SIM.

4. The M2M Service Provider

The M2M Service Provider (MSP) has a big responsibility in getting the IoT ecosystem to work, and is the key to help startups being able to get to the market without being held back by SIM logistics or bad subscription contracts. The MSP must be able to assist the small OEM's with getting the eUICC, and ensuring it is

² ETSI TS 102 671 version 9



properly configured with at least a bootstrap subscription. The M2M service provider responsibilities:

- Ensure multiple MNO's are available at the best possible prices
- Provides the configured eUICC to the upstarts/OEM
- Allow the startup or end user to, in an easy way, select desired MNO

Benefits of having a M2M service provider are multiple, first it is the single point of contact the startup needs. Today the required attentions from the MNO's are not available, especially not for smaller companies. It is difficult to get a small supply of eUICC at a reasonable price, and even harder to ensure a steady supply for ramping up. While MNO's often have multiple plans available it is difficult to understand which plans to choose and also to reason with the MNO about the pricing. The MSP has knowledge about the industry, and can assist the startup in selecting the correct subscriptions depending on the type of device/service and should be able to offer the best possible prices.

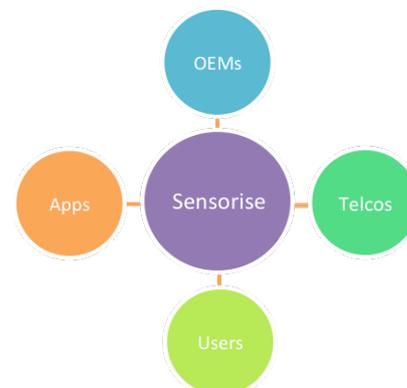
Further the MSP ensures the startup is not locked in with a certain MNO, with life cycle management of the eUICC it is possible to switch the subscription without any physical access to the device, which is critical in many applications.

The MSP can also ensure a better quality of service than a single MNO, if a device goes to a location where operator A has no coverage the MSP can offer to switch to operator B instead. The price may be different, but the OEM will not be locked by the SIM and operator because of the hardware.

5. About Sensorise

Sensorise understands the Indian consumers and enterprises, as also the service gaps and the market opportunities, and intends to build trust on all sides:

- OEM
- Telco
- Application Providers
- Users



The management at Sensorise has been serving the M2M industry for over 5 years, having delivered solutions in the area of Energy Metering, Smart Surveillance, Fleet Telematics, Enterprise Mobility, Mobile Security, Over the Air Management &



Messaging and Secure Cloud deployments. Sensorise has the following approach to solutioning:

- 1) Solutions in this area require devices to be tamper resistant and secure
- 2) The Connectivity has to be carrier class, a difficult to achieve goal given the situation with the Wireless Industry in India. Solutions have to be built that will ensure always on connections with over the air management and built-in QoS, redundancy and emergency fall back
- 3) The importance of Services (Installation, Commissioning, Maintenance and Monitoring) and quality of workmanship holds greater value than the selection of one amongst the hundreds of cameras or gateways or Sensors
- 4) The Software platform and the Hardware (Devices, Sensors, Actuators and Gateways) must be tested and certified to work together. There is no plug and play in this domain at this time
- 5) A new analytical approach to the solution that reduces dependence on simply aggregating unrelated streams of analog and digital hardware inputs
- 6) Securing the management of connections through the various lifecycle stages of the OEM device including resale