How a 3rd Party Company Can Use eSIM for Consumer Devices

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The SIM card, a thing that most people use every day, perhaps without even thinking about it, is slowly starting to disappear. The introduction of the embedded SIM (eSIM), a SIM card that is built directly into a device (such as a smartphone, tablet, laptop, etc.), is making the old SIM card obsolete. This new technology implies new challenges for the mobile operators as they have to readjust to a new system, but it might at the same time be an opportunity for new players to take a place in the mobile communications ecosystem.

Imagine if it were possible to with just a few clicks be able to compare and instantly switch between different mobile carriers and subscription plans. With eSIM this is becoming a reality! In contrast to regular SIM cards where a change of carrier can take some time as you have to get a new SIM card to physically change it in your device, a change of carrier with the use of eSIM can be almost instant. The eSIM profile, which is the collective name for all the data and applications that would normally have been put on the physical SIM card, is simply downloaded and installed on the device over the network through a process called remote SIM provisioning. In short, this process involves four entities; the mobile operator, a server controlled by the operator where the profiles are created and downloaded from (called an SM-SP+ server), a device with an eSIM, and the end user. When the operator has created a profile in the SM-DP+ server, it will be uniquely identified by a so-called activation code. The end user can then enter this activation code into their device to download and install the profile. In this process there no longer exists a physical component as it does with SIM cards, which raises the question, will it still be possible for a 3rd party to re-sell eSIM subscriptions for the carriers like it is possible to re-sell physical SIM cards today?

The master's thesis *eSIM Re-Selling on Mobile App* has looked into this question and the short answer is yes, it is indeed possible, but there are a few obstacles. As the main use of eSIM for consumer devices is for mobile phones, the focus has been on how a re-selling solution could work together with a mobile app. What was found is that there is nothing in the specifications of eSIM or the download process that prevents a 3rd party from being a re-seller. However, the challenges lie in the two most commonly used mobile operating systems, Android and iOS. In both Android and iOS, the download and installation of an eSIM profile is performed through a set of functions where the profile to download is specified by its activation code. The problem for a 3rd party is that these functions are protected in a way that only an app made by the carrier owning the eSIM profile could use them. In iOS, the only way of being able to use these functions is by getting approval from Apple. In Android however, it is possible to gain this access solely from cooperation with the carrier in question. However, regardless if these functions can be used by the app or not, it is always possible to let the end user manually start the download from the eSIM settings on the device.

Based on these findings an architecture for a 3rd party eSIM re-selling solution was developed. In the proposed solution there is a back-end server where the activation codes for all the different eSIM plans from the partaking carriers are stored. The app can then communicate with the back-end to let the user buy and download one of the activation codes. When running low, the back-end server could request new activation codes from the carriers. This process is quite like the one existing in a physical store that sells prepaid SIM cards. The back-end server is like the store, the carriers supply this store with SIM cards (activation codes) and the customer (the user of the app) can browse the store and buy one of the SIM cards (download an activation code). Once the activation code is downloaded, the app could also download and install the profile if it is able to access the functions previously discussed. If it cannot, then the user can be instructed on how to manually start the download through the eSIM settings.