eSIM – Modernising Connectivity and Customer Experience

Telenor exists to connect our customers to what matters most. Empowering societies. Our strategy is driven by an ambition to continuously improve the customer experience. The introduction of embedded SIM (eSIM) offers new opportunities to increase digitisation of society and provide new and improved consumer journeys and services.

Removable SIM cards are an integral part of modern mobile communications. Due to the technological advancements these small plastic cards will over time be replaced by embedded counterparts. This development offers a number of benefits, but can also challenge existing regulatory requirements.

In this paper we set out Telenor's position on key areas related to a future with eSIM in __consumer devices__. In particular we focus on how eSIM can change distribution or the customer journey, options related to technical implementation of the eSIM platform and, finally, new opportunities for pricing of services.

Before setting out our views in these areas we provide a brief introduction to eSIM.

Introduction to eSIM

A SIM-card is a removable smart card that enables the subscriber to connect to a mobile network.

An eSIM is the combination of a remotely programmable chip in the phone or device (called an eUICC) and a digital profile, which contains information on subscriber identity and data for network authorisation. Together the eUICC (hardware) and digital eSIM profile (software) is the complete eSIM and works in exactly the same way as a traditional SIM-card.

The difference between the traditional SIM card and the eSIM is that it can be re-programmed or re-provisioned and can contain several digital eSIM profiles. This is not possible with a traditional SIM-card. eSIM therefore allows customers to change service provider without having to change SIM-card.[1,2]

While removable SIM cards will continue to be the prevalent way of enabling mobile communication in our markets in the short to medium term, we expect eSIM technology, facilitated by the standardisation and specification work done by GSM Association (GSMA)[3] and the European Telecommunications Standards Institute (ETSI)[4], to become widespread over time due to its inherent benefits.

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[1] Currently, it would only be possible to have one eSIM profile active at a time.

[2] eSIM should not be confused with the idea of 'soft SIM', which is a software-only variant.

[3] GSMA is an originally-European trade body that represents the interests of mobile network operators worldwide. Approximately 800 mobile operators are full GSMA members and a further 300 companies in the broader mobile ecosystem are associate members.

[4] ETSI is an independent, not-for-profit, standardization organization in the telecommunications industry (equipment makers and network operators) in Europe, headquartered in Sophia-Antipolis, France, with worldwide projection. ETSI defines the UICC standard.

Examples of the benefits of eSIM are manifold. For device manufactures, eSIM will enable smaller devices and improved waterproofing, leave more room for other parts in the device such as battery, and potentially lower production costs. For service providers, there will be opportunities to further digitise distribution by simplifying the process for customers buying and activating connectivity for a wide range of devices. Telenor is also taking an active role in encouraging partner innovation built around eSIM solutions. For enterprises looking to utilize and/or sell Internet of Things (IoT) devices, the use of eSIM can reduce costs (no removable SIM cards required) and ease switching. Furthermore, IoT security and management will be an area where eSIM may contribute. Finally, consumers will be able to reap the benefits of all of the above through better devices, new services and greater flexibility in choice of connectivity provider. All in all, eSIM will contribute to societal welfare through increased service innovation and more connected devices.

Digital distribution for customer devices

The introduction of eSIM will change the distribution method of a service provider profile and hence the customer experience. With the use of traditional SIM cards, mobile operators have played a key role in both sourcing and distribution of SIM cards for customer devices. When moving to eSIM, it will be important to provide transparency in the choices available to the consumer, a good customer experience and fair competition among service providers. Below are three options that can ensure this:

1. *Service provider pre-selection*: The consumer buys a device from a service provider distribution channel where the service provider is pre-selected. The customer would in this case only need to select their preferred subscription from the service provider. Such an option may be especially relevant for subsidised devices.

2. *Use of QR Code*: A customer buys a subscription either online or in a shop and receives a QR code. By scanning the code with their device, a prepared profile is downloaded from the chosen service provider. This approach is not particularly dissimilar to the current distribution method of a SIM card as compare the purchase of the QR code is comparable to the purchase of a SIM card.

3. *Use of a Service Provider App:* The customer uses a service provider app as the sales channel to complete a sales process, without the need to scan a QR code. The app receives the QR code information directly and provides it to the eSIM in the device, which can then proceed as with the QR code.

Another option is a service provider selection list. Here the consumer selects a service provider from a list on the device. Upon selection of a service provider and a subscription, a prepared profile is downloaded. Where consumers are faced with a service provider selection list the device essentially becomes the "retail store" where service providers compete for selection. A concern in such a situation is the observation of competitive neutrality, i.e. that no one operator is favourably positioned or displayed on the device. This is not a concern with a QR code, the service provider app or where the service provider is pre-selected.

The ability of consumers to register via a list on a device, with or without operator pre-selection, can also challenge the process related to subscriber registration. Registration is generally required to correctly identify the user to prevent fraud. Depending on how existing registration systems are implemented there may be limitations on the ability of service providers to fully digitalise the customer journey using eSIM.

Telenor would encourage relevant authorities to engage with the service provider community with the aim of discussing challenges and opportunities related to digitising distribution. Telenor is committed to working towards a distribution method that is secure, ensures privacy, is competitively

neutral, satisfies governments' requirements for registration and ultimately is the best possible solution for citizens.

eSIM Platform

Common to all eSIM solutions is the need for the installation of IT architecture to enable distribution of digital eSIM profiles. In practice, operators will need to store eSIM profiles on a secure server (known as a 'Subscription Manager'), from which the profile can be downloaded to a device. There are several technical options to implement such a server solution. Telenor's recommendation is a managed service solution.

Existing national regulation and license requirements will have an impact on which type of solution is rolled-out. eSIM profiles contain subscription credentials and potentially some applications, but not data that can directly be linked to any individual subscriber. There can be local restrictions on the flow of data related to such information and a need for regulatory oversight where server responsibility is given to a third party.

Different solutions will also command different costs. In our view, any solution should not disproportionately favour one actor in the value chain over others. Telenor encourages relevant authorities to engage with the operator community with the aim of reaching a technical solution consumers can trust that is secure, fair, cost efficient and competitively neutral for industry..

New opportunities for pricing of services

As eSIM technology develops eSIM will move from niche devices to a wider range of mass-market consumer devices. Smart watches or wearables are examples of early implementations of eSIM; however, eSIM will open opportunities for many more use cases. One consumer could potentially have many eSIMs per subscription each with different connectivity requirements. For example, one subscription could feasibly cover a multitude of connected devices such as a phone, watch, tablet, laptop, car, boat, e-bike and luggage; each would have different connectivity requirements. The laptop could be data only but optimised for superfast download, the boat could utilise low quality connectivity for turning off and on a water pump, the luggage a data roaming service to track its whereabouts etc. Creating shared data plans across such devices is an opportunity to simplify the user experience and creates opportunities for new and innovative pricing that reflects willingness to pay for individual devices.

This is a yet unexplored market where service providers should be allowed the pricing flexibility to innovate and provide clearly value enhancing offers for consumers. Authorities can support this development by ensuring that regulatory instruments such as strict retail regulation or margin squeeze tests or the open internet regulation in the EU do not limit service providers' pricing flexibility.

Telenor's Commitment

GSMA is aligning ecosystem participants on a reference architecture and working with global network operators, service providers and device vendors to develop the standardisation for the implementation of eSIM technology. Telenor is fully committed to this work which is fundamental to the successful implementation of this new technology. Telenor is also committed to working with Governments and authorities in each of its markets on national issues to ensure the smooth introduction of eSIM.