VODAFONE RESPONSE
TO THE CONSULTATION PAPER ISSUED BY
THE INFOCOMM MEDIA DEVELOPMENT AUTHORITY
ON
EMBEDDED SIM TECHNOLOGY

16 August, 2018

Contents

Executive summary

Vodafone welcomes the IMDA's consultation paper on Embedded SIM ("**eSIM**"; "**Consultation Paper**"). We are grateful and supportive of the transparent and inclusive way in which IMDA is consulting a wide range of stakeholders on this topic. Our views can be summarised as follows:

- Vodafone considers that a 'No SIM-lock' policy should not be mandated for eSIM. In a market as diverse as this (encompassing both Consumer and M2M services), there is no 'one size fits all' approach. Some customers will want eSIM, others will not. Operators need to have the flexibility to respond to a range of different customer requirements. Regulation should not mandate a particular approach at this stage of market development.

- We support adoption of GSMA specifications in Singapore as they are detailed, open and innovative. However, such specifications should not be made mandatory, neither exclusive, in order to allow other proprietary options to be applied as well.

- We are supportive of the GSMA Security Accreditation Schemes and ISO 27001 standards and encourage the adaptation of the scheme in Singapore under a non-mandatory basis.

- An Independent Entity can help oversee Over-the-Air ('OTA') switching for enterprise M2M services. This model should be driven by the market in the first instance. However, the IMDA can have an important role to play in setting the necessary policy that can help facilitate the introduction of this new model.

- An overall "light touch" approach to the licensing of M2M services in Singapore, which avoids differentiated treatment based on technology choice, can facilitate market growth and innovation. It would be premature to develop a new licensing policy for eSIM on the basis that the IMDA's existing approach to M2M services is not sustainable.

- Other Low Power Wide Area proprietary connectivity solutions should be within scope of the IMDA's review, in order to ensure a level playing field between cellular and non- cellular IoT connectivity service providers, in a technology neutral manner. No adequate justification has been given for the exclusion of the other M2M technologies set out in paragraph 1.11 of the consultation.

Statement of Interest

This response represents the views of Vodafone Enterprise Singapore Pte Ltd as well as the wider Vodafone Group (reflected in this document as "Vodafone"). Vodafone Enterprise Singapore Pte Ltd holds a Facilities-Based Operations ("**FBO**") Licence, issued by the IMDA on 1 February 2002, renewed on 1 February 2017. Schedule B of the FBO license lists Machine to Machine services as licenced services, under which Vodafone provides M2M/IoT in Singapore. Given IMDA influential role in setting policy and regulatory benchmarks internationally, while at the same time impacting Vodafone's M2M/IoT solutions globally as well as in Singapore, we have provided our detailed comments to this Consultation Paper.

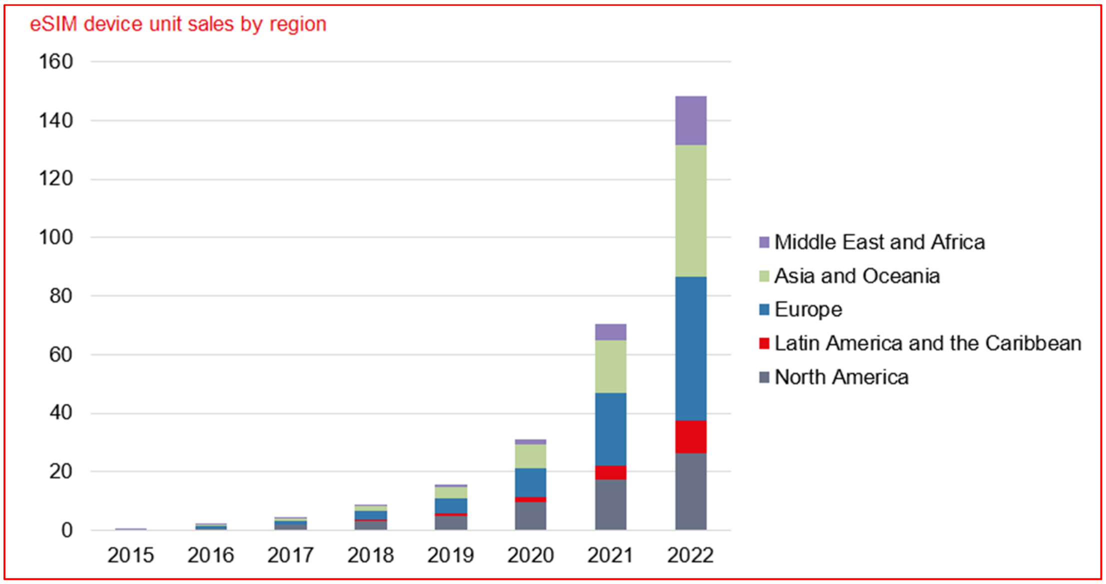
Introduction

M2M (and the wider "Internet of things" or "**IoT**" ecosystem) is a rapidly growing market within which the use of mobile technology is a fundamental element of such expected growth. While global wireless IoT connections have continued to grow at a rapid rate, Vodafone already manages over 68 million IoT connections on behalf of customers, making it a market leader[1].

According to Ovum the eSIM market is expected to grow from 4.4 million to 148 million device unit sales between 2017 and 2022. Tablets and wearables make up for most of eSIM device sales in 2017 and this is expected to continue for several years because eSIM smartphones will be gaining traction very slowly in the market[2]. A projection of eSIM devices sale by region is provided in the below table.

[1] Gartner positions Vodafone as a leader in the Magic Quadrant for Managed M2M Services for the fourth consecutive year. It evaluated Vodafone on its ability to execute and completeness of vision. Gartner, October 2017

[2] eSIM Device Sales Forecast: Smartphones, Tablets, and Wearables, 2017–22, Ovum Research, May 2018.



Ovum Research, May 2018

Vodafone has been engaged in innovative SIM developments for a long time. We led the creation of the M2M remote provisioning specification through the GSMA and in the consumer space were the first operator to experiment with 'Over The Air' provisioning of devices.

Vodafone SIM cards were pre-installed in devices including the Sony PlayStation Vita, and Amazon Kindle Fire HDX.

We also supported the launch of the Samsung Gear S2 classic 3G smartwatch in Germany, one of the first devices in any market to contain an embedded SIM (eSIM) based on the GSMA specification.[3]

This capability is also an important element of our enterprise IoT value proposition. We are a full member of the GSMA Connected Living programme tasked with overseeing the delivery and deployment of GSMA Remote SIM Provisioning for M2M. We are also Full Members of both the GSMA eSIM programme (IoT and consumer), participating in working groups and task forces to develop technical standards for Remote SIM provisioning and the GSMA Fraud and Security Group, participating in developing the auditing standards and methodologies for SAS (Security Accreditation Scheme), covering both previous form factor SIMs and eSIM needs.

[3] For more information, see https://www.vodafone.com/content/index/what/technology-blog/esim-technology.html

Facilitation of eSIM is likely to support acceleration of the market growth of M2M. It introduces a number of important benefits to stakeholders in the ecosystem such as increased operational efficiency, and ultimately drives economies of scale within the M2M industry.[4]

The potential of eSIM explains why regulatory bodies in a number of different jurisdictions have adopted a policy to promote – but not mandate – this technology.[5] In such an environment, which is fast-moving and still evolving, we believe the following policy objectives are relevant:

- Sufficient freedom that promotes innovation and growth and avoids mandated standards;
- A proportionate regulatory treatment, and
- A technologically neutral policy approach between different connectivity technologies that are offering M2M/IoT services.

We consider that these overarching objectives should guide the thinking of any regulatory intervention in the M2M/IoT ecosystem.

Comments

On Section 2 (NO SIM-lock Policy); Questions 1-3

Vodafone considers that a 'NO SIM-lock' policy should not simply be mandated for all eSIM devices, given the variety of different use-cases. For example, even within an enterprise (B2B or B2B2C) environment, there will be many different types of customer, with different requirements.

Furthermore, IoT is more than just connectivity. Switching in the 'traditional' communication environment plays a significant role in boosting competition, on the assumption that every Service Provider offers transferrable equivalent connectivity services: voice and data.

However, in the M2M/IoT market, Service Provers offer a bundle of IoT that includes services and devices, whereas the connectivity element is only a secondary part of this proposition. This means that mandating switching between different IoT service providers, which offer different bundles propositions and devices (i.e. the service offers elements which cannot be entirely transferred), does not necessarily guarantee benefits for the customer.

[4] The importance of Embedded SIM certification to scale the Internet of Things, GSMA Connected Living
[5] See our response to Section 2 of the consultation, below.

In addition, mandating switching is also likely to increase the cost of the IoT devices, thus undermining one of the core elements of the IoT proposition, which is that IoT are affordable devices that can and should reach massive scale of deployment.

As we have set out, there is no 'one size fits all' approach to eSIM switching. Some customers will want the flexibility of eSIM, others will not, because of the service limitations/alterations or costs associated to it. Therefore, regulation should not mandate a particular approach, particularly at this early stage of market development.

A mandate would also be at odds with the prevailing international regulatory policy on eSIM. For example:

- The recently finalised **European Electronic Communications Code**[6] states that Member States should promote, but not mandate, the availability of this technology, as follows:
  - "*Member States should promote over-the-air provisioning of numbering resources to facilitate switching of electronic communications providers. Over the-air provisioning of numbering resources enables the reprogramming of telecommunication equipment identifiers without physical access to the devices concerned. This feature is particularly relevant for machine-to-machine services, that is to say services involving an automated transfer of data and information between devices or software-based applications with limited or no human interaction. Providers of such machine-to-machine services might not have recourse to physical access to their devices due to their use in remote conditions, or to the large number of devices deployed or to their usage patterns. In view of the emerging machine-to-machine market and new technologies, Member States should strive to ensure technological neutrality in promoting over-the-air provisioning.*" (Recital 224 of the Code).

  - "*Member States shall promote over–the-air provisioning - where technically feasible - to facilitate switching of providers of electronic communications networks or services by end-users, in particular providers and users of machine-to-machine services*. (Article 87 of the Code)

- The **Indian Department of Telecommunications recently issued Guidelines on eSIM and Know Your Customer (KYC)**[7] state at paragraph that "*licensees shall be permitted for*

[6] See http://europa.eu/rapid/press-release_IP-18-4070_en.htm
[7] See http://www.dot.gov.in/sites/default/files/M2M%20Guidelines.PDF?download=1

Profile update via Over-the-Air (OTA) feature, as per the prevailing global specifications and standards". The DoT does not, however, mandate switching of eSIM.

- The **Australian Communications and Media Authority** has stated that "*The integrity of personal information, and the interoperability of devices and portability of data and information, will be key underpinnings for the IoT environment*" and device interoperability and portability of data between devices and networks "*may require further examination in the IoT context to provide certainty for suppliers of IoT services about their obligations, as well as certainty for users in supplying information that is exchanged in M2M and IoT communications*".[8] The ACMA has not, however, intervened to mandate switching of eSIM.

'OTA' and eUICC solutions allow for changes to profiles of mobile carriers over the lifespan of the product, offering increased options to customers without the need for regulatory intervention. However, despite the flexibility OTA offers, incorporating an OTA capability inevitably adds costs to an M2M solution. While this may be warranted for higher value products such as automobiles that will be in use for many years, given the economics of many lower value, more disposable M2M devices, such as certain wearables, the benefit of OTA capability may be outweighed by the expense.

Given the successful cooperation between various market participants in designing and implementing working solutions for carrier switching for M2M, and the absence of any demonstrable market failure, we believe that any regulatory mandate to require eSIM switching mechanisms is premature and unjustified. Vodafone considers that the IMDA should rather monitor eSIM market developments and reconsider intervention only if there is a market failure in the future.

Furthermore, and on a wider perspective, we consider that the regulatory policy should not mandate M2M service providers to port the numbers, switch the customer profiles, base all the in-country solutions on eSIM and likewise. We also believe that all technologies and M2M/IoT solutions should be made available and permissible from a regulatory perspective.

On Section 3 (eSIM technology); Questions 4-6

Vodafone supports adoption of GSMA embedded SIM specifications in Singapore (and globally) as they are detailed, open and innovative. However, such specifications should not be made mandatory, neither exclusive (as the only option), in order to allow other proprietary options to be applied as well. We have been participating in GSMA working groups and task forces to develop

[8] See the ACMA publication 'The Internet of Things and the "ACMA's areas of focus" at https://www.acma.gov.au/theACMA/internet-of-things-and-the-acmas-area-of-focus

technical standards for Remote SIM provisioning. In setting the functionality of the eSIM, the GSMA's approach has been to replicate as far as possible existing SIM behaviour. Put simply, this means that in circumstances where SIM locking has been permissible for a 'physical' SIM (e.g. in the case of consumers this applies to subsidized devices, so that the end users are given the possibility to have immediate access to such devices and pay for them along the contract duration), it has also been applied for an eSIM. Network Lock rules should not vary between devices depending on how the SIM is realised; physical SIM or eSIM.

The GSMA's remote provisioning specification allows mobile network operators to provide scalable, reliable and secure connectivity for M2M connected devices, removing the need for each operator to develop their own technical solution. Consumer RSP (SGP21/22) is widely accepted by the industry (OEM, SIM vendors, mobile operators) and Vodafone expects most of consumer eSIM devices worldwide to follow this architecture. Proprietary solutions are less likely to ensure global penetration, while GSMA specifications can provide an easy route toward global adoption of all products[9]. However, having both solutions available and allowed in the market can ensure a wider and complementary market proposition to the customers, so that they can then freely choose their provider based on specific needs.

We are supportive of the GSMA Security Accreditation Schemes and its adaptation in Singapore from the relevant providers (eSIM manufacturers/suppliers, eSIM service providers, mobile operators, mobile device manufacturers and Subscription Managers).

For many years, the GSMA's Security Accreditation Scheme (SAS) enables all GSM operators to assess SIM vendors' security. Therefore, with the introduction of the GSMA eSIM this scheme is being naturally extended to cover also the security assessments of the Embedded UICC and also the Subscription Managers (DP and SR).

The SAS documents are used to design the environment in which the Embedded UICC or SM Products are produced. The process includes an official audit from the GSMA accredited Auditors to the provider of the products, which if approved and successful leads to an "Accepted Supplier" certificate being issued to the audited site[10]. In this context, Vodafone is supportive of SAS and can only encourage a wider adaption of the scheme.

However, given that SAS-SM is tailored for the GSMA eSIM solution, as such it might not be applicable for other or proprietary solutions; this means that in order to ensure a level playing field and increase

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[9] Benefits Analysis of the GSMA embedded Sim specifications on the Mobile Enabled M2M industry, Beecham Research September 2014

[10] The importance of Embedded SIM certification to scale the Internet of Things, GSMA Connected Living

security across the IoT ecosystem, additional accreditation schemes should be considered for other solutions in the near future.

While SAS-SM is targeting at components (SM-DP, SM-DP+, SM-DS), ISO 27001 targets organization and processes. From a subscription management service perspective both ‘standards’ may accompany each other. SAS-SM is a mandatory requirement for any GSMA compliant subscription management solution, ISO 27001 is not a requirement, but might be considered a useful extension.

We are supportive of the GSMA SAS and ISO 27001 standards adoption from all relevant providers and encourage the adaptation of the scheme in Singapore on a non-mandatory basis.

We are not aware, to the best of our knowledge, of any security gaps within SAS and the ISO 27001 standards; however, in practice we additionally apply our own internal security standards/policy with which our supplies should comply with, in addition to the industry standards mentioned in the Consultation Paper.

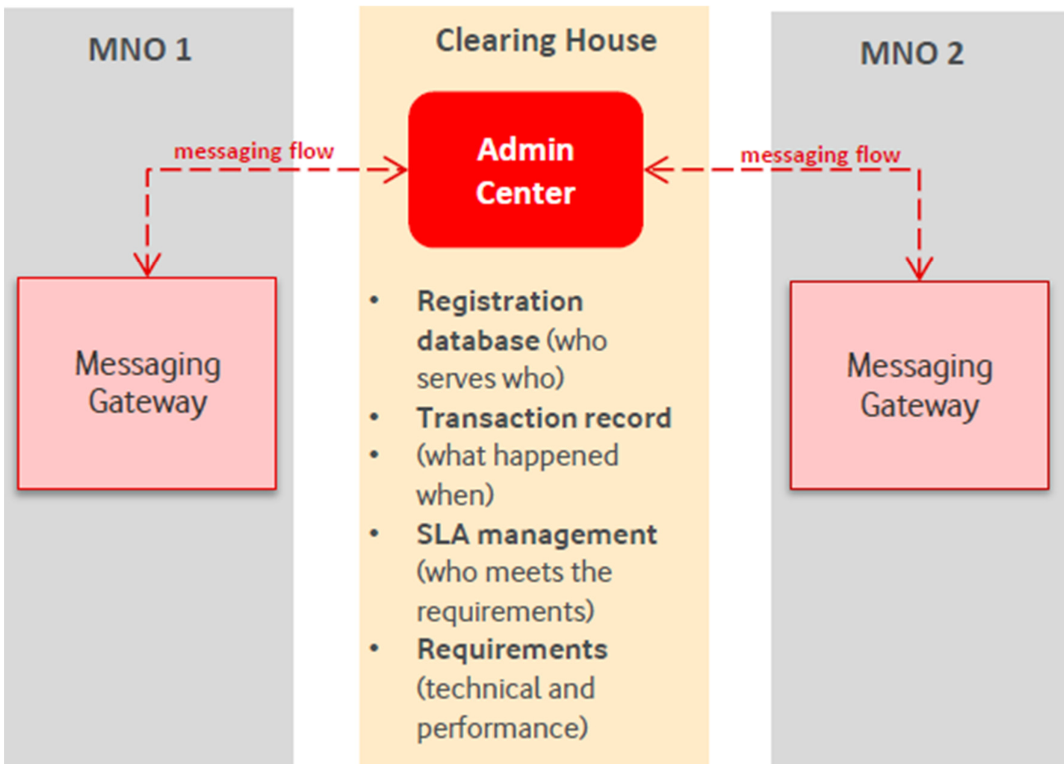
On Section 4 (eSIM business and operating models); Questions 9-11

We consider that it is too early to assess which is the most suitable model and in that context we believe that IMDA should adopt a facilitative policy in this area. Consistent with our general comments on the role of eSIM, there is also no ‘one size fits all’ approach to the business model to underpin the eSIM provisioning model. Both “managed service” and “fully owned” provisioning system models exist in the market and are being rolled out by mobile operators around the world.

It is hard to say at this stage what is the best model – it is often a question of investment and preferred business model with the vendors. Many operators have also chosen the “managed service” approach from traditional SIM vendors offering provisioning services as they have historically the knowledge and the know-how on data generation and security schemes of traditional SIM cards. Some large operators have chosen to “build and own” the provisioning system to have more control on features.

That said, we do consider there is role for the introduction of an Independent Entity to oversee the eSIM provisioning process for enterprise IoT applications. This Independent Entity may already be integrated with mobile network operators for the provision of services related to number portability. This approach would therefore build on existing technical services offered to operators, such as those that support number portability. The introduction of this model should be driven by the market in the first instance. However, IMDA may consider in the future how a supportive regulatory policy framework (e.g. guidelines) could help promote the activities of this Independent Entity. Further detail on how this Independent Entity could function is set out in Figure 1 below:

Figure 1 – an Independent Entity to oversee enterprise IoT eSIM provisioning



On Section 5 (Licensing and regulation of eSIM devices and services); Questions 12-13

We are supportive of the IMDA proposing a "light touch" approach to licensing when it comes to M2M services in Singapore. However, we suggest such "light touch" approach is applied to all M2M solutions, not just eSIM based ones. This would help ensure a technology neutral approach to M2M regulation in Singapore.

In the Consultation Paper the IMDA is proposing a modification of the licensing regime, where a carrier license would not be required for the entities providing the connectivity services to M2M devices that do not support mobility or have no voice communication features, if the entity:

> (i) does not have a direct contractual relationship with the consumer or enterprise end user in Singapore, and
>
> (ii) the eSIMs are roaming on local mobile operators' network.

It is very difficult (from an operational perspective) for telecoms carriers to check and register the "mobility" of the M2M SIMs that are roaming around the world. There are a huge number of solutions that would normally be static, but may have certain "nomadic" or "mobile" capabilities. Most importantly, it would be very difficult for international carriers to actually check it for every customer/SIM/solution.

The absence of a unified and consolidated categorization of M2M/IoT services and the eventual confusion (and possible wrongful interpretation by service providers), may delay the roll out of IoT services and put at risk the efficiency of scale and scope that derive from global solutions. On a more extreme view, such an approach can lead to arbitrary treatment between local vs. global Connectivity Service Providers under unjustified and non-proportionate basis.

In order to make it simpler and easier for all market players (including international mobile carriers), we would recommend that the IMDA adopts such a "light touch" approach to all M2M solutions (a technology neutral approach) not only eSIM based ones, provided by the entities meeting the requirements set out in (i) and (ii) above. In this case, the FBO/SBO license and related compliance requirements would not apply/would not be required.

Other comments

We have observed that IMDA has intentionally chosen not to discuss in this consultation the development of other Low Power Wide Area (LPWA) technologies for the provision of IoT services, for example those operating in unlicensed spectrum.

We consider this as differentiated treatment between cellular and non-cellular LPWA IoT, which is not consistent the technological neutrality principle that should guide any regulatory or policy intervention. Non-cellular IoT exert significant competitive pressure in the LPWA IoT market (in terms of volume, value and global footprint) and as such deserve the necessary attention from the IMDA at this point, in order to avoid future distortion of the market competitiveness.

In this context, we ask IMDA to reconsider its position on this aspect and take the necessary measures to ensure that all connectivity service providers, regardless of the technology they explore to deliver IoT services, benefit in the future from a fair and even competition in the market.

Conclusion

We reiterate our appreciation for the IMDA's consultation on this important topic and we hope that the abovementioned points will be helpful as the IMDA develops its policymaking in this area. We remain ready to discuss any of the points set out in this response further with the IMDA as may be required.