



eSIM: State of the consumer market and the road ahead

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About this report

Scope

- Momentum for eSIM is accelerating in the consumer market, opening up new opportunities for mobile ecosystem players and enabling new benefits for consumers.
- This report focuses on the eSIM consumer market (smartphones, smartwatches, tablets, laptops and other consumer devices), providing a unique and fact-based update on the state of the market and its future outlook. This allows all companies and stakeholders in the eSIM ecosystem to keep up to date with the latest eSIM developments around the world and to understand what is new and why it matters.
- It provides the relevant insights and data related to the eSIM consumer market in a consistent and structured way – a valuable asset for companies looking to formulate or adjust their eSIM strategies and plans as the eSIM consumer market grows and evolves.
- Looking to the future, the report also considers what needs to be done by the eSIM ecosystem (e.g. OEMs, MNOs, MVNOs, and vendors of eSIM solutions and platforms) to fully leverage the potential of eSIM and scale market adoption in the coming years. As eSIM becomes part of day-to-day business, a clear roadmap and strategy will be crucial to capture and monetise the new opportunities presented by eSIM.

Engagement

- This report has been developed by GSMA Intelligence. It provides an analyst view of the eSIM consumer market, rather than serving as an official policy position paper. The views expressed here are those of GSMA Intelligence.
- The GSMA appreciates the collaboration of Giesecke+Devrient and Valid as partners for this report. We also conducted 10 interviews with leading eSIM companies (including Giesecke+Devrient and Valid) to gather views on the future evolution of eSIM and how to leverage the full business potential of eSIM technology. For confidentiality purposes, the key findings of the interviews are presented in aggregate.

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Leading Performance

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99.99% eSIM management service availability

Cutting-Edge Innovations

4G/5G adaptive profile management

Scalable and elastic service platform



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A review of eSIM market developments in 2020

	eSIM consumer devices	eSIM device shipments
Trends	<p>Three new milestones reached</p> <ul style="list-style-type: none"> The number of eSIM devices commercially available for purchase reached 110 models at the end of 2020, across smartphones, laptops, smartwatches and tablets. Samsung and Huawei introduced eSIM in their smartphones, about 18 months after Apple's launch of eSIM in iPhones. This is a key development, as Samsung, Huawei and Apple in aggregate account for about half of global smartphone shipments. eSIM also made its debut in the 5G world. Apple, Google, Huawei, Motorola and Samsung launched 5G phones with eSIM capability, and a few eSIM-enabled 5G fixed wireless access (FWA) routers or customer-premises equipment (CPE) devices entered the market. 	<p>Growth is accelerating</p> <ul style="list-style-type: none"> According to the latest data published by the Trusted Connectivity Alliance (TCA), eSIM shipments collectively reported by TCA members increased by 83% year on year in 2020. This is a significant acceleration compared to the 50% year-on-year growth in 2019.¹ Growth was driven by the commercial launch of new eSIM smartphones, smartwatches, IoT devices and deployments in the automotive sector (the European eCall initiative is an important factor). The TCA also reported that eSIM profile transactions (i.e. the number of times a mobile operator profile was downloaded to a device) increased by over 300% year on year in 2020.
Implications	<p>Poised for further growth</p> <ul style="list-style-type: none"> With Huawei and Samsung now on board (alongside Apple), the direction of travel for the wider handset ecosystem is clear. Oppo has also just introduced eSIM in one of its new smartphone models. For OEMs that have yet to launch eSIM for phones, doing so is not a matter of if, but when. eSIM progress in smartphones should also drive renewed interest in other eSIM consumer devices. 5G is important in the context of eSIM market adoption. As 5G adoption grows (and because the GSMA's eSIM specifications have been updated to include 5G use), 5G device renewals represent an opportunity to push the transition to eSIM, as more 5G devices will have eSIM capability. 	<p>Starting to scale</p> <ul style="list-style-type: none"> The faster growth of eSIM shipments and activations is an important development for the eSIM ecosystem, especially in the context of the Covid-19 pandemic, which is accelerating the shift to online sales and the use of digital distribution channels. As the share of eSIM-enabled consumer device shipments continues to grow, eSIM activations should gain traction in 2021 and beyond. We forecast that 2.4 billion smartphone connections globally will use eSIM by the end of 2025 (representing 33% of total smartphone connections).

¹ <https://trustedconnectivityalliance.org/trusted-connectivity-alliance-reports-global-esim-growth-in-2020/>

A review of eSIM market developments in 2020

	Retail price of eSIM smartphones	eSIM service commercialisation
Trends	<p>Mixed trends</p> <ul style="list-style-type: none"> Following the update of the GSMA's eSIM specifications for 5G use, eSIM technology was introduced in a range of new 5G smartphones. These devices have higher-than-average retail prices, as the latest network capabilities enhance the connectivity experience and enable new consumer services. Apple and Google launched cheaper eSIM smartphones (prices below €500). This will help expand eSIM adoption beyond the high-end customer segment and in developing markets. For both OEMs, all new smartphone models launched since 2018 have eSIM capability. 	<p>A threefold increase</p> <ul style="list-style-type: none"> At the end of 2020, at least 175 mobile service providers (MNOs and MVNOs) had launched commercial eSIM service for smartphones across at least 69 countries (three times the number of countries compared to in 2018). Discussions with leading eSIM vendors indicate that this figure is even higher, as some operators have yet to be included in the publicly available lists provided by the top three OEMs (Apple, Huawei and Samsung) or are working with other OEMs. eSIM commercial service for smartphones is available in most of the top 30 mobile markets in the world. Developed markets lead the way.
Implications	<p>Retail prices are driven by market dynamics</p> <ul style="list-style-type: none"> Higher retail prices are not caused by the cost of implementing eSIM technology into the device. The use of eSIM, instead of the removable SIM, has a positive impact on manufacturing costs (especially in an eSIM-only world) and frees up space in the device. Higher retail prices are a natural market dynamic. Because eSIM is introduced in newer flagship devices first, eSIM phones have higher-than-average retail prices, especially if they also are 5G capable. 	<p>Getting bigger</p> <ul style="list-style-type: none"> 175 launches is good progress. Further, a range of MNOs and MVNOs are currently working with eSIM vendors to implement eSIM technology, meaning that the number of mobile service providers working on eSIM implementation is even higher than this figure. Since 90% of operators plan to offer eSIM service by 2025 momentum for eSIM launches will likely accelerate in 2021 and 2022, including in developing markets. Growing market adoption will also be a catalyst for further launches.

A review of eSIM market developments in 2020

	Consumer awareness of eSIM	Work on eSIM specification
Trends	<p>An awareness gap</p> <ul style="list-style-type: none"> • Our research, based on a consumer survey in 17 major markets around the world, shows that only 20% of consumers, on average, are aware of eSIM. • Awareness is higher among the 25–34 age group, 5G users and owners of other consumer mobile devices (up to 41% for smartwatch owners). • While consumer awareness of eSIM is still generally low, some of the interviewed companies highlighted a correlation between operators’ promotional activity for eSIM and volumes of eSIM activations on their platforms, meaning that consumers are more likely to adopt eSIM if operators promote it. This is an important factor to build on. 	<p>Growing support</p> <ul style="list-style-type: none"> • The number of mobile industry players supporting the GSMA project to define and maintain eSIM specifications grew significantly in 2020, reaching more than 180 at the time of writing. These include MNOs, OEMs, SIM vendors, network vendors, semiconductor manufacturers and end-user enterprises. • Throughout 2020, the GSMA updated or released new eSIM specifications (e.g. technical specifications, test certificates and compliance specifications). The GSMA also launched an eUICC Identity Scheme and an eUICC Security Assurance Scheme.
Implications	<p>More customer education needed</p> <ul style="list-style-type: none"> • Raising consumer awareness of eSIM and promoting its benefits are crucial to drive adoption. MNOs, MVNOs and OEMs have an important role to play here, as they are the key touchpoints with end users. • Digital consumers represent the early addressable market for eSIM. These include professionals of all ages and younger generations – both groups demand (and expect) greater digitisation of services and service onboarding, and greater use of digital distribution channels. 	<p>Global approach is key</p> <ul style="list-style-type: none"> • Most eSIM consumer devices available on the market use the GSMA’s eSIM specifications. A standardised approach to eSIM management is critical to ensure an efficient and interoperable global ecosystem applicable to all industry participants. • In 2021 and beyond, the GSMA will continue to work on a range of eSIM activities to support the development and sustainability of the eSIM ecosystem worldwide. These include further work to update eSIM specifications to meet market needs and a new eSIM architecture for constrained IoT devices.

Key market factors to watch for in 2021–2022

1

When will eSIM get a boost at larger scale? Some eSIM players are ahead of the curve and driving eSIM momentum. Others lag behind – some of these, including a range of MNOs, are still in a wait-and-see phase. On one side there is a technology (traditional SIM) that has played a pivotal role in the rapid rise of mobile services over the last three decades. On the other side there is an ongoing transition to a new technology (eSIM) that brings new benefits – but also changes and challenges – for mobile ecosystem players. Embracing eSIM at scale undoubtedly takes time, but it's a prerequisite to fully leverage the potential of eSIM for consumers and businesses.

2

When will Xiaomi and Vivo launch eSIM phones? What about China? Xiaomi and Vivo embracing eSIM would certainly be another milestone for the eSIM ecosystem, as the two OEMs account for about 20% of the global smartphone market and have large market shares in various developing markets. Launching eSIM would allow them to start capturing new market opportunities (expanding the reach of eSIM). The launch of commercial eSIM service for smartphones in China (eSIM service is already available for smartwatches) would also be a game changer, given the size of the market and the global reach of Chinese phones.

3

When will the transition to eSIM-only devices happen? One of the key factors that could accelerate eSIM market adoption is the transition to eSIM-only devices. Today, all eSIM smartphones commercialised by OEMs, except for the Motorola Razr (4G model), have dual capability (removable SIM and eSIM). OEMs have an economic interest to switch to eSIM-only, but they will plan such a transition sensibly. All eyes are on Apple, which is seen as the OEM most likely to be a first mover. 2021 looks highly unlikely for the transition to eSIM-only; 2022–2023 is a more realistic expectation. The transition to eSIM-only phones will not affect consumers' ability to have and access multiple subscription plans from the same phone.

4

How fast will eSIM market adoption grow? While a majority of mobile users look for brand reputation, camera quality, device cost and 5G compatibility when choosing their next smartphones, the importance of eSIM cannot be underestimated. eSIM is an underlying feature that enables new services and further digitisation. Some digital consumers, for example, may change their mobile service provider to capture the benefit of connecting eSIM companion devices. By the end of 2022, more than 500 million smartphone connections will use eSIM globally, with Europe and North America leading the way. Operators not offering eSIM service will miss out on this part of the market.

The eSIM ecosystem will continue to work on eSIM deployments and innovation to fully leverage the potential of eSIM and scale market adoption. This will be discussed in [The road ahead](#) section.

The market in numbers

eSIM consumer devices

110

The number of eSIM consumer devices commercially available for purchase more than doubled in the last two years, reaching 110 models at the end of 2020, across smartphones, smartwatches, laptops and tablets.

Consumer awareness of eSIM

20%

On average, 20% of consumers across major countries have heard of eSIM. For comparison, 85% are aware of 5G. Awareness of eSIM is higher among the 25–34 age group, 5G users and smartwatch owners.

Apple's eSIM devices

25

Apple has launched the highest number of eSIM devices so far: 25 models across phones, smartwatches and tablets. Since 2018, all new smartphone models launched by Apple and Google have eSIM capability.

eSIM smartphone connections

2.4
billion

We forecast 2.4 billion eSIM smartphone connections globally by 2025 (33% of total smartphone connections), with 1.9 billion and 2.8 billion as low and high adoption scenarios respectively.

Number of countries with eSIM service

69

At the end of 2020, commercial eSIM service for smartphones had been launched in at least 69 countries – a threefold increase compared to in 2018. eSIM service is commercially available for more than 2 billion mobile users.

eSIM as a priority

44%

44% of operators agree that OEMs should consider eSIM a “very high priority” smartphone feature. This should be a wake-up call for handset vendors that have yet to introduce eSIM in their smartphones.

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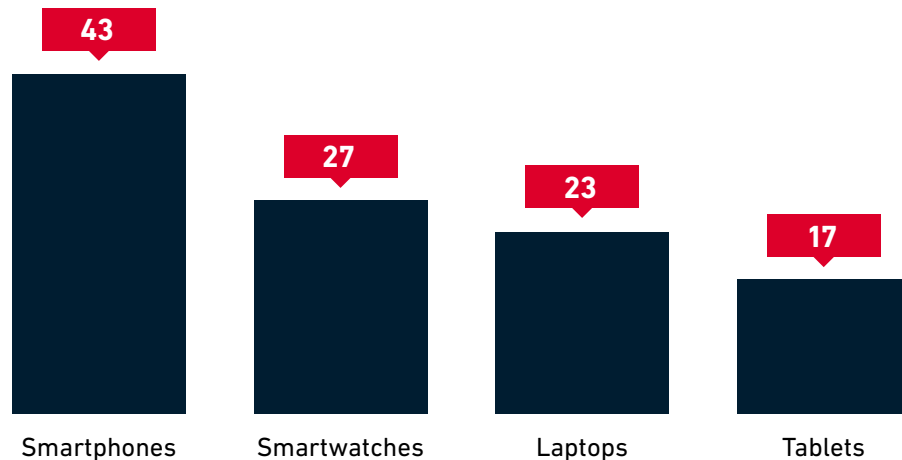
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eSIM consumer devices: commercialisation ramps up

- **Doubling down.** The number of eSIM consumer devices commercially available more than doubled in the last two years, reaching 110 models at the end of 2020. Smartwatches led the first wave (2016–2018), spurring new entrants (OEMs) in the market. Smartphones have recently taken the lead, with more than 40 eSIM models (40% of these have 5G capability).
- **OEMs are no longer holding back.** Top brands in the four main categories of consumer mobile device have launched eSIM. This is important, as these brands represent a major share of the four markets and lead in innovation. Apple has launched the highest number of eSIM devices so far (25 models across phones, smartwatches and tablets).

eSIM consumer devices: number of models in the main consumer mobile device categories*



OEMs that are commercialising eSIM consumer devices*

Smartphones	Smartwatches	Laptops
Apple	Amazfit	Acer
Google	Apple	Asus
Huawei	Garmin	Dell
Microsoft	Huawei	HP
Motorola	Mobvoi	Lenovo
NUU Mobile	Montblanc	Panasonic
Samsung	Nubia	
	Oppo	
	Samsung	
	TCL	
	Xiaomi	
	Xplora	
	ZTE	
		Tablets
		Apple
		Asus
		Microsoft
		Panasonic

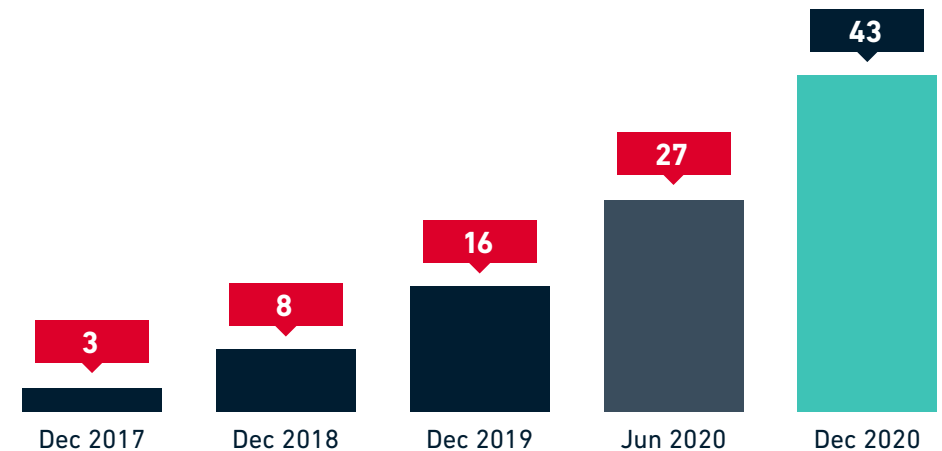
Note: Oppo launched an eSIM smartphone in March 2021

* For each category of consumer mobile device, a majority of OEMs have launched multiple eSIM models (i.e. new models or upgrades of previously-launched models). Excludes eSIM consumer devices manufactured by OEMs but commercialised by operators.

Smartphone market: eSIM is real

- 2020 was an important year.** After a slow start in 2017–2019, eSIM smartphone commercialisation accelerated in 2020. During the year, 27 new models were launched despite the challenges of Covid-19 (e.g. lockdowns and temporary closure of retail shops). Samsung and Huawei also launched their first eSIM smartphones, about 18 months after Apple's launch of eSIM in iPhones (September 2018). With 5G gaining momentum, the launch of 5G smartphones with eSIM technology by Apple, Google, Huawei, Motorola and Samsung (a total of 17 models) was another major milestone.
- The top three smartphone vendors are on board.** Apple, Huawei and Samsung introducing eSIM in their flagship smartphones is a major development for the eSIM ecosystem, as the three OEMs represent about half of the global smartphone market. Since the launch of eSIM in iPhones, Apple has been driving eSIM momentum in the smartphone market, positioning eSIM as the future mainstream SIM technology for connected devices.
- Only a matter of time for the other leading OEMs.** Oppo (the fifth largest OEM by smartphone shipments globally) just launched eSIM in one of its new flagship smartphone models (Oppo Find X3 Pro). Xiaomi and Vivo (the fourth and sixth largest OEMs) have yet to launch eSIM in their smartphones, though Xiaomi already markets eSIM smartwatches. For both companies, the launch of eSIM for smartphones is not a matter of if, but when.
- What next?** Now that many of the top OEMs have introduced eSIM in their smartphones, the next question is, when will most OEMs shift to eSIM-only, at least for their newer models? Our global operator survey² suggests that 40% of operators expect the transition to eSIM-only smartphones to occur during 2022–2023 for a majority of OEMs. This seems to be a realistic expectation.

Number of eSIM smartphone models



By OEM	Number of eSIM smartphone models
Total	43
Samsung	14
Apple	11
Google	11
Huawei	3
Motorola	2
Microsoft	1
NUU Mobile	1

Smartphones: operators call for OEMs to prioritise eSIM

- eSIM is a priority.** According to the results of our global survey of 100 operators, most operators agree that eSIM should be a priority for OEMs. In terms of smartphone features that OEMs should prioritise, eSIM ranked second, after 5G. Since 5G and eSIM are being deployed at the same time, there is an implicit call for OEMs to launch more 5G smartphones with eSIM capability across all price ranges, to drive wider customer reach. This should serve as a wake-up call for OEMs that have yet to introduce eSIM in their smartphones.
- Linking 5G and eSIM.** There are two important considerations in terms of 5G and eSIM:
 - From a design perspective, eSIM allows significant space reduction in the phone compared to a removable SIM – a crucial factor in the 5G era, as 5G requires more space for antennas and larger batteries, especially for early iterations. The dual-SIM capability provided by early eSIM smartphones also allows users to have two mobile subscriptions and phone numbers – for example, one for business and one for personal use.
 - From a consumer perspective, our global consumer survey³ shows that consumer intent to upgrade to 5G is growing in most markets. For OEMs, MNOs and MVNOs, 5G device renewals represent an opportunity to push the transition to eSIM, as more 5G smartphones will have eSIM capability.

New smartphone features: what should OEMs prioritise?

Which of the following smartphone features do you believe vendors should prioritise in their devices? (Percentage of respondents)

5G compatibility



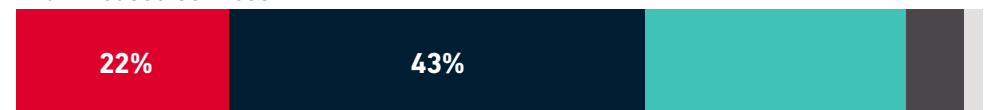
eSIM compatibility



AI capability



AR/VR-based services



Very high priority
5 4 3 2 1
Very low priority

eSIM smartphone pricing is driven by market dynamics

- Understanding the pricing of eSIM smartphones.**
 eSIM does not make devices more expensive. The use of eSIM, instead of the removable SIM, has a positive impact on manufacturing costs (especially in an eSIM-only world). However, the average retail price of an eSIM smartphone (€800) is significantly higher than the average price of all smartphones (€350). This is not a surprise. Higher retail prices are a natural market dynamic: because eSIM is being introduced in newer flagship smartphones first, eSIM devices have higher retail prices, especially if they are also 5G capable (17 out of the 43 eSIM smartphone models available at the end of 2020 had 5G capability).
- Retail prices starting to decline.** Apple and Google have introduced cheaper eSIM smartphones (retail prices below €500). This should help expand eSIM adoption beyond the high-end consumer segment and in developing markets.
- Future pricing.** Future prices of eSIM phones will continue to be driven by market dynamics. This should also be seen in the context of 5G. Half of operators around the world indicated that a 5G smartphone price below \$500 (€415) would spur mass-market 5G adoption globally.⁴ The same line of thought may apply to eSIM, especially if Xiaomi, Oppo and Vivo introduce lower-cost eSIM/5G smartphones.

Retail price of eSIM smartphones

Average price

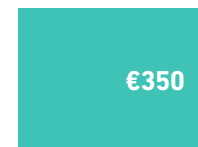
5G smartphones with eSIM technology (17 models)



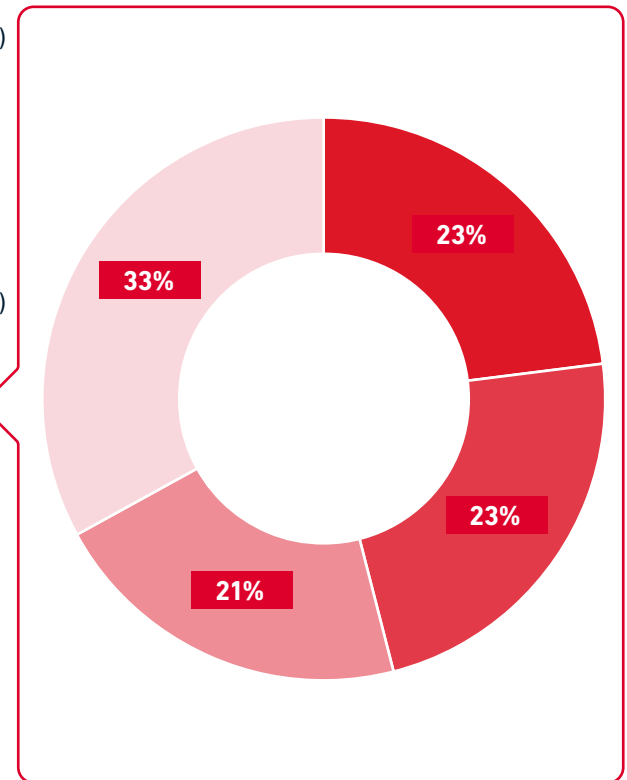
All smartphones with eSIM technology (43 models)



All smartphones



Distribution by price range for all eSIM smartphones (43 models)



■ €0-500
 ■ €500-750
 ■ €750-1,000
 ■ >€1,000

4 GSMA Intelligence Operators in Focus Survey 2020 (global, 100 operators).



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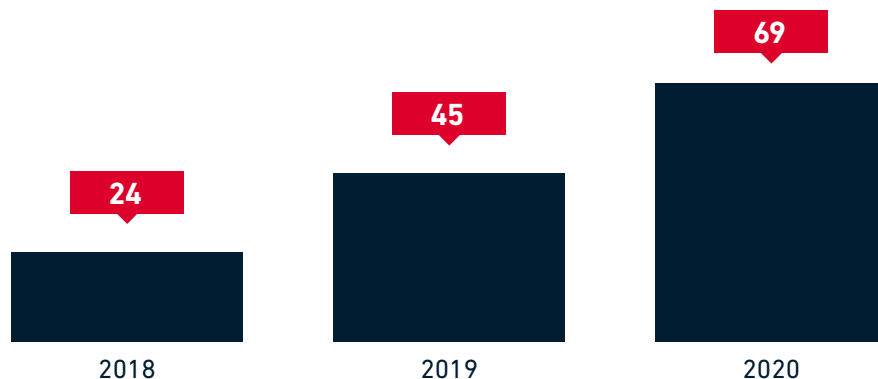
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eSIM service for smartphones: commercialisation on the rise

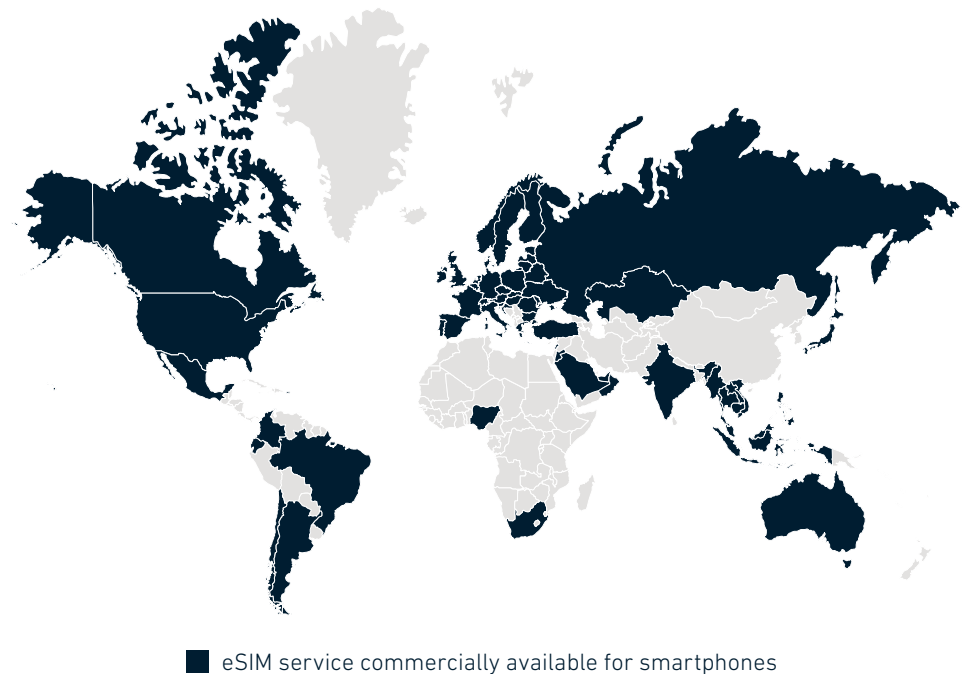
- **Getting bigger.** At the end of 2020, commercial eSIM service for smartphones had been launched in at least 69 countries around the world – a threefold increase compared to in 2018. Discussions with leading eSIM vendors indicate that this figure is even higher, as some operators have yet to be included in the publicly available lists provided by the top three OEMs (Apple, Huawei and Samsung) or are working with other OEMs.
- **Most major markets are on board.** The US and Canada were among the pioneer markets for eSIM service. In Europe, eSIM service is now available in nearly all countries. Africa lags behind, but this is likely to change in the future as mid- and low-range eSIM phones enter the market. China and South Korea are notable exceptions; in both markets, eSIM service is available for smartwatches and some IoT applications, but not for handsets. The timelines in these markets are uncertain, but it is only a matter of time until eSIM is launched for smartphones.

Commercial availability of eSIM service for smartphones
Number of countries*



* Minimum number of countries, based on the list provided by Apple, Huawei and Samsung (publicly available information) and GSMA Intelligence research of the top 30 markets.

Commercial availability of eSIM service for smartphones

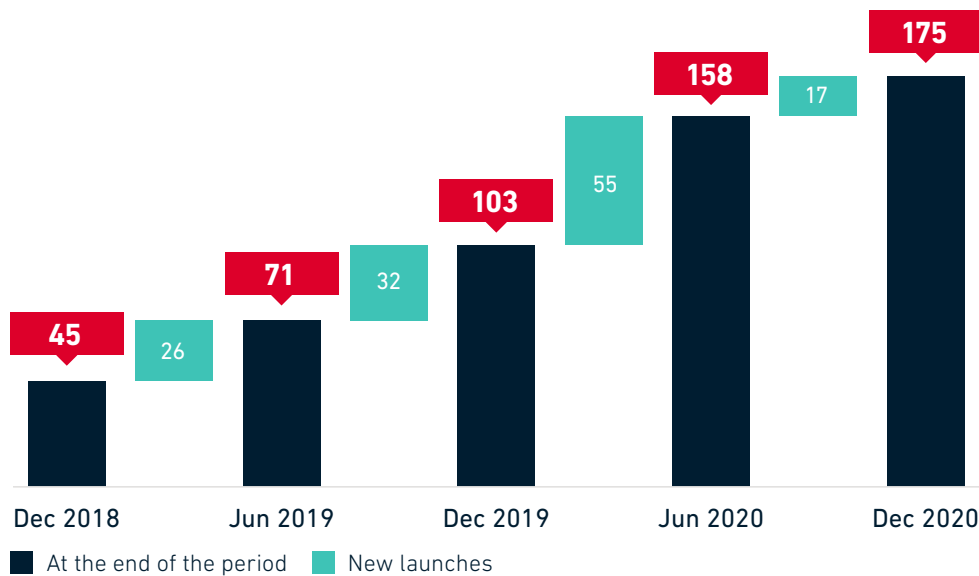


Operators are gradually launching eSIM service

- **Significant progress being made.** As of the end of 2020, at least 175 mobile service providers had launched commercial eSIM service for smartphones across at least 69 countries. The vast majority are MNOs, but there are also a few MVNOs and global service providers (e.g. Dent, GigSky, SIM Local, Truphone and Ubigi) providing eSIM service to consumers, especially for international travel. The Covid-19 pandemic slowed eSIM launches in the second half of 2020 – some operators may have decided to slightly delay their eSIM implementation projects to focus on key priorities, such as mobile network resiliency.

- **What lies ahead?** 175 launches is good progress. Further, a wide range of MNOs and MVNOs are currently working with eSIM vendors to implement eSIM technology, meaning that the number of mobile service providers working on eSIM implementation is even higher than this figure. Considering that 90% of operators plan to offer eSIM service by 2025, momentum will likely build in 2021 and 2022,⁵ especially if consumers start to adopt eSIM at larger scale.

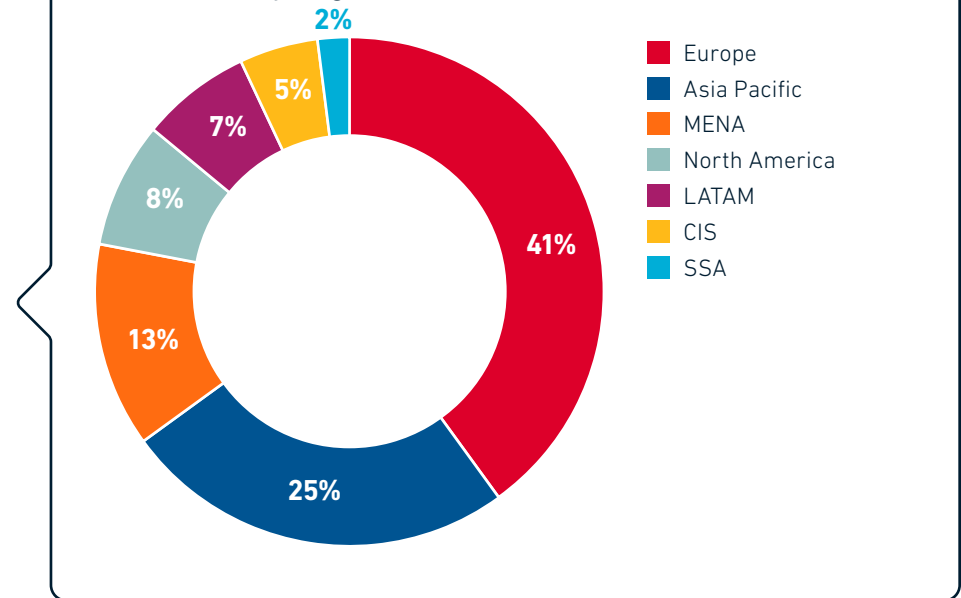
Number of mobile service providers offering commercial eSIM service for smartphones*



* Minimum number of mobile service providers, based on the list provided by Apple, Huawei and Samsung (publicly available information) and GSMA Intelligence research of the top 30 markets. Discussions with leading eSIM vendors suggest that these figures are even higher.

⁵ [How eSIM is transforming connectivity for consumers and enterprises](#), Mobile World Live, 2021

Breakdown by region (December 2020)

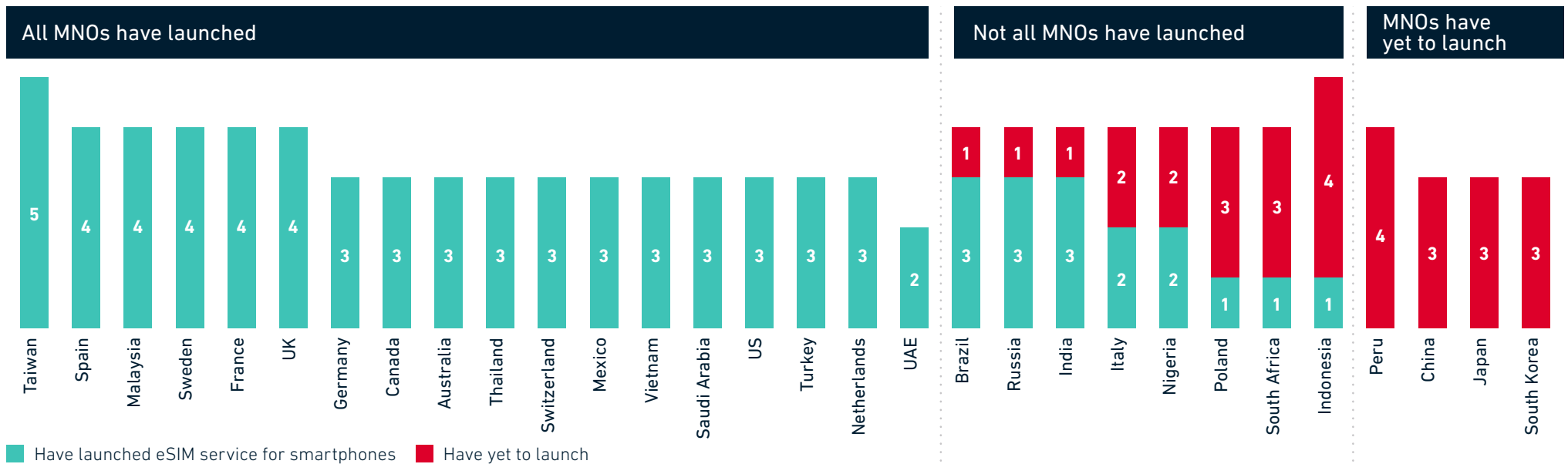


Larger markets lead the way

- eSIM is nearly ubiquitous in larger markets.** eSIM service for smartphones is available in most of the top 30 mobile markets in the world. Nigeria, South Africa and Turkey are the latest additions to this list. In aggregate, more than 70% of the MNOs operating in these 30 markets offer eSIM service for smartphones. In many of these markets, eSIM has been fully launched, meaning that all MNOs have made eSIM service available to their smartphone customers. Various MVNOs have also launched eSIM service for their smartphone customers in some of these markets.
- eSIM as a group strategy.** Several groups, including Orange, Deutsche Telekom, Vodafone and Three, have launched eSIM service for smartphones across many of the markets in their footprints. Deutsche Telekom was a pioneer at a group level, while Telefónica has fully launched eSIM in Europe (Spain, Germany and the UK) and is increasingly launching eSIM across Latin America.

Number of MNOs offering eSIM service for smartphones in the top 30 markets by mobile revenue

MNOs with at least 5% share of smartphone connections in a given country*



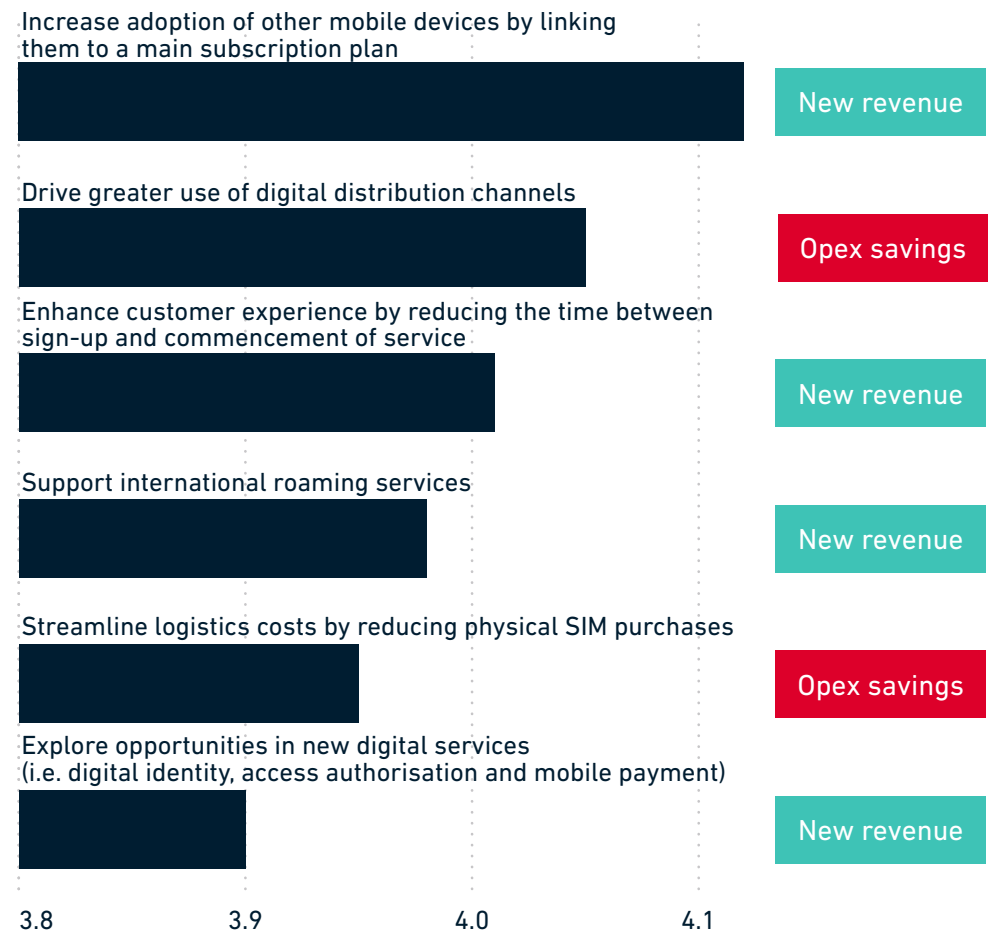
* Rakuten has launched eSIM service for smartphones in Japan, but it is not included in the chart because it has 1% market share (as of Q4 2020)

Potential benefits of eSIM for operators

- **Operators see a variety of benefits.** Most operators see eSIM as an enabler of new revenue and further digitisation for consumers, according to our operator survey. The most important benefit is perceived to be the increased adoption of other devices by linking them to a main subscription plan (typically a smartphone plan). This comes as no surprise, as operators are a key distributor of such devices because of the link with connectivity services. In fact, on average across operators, 25% of all device unit sales to consumers are non-phone devices, including smartwatches, tablets and laptops.
- **eSIM is fit for purpose.** eSIM allows operators to add companion devices and associated cellular connectivity services to a consumer's or family's main data plan more easily than with traditional SIMs. However, there has not been much use of eSIM-enabled connectivity for such eSIM companion devices so far, being mostly confined to eSIM smartwatches.
- **Future outlook.** Most consumers welcome the possibility of using cellular connectivity in all their mobile devices, as it reduces the dependence on Wi-Fi. However, the typical value for money principle applies: what are the additional benefits and services (compared to using those devices with Wi-Fi only), and how much does it cost on a monthly basis to access these additional benefits and services? Product/service innovation and new thinking on how mobile tariffs should be designed in a 5G and eSIM world will both be increasingly vital to spur adoption of eSIM companion devices and associated connectivity services. Various operators already offer eSIM as part of their multi-device and multi-user packages (under a single contract and single invoice), including offerings designed for families – this is something to build on in the new eSIM scenario.

Potential benefits of eSIM

Please rate the following potential benefits associated with eSIM based on how important they are to your business. Scores range from 1 (not at all important) to 5 (extremely important)

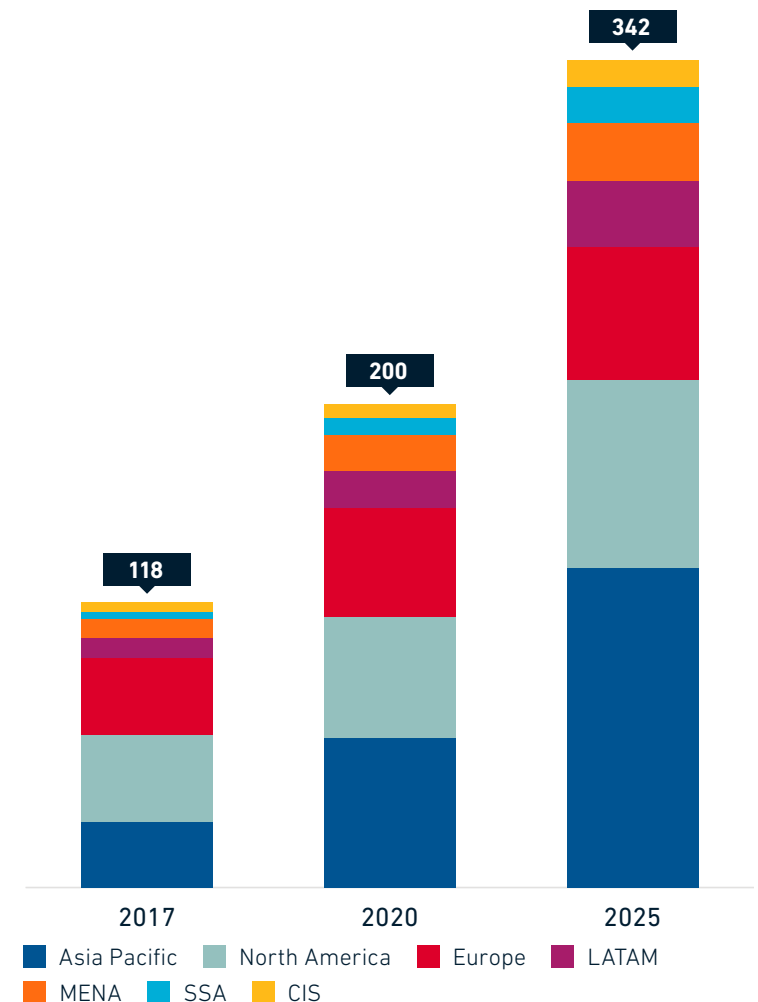


eSIM for smartwatches: the value for money challenge

- Smartwatch adoption is rising.** Consumer adoption of smartwatches nearly doubled between 2017 and 2020, reaching 200 million consumers globally (installed base). Various factors are driving adoption, including an expanded portfolio of smartwatches and the launch of cheaper models, mostly by new entrants. Enhanced features beyond music and payments, especially for fitness and healthcare (also in the context of Covid-19), are key drivers too.
- Good progress on eSIM smartwatches.** At the end of 2020, 27 eSIM smartwatch models had been launched by a total of 13 vendors. eSIM service is also available to a certain extent. According to Apple (which has a roughly 40% share of smartwatch shipments globally), more than 100 operators provide eSIM service for smartwatches, and this number is growing. In some countries, eSIM service is available for smartwatches but not yet available for smartphones; China and South Korea are notable examples.
- Value for money challenge.** Today, eSIM smartwatches account for a small share of the total smartwatch market, being largely confined to the high-end consumer segment. Higher retail prices (an OEM factor) and service availability limitations (a function of operators offering eSIM service) are major barriers, especially in developing markets. However, there is also a more fundamental challenge. Many smartwatch users do not see enough value in paying a monthly fee (on top of their smartphone subscription fee) to have their smartwatches untethered from their phones. This depends on the balance between additional benefits and services and cost. This may change in the future, especially if a richer ecosystem of services becomes available that makes standalone cellular connectivity for smartwatches (delivered via eSIM) more valuable. All eyes are on healthcare applications.
- Sizing the potential incremental revenues for operators.** Since operators typically apply a monthly fee of €5 for the use of cellular connectivity in smartwatches, eSIM could generate €6 billion in annual service revenue globally in 2025 if it accounted for 30% of the total smartwatch market. But this assumes that additional benefits and services will be offered by operators.

Smartwatch adoption worldwide

Installed base (million)



eSIM for laptops: interesting use case, but slow traction so far

- **Major laptop vendors are on board.** The top three global vendors by market share (Lenovo, HP and Dell), in addition to other vendors, have launched laptops with eSIM capability. Some of these devices are also 5G compatible. As of the end of 2020, 23 eSIM laptop models were commercially available, which is nearly as high as the number for eSIM smartwatches (27 models).
- **Marginal use of eSIM so far.** A range of companies (e.g. GigSky, Truphone and Ubigi) provide eSIM data plans specifically designed for use in laptops, to serve international travellers, digital nomads and remote-working professionals. However, the number of eSIM activations for laptops has been low so far. The number of MNOs offering data plans for laptops is still negligible (see the Microsoft example on the right).
- **Wi-Fi versus mobile.** Laptops are mobile devices, but they typically use Wi-Fi networks, with mobile connectivity predominantly used in the business segment. Given the low use of mobile connectivity, there is a question as to how this fits into major laptop vendors' ambitions to transform the laptop mobile experience through always-connected laptops. There is certainly a mismatch. On one hand, major vendors are increasingly launching laptops with eSIM capability, despite the incremental cost of embedding eSIM into laptops; on the other hand, the service ecosystem is moving slowly. As laptops consume huge amounts of data, there is also a traffic offloading component to consider.
- **Will 5G and eSIM fuel interest in cellular connected laptops?** Once businesses return to normal after the Covid-19 pandemic, working on the move will pick up again for business travellers and freelance workers. eSIM can allow laptops to reduce their dependence on Wi-Fi and tethering while simplifying the management and personalisation of enterprise device pools for IT managers. However, wider adoption of eSIM in laptops will depend on various factors, including the promise of all-day battery life, more efficient processors, dual-screen laptops, low-latency 5G (e.g. for gaming), and perhaps new customer propositions and tariff models by operators.

Mobile service providers currently offering data plans for the Mobile Plans app in Windows 10

Bell Canada
KDDI Japan
Sprint US
Swisscom Switzerland
Telenor Norway
Telstra Australia
Vodafone Germany
GigSky multiple countries
Lenovo Connect multiple countries
Ubigi multiple countries

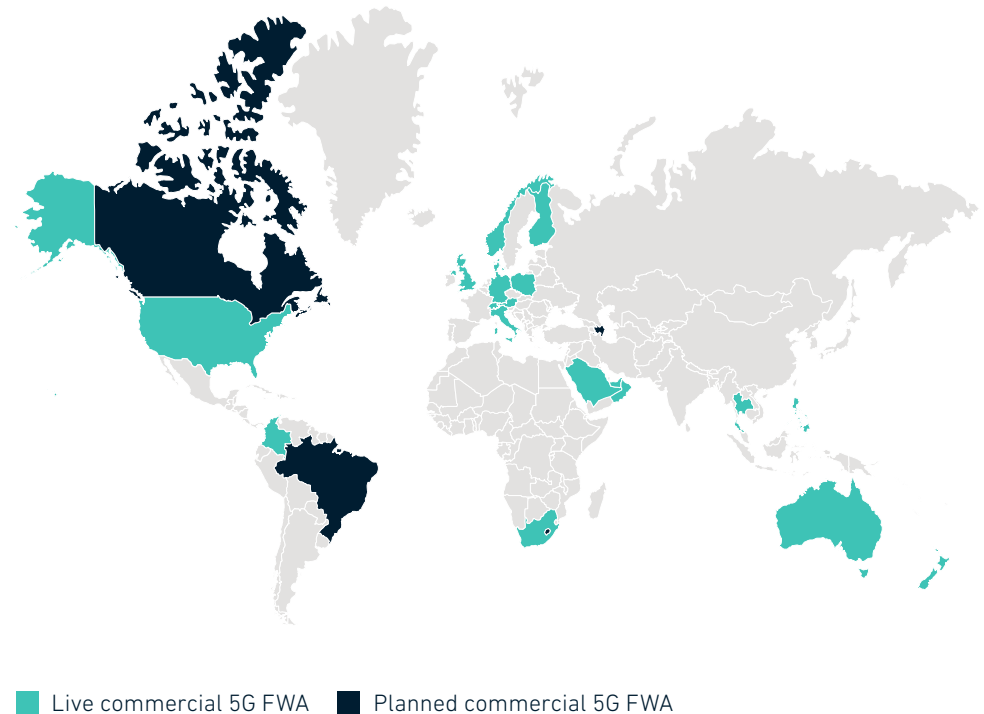
As of December 2020

Source Microsoft

eSIM for other consumer mobile devices: what next?

- **Slow progress so far.** Beyond smartphones, smartwatches, laptops and tablets, there has not been much eSIM momentum for other consumer devices. Only a limited number of eSIM-enabled products are commercially available, including bikes, GPS trackers and security cameras. This may change in the future as the mobile ecosystem gains eSIM experience and eSIM adoption grows. Most companies we spoke to believe that eSIM could have a future in other consumer devices (e.g. smart home devices and speakers). Exploring new use cases is certainly a good course of action.
- **First eSIM-enabled 5G FWA devices.** At least a couple of 5G routers or CPEs with eSIM capability have recently entered the market. Oppo launched its 5G CPE T1, while Zain KSA announced, in partnership with Nokia, the launch of a 5G smart router powered by eSIM technology, which provides fixed wireless connectivity to homes and offices. As the mobile industry seeks new 5G use cases, this is an important development for eSIM.
- **5G FWA is a use case to watch.** At the end of 2020, 51 service providers (the vast majority operators) had launched commercial 5G FWA services across 26 countries. Further, 17 operators have announced plans to launch 5G FWA in 2021 or later. This totals 68 providers across 32 countries. 5G FWA launches should accelerate through to 2025, especially if pioneer operators show success. 5G routers and CPEs can use eSIM or the traditional SIM (which many 4G routers or CPEs use). eSIM is certainly fit for purpose, especially for scenarios where the CPE is located outside the home.

5G FWA: service commercialisation



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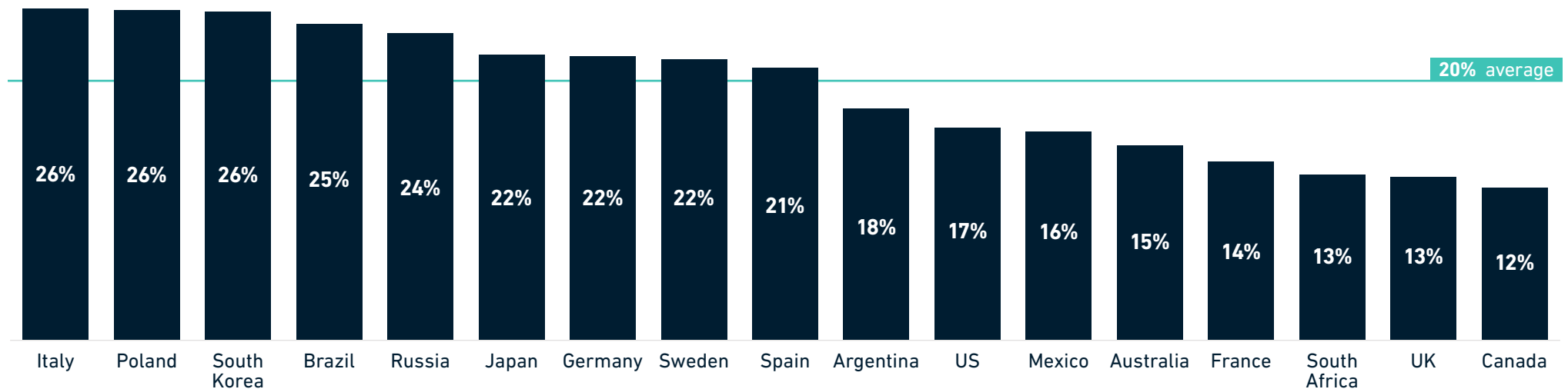
5 The road ahead

Consumer awareness of eSIM is still low

- An awareness gap.** Despite significant progress on commercial availability of eSIM devices and associated connectivity services, eSIM market adoption is still low relative to its long-term uptake. There are a number of reasons for this, including low consumer awareness of eSIM. Our research, based on a consumer survey in 17 major markets, found that 20% of consumers are aware of eSIM, on average. For comparison, awareness of 5G is 85% on average. Raising consumer awareness of eSIM and explaining and promoting its benefits is key to drive market adoption. Operators (MNOs and MVNOs) and OEMs have an important role to play here, being the main touchpoints with end users.
- A link between eSIM promotional activity and adoption.** Our research also shows that there is no correlation between consumer awareness of eSIM and timelines of eSIM launch or even availability of commercial eSIM service. For example, operators in the US and Canada were early adopters of eSIM and today, all MNOs and various MVNOs in those markets offer commercial eSIM service – but consumer awareness in those markets is below 20%. However, some of the interviewed companies noted that they see a correlation between operators’ promotional activity of eSIM and volumes of eSIM activations on their platforms, meaning that consumers are more likely to adopt eSIM if operators promote it. This is an important factor to build on.

Consumer awareness of eSIM by country

Percentage of surveyed consumers who have heard of eSIM



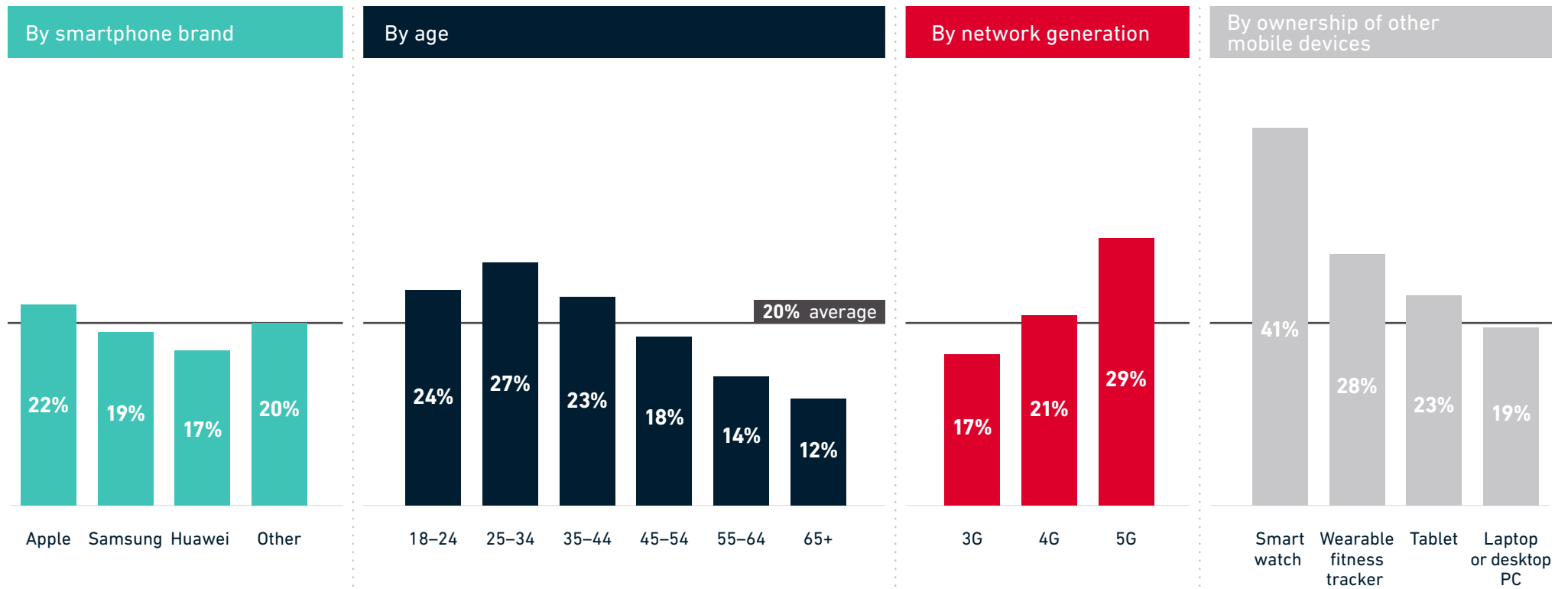
Segmenting consumer awareness of eSIM

- **Interesting variations.** iPhone users are more likely to know what eSIM is compared to Samsung and Huawei smartphone users. The fact that Apple launched eSIM in smartphones in September 2018, about 18 months before the launch of Samsung and Huawei, may be a factor. Consumer awareness of eSIM is higher than average among the 25–34 age group

(27%), 5G users (29%) and owners of other mobile devices (up to 41% for smartwatch owners). This suggests that digital consumers are more likely to adopt eSIM in the new technology's early years. It also reinforces our view that 5G device renewals represent an opportunity to push the transition to eSIM, as more 5G phones will have eSIM capability.

Consumer awareness of eSIM by category

Percentage of surveyed consumers who have heard of eSIM



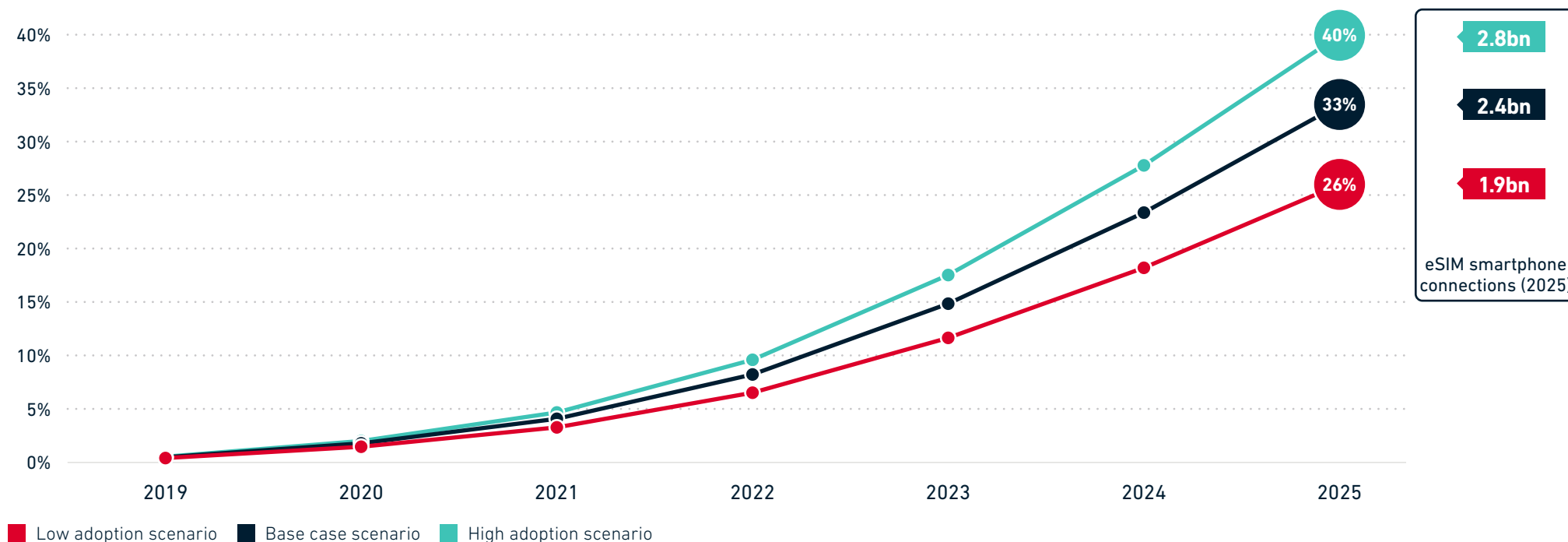
Source GSMA Intelligence Consumers In Focus Survey 2020 (17 countries, 17,000 consumers)

eSIM market adoption: forecast to 2025

- Sizing the eSIM smartphone market.** We forecast 2.4 billion eSIM smartphone connections (installed base) globally by the end of 2025. This would account for 33% of the total number of smartphone connections. Given the 2-3 year replacement rates in most countries, a sizeable base of smartphones with removable SIMs will likely remain in place for several years.
- Acceleration from 2022 onwards.** After a slow start, eSIM adoption will gain momentum from 2022 onwards. By then, a majority of operators will offer commercial eSIM service to their smartphone customers, and smartphone vendors that have yet to launch eSIM phones will likely do so. As several factors will determine the speed of eSIM adoption among smartphone users, we run two separate scenarios in addition to the base case scenario. Our low and high adoption scenarios predict 1.9 billion and 2.8 billion eSIM smartphone connections globally by 2025, respectively.

eSIM smartphone connections to 2025

Percentage of total smartphone connections (installed base) globally

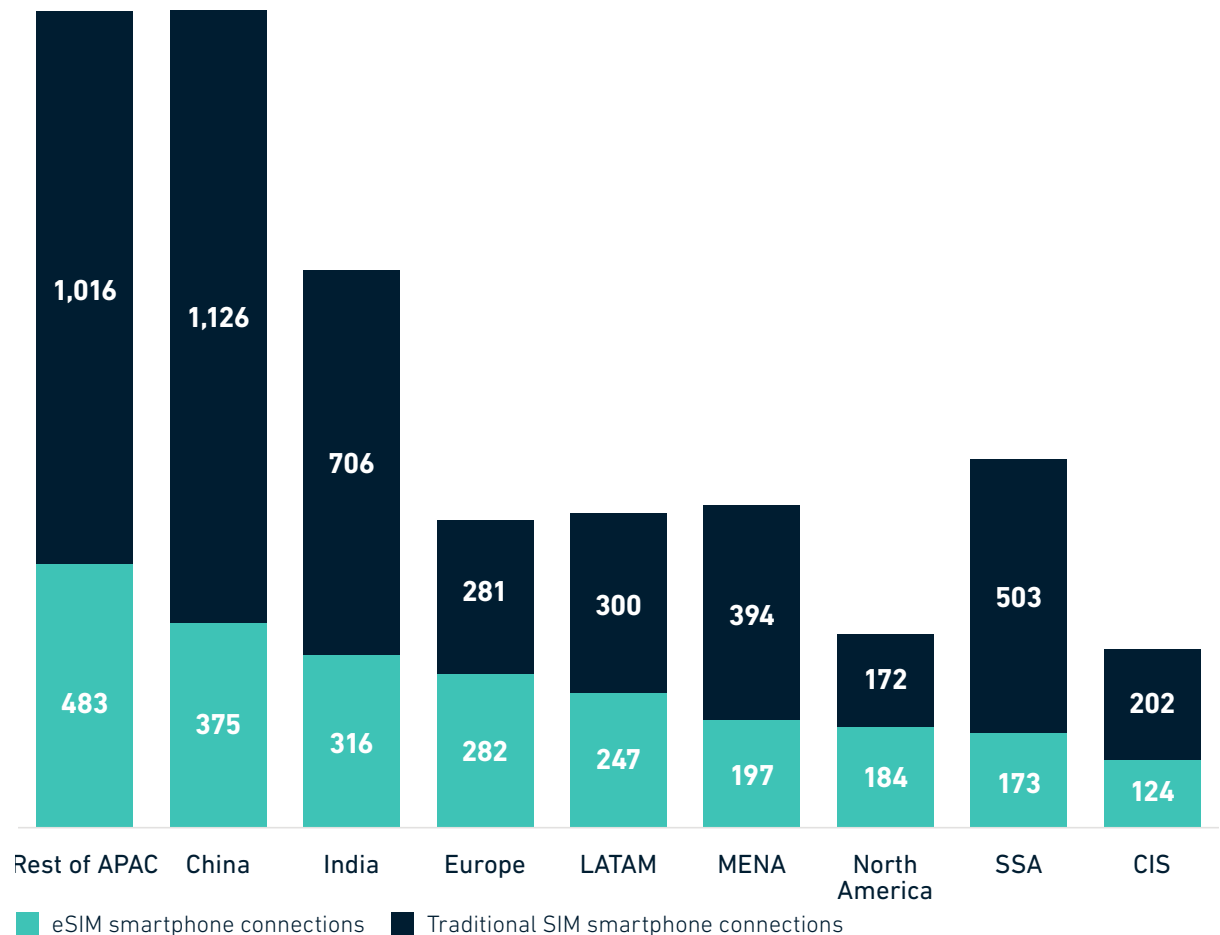


eSIM market adoption: significant regional variations

- Identifying the early leading markets.** The markets that are more likely to have faster eSIM adoption rates at an earlier stage will be the ones that meet two criteria: where Apple, Samsung and Huawei have in aggregate more than 70% of the share of smartphone users; and where all MNOs and most MVNOs already provide commercial eSIM service for smartphones. Such markets include the US, Canada, Australia, Saudi Arabia and a number of European countries (e.g. France, Germany, Sweden, the Netherlands and the UK).
- Big variations by region.** North America and Europe will be the regions with the fastest rate of eSIM market adoption; they will be the first regions in 2021 to hit the 10% mark for eSIM adoption (as a share of smartphone connections). By the end of 2025, more than half of smartphone connections in both regions will use eSIM. eSIM market adoption will be slower in developing markets, especially in India and Sub-Saharan Africa.
- China will take over in the medium to long term.** China will begin its transition to eSIM in smartphones later than other countries, but it will catch up in the medium term. In the base case scenario, we estimate that China will have nearly 400 million eSIM smartphone connections by 2025.

eSIM smartphone connections by region, 2025

Base case scenario, installed base (million)



Understanding our eSIM market adoption forecasts

Some of the key assumptions

Covid-19 will slightly lengthen smartphone replacement rates

Before the Covid-19 pandemic, the average time it took for a consumer to replace their smartphone was 2–3 years in most markets, with variations between developed markets (2 years) and developing markets (3 years or more). Our recent consumer survey suggests mixed trends. Some consumers anticipate slightly longer replacement cycles, but this will be partially mitigated by 5G upgrades.

All smartphone vendors on board by 2021

Apple, Google, Huawei, Microsoft, Motorola, NUU Mobile, Oppo and Samsung have already launched eSIM smartphones. Other vendors have yet to launch, including Xiaomi and Vivo. In our model, we assume that all global and regional major smartphone vendors will have launched smartphones with eSIM capability by the end of 2021 (but not in China).

China to launch eSIM service for smartphones in 2022

In China, commercial eSIM service is already available for smartwatches and some IoT applications, but not for handsets. In all three scenarios, we assume that most major global and local smartphone vendors will launch eSIM service for smartphones in the country by the end of 2022, although regulatory timelines are still unclear.

Smartphone shipments: eSIM takes the lead in the medium term

The share of new smartphone shipments that are eSIM enabled will grow over time. This is partly driven by increasing operator support of eSIM service. As OEMs shift to an eSIM-only model, at least for their newer handset releases (2022–2023 seems a realistic assumption for many OEMs), a majority of smartphone shipments will be eSIM enabled globally in the medium term.

What could change our forecast (upward revision)

Smartphone vendors

- Faster-than-anticipated transition to eSIM-only smartphones
- Faster proliferation of eSIM smartphones, including mid- and low-price phones in emerging markets

Operators (MNOs and MVNOs)

- Operators that are planning to wait until 2022 or later before launching eSIM for smartphones reconsidering their plans
- Greater commercial push for eSIM
- Product and service innovation becoming centred around eSIM
- Chinese operators launching commercial eSIM service for smartphones in 2021

Consumers

- Faster-than-anticipated smartphone replacement rates as economies rebound after the Covid-19 pandemic
- Greater consumer propensity to adopt eSIM
- Faster adoption of companion devices such as smartwatches

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How to fully leverage the potential of eSIM and scale market adoption in the coming years

Consumer-oriented actions

Raise consumer awareness of eSIM and promote its benefits

Enhance user experience for eSIM activation and beyond

Democratise eSIM devices and drive product and service innovation

Strategic and operational actions

Push the shift to digital and embrace a fully digital eSIM model

Start implementing eSIM if you haven't

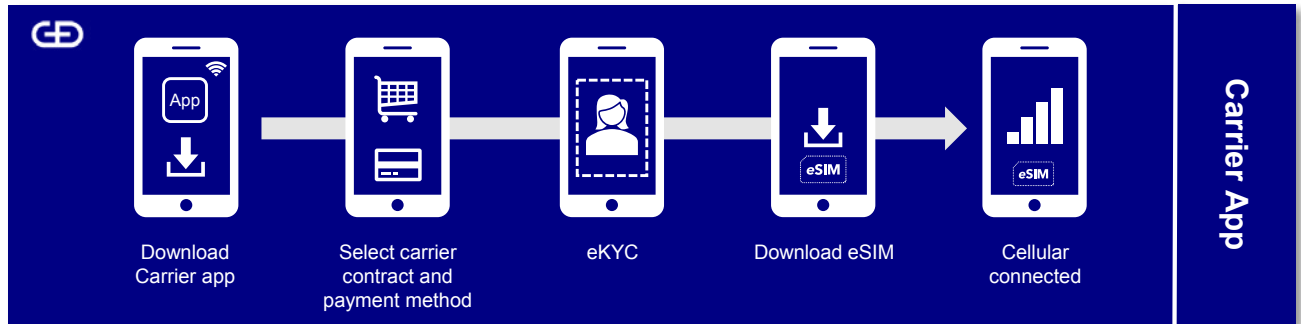
Develop your eSIM strategy and externalise it to stakeholders



Fully digital consumer onboarding journey for best user experience

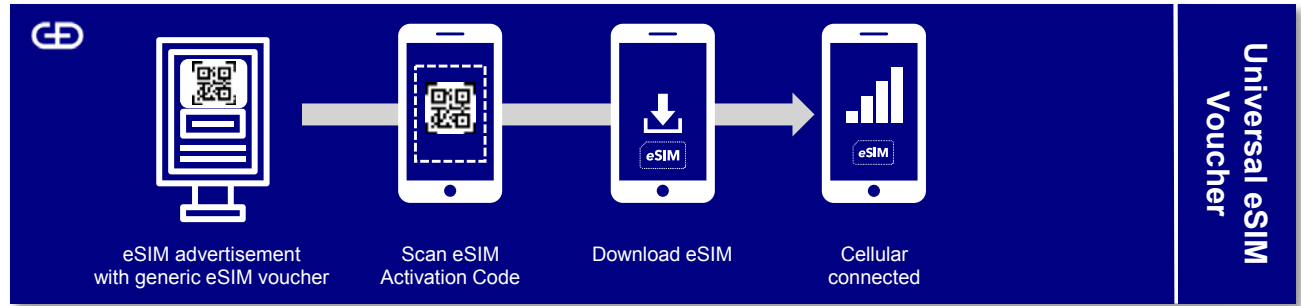
Click & Connect

The standard way to rapidly onboard new subscribers. Fast, easy, and flexible onboarding process to subscribe to a carrier contract directly from the device, in just a few minutes.



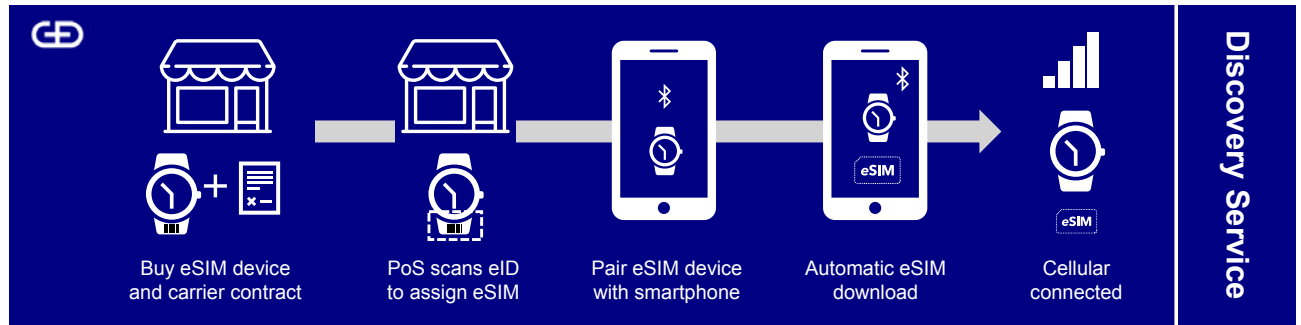
Scan & Connect

The ideal tool for advertising campaigns to onboard new customers quickly. Best for casual and immediate onboarding use cases, e.g. to attract travelers at airports or visitors at events.



Power-On & Connect

The convenient use-case to assign a device to a carrier contract at Point-of-Sale. Most suitable for devices with smaller user interfaces such as watches, trackers or routers.



How to fully leverage the potential of eSIM and scale market adoption in the coming years

Raise consumer awareness of eSIM and promote its benefits

Today's challenges

Across major countries, 80% of consumers don't know what eSIM is. Some eSIM stakeholders may argue that consumers don't need to know, as end-users are mostly interested in services, not in the enabling platforms. However, consumers have been using the traditional removable SIM card for three decades, so the transition to eSIM cannot be silent.

What next?

Raising consumer awareness of eSIM involves two aspects: talking to consumers about eSIM, and explaining and promoting its benefits. MNOs, MVNOs and OEMs have a big role to play here, as they are the key touchpoints with consumers. Many OEMs and operators have created full pages in their commercial websites, highlighting relevant information for consumers (e.g. how to activate eSIM, what eSIM devices are available), but only a few are promoting eSIM via their marketing or sales channels. This should be the next step.

Also, as eSIM is a new technology that comes after 30 years of 'plastic' SIMs, a proper education phase for consumer-facing employees (e.g. those working in retail stores or call centres) is also essential. This applies to both operators and OEMs.

Enhance user experience for eSIM activation and beyond

Today's challenges

Consumers can currently activate eSIM in different ways, including via QR codes (sent by mail or online), discovery server provided by the GSMA and mobile service providers' apps. There is a general consensus in the eSIM ecosystem that eSIM has significantly streamlined the process for SIM activation and subscription delivery compared to the traditional removable SIM, making it simpler and faster for consumers. However, it can be improved further, especially if the process becomes fully digital.

What next?

A simple and fully digital eSIM process should be the ultimate, universal goal. The use of apps is largely seen as the way forward, as apps appeal greatly to consumers and app interfaces are intuitive. Some companies also mentioned the eSIM smartwatch set-up as a good example of simple activation.

A consumer-friendly way to manage all the subsequent activities is also important. For vendors of eSIM solutions, this means providing well-designed, effective and widely available eSIM management platforms. For consumers, it means the ability to remotely connect (at any time and everywhere) and manage all eSIM devices and associated connectivity services (e.g. adding or removing companion devices) easily and seamlessly.

How to fully leverage the potential of eSIM and scale market adoption in the coming years

Democratise eSIM devices and drive product and service innovation

Today's challenges

The typical innovation cycle and pricing trends for new device features apply to eSIM as well. Today, the average price of an eSIM phone (€800) is more than double the average price of all phones. As discussed before, this has nothing to do with the cost of implementing eSIM into the device. Because eSIM is introduced in flagship smartphones first, eSIM devices have higher-than-average retail prices, especially if they are also 5G capable.

What next?

A wider portfolio of eSIM devices, including mid-range and low-end phones, is needed to drive eSIM adoption beyond the high-end customer segment and in developing markets. 5G provides a good example. The average launch price of new 5G phones has fallen by a third since Q1 2019 (from €750 to €500), largely due to lower-cost phones from China.

As eSIM opens up new opportunities, product/service innovation and new thinking on how mobile tariffs should be designed in a 5G and eSIM world (e.g. per data allowance or number of devices) will be key. Today, most operators don't apply differences between subscription plans for eSIM and traditional SIMs, but this may change in the future. Some MVNOs are already differentiating their eSIM offerings, especially in the context of international travel.

Push the shift to digital and embrace a fully digital eSIM model

Today's challenges

Even before Covid-19 there was a clear shift to online and digital in most sectors. The fallout from the pandemic has accelerated this trend. eSIM adds another element of digitisation, but many companies have yet to decide how to fully leverage eSIM in the context of growing digitisation. Quite often, their thinking focuses on the short term (costs) rather than the long term (revenue). Legacy IT systems also require investments in upgrades.

What next?

Digitisation is a must for companies. It means applying a digital mindset to technology, customer relationships and business models. Several operators are doing only the minimum for eSIM, but they need to be ready if they don't want to miss out on new opportunities.

The pandemic offers an incremental opportunity to digitise customer interaction. eSIM is fit for purpose: it changes the customer acquisition journey and subscription delivery model to digital, allowing the digitisation of KYC (know your customer) and TDI (trusted digital identity). As the use of online and digital channels escalates among consumers, operators need to adjust their smartphone and subscription distribution plans to increasingly support a fully digital customer experience.

How to fully leverage the potential of eSIM and scale market adoption in the coming years

Start implementing eSIM if you haven't

Today's challenges

Some major vendors, such as Xiaomi and Vivo, have yet to launch eSIM in smartphones. These OEMs have significant market share in various developing markets, especially in Asia Pacific. Launching eSIM would allow them to start capturing new market opportunities (expanding the reach of eSIM). Further, nearly 30% of operators plan to wait until 2022 or later before launching eSIM for smartphones.

What next?

Mainstream adoption of eSIM in smartphones is not a matter of if, but when. Operators don't typically disclose their expectations, but there are a few exceptions. For example, Orange expects eSIM to reach almost 100% of the Belgian market by 2030. We forecast that by 2022, more than 500 million smartphone connections will use eSIM. Operators not offering eSIM service will miss out on this 10% of the market.

Over the next two or three years, OEMs will likely start shifting to eSIM-only devices. When this happens, operators who are behind on eSIM implementation may lose market share. Operators planning to wait until 2022 or later may reconsider their plans, as implementing eSIM and integrating it into operator business processes (especially important customer-facing processes) takes time, so the journey needs to start as early as possible.

Develop your eSIM strategy and externalise it to stakeholders

Today's challenges

eSIM strategies are rarely discussed when companies present their mobile device and services strategies. For example, CB Insights data shows that eSIM was mentioned only 65 times in companies' earnings calls throughout 2020. For comparison, 5G was mentioned more than 9,000 times in 2020. Despite significant progress on eSIM over the last two years, eSIM was mentioned the same number of times in 2020 as in 2018.

What next?

Developing an eSIM strategy and externalising it to stakeholders and the wider mobile ecosystem is vital to support and drive eSIM deployments. Strategy briefings, industry conferences and forums are all important channels to make eSIM strategies more visible to stakeholders. This helps smaller companies in the emerging eSIM ecosystem to be fully aware of eSIM progress, understand the new market opportunities and choose the right business partners.

This goes beyond the consumer market. Many companies claim that eSIM is crucial for their IoT deployments (e.g. in automotive, utilities and other vertical sectors), but few have a clear eSIM strategy that goes alongside their main IoT proposition. Recent trends show that tech incubators (sometimes funded by MNOs) are helping bridge the tech and end-user sectors.

