



SURVEY REPORT

State of the market on Integrated SIM (iSIM): Ready for Massive IoT?

Adoption of integrated SIM (iSIM) technology and Cellular IoT is set to grow rapidly, according to a new Mobile World Live survey

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Executive Summary

This paper presents the key findings from an online survey of more than 750 respondents, conducted in the autumn of 2020, to understand market perceptions of Cellular IoT and Integrated SIM (iSIM) technology. The research was carried out independently by Mobile World Live, and sponsored by Kigen, Sony Semiconductor IL and Vodafone Business – three leading players in the development and deployment of iSIM.

The survey found that 79% of businesses adopting IoT technology and 77% of device makers are either using Cellular IoT already or plan to do so within 18 months. Many of these respondents have already adopted the primary cellular low power wide area technologies - NB-IoT and LTE-M. Although NB-IoT is still relatively new, almost half of the device makers surveyed, for example, are using this low cost technology, which makes it easier to connect battery-powered devices. The survey found that users particularly value the coverage, reliability and security of cellular networks.

Most of the user respondents believe it is important to have a dedicated hardware security element, such as SIM card, in a connected device. However, relying on familiar, replaceable SIM cards can make it cumbersome to change the network used by a device - you need to manually go and swap the SIM card. The industry has developed several new SIM technologies that make it easier for Cellular IoT solutions to switch between different operators' networks. The vast majority of the supplier respondents in the survey regard the new wave of SIM technologies as critical or important.

This survey focused in particular on perceptions of iSIM technology. As it is intended to be a space-efficient, straightforward-to-deploy and cost-effective solution, iSIM can be the ideal option for many IoT use cases. That means more devices can be connected, more simply, and are secure-by-design. In the IoT sector, iSIM is designed to lower the barriers to entry and speed up time-to-market by making it easy for the device maker to harness global connectivity. The user respondents identified the low power consumption and small size of iSIM as particularly attractive features. The survey also revealed considerable enthusiasm for iSIM among suppliers of IoT solutions. Approximately two thirds of the respondents are considering incorporating iSIM technology into their IoT offering.

The survey findings suggest the expansion of the Cellular IoT will primarily be driven by low power wide area connectivity, its broad coverage and ease of use, as well as simplicity in securing devices and their data exchanges with the cloud. With more suppliers bringing forth products, it is becoming increasingly straightforward for smaller players to employ Cellular IoT and gain a competitive advantage.

The next step will be for suppliers to create out-of-the-box solutions that enable non-specialists to adopt Cellular IoT and integrate it into their own business models. In the survey, 40% of all respondents noted that “more pre-packaged solutions designed to meet cost and customer experience aims” are needed to drive greater adoption of the next generation of low power, secure, massive IoT. Choice and flexibility are key to support the aims of businesses and device makers looking to get to market rapidly.

Industry standards are enabling fast moving companies to develop data and insight-oriented services that benefit from scalable chip-to-cloud security, underpinned by solutions from ecosystems, rather than single proprietary solutions. As iSIM simplifies the manufacture of trusted devices and supports remote SIM provisioning across network technologies, such as NB-IoT, it will usher in an exciting chapter of efficient, globally available massive IoT.

Read on, to get ready.

Introduction

Investment in Internet of Things (IoT) is rising rapidly, as organisations look to both remotely monitor and control their assets. IoT solutions are being used to enable everything from the management of white goods and water monitoring to tracking shipments and vehicle movements.

GSMA Intelligence forecasts that total IoT connections will double between 2019 and 2025, reaching 24 billion globally. In an unpredictable and dynamic business environment, IoT is helping businesses collect the real-time data they need to make better decisions, faster. Almost half the companies surveyed by GSMA Intelligence described IoT as transformational to their company and their industry.

Cellular technologies, such as 4G, 5G, Narrowband IoT (NB-IoT) and Long Term Evolution for Machines (LTE-M), are playing an increasingly important role in the development of IoT. This paper presents the key findings from an online survey conducted by Mobile World Live into Cellular IoT adoption in conjunction with an Integrated SIM (iSIM), which is a SIM technology that resides within a dedicated isolated security enclave, alongside the application processor and modem, on a purpose-built system on a chip. The research was sponsored by Kigen, Sony Semiconductor IL and Vodafone Business – three leading players in the development and deployment of iSIM.

How does iSIM work?

iSIM upholds three decades of SIM technology and cellular standards evolution to offer the most advanced, flexible and efficient device-side network authentication security component. The fundamental advancement that iSIM brings is the departure from a discrete dedicated SIM hardware. This makes it possible to run the SIM functionality, be this single profile or enabled via remote SIM provisioning (RSP), within an industry-accepted dedicated security bastion residing on an existing silicon die, the system-on-chip.

This dedicated security bastion, the secure enclave, is customised for the device's use case with the most appropriate SIM operating system (SIM OS), which defines the SIM's functional capabilities. As with the pluggable or embedded SIM, the carrier-specific element, the SIM profile, can either be loaded at iSIM manufacture or, through remote SIM provisioning via over-the-air download. With the SIM now being a permanent fixture of the device, it is possible to remotely manage the SIM profiles, so a new carrier can be selected during its life. However, this is not mandated, and some short life use cases will not require this functionality.

When combined with low power wide area (LPWA) cellular technologies, iSIM can help unlock new massive IoT applications and services not possible before.

Further resources:

See the video "What is Integrated SIM?" on the [GSMA iSIM Resource hub](#)

Survey methodology

This report is based on responses to an online survey conducted by Mobile World Live in autumn 2020, which attracted more than 750 respondents from around the world. Of these, 41% were categorised as users - businesses adopting IoT technology, app developers, systems integrators, design houses and device makers. A further 33% of the respondents identified themselves as belonging to companies that are part of the supplier side ecosystem, such as telecom operators, chipset or module suppliers, or related software providers.

Organisations with more than 5,000 employees consisted of 41% of the ecosystem respondents and 24% of the user respondents. Of the user respondents, 57% were small and medium businesses with less than 250 employees. Geographically, the largest group of respondents were from companies headquartered in Europe, followed by North America and East Asia.

How iSIM changes the game for Mobile IoT

The Integrated SIM makes it simple for businesses to adopt Cellular IoT, removing the barriers of size, power, complexity and cost. For original equipment manufacturers (OEMs) or device makers, iSIM is designed to eliminate the effort required to integrate connectivity and security technology. This simplifies the supply chain of trusted manufacturing, enabling device makers and enterprises to focus on their own business goals.

The integrated SIM provides benefits to each group of stakeholders:

1. For businesses who build 'things' using iSIM: reduced complexity, streamlined logistics for trusted manufacture of their devices, reduced bill of materials (BOM) and a reduction in total cost of ownership (TCO). This is particularly attractive when looking at the needs of massive IoT, as iSIM can incorporate strong security within a much smaller footprint, and support product optimisation by enabling a single SKU device to be deployed in multiple regions. All of these things mean the business case for IoT improves and businesses are able to create cellular connected 'things' that were not possible before.
2. Mobile network operators: create new markets for built-for-IoT services, expand product portfolio beyond connectivity, increase traffic and return on investment for LPWA networks.
3. Chipset makers: increase the functionality of their solutions, offer greater diversity across multiple connectivity technologies and choice of modules.
4. Module makers: increased shipments/revenues, do not need to manage SIM cards, ability to serve more markets and regions through single module SKU.

Further resources:

See how a joint vision shaped the [ecosystem approach to iSIM](#)



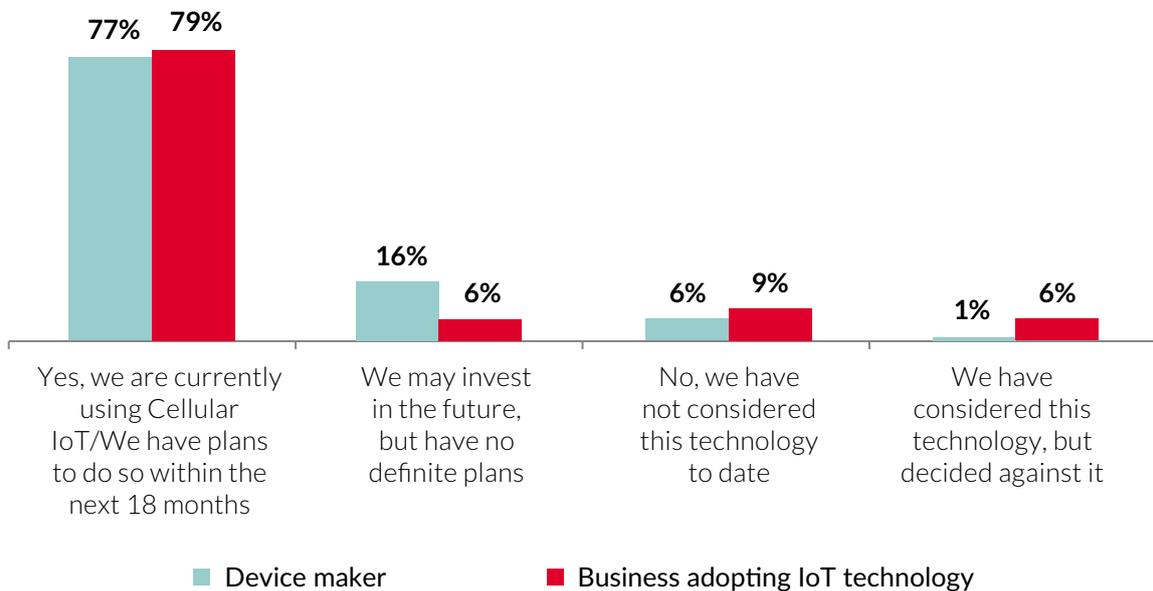
Strong demand for the Cellular IoT

IoT promises to deliver timely and reliable data, allowing businesses to improve their performance and processes - make smarter decisions, improve efficiency, lower costs and, most importantly, improve customer experience. Cellular IoT has long been the choice of many businesses looking to address IoT globally, with robust security and resiliency - thanks to the standardised approach in traditional SIMs. Low power Cellular IoT solutions are now changing the game by making it possible for businesses to leverage full global-scale connectivity.

Broad adoption of the Cellular IoT

In this survey, 77% of device makers and 79% of businesses adopting IoT said they are already using Cellular IoT connectivity or are planning to do so in the next 18 months (see Figure 1). Some 53% of the 70 device makers surveyed said they are already using the Cellular IoT and a further 24% plan to do so in the next 18 months. Among businesses adopting IoT technologies, 46% reported they are currently using the Cellular IoT and a further 33% have plans to do so in the next 18 months. These figures point to further strong growth in the Cellular IoT in the near future.

Figure 1: Most businesses are adopting cellular technologies to support their Internet of Things solutions



Large organisations (those with more than 5,000 employees) are leading the adoption of Cellular IoT, reflecting the key benefits Cellular IoT offers to enterprises, such as reliability, global consistency and only having a single SKU (stock keeping unit) to manage

– the global standardisation of cellular technologies means the same devices can be deployed right across the world. The survey aimed to test enablers that support this acceleration - starting with low power wide area connectivity.

Low power wide area connectivity is seeing strong uptake

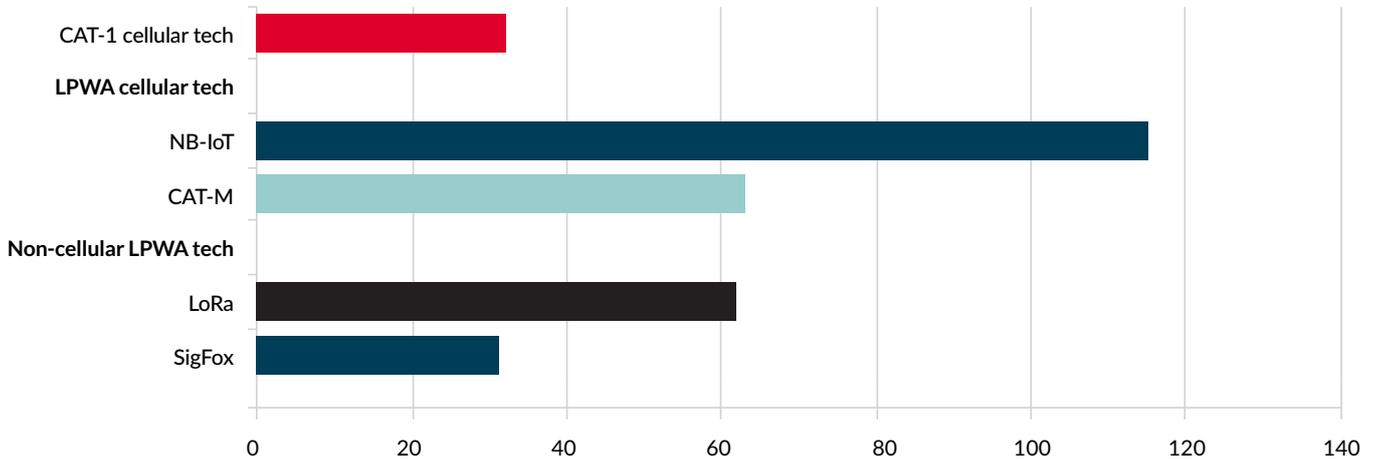
Now live in most markets around the world, low power wide area (LPWA) networks are designed to support IoT solutions that don't require high-speed connectivity, but do need good coverage in remote and hard to reach locations, such as in basements or deep inside buildings. As this form of connectivity only consumes small amounts of energy, it is also well-suited to bringing battery-powered devices online. Moreover, the low cost

of LPWA connectivity should make it viable to connect many billions more devices.

Cellular low power wide area technologies, such as NB-IoT and LTE-M, are designed to be both highly secure and reliable: they use dedicated spectrum bands to avoid interference and employ hardware-based authentication, via SIM cards. NB-IoT and LTE-M are still relatively new, but mobile operators are expanding coverage quickly and the Mobile World Live survey found that many users have already adopted these technologies (see Figure 2).

Figure 2: Low power wide area technologies now have significant traction within IoT

Please specify which connectivity technologies you are using for IoT solutions? - choose all that apply (287 user respondents)





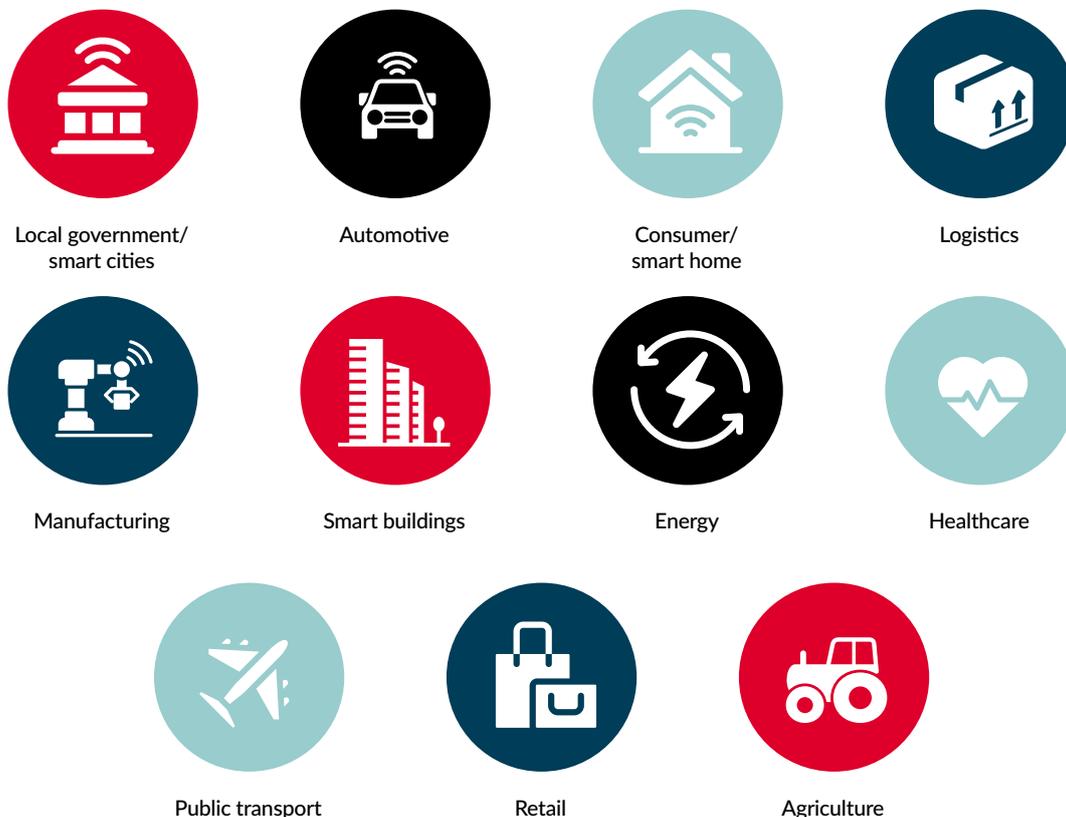
The sectors leading Cellular IoT adoption

Cellular IoT is taking root across the economy (see Figure 3). Almost half the user respondents in the survey place local government/smart cities, automotive and consumer/smart home sectors in their top three drivers of demand for Cellular IoT. Of these three, the consumer/smart home sector was most frequently

identified as the number one adopter, but the survey also highlighted strong demand from industry, including the manufacturing, logistics and construction sectors.

To date, Cellular IoT has been widely adopted by industries requiring reliability and outdoor coverage whilst being less sensitive to its cost. But further simplification and cost reduction, such as that enabled by iSIM technology, are enabling more sectors to realise the advantages of Cellular IoT.

Figure 3: The industries leading the adoption of Cellular IoT



How will Cellular IoT develop from here?

Although Cellular IoT has considerable momentum, there are still some obstacles to wider adoption. The results of the Mobile World Live survey point to the steps the mobile industry can take to enable Cellular IoT to generate even greater value for businesses.

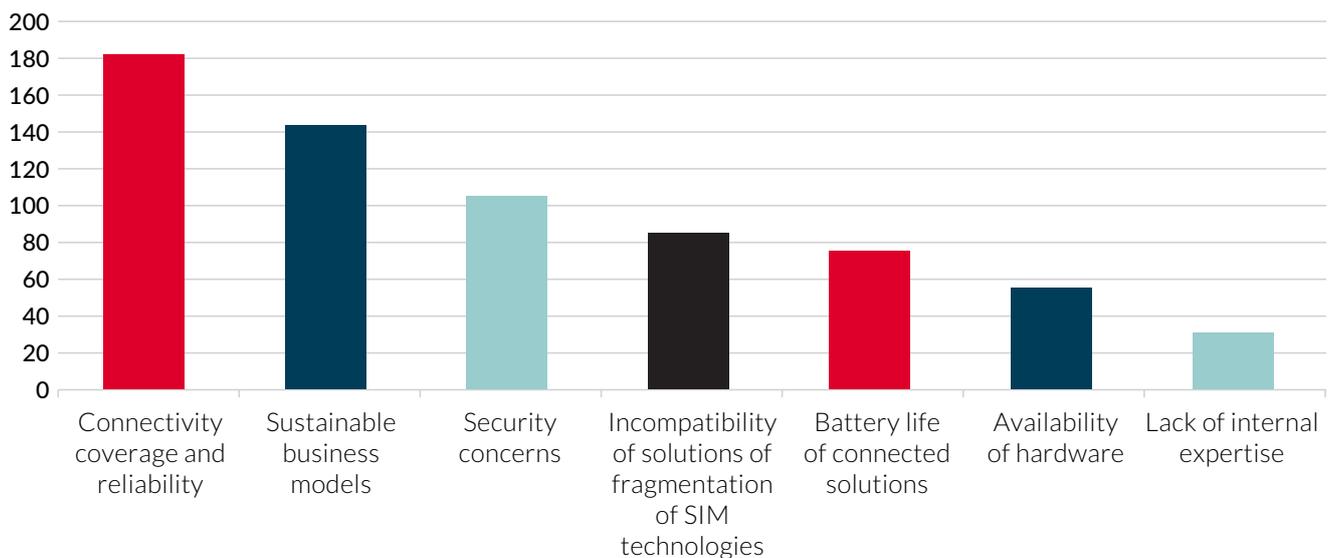
The challenges facing Cellular IoT adopters

The survey asked users to identify the major obstacles to wider adoption of Cellular IoT. The highest ranked were connectivity coverage/reliability and the need to develop sustainable business models (see Figure 4).

For device makers, for example, broad reliable coverage across the world is important because that enables them to minimise the number of SKUs they need to produce to cover the global market.

As the Cellular IoT ecosystem increasingly benefits from economies of scale, the costs of employing this connectivity will continue to fall, making it easier for companies to build a robust business case. The concerns about coverage, reliability and security (shown in Figure 4) underline the need for the ecosystem to work together to enable Cellular IoT users to easily connect to the best network available in a secure manner.

Figure 4: Challenges ranked by number of respondents that put them in the top three



The flexibility to change operators

One of the key strengths of Cellular IoT is the breadth of the ecosystem – in nearly every market, there are multiple operators and device makers providing Cellular IoT services and equipment. In the survey, almost half (46%) of the user respondents said it is important or very important to have the flexibility to change operators during a connected device's lifespan.

When asked why they would like to have the flexibility to change operators, 48% of the user respondents chose the option: “to take advantage of the best coverage and availability of service.” A further 23% chose “the desired customer experience requires a switch of solution during the lifespan”, 11% chose “to assist with lifecycle operations” and 8% cited regulatory requirements. Other reasons noted by respondents included in-field and after-sales models; optimising total cost of ownership and zero-touch deployment.

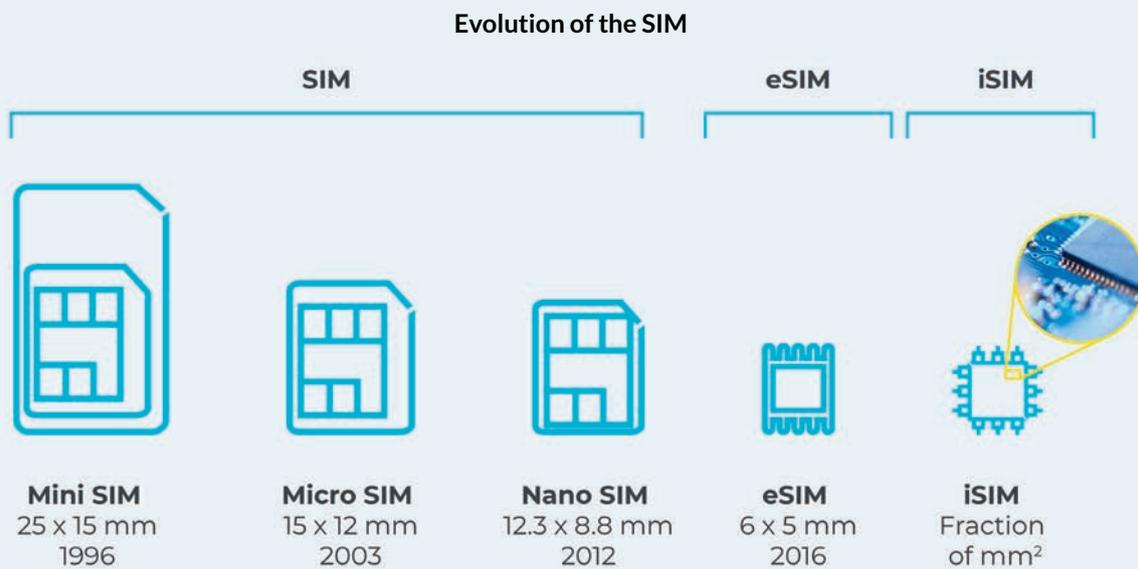
Understanding how the SIM is evolving: SIM, eSIM, iSIM?

A SIM, which stands for subscriber identity module, enables a device to be recognised and trusted to join the carrier network and identified by the number associated with it.

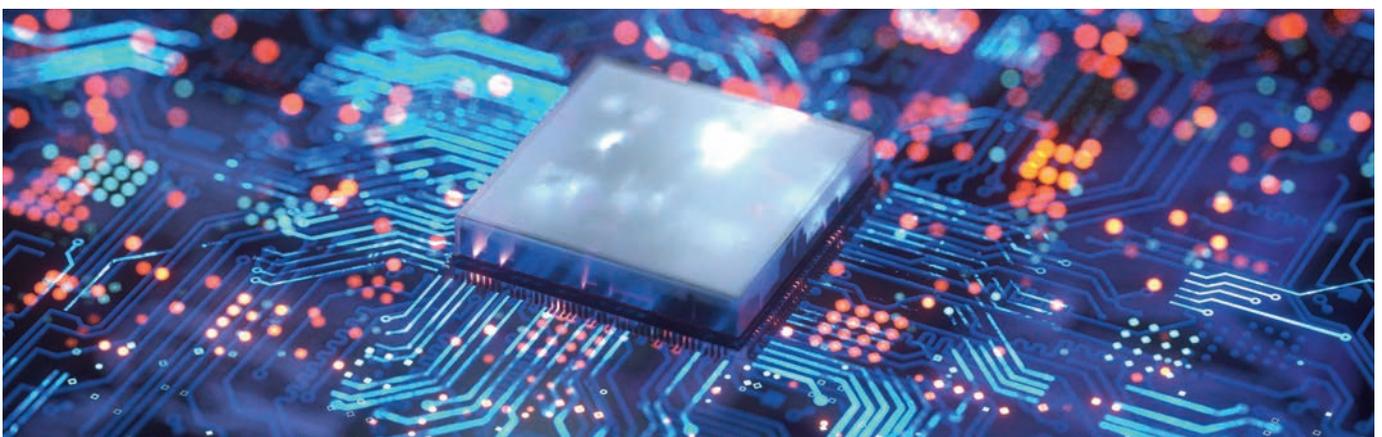
Embedded SIM technology offers an elegant, robust, and almost infinitely scalable solution to the legacy SIM challenges in IoT applications. An eSIM is still a physical SIM, but authorised users can access and update profiles and other data on the eSIM via an over-the-air, remote SIM provisioning solution (RSP).

iSIM's major innovation is that it moves SIM functionality into a device's permanent hardware array. Located on a secure enclave with its own CPU and hardware resources on a system-on-chip (SoC), it affords a root of trust for trusted services through the mobile network and data cloud.

Further reading: [See in detail the difference between SIM, eSIM and iSIM on the GSMA iSIM Resource Hub](#)



Source: Kigen

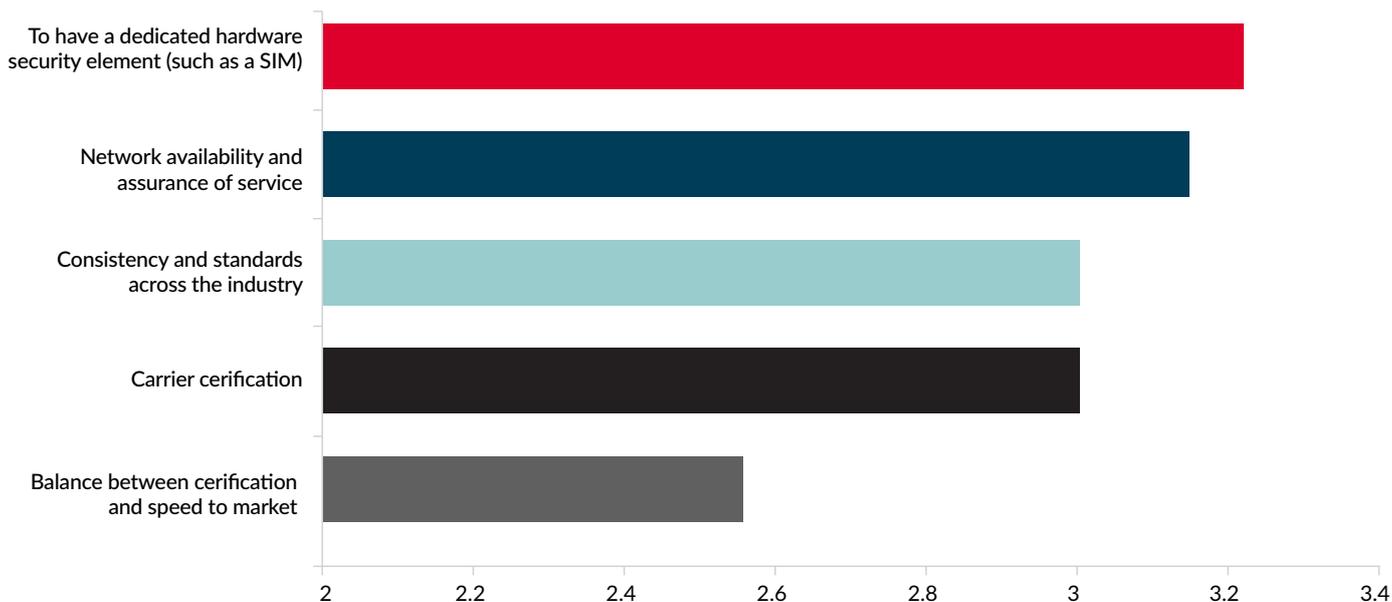


Emerging SIM technologies

Most of the IoT users responding to our survey believe it is important to have a dedicated hardware security element, such as a SIM card, in a connected device (see Figure 5).

Figure 5: Most users regard a dedicated hardware security element as important

How important are the following considerations when developing IoT solutions using emerging SIM technologies?
Average score out of 5 (all user respondents)



For many new Cellular IoT applications, the use of traditional SIM cards can make it cumbersome to change the network used by a device deployed in the field (you need to manually go and swap the SIM card). In recent years the industry has developed different technologies to change the profile of an operator over the air (see box). But the breakthrough and wide acceptance across the entire industry was only reached through the GSMA eSIM specifications. The GSMA recognised the need for an integrated SIM and has now also introduced this new technology into the eSIM specifications. In addition, these specifications provide a certification scheme for iSIM implementations to ensure, on the one hand, the same level of security as with a discrete SIM today, but also to build an industry accepted baseline in which the different players within the ecosystem can trust.

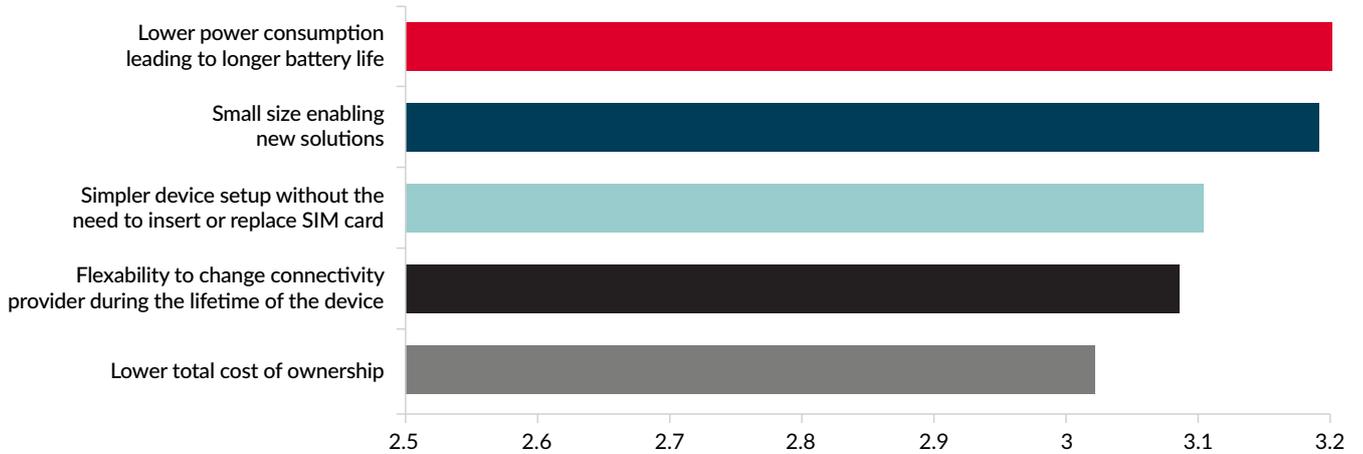
An Integrated SIM brings new benefits

This survey focused in particular on perceptions of iSIM technology. As it is intended to be a space-efficient, straightforward-to-deploy and cost-effective solution, iSIM can be the ideal option for many IoT use cases. That means more devices can be connected, more simply. As iSIM is designed to be simple to deploy, it lowers the barriers to entry and speeds up time-to-market by making it easy for the device maker to harness connectivity.

The user respondents identified the low power consumption and small size of iSIM as the most valuable benefits. (see Figure 6).

Figure 6: Users pinpointed the low power consumption and small size of iSIM as key benefits

Average score out of 5 (241 user respondents)



An iSIM is installed in devices at the point of manufacture, making it possible for the device to connect, authenticate and exchange trusted data right out-of-the-box. This simplicity and ease-of-deployment means iSIM is likely to be used to support a very broad range of IoT use cases, including asset tracking applications, telematics, smart meters, wearables and monitoring consumer appliances. In addition, with a small

form factor and low power consumption, iSIM paves the way for a whole new set of applications/use cases.

The survey found that device makers, systems integrators, design houses and application developers see the small size and lower power consumption of iSIM as particularly beneficial. Businesses adopting IoT technology also regard the simpler device set up offered by iSIM as a key benefit.



Enabling smart water metering



The Arad Group, a world leader in the field of water metering, believes iSIM technology could help it retrieve data on water consumption and detect leaks on behalf of its customers. “Fundamentally we are looking for data integrity,” explains Rotem Gazit, CEO of Arad, in an interview with Mobile World Live. “It’s crucial that the communication devices in the field and the data measurement that is sent to the network can be trusted. iSIM allows all that, with some additional benefits, including saving bill of material costs by eliminating additional hardware components and increasing product reliability by eliminating the external SIM card or chip.”

He notes that iSIM also reduces power consumption, which is critical for Arad, as its meters rely on irreplaceable batteries. Arad expects its meters to have an operational lifetime of between 10 and 15 years. “The iSIM that is tightly integrated in the modern chipset already implements all the required low power modes and consumes less power than a standalone solution,” Rotem Gazit says.

As a business that operates in Europe, North America, South America, China and Israel, Arad also seeks to minimise the number of stock keeping units (SKUs) it needs to produce. Rotem Gazit says iSIM will enable Arad to use a single hardware SKU to support different telecoms carriers in different countries.

For more information, please watch the Mobile World Live [interview with Rotem Gazit](#)



Image is the courtesy of the Arad Group

Standards enable ecosystems

The cellular industry has a long and successful track record of using standards to support interoperability and the development of diverse global markets for equipment. Most of the respondents in the survey

regard standardisation activity as important for wide adoption of new technology (see Table 1). The majority of users of the Cellular IoT said they generally wait until standards work is almost completed and stable before starting implementation of new technologies.

Table 1: Which of the following best describes your approach to implementing a new technology?

	Standardisation is not important at all	If standards work has already started, we will start implementation	We will wait until the standards work is almost completed and stable before starting implementation	We will wait until the standard is mature and public before starting implementation	We will only implement a technology after we see others implementing according to the standard and it has no issues
Device maker (60 respondents)	3%	30%	35%	25%	7%
Systems integrator/ consultancy/ application developer (116)	3%	28%	35%	23%	11%
Business adopting IoT technology (46)	11%	39%	39%	9%	2%

In the case of the iSIM, the standardisation process is being coordinated by the GSMA and is nearing completion. There are already documents that define how to certify an iSIM, and the first version of GSMA's certification for iSIM

is set to become available soon. In parallel, the GSMA is working on iSIM optimisation for low power/low end devices to ensure they comply fully with the standards.

Standardising best practices on integrated SIM security

The GSMA coordinates standardisation efforts to promote best practices and ease the development of secure cellular technology for IoT across the mobile industry. Through the GSMA IoT Security Guidelines, IoT Security Assessments, and M2M iSIM security certification framework SGP.08, the collaborative standardisation efforts address how credentials are managed, as well as bringing scale to the trusted manufacturing of IoT goods and services.

Key benefits of this standardisation effort enable IoT device makers to use the same platforms for iSIM remote provisioning and personalisation as they would for eSIM or SIM, ensuring the same robust security functionality is available across any SIM technology. Further, the GSMA's IoT SAFE mechanism offers a common approach to secure connections between iSIM-enabled IoT applications and remote services to enable scalable and repeatable models around chip-to-cloud security.

The GSMA has published the Security Evaluation of Integrated eUICC documents, which outline the process for the security evaluation of standards-compliant iSIM in the M2M RSP ecosystem.

Further resources: [Learn more about GSMA standards on iSIM](#)

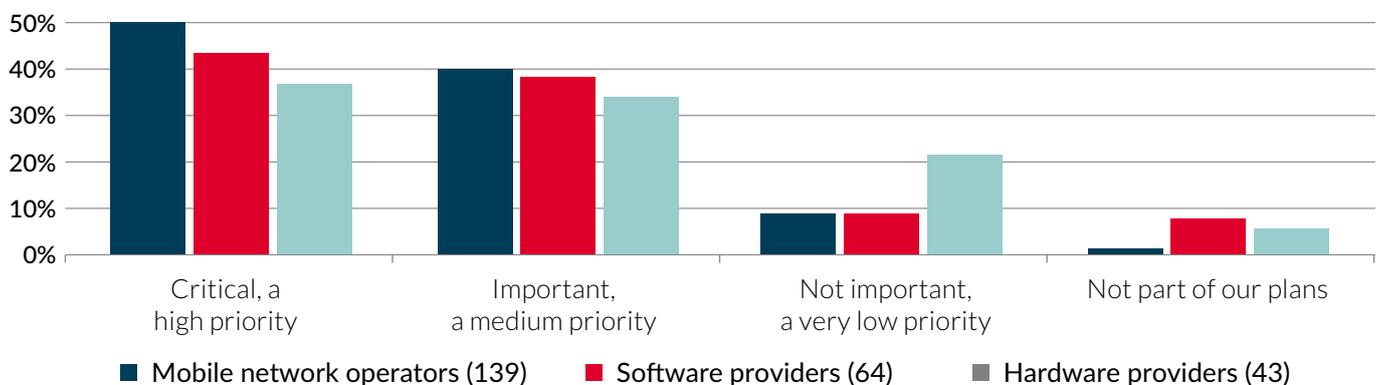
Ecosystem support for new SIM technologies

The vast majority of mobile operators, silicon vendors, module makers and other players along the supply chain regard the new wave of SIM technologies as critical or important (see Figure 7). Support is particularly strong among large companies with more than 5,000 staff – 58% of respondents in this category described new SIM

technologies as critical. Large organisations deploying hundreds of thousands of IoT devices at a time will really see the benefits from the lower cost of these new technologies. Although the cost advantage of iSIM, for example, on a per unit basis may be small, it can still result in major savings for an enterprise IoT deployment.

Figure 7: Most ecosystem respondents regard new SIM technologies as a key enabler of the Cellular IoT

How important are new SIM technologies to adoption of Cellular IoT? Ecosystem respondents (246)

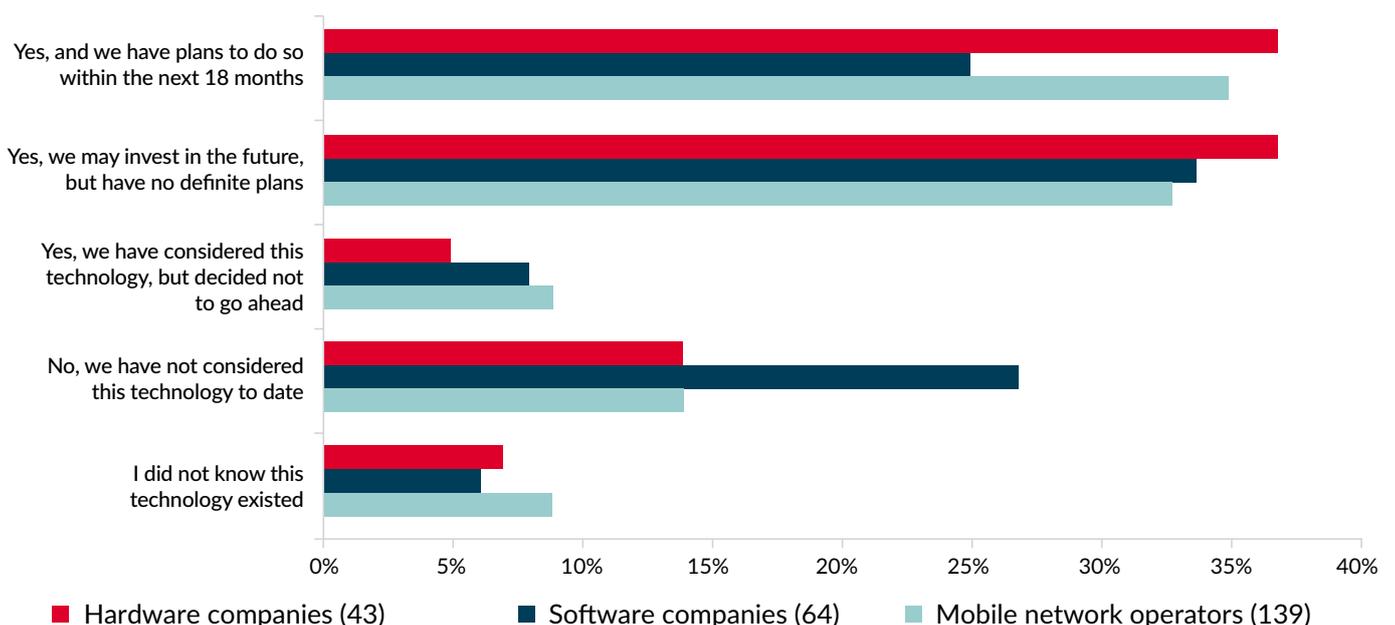


The survey also revealed considerable enthusiasm for iSIM in the supply chain ecosystem. Approximately one third of the respondents said they plan to incorporate

iSIM technology into their IoT offering within the next 18 months and a further third indicated they may invest in iSIM in future (see Figure 8).

Figure 8: There is strong support for iSIM technology within the cellular ecosystem

Have you considered incorporating integrated SIM (iSIM) technology into your IoT offering?



Security is paramount

The main driver for the mobile ecosystem’s continued investment in SIM technologies is, of course, security. The survey confirmed that the ecosystem generally regards a dedicated hardware security element as essential (see Table 2).

Table 2: How important are the following standardisation and security considerations when building new connected solutions? (where 1 is most important).

	Mobile network operators (average ranking)	Software providers (average ranking)	Hardware providers (average ranking)
To have a dedicated hardware security element (such as a SIM), as opposed to just software based security	2.7	2.5	2.6
Certification to be the same level as a traditional SIM	2.8	3.1	2.8
Consistency and standards across the industry	3.0	3.1	3.1
Balance between certification and speed to market	3.2	3.2	3.1
Network availability and assurance of service	3.3	3.1	3.5

Leveraging a hardware secure element, or ‘root of trust’, to establish end-to-end, chip-to-cloud security for IoT products and services is a key recommendation of the GSMA IoT Security Guidelines. This requires both the provisioning and use of security credentials that are inside a secure enclave within the device.

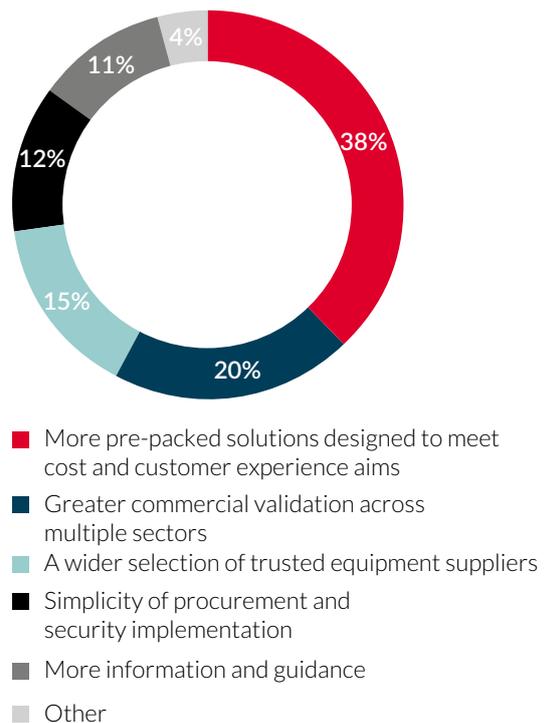
The isolated secure hardware that is used for the SIM functionality is well suited to provide additional hardware ‘root of trust’ in an IoT device: it has advanced security and cryptographic features and is a fully standardised secure element, enabling interoperability across different vendors and consistent use by IoT device makers.

Call for low cost and convenient solutions

With widespread adoption of IoT by smaller organisations, there is growing demand for solutions that can be deployed quickly and easily, without the need for significant systems integration. This trend was reflected in the survey, which asked all the respondents what would drive greater adoption of low power cellular connectivity, such as NB-IoT and LTE-M. Almost 40% of the respondents selected: “More pre-packaged solutions designed to meet cost and customer experience aims” – see Figure 9. Clearly, the industry needs to be sure to meet this demand.

The survey also found significant numbers of stakeholders would like to see greater commercial validation, a broader supplier base and simpler procurement (see Figure 9).

Figure 9: Stakeholders are looking for more pre-packaged solutions and greater commercial validation



Conclusions

Key Findings

- 79% of businesses adopting IoT technology and 77% of device makers are planning to leverage Cellular IoT within the next 18 months, signalling a significant acceleration for massive IoT.
- 64% of the supplier ecosystem respondents are considering adopting iSIM technology in their IoT offering in the future, with rising demand for low cost and pre-packaged solutions as enablers for speed to market.
- The top three benefits of iSIM (as identified by the survey) reveal that the technology is ideally placed to support a wide range of battery-efficient applications/devices, increasingly constrained form factors (previously not possible due to their smaller size) and simpler device set up.

The research confirmed growing demand for both Cellular IoT and new SIM technologies, which together, make it simpler and more cost-effective for businesses to harness cellular connectivity. It found particularly strong adoption of low power wide area Cellular IoT technologies among device makers, signalling that a new era of connected solutions is imminent that could lead to a proliferation of large-scale deployments of innovative devices not possible before. These devices are likely to be integrated with secure and trusted Cellular IoT services, supported by low power wide area networks, over the next 18 months.

While most respondents believe the security associated with a conventional SIM card is important, they also want the flexibility to change operators during a connected device's lifespan. Many market players perceive that iSIM technology could deliver that flexibility, while also delivering reduced power consumption for solutions where battery life is critical. It can also be integrated into a device at the point of manufacture and deliver out-of-the-box connectivity. The research found that users particularly value iSIM's low power consumption and small size, but also appreciate its simplicity and lower cost of ownership.

For suppliers, the survey delivered a clear message around the need to provide cost effective and convenient solutions that can be deployed quickly and easily, without the need for significant systems integration. While the research also highlighted the strong support for standards, it suggests that many users are happy to begin deployments before standards are fully completed. In any case, those users that are waiting for the standards to be completed, shouldn't have long to wait.

Appendix

Glossary

eSIM (embedded SIM)

eSIM is the functionality that allows a change of an operator remotely over the air (remote provisioning). The term has now been broadly associated with a SIM chip, which is a physical SIM that in most cases is soldered 'thus embedded' into the device, but may also be plugged in.

eUICC (embedded Universal Integrated Circuit Card)

Discrete hardware component soldered alongside the SoC that runs SIM software capable of supporting remote provisioning. The term is used interchangeably with eSIM.

RSP (Remote SIM Provisioning)

Secure and remote (over the air) management of network operator profiles on an eSIM or iSIM.

SoC (System on Chip)

A microchip with all the necessary electronic circuits and parts for a given system.

iSIM (integrated SIM) or iUICC (integrated Universal Integrated Circuit Card)

eUICC software which runs in a dedicated secure enclave, alongside the modem, on a purpose-built SoC.

SIM (Subscriber Identity Module)

The secure element that stores security data enabling network access. Colloquially, SIM is often used to refer to the removable physical SIM card containing a UICC with a single profile.



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At Kigen, we are making the future of securing connectivity simple. As simple as can be. Together with our partners and customers, we are unlocking new opportunities as (integrated) eSIM becomes the cornerstone of connected devices security. Our industry-leading SIM OS products enable over 2 billion SIMs. Our remote SIM provisioning and eSIM services drive this momentum further placing us amongst top 5 SIM vendors globally. Our 150 employees globally are guided by the vision of a world where every device can connect securely and reliably.

For more information, go to kigen.com or speak to us on @Kigen_Ltd on Twitter and LinkedIn about #futureofSIM.

SONY

Sony Semiconductor Israel Ltd. (Sony, formerly known as Altair Semiconductor) is a leading provider of cellular IoT chipsets. We offer the smallest and most highly integrated LTE CAT-M and NB-IoT chipsets on the market, featuring ultra-low power consumption, hardware-based security, and a carrier-grade integrated SIM (iSIM), all 5G ready. With a commitment to the highest quality and end-to-end security approach, our all-inclusive cellular IoT chipsets offer the longest battery life and fastest time to market.

Sony's Altair cellular IoT chipsets are commercially deployed on the world's most advanced LTE networks. We partner with leading global vendors to provide low-power and cost-efficient modules for a range of industrial and consumer IoT applications such as trackers, smart meters, wearables, and vehicle telematics.

For more information, visit www.altair-semi.com or on LinkedIn: Altair Semiconductor; @AltairSemi on Twitter



Vodafone is a leading telecommunications company in Europe and Africa. Our purpose is to "connect for a better future" enabling an inclusive and sustainable digital society. Our expertise and scale gives us a unique opportunity to drive positive change for society. Our networks keep family, friends, businesses and governments connected and – as COVID-19 has clearly demonstrated – we play a vital role in keeping economies running and the functioning of critical sectors like education and healthcare.

Vodafone is the largest mobile and fixed network operator in Europe and a leading global IoT connectivity provider. Our M-Pesa technology platform in Africa enables over 48m people to benefit from access to mobile payments and financial services. We operate mobile and fixed networks in 21 countries and partner with mobile networks in 49 more. As of 31 March 2021, we had over 300m mobile customers, more than 28m fixed broadband customers, over 22m TV customers and we connected more than 123m IoT devices.

We support diversity and inclusion through our maternity and parental leave policies, empowering women through connectivity and improving access to education and digital skills for women, girls, and society at large. We are respectful of all individuals, irrespective of race, ethnicity, disability, age, sexual orientation, gender identity, belief, culture or religion.

Vodafone is also taking significant steps to reduce our impact on our planet by reducing our greenhouse gas emissions by 50% by 2025 and becoming net zero by 2040, purchasing 100% of our electricity from renewable sources by 2025 and by July 2021 in Europe, and reusing, reselling or recycling 100% of our redundant network equipment.

For more information, please visit www.vodafone.com, follow us on Twitter at @VodafoneGroup or connect with us on LinkedIn at www.linkedin.com/company/vodafone.