

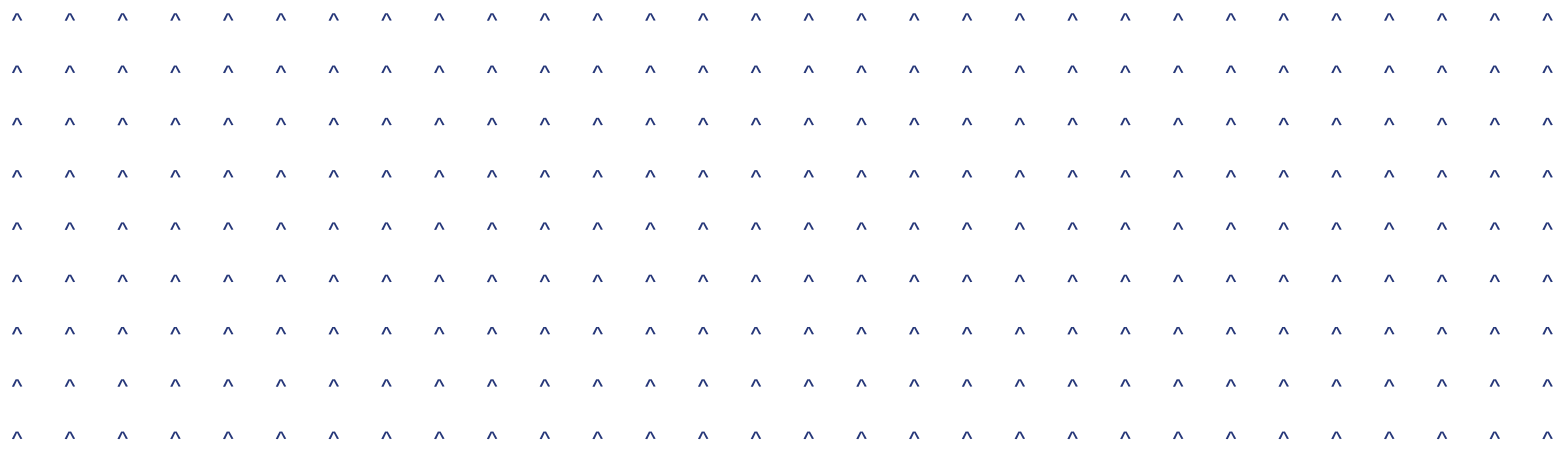


eSIM Solutions

Accelerating digital transformation for Mobile Network Operators

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Overview:

A new digital dynamic in the consumer device connectivity market

For Mobile Network Operators (MNOs), the eSIM represents much more than a technical evolution in device connectivity. Supporting remote subscription activation, anytime and anywhere, it creates a platform for a fully digital, frictionless customer experience. Further enabled by the latest online ID verification solutions, as well as 5G networks, the emerging eSIM ecosystem also aligns perfectly with MNOs' wider ambitions for digital transformation.

In the years ahead, across both the consumer and industrial domains, billions more products will employ the eSIM. As a result, the relationship between MNOs and their customers will be redefined. In this white paper, we focus on the compelling opportunities being created in the consumer market to increase revenues and streamline business operations.

The industrial market will be the subject of a separate publication. However, across both sectors, the key to success for MNOs lies in exploiting the wide range of eSIM subscription activation methods defined by GSMA specifications, and the rich array of innovative consumer use cases they enable. Crucially, these provide MNOs with the freedom to develop policies that are in line with both their go-to-market business strategies and customer preferences.

As critical mass is reached in the eSIM-enabled consumer device market, we outline the options available to MNOs, and the key role that associated technologies such as secure online customer onboarding and the 5G eSIM are set to play.



Business context:

A global surge in eSIM devices

The eSIM (embedded SIM) is experiencing steady growth, driven in part by an increasing number of device manufacturers integrating the technology into their smartphones and Internet of Things (IoT) devices.

Thales projects that by 2028, there will be nearly 4 billion consumer eSIM devices and 2 billion eSIM IoT devices deployed globally. As of June 2023, nearly 400 operators in about 116 countries supported eSIM-enabled devices according to GSMA Intelligence.

Additionally, according to Thales Intelligence there are more than 330 consumer eSIM devices in the market as of September 2024.

Notably, eSIM-only smartphones, such as Apple's iPhone 16 and the two previous versions in the U.S. market, are gaining popularity. Similarly the new iPad are now eSIM-only worldwide, since May 2024.

Recent data from the Trusted Connectivity Alliance (TCA) in 2023 indicates a 109% increase in eSIM consumer profile downloads. These numbers highlight the significant potential of eSIM across various sectors.

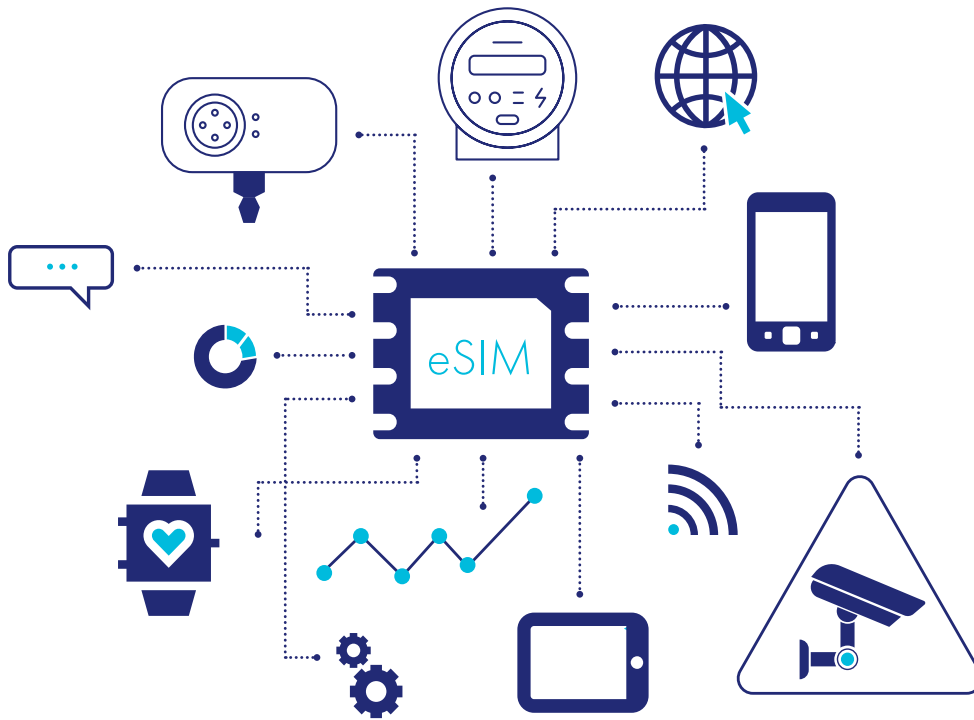
In the smartphone market, GSMA Intelligence estimates that by 2028, half of all smartphone connections globally will utilize eSIM technology.

Also, in the IoT sector, the introduction of GSMA SGP.32 specifications greatly simplifies the cellular connectivity management for IoT service provider. GSMA Intelligence forecasts a global increase in licensed cellular IoT connections, with eSIM gradually capturing a larger share of the market.

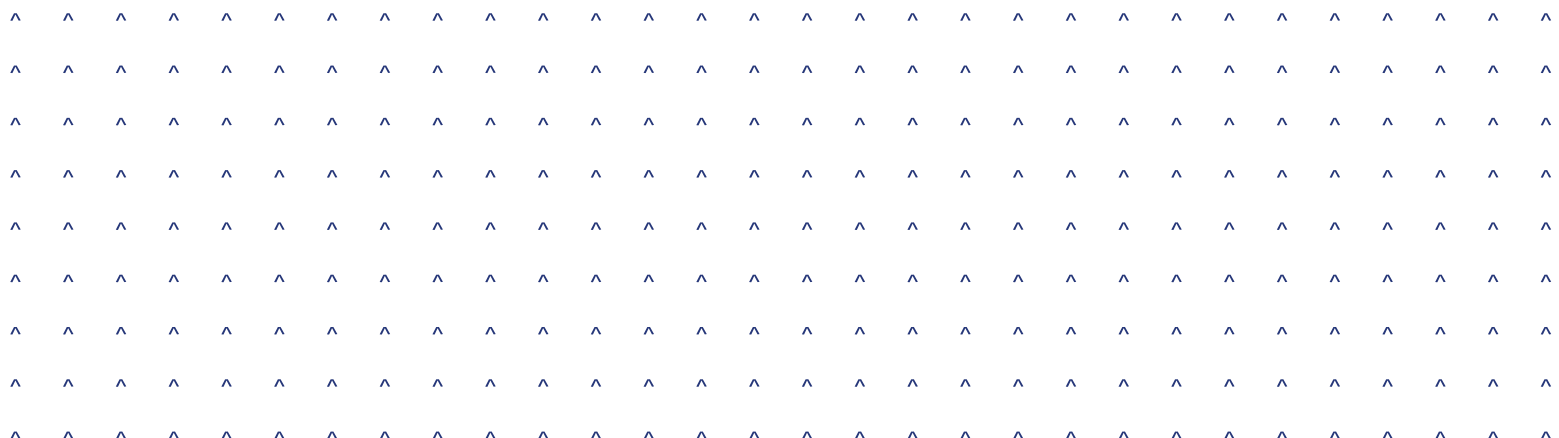
According to GSMA Intelligence, operators anticipate eSIM to represent nearly 40% of the total number of cellular IoT connections by 2030.



The eSIM ecosystem is now fully in place



As eSIM-enabled consumer devices reach critical mass, a new ecosystem is emerging. Alongside the inherent benefits of the eSIM, this is being built on the firm foundations of a mature and well proven set of GSMA specifications. For MNOs, the rapid development of this market is highly significant, as it provides an opportunity to fundamentally transform their business operations. Leveraging a range of eSIM solutions, MNOs are now able to digitize the consumer journey for a wide variety of consumer devices. This in turn will serve to boost connectivity revenues.



MNOs and subscribers are now fully embracing eSIM technology

In the consumer market, eSIM adoption is being fueled by smartphones, with OEMs offering an expanding range of eSIM-compatible handsets. Additionally, eSIMs are becoming more prevalent in tablets, PCs, smartwatches, and other wearables. GSMA specifications for eSIM technology are now well-established and proven in the field, providing a strong foundation for the evolving ecosystem.

Furthermore, in a survey of 100 MNOs, almost 80% indicated that eSIM capability should be a priority feature on smartphones. The increasing adoption of eSIM technology presents MNOs with opportunities to accelerate digital transformation, boost revenue, and attract new customers by enabling remote enrollment of eSIM-capable devices at any time and location.

Consumer awareness and adoption of eSIM technology have also increased, with a recent GSMA Intelligence consumer survey in major developed mobile markets showing an increase in awareness from 20% in 2020 to over 40% in December 2023. This growing familiarity with eSIMs indicates the need for continued consumer education and the removal of adoption barriers to further enhance awareness and uptake of eSIM technology.



Thales enables Digital Transformation

Thales eSIM solutions comprise the two fundamental pillars:

• The hardware

The eSIM (also known as embedded SIM or eUICC) is a small, secure chip built into devices, and it follows global standards set by the GSMA. This technology enables Remote SIM Provisioning (RSP), which allows you to change the mobile carriers subscription remotely (for the same MNOs or new MNOs) and seamlessly without needing to replace the physical SIM card.

Thales eSIMs use state-of-the-art cryptography and a secure operating system to ensure a reliable experience. Our MultiSIM consumer and IoT products include packages for Connected Secure Elements, allowing subscription profiles to be also downloaded and updated remotely via RSP.

Our high-performance eSIM operating system (OS) is optimized for size and efficiency, featuring innovative functionalities such as Multiple Enabled Profiles. This means that we can have several active profiles on a single eSIM, bringing greater convenience.

Additionally, Thales offers iSIM (integrated SIM), a smaller form factor that integrates SIM functionality directly into the device's processor. This iSIM provides all the benefits and functionalities of eSIM, while further enhancing power efficiency.

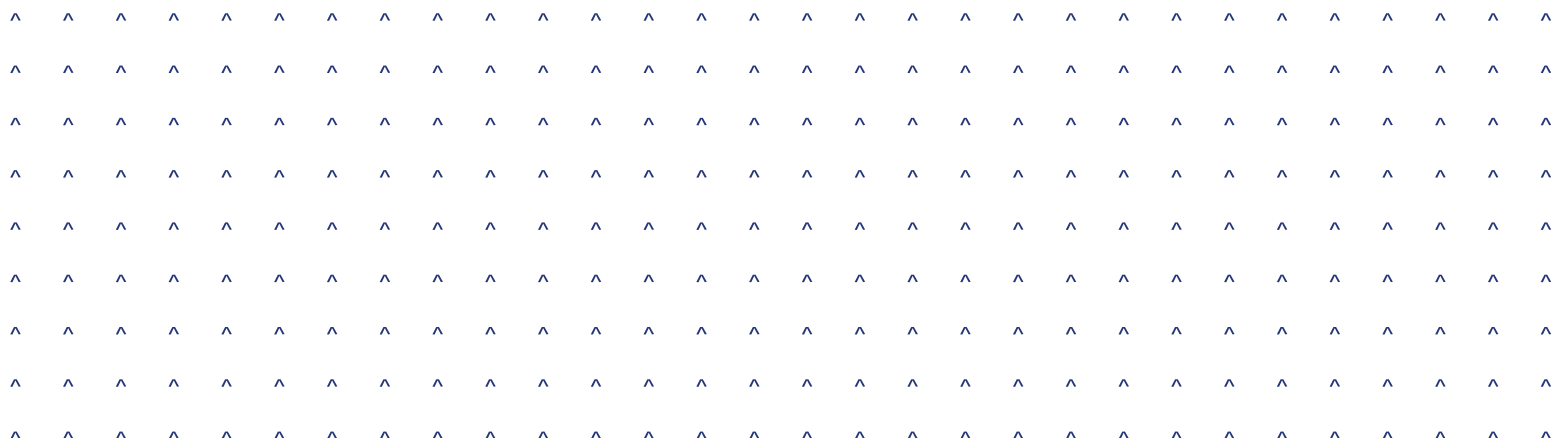
• The eSIM Management platform

Also called the Remote SIM Provisioning (RSP) platform or SM-DP+ (Subscription Manager Data Preparation +) enables the activation of cellular subscription securely onto an eSIM or an iSIM.

In practice, the eSIM and RSP are two sides of the same coin: both need to follow the GSMA specifications which are now mature but also evolve over time. Reflecting this, Thales solutions are fully compliant with the latest specifications, and ensuring that our platform enables the secure download and management of telecom operator subscriptions (profile packages) in all devices equipped with an eSIM.

The RSP process

RSP involves processing of input data, data preparation and personalization: all the steps required for developing a SIM Profile must be carried out. The infographic below highlights the key components and actors within the RSP architecture.

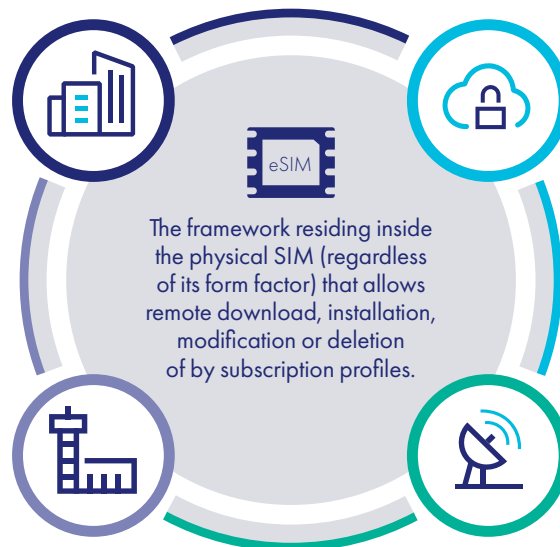


OEM (Original Equipment Manufacturer)

The OEM is responsible for ensuring that a device is capable of interfacing between the consumer and the eUICC. The DM has no hardware changes to implement in relation to RSP. In consumer usage the DM has to implement a software agent called LPA (Local Profile Agent) that provides, notably a user interface.

SM-DP+ (Subscription Management Data Preparation)

The SM-DP+ is responsible for the secure creation, generation, download and management of eSIM profiles for Consumer and IoT.



eSIM Manufacturer

The traditional SIM Manufacturer ensures that each eSIM conforms to security standards and is configured according to the needs of each MNO.

MVNO

The Mobile Network Operator provides the SIM Profile characteristic to the eSIM Manufacturer, and will be the owner of the SM-DP+.

In the rapidly expanding eSIM market, Mobile Network Operators (MNOs) must efficiently manage eSIM profiles to meet escalating demand and ensure seamless services for end-users—an undeniably mission-critical task. It is imperative for MNOs to establish a robust system for provisioning eSIM profiles, anticipating surges in activation demands, and maintaining adequate inventory to provide uninterrupted service continuity.

Thales offers a comprehensive suite of solutions that address the operational challenges faced by MNOs. These solutions extend from front-office processes, where multiple activation methods are offered to enhance the end-user experience, to back-office operations, which focus on optimizing eSIM inventory management and increasing eSIM activation success rates.

With the eSIM market witnessing a rapid increase in the variety of eSIM devices, ensuring the compatibility of eSIM profiles with the respective devices is paramount for streamlined operations. Thales' suite of solutions encompasses optimizing eSIM inventory management, improving the success rate of eSIM profile activations through real-time profile adaptation experience.

Essentially, Thales' solutions address the mission-critical demands of the eSIM market by delivering operational excellence in both front-office and back-office operations, aligning with premiumization framework of our offers.

Thales solutions to address the digital customer experience

In today's mobile communications market, the consumer is firmly in charge. Operators need to provide an outstanding end user journey, tailored to individual requirements. Thales offers MNOs a full range of methods for downloading and activating their mobile subscriptions to any eSIM capable device. Common to all is a seamless and secure digital connectivity experience - one that gives the end user a comprehensive choice of mobile subscriptions, across all channels, in-store and online.

The preferred method of downloading and activating mobile subscriptions will be driven by the MNO's strategy for maximizing adoption in the eSIM market and thereby optimizing the reach and activation of both branded and non-branded eSIM-capable consumer devices. In addition to this, the ability to provide portability of mobile subscriptions between non-eSIM and eSIM-capable devices or between eSIM devices is critical.

Again, Thales addresses this challenge seamlessly, Thales On Demand Subscription Manager, our eSIM Management Platform (SM-DP+). When focusing on the eSIM market, it is also important that MNOs do not overlook the critical first phase that is customer onboarding. Here too, Thales offers unrivalled capabilities that facilitate effortless eSIM activation via a fully secure and highly intuitive digital end user experience as explained below.



Freedom of choice: Introducing the three methods of eSIM subscription activation

Every stage of the eSIM lifecycle is defined within the GSMA specifications. This encompasses eSIM specifications, profile downloads and subscription activation. It also includes the interaction between the user and their device to activate the subscription.

Thales solutions complies with the GSMA specifications which recognizes three main methods of activation, all of which enable instant activation of mobile subscriptions, anytime and anywhere.

Thales supports all these solutions, providing freedom of choice.

1. QR Code-based eSIM activation

When buying an eSIM-based mobile subscription, customers get a Digital QR code, which, when scanned with their smartphone, downloads the eSIM profile. This profile has important details like the SM-DP+ address. The device needs a primary connection, like Wi-Fi, to complete the eSIM subscription.



2. Carrier app eSIM activation

This feature, integrated into MNOs' mobile apps, facilitates eSIM activation and device changes seamlessly. It relies on a client/server approach, where the eSIM SDK is integrated into the MNO's app and a cloud orchestration layer manages eSIM profile provisioning via API. This approach ensures a fully digital and automated process for end-users, enhancing their overall experience. Thales offers solutions for seamless eSIM-enabled connectivity, covering subscription activation, device change, and subscription upgrades.



3. eSIM activation in one click with SM-DS (Subscription Manager Discovery Server)

The SM-DS is a standardized method for downloading subscriptions into eSIM-equipped consumer and IoT devices. It acts as a central hub for devices to find available eSIM profiles. When a Mobile Network Operator has a profile for a device, they inform the SM-DS, which then directs the device to download the eSIM profile from the MNO's SM-DP+. The GSMA has deployed the first SM-DS, called the eSIM Discovery Service, also major players like Apple, Samsung, and Google have their own Root SM-DS servers. Thales provides robust solutions to ensure seamless routing to the appropriate SM-DS. For end-users, once they purchase a subscription, they receive a message to download the profile, which can be easily done through their device's setup wizard or settings menu.



Matching eSIM subscription activation to MNO business strategies

These three activation methods offer MNOs a high degree of flexibility in terms of how they onboard customers. They also provide a platform for innovative use cases that deliver real added value for their subscribers.

With a choice of frictionless onboarding techniques such as QR codes or one-click solutions, MNOs can tailor their approach in line with their customers' preferences - and their go-to-market business strategies. Crucially, by supporting full and seamless digital journeys that enable instant activation of a mobile subscription, consumer adoption of the eSIM is optimized, along with associated connectivity revenues.

Enabling new consumer offers

The potential for innovative use cases further magnifies the benefits of eSIM solutions. For instance, eSIM subscription activation via a generic voucher with a single QR code facilitates the seamless onboarding of multiple connected devices, each with its independent cellular connection. This supports appealing consumer offers like family bundles, allowing multiple eSIM-enabled devices within the same household to be managed via a single, simple contract.

Additionally, this process can be extended to personalized subscriptions for an organization's employees, activated and managed simply by scanning a QR code at any time and place. Another opportunity presents itself in the form of eSIM-based prepaid inbound roaming offers, which propose consumer deals based on local tariffs, establishing the MNO as a reliable choice for tourists' mobile data needs.

Empowering Operators with eSIM Solutions for Massification and Supply Chain Digitalization

In response to the increasing volume of connected devices and high traffic peaks, creating a resilient, scalable, and secure infrastructure is essential for eSIM market preparedness.

Thales empowers Mobile Network Operators (MNOs) with a comprehensive suite of back-office solutions that drive the evolution of digital customer experiences.

These solutions enable MNOs to streamline operations, elevate end-user interactions, and deliver tailored connectivity offerings to a diverse customer base.

Thriving for operational excellence

Thales provides reliable eSIM solutions with high service level agreements (SLAs) to ensure continuity of operations and efficiencies. Our solutions allow operators to leverage Thales' expertise and utilize a public cloud framework for remote SIM provisioning.

This framework enables operators to offer subscribers the speed, convenience, and efficiency of activating subscriptions remotely, even during peak demand periods, while maintaining a secure environment under their control.

By offering comprehensive eSIM management services, Thales empowers MNOs to adapt to the dynamic eSIM market. Our services help MNOs overcome challenges and seize opportunities in this evolving landscape.



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Digitalizing the eSIM supply chain



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From flexible eSIM profile handling to real-time monitoring and predictive insights, we enable MNOs to adjust their strategies based on new forecasts, enabling proactive planning and efficient resource reallocation, resulting in valuable time savings and optimized resource utilization.

Our real-time services maximize eSIM profile activation success by matching profiles to devices in real time, enhancing operational efficiency and improving the user experience. The real-time profile update capability allows immediate adjustments to mobile network operator or subscription details, offering unmatched convenience and flexibility. Additionally, our brand personalization solution enables MNOs to tailor eSIM experiences for sub-brands and MVNOs, delivering personalized and distinct experiences for their customers.

Integrated and Harmonized Solutions

Furthermore, Thales is prepared for massive IoT deployments, leveraging our On Demand Subscription Manager capabilities in adherence to SGP.32 GSMA eSIM IoT standards. This ensures seamless and secure integration of eSIM technology into a wide array of IoT devices, facilitating efficient and scalable connectivity solutions for MNOs.

At Thales, we are dedicated to collaborating with MNOs to shape the future with innovative eSIM solutions within a standardized framework. Our commitment ensures that our customers are equipped to meet the challenges of a dynamic and interconnected world



Thales On-Demand Subscription Manager

Case Study

Major Network Operator improves user experience eSIM with Thales Smart Profile Matcher

Greater volume, greater variety of devices

Rapid growth in the number of eSIM devices is creating compelling new commercial opportunities for MNOs (Mobile Network Operators) around the world. At the same time, eSIM proliferation brings its operational challenges. For instance, different eSIM devices can have different eSIM versions supporting different features that all require different subscription profiles. When an end user activates a new subscription, the MNO must therefore ensure it downloads the correct profile for the device capabilities in question.

This is an easy thing to do in the case of subsidized handsets as MNOs are aware of the device characteristics and can allocate the right eSIM profile. On the other hand, for Bring Your Own Device cases this is more challenging, and it can result in a failed eSIM download.

Thales is working with a major MNO that is acutely aware of these challenges. Across both a new standalone 5G network and existing 4G networks, this MNO already supports a diverse range of eSIM subscription profiles.

The MNO's overriding priority is to optimise the speed and success rate of its subscription profile downloads. Any failures or delays here will seriously undermine the end user experience, and incur significant costs associated with error management and rectification.



Thales' Smart Profile Matcher: the perfect match

In response to the challenges of a fast-evolving eSIM market, the MNO adopted Thales' Smart Profile Matcher (SPM). Deployed in conjunction with the MNO's existing Thales SM-DP+ platform, SPM adapts eSIM subscription profiles in real-time to ensure a perfect match with the target device.

When an end user activates a new subscription for their eSIM device, Thales Smart Profile Matcher checks the device capabilities and based on a set of defined rules by the MNO, will either allocate & download the right 5G profile if the device supports it or will automatically modify an existing profile to match the device capabilities. The subscriber credentials associated with the profile remain unchanged. Moreover, this happens in seconds and is totally transparent for the end-user.

Enabling the best customer experience

With the support of SPM, the MNO is now ideally positioned to take full advantage of surging demand for eSIM-enabled devices. SPM ensures that the MNO can address all eSIM devices in the market.

**Reducing 10%
of failed downloads
for 100% success**

Smart Profile Matcher has increased the success rate of eSIM profile activations by reducing failed downloads by approximately 10% and eliminating the need for costly error management procedures.

Fit for the future

Thales's solution is completely future proof. SPM will enable this pioneering MNO to support all future eSIM-enabled devices as soon as they are launched. Crucially, SPM can be used for every type of IoT eSIM-enabled device, in addition to consumer devices.

Furthermore, SPM offers all the flexibility required to bridge the MNO's journey from 4G to 5G and any other future technologies such as 6G and embrace new standards and specifications as they emerge. As a result, the MNO and its customers can look forward to a future characterised by outstanding end user experiences.

Secure Solutions for a Connected World

At Thales, we envision a world of seamless, intuitive connectivity. Our distinct, systematic approach to eSIM solutions emphasizes cutting-edge innovation, operational excellence, and enduring customer relationships. We are unwavering in our commitment to not only meet but redefine industry standards, delivering integrated solutions that address both consumer and IoT markets. With Thales, experience reliable, future-forward connectivity that keeps you one step ahead.

Unrivalled Operational Excellence & Reliability

*High availability & scalability with over 200M+ eSIMs activated.
Industry leader, consistently ranked #1 by analysts.
Local & global support with 650+ experts in 22 countries.*

over **380** platforms
in **90** countries

Unmatched Customer Relationships

*Trusted partner committed to long-term relationships.
Proactive relationships built on transparency & continuous feedback.
"Thales isn't just a supplier; they listen and respond
to our needs, making them a true partner."*

NPS of 57 

Pioneers of Innovation

Thales holds about 20,500 patents. With over 30 years in telecom and involvement in Trusted Connectivity Alliance and GSMA, Thales leads in eSIM innovation and industry shaping. Driving future advancements in cloud solutions, embedded systems, quantum technology, and 5G/6G.

First
public cloud-based

Harmonized and Integrated Solutions

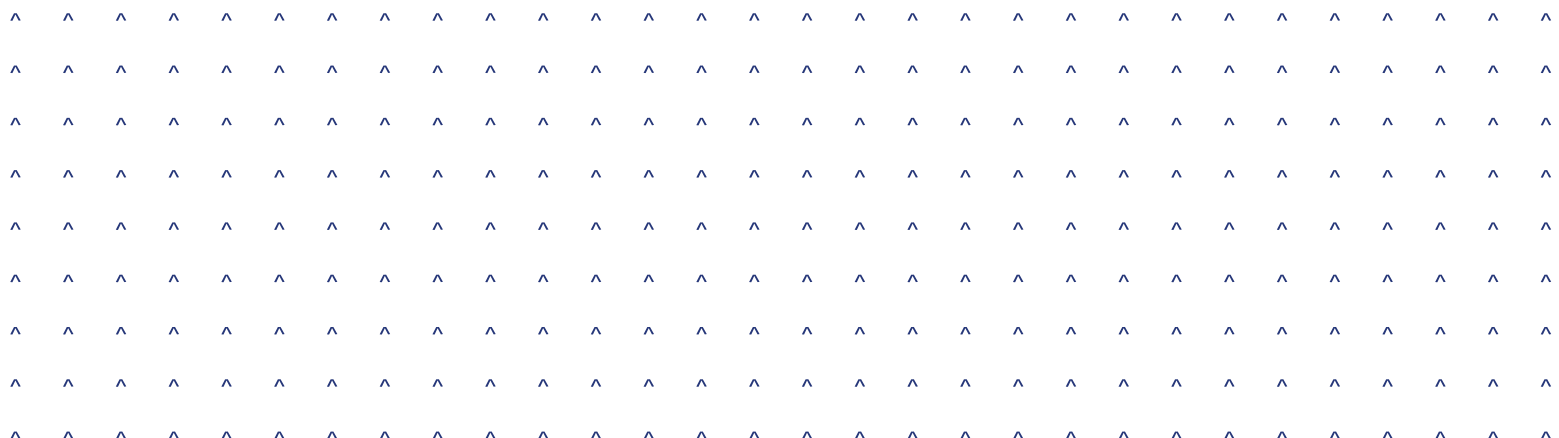
We leverage the eSIM infrastructure for consumer devices while maintaining the capability of remotely and seamlessly managing the connectivity of unattended IoT devices.

over **450** mobile
network operators & more
than **100** OEMs

" Together, let's drive the digital revolution forward."

Useful links

- > [Thales eSIM solutions](#)
- > [Thales Smart Profile Matcher video](#)
- > [Thales Smart Profile Matcher eBook](#)
- > [Thales On Demand Subscription Dashboard video](#)
- > [Thales On Demand Subscription Dashboard eBook](#)
- > [QR code eSIM activation with Thales eSIM Generic Voucher](#)
- > [Discovery service-based eSIM activation with Thales SMDS Connect](#)
- > [eSIM activation for OEMs with Thales Instant Connect](#)



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