A BRIEF GUIDE TO iSIM

COM4

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INTRODUCTION

The future of SIM technology has arrived, and all eyes are on iSIM.

It's no wonder—this innovation brings significant advantages, including important space savings, advanced tamper-resistant security, and unprecedented compatibility with a wider range of radio access types.
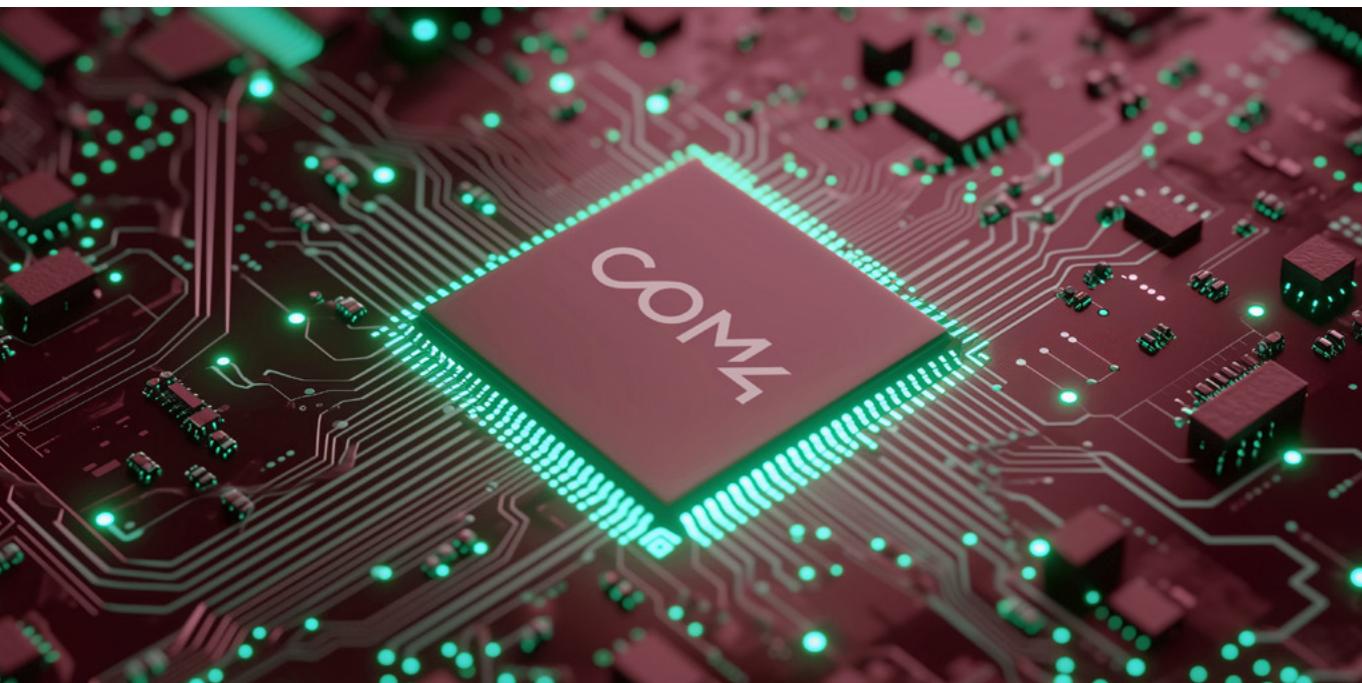
iSIM is also a win for sustainability, eliminating the need for plastic. For devices, it offers the smallest possible physical footprint, making it a perfect fit for next-generation IoT solutions. What's not to love?

By unlocking the full potential of IoT, iSIM paves the way for expansion and innovation, despite the hurdles that come with adopting new technology.

This IoT Guide to iSIM covers everything you need to know: the key benefits for IoT, real-world use cases across various industries, and potential challenges to keep in mind.

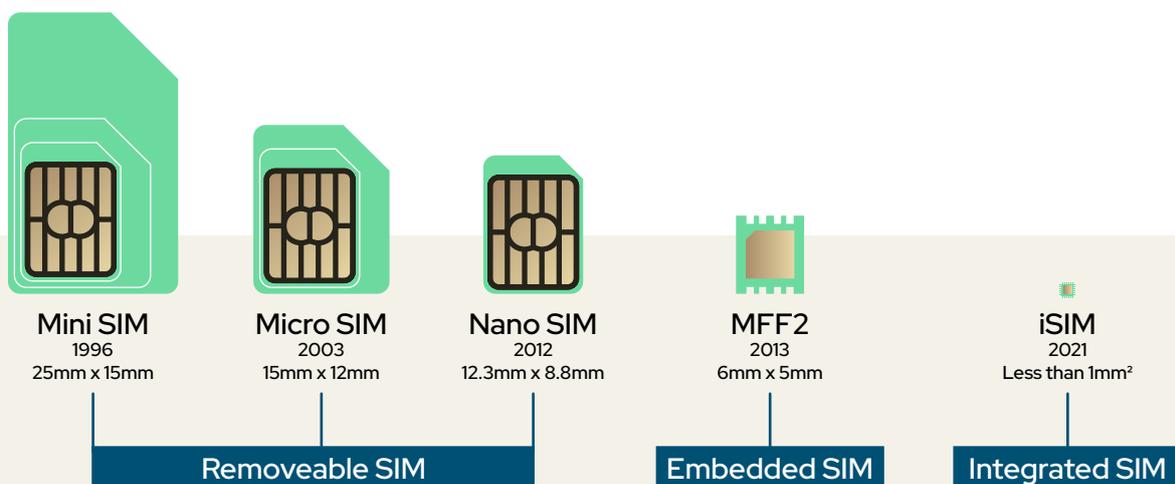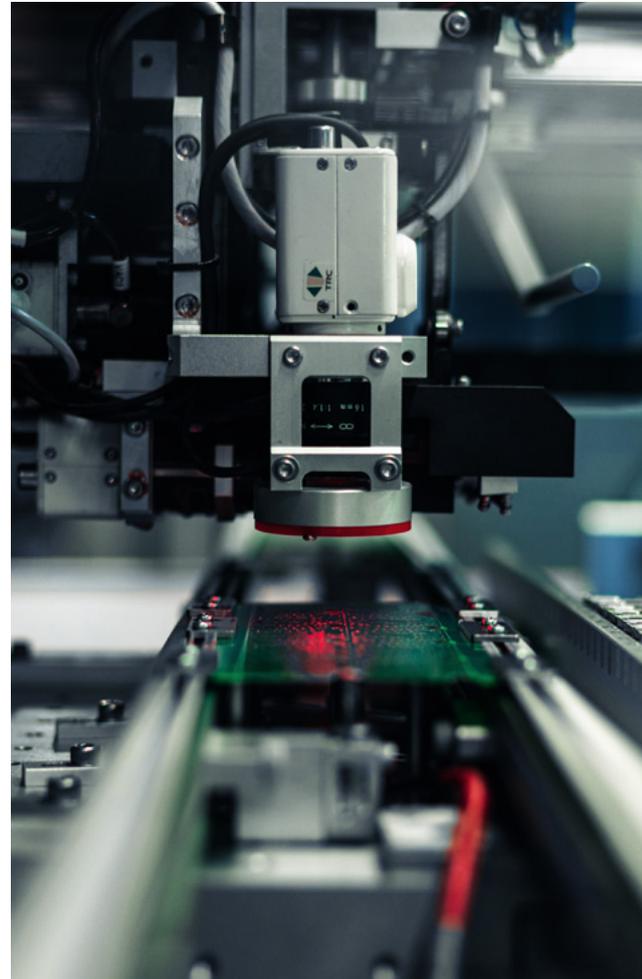## Ready to dive in?
Let's explore!

From Traditional SIMs to Cutting-Edge iSIMs:
The Evolution of SIM Technology

The journey of SIM technology began in the early 1990s with the introduction of the first SIM, which was the size of a credit card. These early SIMs featured minimal memory and required a 5V voltage supply. As technology advanced, the demand for smaller and more efficient devices drove the development of new SIM form factors.

Over time, SIMs evolved from Mini to Micro and eventually to Nano, becoming significantly smaller while offering enhanced performance, security, and functionality. These iterations also reduced power requirements, with modern SIMs operating at just 1.8V.

The 2010s marked a major innovation with the introduction of the embedded SIM (eSIM). Designed to address challenges associated with removable SIM cards, eSIMs eliminated the need for physical sockets, reducing device size and complexity. They also offered better security and simplified management, making them ideal for IoT deployments.

Today, the iSIM represents the next leap forward. By integrating SIM functionality directly into a System-on-Chip (SoC), the iSIM eliminates the need for a separate SIM card or chip. This innovation reduces device costs, saves space, and enhances security—an essential evolution for the future of IoT connectivity.

Mini SIM
1996
25mm x 15mm

Micro SIM
2003
15mm x 12mm

Nano SIM
2012
12.3mm x 8.8mm

MFF2
2013
6mm x 5mm

iSIM
2021
Less than 1mm²

Removeable SIM

Embedded SIM

Integrated SIM

Key Benefits of iSIM Technology for IoT

Compact Design and Versatility

The iSIM technology integrates the SIM directly into the System on Chip (SoC), significantly reducing the device footprint by up to 98% compared to traditional eSIM setups. This ultra-compact design enables smaller, more versatile devices, unlocking innovative opportunities such as:

- **Smart labels:** Used for tracking shipments and goods.

- **Wearables:** Miniaturized devices like smart glasses, medical sensors, and other connected health solutions.

- **VR/XR advancements:** Ultra-compact designs to enhance functionality and user experience.

Superior Power Efficiency

IoT devices often operate in remote or challenging environments where battery life is critical. iSIM technology delivers:

- **Long battery life:** Devices achieve lifespans of 10-15 years, particularly when using low-power networks such as LTE-M and NB-IoT.

- **Integrated performance:** Efficient energy delivery and operation through close integration of components.

- **Optimized energy usage:** Several available iSIM modules support LPWA technologies, which include built-in power-saving modes (PSM) and extended discontinuous reception (eDRX) to minimize consumption. This combination of iSIM and LPWA can be highly beneficial for energy-efficient IoT deployments.

Cost-Efficiency and Simplified Deployment

iSIM reduces production complexity and costs while accelerating deployment:

- **Lower manufacturing costs:** Fewer components simplify PCB design, cutting production and logistics costs by up to 50%.

- **Streamlined supply chains:** Consolidates SIM and modem into a single SoC, reducing risks and delays.

- **Pre-provisioned profiles:** Eliminates the need for physical SIM cards, expediting device rollout.

Enhanced Security

iSIM technology addresses security challenges in IoT with robust solutions:

- **Integrated security elements:** GSMA-standardized and compliant with global security frameworks like TCA and Global Platform standards.
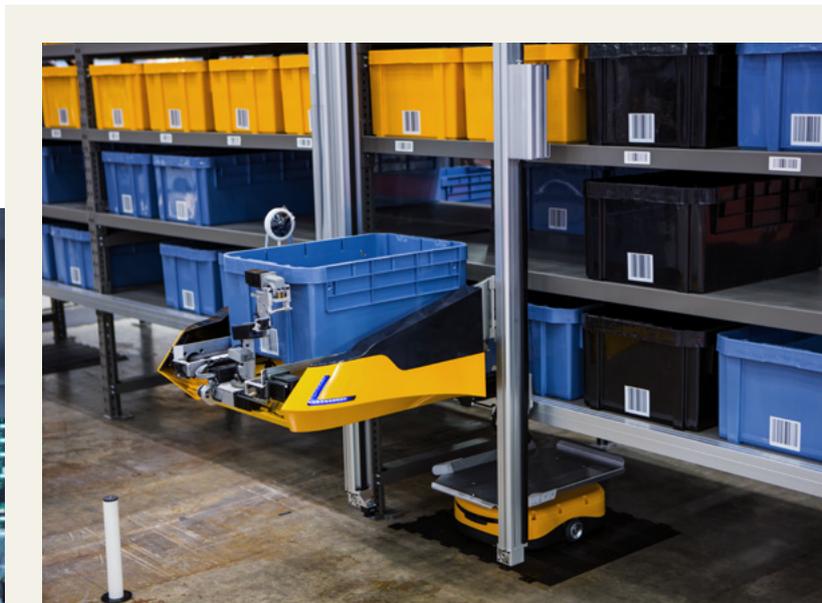
Applications of iSIM Technology

The versatility of iSIM technology supports
a wide range of IoT applications:

Asset Tracking and Monitoring:

- Secure tracking of high-value goods.

- Environmental monitoring for sensitive shipments
  like fresh food or medical supplies.

- Optimized logistics with real-time location data.

Wearables:

- Compact, untethered devices for healthcare monitoring,
  fitness tracking, and VR/XR applications.

Smart Utilities:

- Ruggedized devices for remote metering
  and sensor management.

- Reliable operation in harsh environments
  for extended periods.

Fleet Management:

- Tamper-proof tracking solutions for e-bikes,
  e-scooters, and shared mobility systems.

- Extended battery life for uninterrupted service.

Automotive:

- Advanced telematics, infotainment, and emergency services.

- Future-ready connectivity for autonomous vehicles.

iSIM: Solving Compliance Challenges for Global IoT Deployments

The SIM plays a critical role in cellular IoT by securely identifying and authenticating devices on the network. To ensure seamless global deployment, it must comply with regulatory and carrier requirements. iSIM (Integrated SIM) addresses this challenge by securely storing network credentials within a tamper-proof Secure Element embedded in the device's hardware. This safeguards against both physical and digital threats, ensuring robust security. By adhering to GSMA certification and a standardized framework, iSIM guarantees secure, reliable, and scalable IoT connectivity worldwide.

While other integrated SIM solutions exist, they come with significant drawbacks. For example, SoftSIM stores network credentials in a less secure Trusted Execution Environment (TEE), lacking the proven security and reliability of iSIM. Using uncertified solutions increases security vulnerabilities, compliance risks, and performance unpredictability. Additionally, proprietary solutions often lead to vendor lock-in, limiting flexibility and long-term scalability.

For secure, compliant, and future-proof IoT deployments, businesses should prioritize GSMA-certified solutions like iSIM, ensuring both global interoperability and long-term reliability.
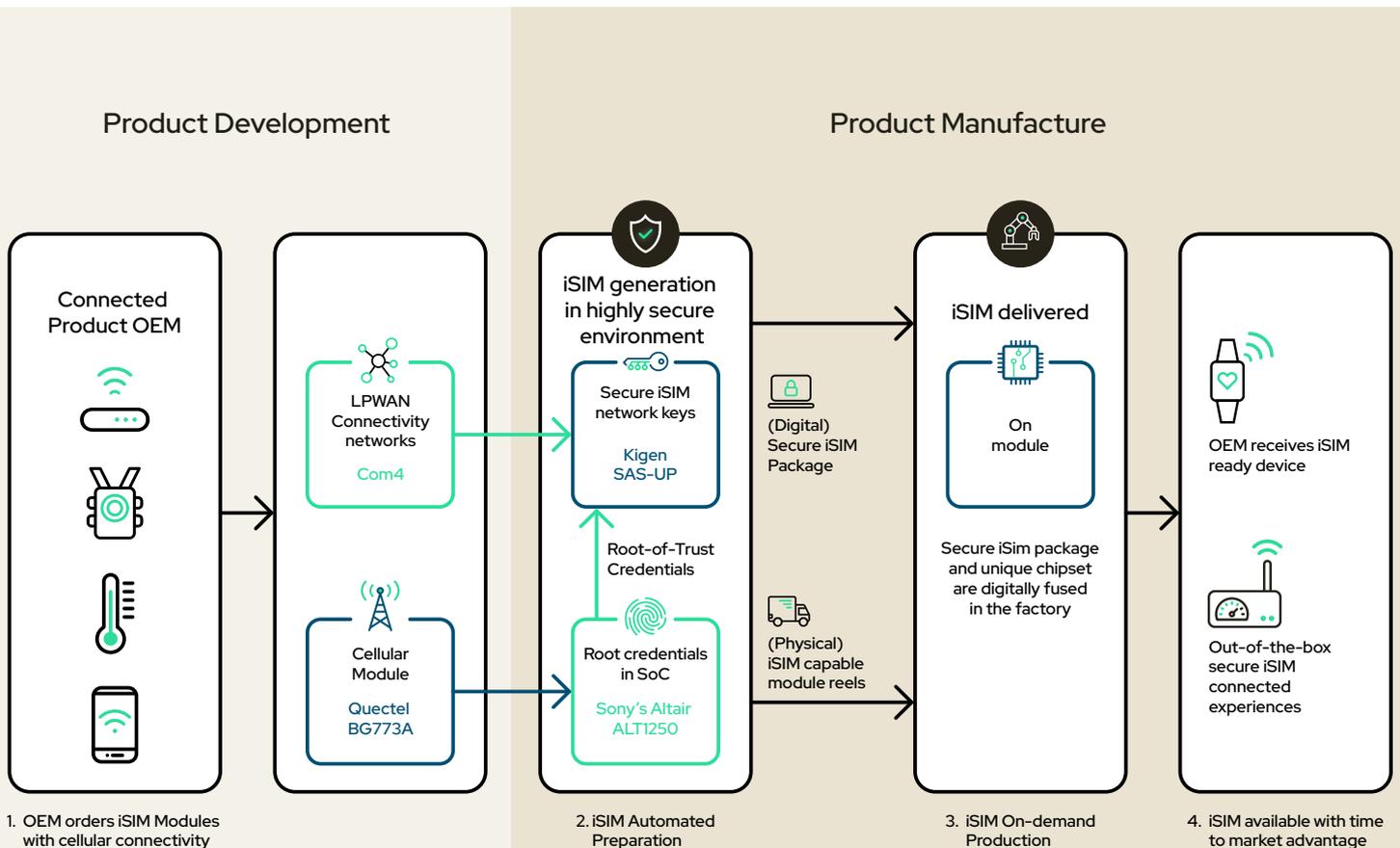
iSIM: Transforming IoT Device Design

The rising adoption of iSIM highlights its role as a transformative technology in IoT. By embedding SIM functionality directly into a chip, iSIM empowers OEMs to create highly optimized, connected devices that leverage global networks while ensuring robust security for both users and data.

IoT applications come with distinct challenges, and iSIM is designed to address them. Key advantages include:

○ **Seamless System-on-Chip (SoC) integration**

○ **Extended battery life for energy-efficient operation**

○ **Enhanced security and reliable connectivity**

By simplifying connectivity while maintaining high performance and security, iSIM is redefining how OEMs design and deploy next-generation IoT solutions.

Product Development

Connected Product OEM

LPWAN Connectivity networks
Com4

Cellular Module
Quectel BG773A

Product Manufacture

iSIM generation in highly secure environment

Secure iSIM network keys
Kigen SAS-UP

Root-of-Trust Credentials

Root credentials in SoC
Sony's Altair ALT1250

(Digital) Secure iSIM Package

(Physical) iSIM capable module reels

iSIM delivered

On module

Secure iSim package and unique chipset are digitally fused in the factory

OEM receives iSIM ready device

Out-of-the-box secure iSIM connected experiences

1. OEM orders iSIM Modules with cellular connectivity

2. iSIM Automated Preparation

3. iSIM On-demand Production

4. iSIM available with time to market advantage

A Bright Future for iSIMs

Integrated SIMs (iSIMs) are gaining momentum as a space-efficient and power-saving alternative to traditional SIM cards. Recent studies project significant growth in iSIM adoption:

Current Adoption
Approximately 800,000 iSIMs are installed in connected devices as of 2024.

Projected Growth
This number is expected to rise dramatically to over 10 million by 2026, driven by the anticipated launch of the GSMA's SGP.41/42 specifications, which will streamline and standardize iSIM-enabled device deployment.

Long-term Forecast
By 2028, the total number of iSIM active devices and sensors is projected to reach 211.8 million.

This growth is likely to be seen in use cases that need the efficient power use of iSIMs in combination with LPWA networks, such as LTE-M and NB-IoT. Additionally, iSIM technology is expected to be adopted for devices where space is at a premium, such as wearables.

While it will take time for a wide selection of certified iSIM System-on-Chips (SoCs) to become available, iSIM technology is opening up opportunities to enhance existing applications and to present cellular connectivity as a viable option for a whole host of new applications and devices.

JUNIPER Research

800k
Approx iSIMs in 2024

10m
Projected by 2026

212m
Projected by 2028

Sources: Juniper Research, Research and Markets.

Take Your IoT Beyond with iSIM Technology

Com4, in collaboration with industry leaders such as Sony , Kigen, and Quectel, offers a cutting-edge, global, secure, and end-to-end iSIM connectivity solution. This solution redefines the integration of mobile services into IoT devices, setting new benchmarks in connectivity, innovation, and sustainability.

Kigen | SONY | QUECTEL | COM4

Industry-Leading Connectivity with Com4

Our iSIM and eSIM solutions deliver unparalleled flexibility for IoT connectivity:

Dynamic Multi-Profile Provisioning

Customize connectivity profiles dynamically over-the-air with zero-touch activation, powered by Kigen and Quectel.

Resilience Through Multiple IMSIs

Each Com4 IoT SIM features multiple IMSIs, ensuring robust fallback options to maintain uninterrupted connectivity during network disruptions.

Global Access with One Contract

Through our extensive network partnerships, achieve near 100% global connectivity with a single contract and one bill, eliminating the need for individual agreements with carriers.

Future-Proof Your IoT Strategy

Com4 ensures that you can leverage the best of today's connectivity solutions while preparing for the future of iSIM technology. Our offerings, aligned with GSMA RSP M2M specifications and the latest SG31/32 SMDP+ mechanisms, guarantee maximum control, scalability, and security.

Start connecting your IoT devices today with Com4's award-winning eSIMs and iSIM solutions, designed to deliver secure, seamless, and sustainable connectivity for the most demanding IoT applications.

Discover more about our universal iSIM solutions and take your IoT connectivity to the next level.
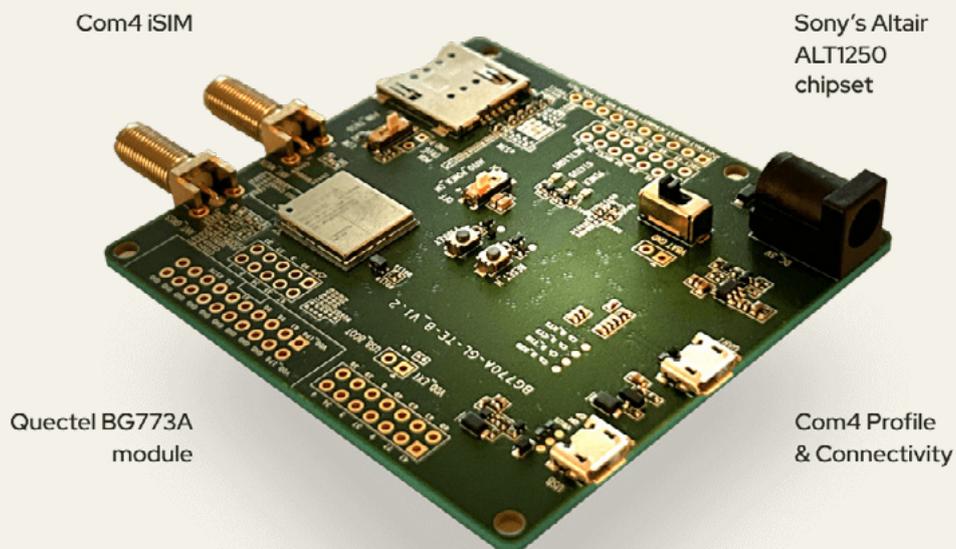
Explore Com4 iSIM Evaluation Kit and Connectivity Management Platform!

Jumpstart your iSIM hardware journey with Com4 Evaluation Kit, offering the quickest and easiest path to success. Combining the ideal chip, module, and connectivity partners, this kit is developed in collaboration with the world's leading iSIM ecosystems. Experience top-tier dual-band LTE-M and NB-IoT connectivity available today.

Tailored as a complete toolkit, our evaluation kits are perfect for device makers seeking to scale connected IoT products. Kits are available upon meeting business qualifications.

Order your iSIM Evaluation Kit

Order the Kit

Com4 iSIM

Sony's Altair ALT1250 chipset

Quectel BG773A module

Com4 Profile & Connectivity

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Global IoT Connectivity

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