Understanding eSIM Specifications

Kigen

M2M vs Consumer vs IoT eSIM Standards

Considerations for selecting which eSIMs are best suited for your business

SELECTION GUIDE

The **GSMA,** the global organization unifying the mobile ecosystem, has released industry standards for various eSIM use cases and functionalities through its eSIM Working Group. This handy selection guide highlights the features of each Remote SIM Provisioning (RSP) standards, and assist your selection between

- **eSIM for machine-to-machine devices (M2M eSIM)**
- **eSIM for consumer devices (Consumer eSIM)**
- **eSIM for IoT devices (IoT eSIM)**

❮ eSIM specifications for RSP in detail

	M2M eSIM	Consumer eSIM	IoT eSIM NEW
GSMA Standards	**SGP.01:** M2M eSIM Architecture **SGP.02:** RSP for Embedded UICC Technical Specification	**SGP.21:** eSIM Consumer Architecture Specification **SGP.22:** eSIM Consumer Technical Specifications	**SGP.31:** eSIM IoT Architecture and Requirements Specification **SGP.32:** eSIM IoT Technical Specification
Background	Legacy RSP specification completed in **2014** for machine-to-machine (M2M) and industrial IoT connections. It allows operators to download, change, and manage eSIM profiles over the air without physical card swaps.	Evolved RSP in **2017** for user-facing consumer devices like smartphones and tablets to safely download, store, and manage digital mobile network profiles over the air, activating profiles via a QR code or an app.	Published in **2023**, this simplifies RSP for IoT, making it ideal for large-scale, low-power deployments. It adapts the flexible consumer "pull" model but replaces the human user with automated, server-driven commands.
RSP approach	**Push Model** Triggered by an operator, profiles are delivered over the air via SMS or HTTPS.	**Pull Model** User or client-device driven action through an interface triggers download of profiles via a QR code, or server activation.	**Pull Model** IoT device can trigger directly from an SM-DP+ server (Direct download) or eIM acts as a proxy for profile routing (Indirect download). Serves devices with no UI, no SMS capability on LPWAN networks. Can use network efficient protocols for routing such as CoAP and DTLS.
RSP architecture defining features	**SM-DP:** Subscription Manager - Data Preparation **SM-SR:** Subscription Manager - Secure Routing	**SM-DP+:** Combines SM-DP and SM-SR **LPA:** Local Profile Assistant, device side software that connects to secure server	**SM-DP+** **eIM:** eSIM remote IoT Manager, a lightweight IoT secure server-side coordinator **IPA:** IoT Profile Assistant, devise side client connecting to remote eIM or server. Can be on eSIM (IPAe) or on device (IPAd)

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Considerations for selecting between eSIM Standards

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Best suited for	Devices without a direct user interface and with **limited memory or network r**esources in industrial or automotive telematics use cases.	Devices with **a direct user interface,** such as consumer devices. Typically, for use cases with higher bandwidth network usage.	Devices that are constrained by UI, memory or network resources. Typically, for use cases that are better managed with network automation, require greater security, or may outlast the first network contract, or need management of **large fleets of devices.**
Flexibility considerations	Potential for **vendor lock-in.** Can hold multiple profiles on eSIM, but requires contractual agreements between vendors with complex integration (SM-SR lock-in) that can be costly and create a barrier.	**User-driven** with ability to switch. Can hold multiple digital profiles on eSIM, but activate only one network profile with user consent being the permissive factor. Integration effort is reduced compared to M2M.	Designed for interoperability and **vendor choice.** Can hold multiple digital profiles on eSIM, switch connectivity providers or queue multiple providers based on automation or business logic. Current market solutions, such as Kigen's are proven for interoperability with other eSIMs and eIM. Integration effort uses existing SM-DP+ reducing complexity.
Scalability considerations	Network dependency and **complex integration** limit M2M scalability unless suited to the use case.	Streamlines consumer device activation via local user interfaces but **struggles with IoT devices** devoid of suitable UI or those that cannot directly connect to the public internet.	Versatile lightweight (eIM and IPA) architecture can support **zero-touch scalability** across millions of low-power IoT devices on both public and private networks. Industry interoperability testing is ongoing, with further clarity expected in 2026.
Guiding principles	M2M and IoT RSP devices **require separate management.** Suitable for maintenance of significant legacy investments, but offers less flexibility and carries a longer-term risk of provider sunset.	While best suited for devices where eSIM profile download needs user-control and consent, the **popularity and broad compatibility** make it an excellent foundation to work with most eSIM connectivity providers. Look for eSIM solutions that are GSMA eSA-certified for both consumer and IoT eSIMs, such as Kigen's.	Top choice for **new, large-scale, headless IoT deployments** that require remote profile control, streamlined provisioning, and centralized management. It can support EU CRA-aligned eSIM software deployment and updates, while preserving provider choice when device lifecycles extend beyond initial deployments or contracts.

To explore which eSIM specification best suits your business use case and reduce integration complexity, select from trusted partners with a deep expertise in eSIMs and fully certified eSIMs, RSP, or eIM.

Intrigued by SGP.32 IoT eSIMs? Discover the Kigen IoT eSIM Starter Kit, your launchpad to IoT at scale at https://kigen.com/iot-esim-starter-kit/