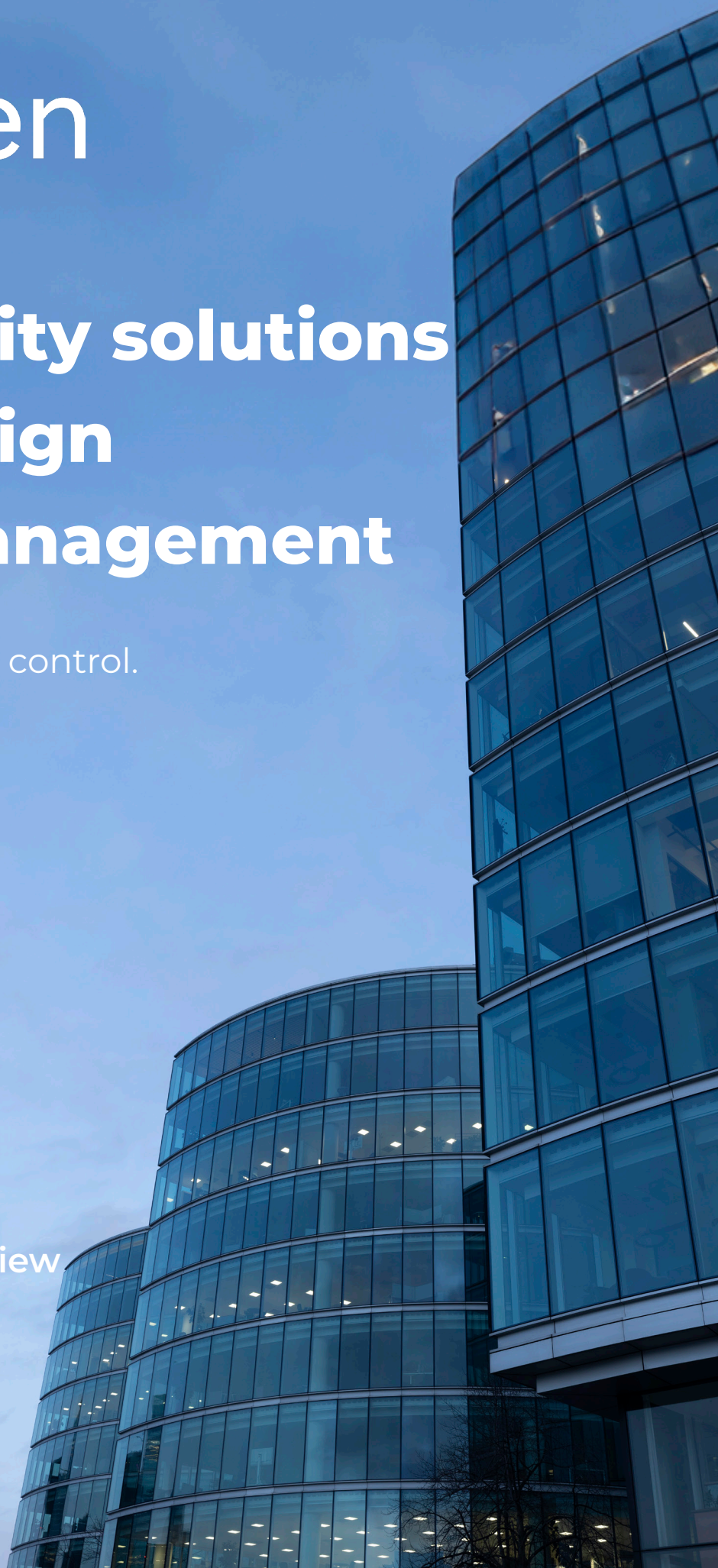
Kigen

Connectivity solutions for Sovereign Energy Management

Secure identity. Utility control.
Resilient connectivity.



Kigen Solution Overview

November 2026

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About Kigen

Kigen is the forerunner in GSMA-certified eSIM and Remote SIM Provisioning security solutions, empowering networks and manufacturers, including leaders in critical industrial sectors, to scale cellular IoT and comply with new cybersecurity mandates such as the EU Cyber Resilience Act.

Headquartered in Cambridge, UK, Kigen keeps its core operations in Europe: eUICC R&D in Copenhagen, server engineering in Belfast, and a GSMA SAS-accredited data center in Dublin, powered by 100% renewable energy, complemented by hosted orchestration in AWS GSMA SAS-SM accredited facilities in Paris and Ohio.

Our award-winning eSIM technology delivers intelligence on the SIM for AI-era networks, with proven interoperability across leading chipsets and modules for faster time to market. Backed by Arm, SoftBank Vision Fund 2 and SBI Group, Kigen was named to The Sunday Times 100 Tech list of the UK's fastest-growing private tech companies. Learn more at kigen.com

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Executive selection brief

Meters and grid assets are long-term investments, amortized over service lives that extend beyond the initial network contract. DSOs therefore need authority over their own eSIM estate: operator profiles, access, recovery policies and future provider changes. Specialist partners can operate the infrastructure, while the utility retains decision-making control.

Preserve data continuity

Critical grid functions and AI-assisted decisions depend on timely data. Zero data gaps must be a system design objective. Kigen's configurable eSIM intelligence supports local failover and switchover between available profiles; eIM and Pulse provide the profile state and execution history needed to govern recovery. Buffering and reconciliation in meter and data systems complete the continuity design.

Establish secure identity and operational truth

eSA-certified eSIMs protect cellular credentials and authenticate network access. Kigen's SAS-SM certified eIM provides the authoritative record of eSIM profile operations. Combined with network and device telemetry, this lets the DSO maintain the pulse of its fleet and act on verified profile state, rather than fragmented provider reports. [1–3]

Select capabilities built for constrained assets

Indirect profile download preserves access to operator profiles where devices cannot use direct HTTPS connections. Securely bound profile packages can be delivered through a supported CoAP path over cellular LPWAN. DLMS/COSEM integration must be specified and validated with the meter platform. [2, 4]

Use established references to inform selection

Itron uses Kigen SGP.32 eSIM technology. LCRA selected Kigen SIM technology for its private LTE deployment; Evergy selected Kigen eSIM OS and eIM for private/public network recovery. OneLayer simplifies onboarding into private cores, while Simetric integrates orchestration across carriers and deployments. Together, these references support evaluation of an interoperable utility architecture. [5–9]

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Utility requirements and lifecycle governance

Connectivity is part of the critical infrastructure investment. Procurement should preserve control across multiple network contract cycles, supplier changes and the eventual replacement of the asset.

Control the eSIM estate

- Retain authority over which profiles are installed, enabled, disabled or removed, with controlled permissions for delivery partners.
- Define the right to change operators and management providers, including data export, integration access, migration support and exit responsibilities.
- Align hardware qualification, software maintenance and service support with the asset's expected operating and amortization period.

Specify coverage and recovery by service requirement

- Plan primary and fallback subscriptions against actual coverage, permitted roaming and access to public or private networks. No profile provides access to every network by default.
- Set recovery triggers using application reachability, attach results and agreed performance thresholds. Account for modem capability, power budgets and reporting intervals.
- Validate local recovery during loss of management connectivity. Measure the interruption duration and the restoration of meter data; do not assume that a profile switch preserves the application session.

Govern routing and sovereignty

Agree private APNs, permitted provisioning endpoints, OT segmentation, hosting, data residency and audit retention. Identify who approves changes and who operates each service. Consistent APN conventions can simplify integration where supported by the selected operators.

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Utility requirements and lifecycle governance

Make data continuity measurable

Specify tolerances for data freshness, record loss and reconciliation by application. Meter buffering, sequence validation, and head-end reconciliation must work in concert with network recovery to prevent permanent gaps. Secure eSIM identity supports trusted cellular access; sensor validation and application security remain essential for AI-ready data.

Ask Kigen to demonstrate provisioning, profile-state reconciliation and recovery on your proposed devices and networks before national deployment.



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Secure delivery for constrained meters

Indirect profile download

Kigen eIM retrieves the operator's bound profile package from the SM-DP+ and relays it through the IoT Profile Assistant to the intended eUICC. The profile remains cryptographically bound to that eUICC. This enables profile delivery without requiring the endpoint to establish its own direct HTTPS session to each operator platform. [2, 4]

The indirect path is particularly relevant to firewalled devices, restricted networks, and constrained NB-IoT or LTE-M implementations. To reach remote, constrained devices on NB-IoT, Kigen eIM supports SAS-SM certified profile delivery over CoAP and other bearers, with both direct and indirect download. This lighter alternative to memory-heavy HTTPS reduces power use and extends battery life, which is critical for remote utility networks. It also bridges to the protocols already used across grid networks.

CoAP over cellular LPWAN

Kigen supports CoAP and compact protocol bindings for constrained communication paths, with translation toward SM-DP+ services. LPWAN describes the network environment; CoAP is an application protocol. Secure package protection and transport security must both be maintained. [2]

DLMS and COSEM integration

DLMS/COSEM defines metering data models and communication services. Where the DSO requires profile-package delivery through an existing DLMS/COSEM workflow, the meter OEM, head-end provider, and Kigen must agree on the integration to the IPA, package handling, and acknowledgment path. [10]

Specify the DLMS/COSEM delivery route as a project-specific integration. Confirm support for package transfer, installation results and error recovery with the selected meter and head-end before deployment.

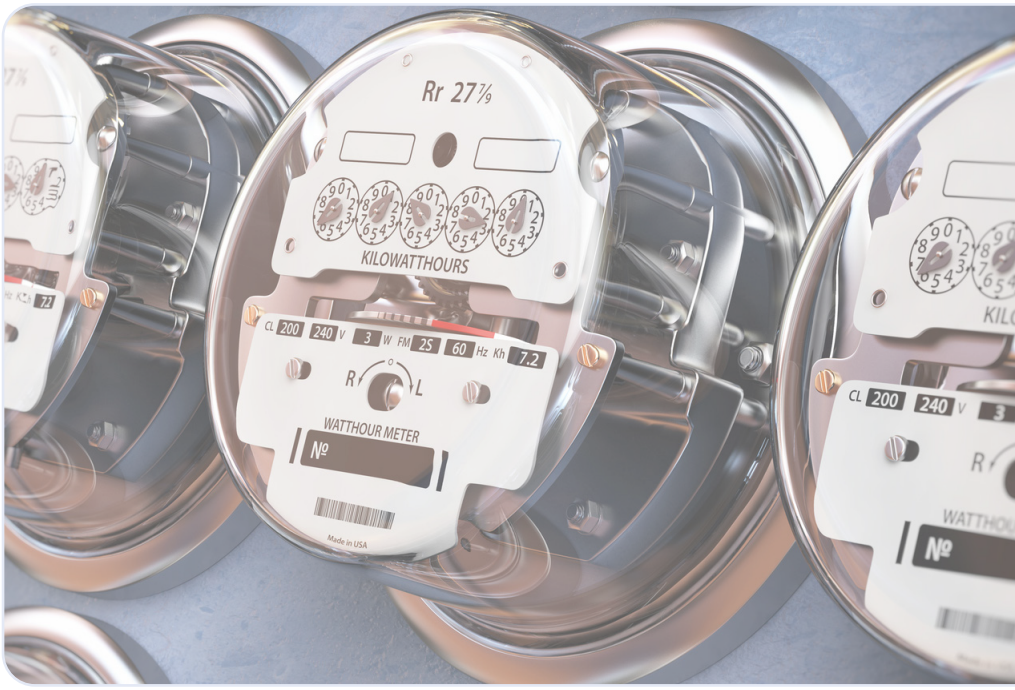
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Secure delivery for constrained meters

Specify acceptance evidence

- Successful download, installation and confirmation on the exact meter, modem, IPA and eUICC configuration.
- Recovery after interrupted transfer, constrained bandwidth and prolonged device unavailability.
- Verified profile state, controlled activation and auditable completion across representative fleet batches.

Retain control of national connectivity for the full infrastructure investment lifecycle.



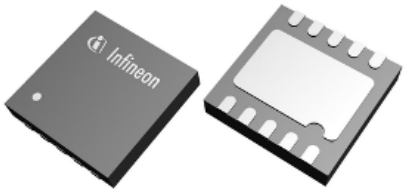
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Product portfolio

Select secure identity, remote management and device integration as one lifecycle architecture. Package availability and certification depend on the exact hardware and software configuration. **Supplied product images are illustrative not to scale.**



MFF2 solderable eSIM



MFF3 solderable eSIM



MFF4 solderable eSIM

Product	Role in the utility architecture
Kigen eSIM OS and eUICCs	eSA-certified portfolio across Infineon SLx17 and TEGRION SLx22 platforms. Removable 2FF/3FF/4FF and solderable MFF2/MFF4 configurations; confirm MFF3 product availability and certification for the selected device. [1]
Kigen eIM	SGP.32 profile lifecycle execution, direct/indirect download and secure remote management. [2]
Kigen Pulse	Operational interface, profile history, fleet campaigns and OpenAPI 3.0 integration. [3]
Device integration tools	IPAe/IPAd options and device C-SDK for integration with the selected module and meter architecture.
Factory provisioning	In-Factory Profile Provisioning loads agreed connectivity before shipment, supporting repeatable activation and reduced SKU complexity.

Solderable packages support sealed equipment design. Temperature, humidity ingress, corrosion resistance and service-life qualification must be established for the complete package, assembly and enclosure. eSA certification is a security assurance, not an environmental rating.

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Deployment architecture

The utility can combine two deployment approaches across its estate. Both preserve central governance and allow local recovery where the configured device and eSIM support it.

Option 1: Preloaded operator profiles

Load the agreed national public-network profiles and, where required, a private-network profile before deployment. Activate the primary subscription and retain alternatives for recovery or planned changes. Configured local switching logic can select an alternative when the primary service no longer meets policy.

This approach suits known coverage requirements and assets that need an immediately available fallback. Operator contracts, profile capacity, and roaming permissions must be established in advance.

Option 2: Bootstrap and adaptive provisioning

Use an agreed bootstrap subscription to obtain initial connectivity. Device-side discovery and operational telemetry inform the choice of network. The eIM then coordinates remote download and activation of the approved profile, through a direct or indirect delivery path.

Retain a suitable fallback profile where required. This approach supports phased national rollouts and sites where the best operational subscription is determined after installation.

Configurable device intelligence

- Network discovery can contribute attach results and reachability measurements, subject to modem and applet support
- Local recovery logic applies approved failure thresholds and can switch profiles without waiting for a central instruction.
- Device-binding controls can restrict unauthorized SIM reuse. IMEI checks support device-binding policy; add attestation where cryptographic device authentication is required.

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Deployment architecture

Validate the whole recovery chain

The acceptance test must include profile activation, modem reattachment, application reconnection and recovery of buffered meter records. Private networks, public operators and future spectrum choices can be incorporated through agreed profiles and compatible radio hardware.

Combine preloaded profiles and adaptive provisioning to support network changes, local recovery and long-term connectivity control.



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eIM Pulse and integrated operations

The source of truth for eSIM operations

Kigen eIM records authorized profile operations and their reported results. Pulse exposes the current known state, history and campaign outcomes. Reconcile this with device acknowledgments and operator data, and explicitly identify dormant or unreachable endpoints.

A known profile state is distinct from proof that the meter application is delivering data. [2, 3]

Layer	Operational responsibility
Kigen eSIM and IPA	Secure cellular credentials, profile installation and configured local behavior.
Kigen eIM and Pulse	Profile lifecycle commands, results, fleet visibility and API integration.
OneLayer integration	Simplified SIM/eSIM provisioning into private cores; coordinated onboarding with private-network visibility and OT security workflows. [8]
Simetric orchestration	Cross-carrier visibility and workflows across connectivity platforms; reconciliation of device, profile and commercial records as deployments accumulate. [9]
DSO device and meter systems	Device health, application telemetry, buffering, data reconcillation and business-service monitoring.

Zero-touch provisioning with controlled authority

Kigen's integration with OneLayer reduces manual provisioning into private cellular cores and supports automated onboarding. Zero-touch operation requires the core, device identity records, profile supply, and access policies to be configured together. The utility retains approval and audit control over those workflows.

Reconcile multiple deployments and networks

As the DSO consolidates territories, meter suppliers and network contracts, APIs link eIM operations to Simetric and other operational systems. Compare intended profile, device-reported state, network service and billing records before declaring an asset operational. This provides one consistent operational view without assigning every function to the eIM.

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Factory-to-field operating flow

Stage	Action	Evidence of completion
1 Design	Agree supported profiles, routing, local recovery, hosting and integration ownership.	Approved architecture and measurable acceptance criteria.
2 Provision	Load preselected profiles or bootstrap connectivity in the factory.	EID and asset mapping; authorized profiles; activation records.
3 Connect	Attach to the intended network and confirm application reachability.	Meter data received by the intended head-end.
4 Adapt	Use eIM to deliver and activate an approved alternative profile.	Installed/enabled state confirmed and reconciled with network records.
5 Recover	Apply local or centrally coordinated recovery when service degrades.	Reattachment and application recovery within the agreed target.
6 Reconcile	Deliver buffered records and resolve missing, delayed or duplicate readings.	Complete data sequence and reported exceptions.
7 Maintain	Review profiles, security updates, contracts and supplier changes.	Auditable campaigns, support evidence and tested migration procedures.

Preserve trust as AI use expands

Grid analytics and AI require timely data from devices whose access is authenticated and governed. Secure eSIMs establish a cellular identity foundation; eIM enables controlled changes to that connectivity. Device security, application authentication and validated measurements provide the remaining assurance for trustworthy decisions.

Operate to explicit service targets

Define availability and data freshness separately. A restored connection does not prove that all readings have arrived, and complete historical records do not prove that a control message arrived on time. Assign recovery, buffering and reconciliation responsibilities accordingly.

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Utility and ecosystem evidence

Itron Metering supplier adoption

Itron, a major AMI and AMR supplier, uses Kigen SGP.32 eSIM technology to support manufacturing flexibility and remote lifecycle management. Its published customer perspective states: “eSIM enables resilient, multi-carrier connectivity”. [5]

LCRA Large area private cellular deployment

LCRA selected Kigen SIM technology for its private LTE deployment. Its communications system covers more than 70,000 square miles across 68 Texas counties and supports utility, government, and public-safety users. This is evidence of Kigen’s role in utility-controlled infrastructure. [6]

Evergy Private and public network recovery

Evergy serves 1.7 million customers in Kansas and Missouri and selected Kigen eSIM OS and eIM for automated recovery across private LTE and public networks. The announcement describes a 100-site LTE network supporting thousands of operational devices. [7]

Crout and Melita Independent recovery paths

2CoreSIM combines independent profiles for Telefónica Deutschland and Melita, along with core infrastructure, using Kigen eSIM and eIM technology. Configured local logic switches profiles and rebuilds connectivity when the primary path fails. [11]

EU National program context

An EU Utility’s program includes a first call-off of 2.76 million meters and a target of 7.7 million meters by 2030. For first-phase SIM supply and NB-IoT/LTE-M connectivity, Kigen-supplied eSIMs solution pairing floLIVE and the national network’s connectivity, supported through Kigen applets for rescue and recovery within the connectivity architecture. Kigen eSIMs are factory-fitted with the utility-selected smart metering and grid gateway manufacturers with pre-loaded profiles.

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Industry participation and next steps

Kigen participates in industry ecosystems that support interoperability, shared deployment knowledge, and supplier choice for DSOs.

- Anterix Active Ecosystem: collaboration around private 900 MHz utility broadband. Kigen's participation is publicly described in its Juniper Research interview. [13]
- UBBA — Utility Broadband Alliance: utility and technology collaboration, including public showcases and technical exchanges. [14]
- 450 MHz Alliance: an industry association serving the 400/450 MHz ecosystem; the Alliance identifies Kigen as a member. [15]
- GSMA standards work, and integrations with OneLayer and Simetric connect secure identity with private-network operations and cross-carrier orchestration. [8, 9]

Define your national connectivity architecture with Kigen

Bring your meter roadmap, coverage requirements, and network contract milestones. Kigen will help define the scope of eSIM, remote management, and integration for a representative evaluation.

- Validate certified eSIM configurations on the intended meters and modules.
- Demonstrate profile delivery, local failover and recovery of meter data.
- Agree hosting, governance, service responsibilities and lifecycle costs before scale-up.

The Kigen IoT eSIM Starter Kit provides a qualified evaluation route, subject to eligibility and agreed terms. Scope the trial around the devices, profiles and operating conditions that matter to your deployment. Arrange a technical discovery session.

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Sources and implementation notes

[1] Kigen eSA certified portfolio

[2] Kigen eIM indirect download and constrained transport

[3] Kigen eIM product and operational integration

[4] GSMA SGP.32 v1.3 - eSIM IoT Technical Spec (indirect profile download)

[5] Itron customer perspective in the joint UBBA webinar

[6] LCRA selection of Kigen SIM technology

[7] Evergy selection of Kigen eSIM OS and eIM

[8] Kigen and OneLayer private cellular integration

[9] Kigen and Simetric cross-carrier orchestration

[10] DLMS User Association architecture and protocols

[11] Crout and Melita 2CoreSIM

[12] Glossary

[13] Kigen and Anterix participation in Juniper interview

[13a] Anterix Active Ecosystem

[14] UBBA technology showcase listing Kigen

[15] 450 MHz Alliance identifies Kigen membership

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Glossary

Acronym / term	Meaning	Page(s)
2FF / 3FF / 4FF	Mini-SIM / Micro-SIM / Nano-SIM form factors	9
AMI	Advanced Metering Infrastructure	14
AMR	Automatic Meter Reading	14
API / APIs	Application Programming Interface(s)	9
APN	Access Point Name	5
AWS	Amazon Web Services	2
CoAP	Constrained Application Protocol	3, 7
COSEM	Companion Specification for Energy Metering	3, 7
C-SDK	C Software Development Kit	9
DLMS	Device Language Message Specification (historical expansion)	3, 7
DSO	Distribution System Operator	3, 5, 6, 9, 12
EID	eUICC Identifier	13
eIM	eSIM IoT Remote Manager	3, 6–11
eSA	eUICC Security Assurance	3, 7, 15
eSIM	Embedded SIM	Throughout
eUICC	Embedded Universal Integrated Circuit Card	2, 6, 7, 14
GSMA	GSM Association	2, 12, 15
HTTPS	Hypertext Transfer Protocol Secure	3, 6
IMEI	International Mobile Equipment Identity	10
IoT	Internet of Things	2, 6, 12
IPA	IoT Profile Assistant	6, 9
IPAd	IoT Profile Assistant in the Device	9
IPAe	IoT Profile Assistant in the eUICC	9
LCRA	Lower Colorado River Authority	3, 14
LPWAN	Low-Power Wide-Area Network	3, 7
LTE	Long-Term Evolution	3, 6, 11
LTE-M	Long-Term Evolution for Machines	6, 11
MFF	Machine-to-Machine Form Factor	9
MHz	Megahertz	12, 15
NB-IoT	Narrowband Internet of Things	7, 14
OEM	Original Equipment Manufacturer	7
OpenAPI	OpenAPI Specification	9
OS	Operating System	3, 7, 11
OT	Operational Technology	5, 9
R&D	Research and Development	2
SAS	Security Accreditation Scheme	2
SAS-SM	Security Accreditation Scheme for Subscription Management	2, 3, 6
SGP.32	GSMA specification for IoT eSIM remote provisioning	3, 7, 11, 15
SIM	Subscriber Identity Module	Throughout
SKU	Stock Keeping Unit	7
SM-DP+	Subscription Manager Data Preparation Plus	7

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