



Grid Edge Intelligence

Transforming data into actionable intelligence and control



NEW GRID CONDITIONS REQUIRE A NEW OPERATIONAL MODEL

Across Asia Pacific, utilities are operating in an environment of rapidly growing electricity demand, increasing electrification and accelerating renewable energy integration.

In many markets across the region, electricity demand continues to grow as urbanisation, industrial development and rising living standards place increasing pressure on distribution networks. In Southeast Asia alone, electricity demand has increased by more than 60% over the last decade*, while clean energy investment now accounts for almost half of all energy investment in the region.

As distributed energy resources (DERs), battery storage, electric vehicles (EV) and behind-the-meter technologies continue to expand, power flows are becoming increasingly dynamic and decentralised.

These changes are creating new challenges across low-voltage (LV) networks, including fluctuating demand profiles, localised congestion, changing asset utilisation patterns and reduced visibility

* IEA (2025), [World Energy Investment 2025](#), IEA, Paris, Licence: CC BY 4.0

of network conditions. Increasingly, these operational pressures are concentrated at the grid edge, where dynamic power flows, localised demand variability and emerging network constraints directly impact transformer loading, voltage performance and overall network operations.

Utilities are expected to improve reliability, accommodate growing demand, support decarbonisation goals and maintain affordability, often while facing increasing regulatory scrutiny and constrained capital budgets.

Traditional operating models built primarily around meter-to-cash processes provide limited visibility into these evolving network conditions. As utilities seek to improve reliability, resiliency, safety and customer outcomes while maximising existing infrastructure investments, greater operational awareness at the grid edge is becoming essential. Advanced Metering Infrastructure (AMI) is therefore evolving beyond traditional billing applications into a critical operational platform for managing increasingly distributed and decentralised power systems.

GRID EDGE INTELLIGENCE: FROM METER-TO-CASH TO OPERATIONAL INTELLIGENCE

Grid Edge Intelligence (GEI) extends the role of AMI beyond meter-to-cash operations, enabling utilities to improve operational awareness, responsiveness and control across increasingly distributed networks.

Key operational outcomes enabled by GEI include:

Improve Low-Voltage Visibility and Grid Awareness	Enhance Reliability Through Outage Awareness and Fault Prevention	Optimise Infrastructure and Prepare for Electrification
As distribution networks become increasingly dynamic and decentralised, utilities require greater visibility into network conditions, asset utilisation and emerging constraints. GEI provides enhanced awareness across the low-voltage network, enabling utilities to identify issues earlier, improve operational decision-making and maximise the value of existing infrastructure.	Maintaining reliability is becoming increasingly challenging as networks grow in complexity and customer expectations continue to rise. By delivering localised intelligence closer to where events occur, Grid Edge Intelligence helps utilities detect outages, identify abnormal operating conditions and accelerate restoration efforts, improving customer outcomes and operational performance.	As electrification, renewable integration and energy demand continue to grow, utilities need to maximise existing assets before committing to traditional network augmentation. Greater visibility into network behavior and asset utilisation supports more targeted investment decisions, helping utilities improve capital efficiency while preparing the network for future growth.

By combining distributed intelligence (DI) applications, edge-based analytics and intelligent orchestration, GEI enables utilities to detect, analyse and respond to network conditions closer to where they occur. This improves visibility into transformer loading, outage conditions, voltage performance and emerging low-voltage (LV) network constraints.

Unlike traditional AMI environments that rely heavily on centralised collection and retrospective analysis, GEI delivers localised intelligence directly at the grid edge. This enables utilities to respond more quickly to evolving network conditions, optimise infrastructure utilisation and proactively manage increasingly dynamic LV conditions.

Importantly, GEI delivers operational value from the first deployed meter. As deployments expand, utilities can progressively enhance grid visibility, operational insight and network awareness without waiting for full network-wide implementation.



THE FOUNDATION: UPGRADE FROM AMI 1.0 TO AMI 2.0

Transitioning from AMI 1.0 to AMI 2.0 is the first step in unlocking these operational capabilities. With the Itron Riva® electricity meter as a key foundation, utilities can securely orchestrate distributed intelligence applications and edge analytics at scale.

As meter fleets age and grid conditions become more dynamic, utilities need a smarter, more flexible platform for grid-edge visibility and control. The combination of Riva meters, DI-enabled devices and the Itron Gen6™ network platform helps utilities modernise existing AMI networks without costly replacement, enabling high-frequency data streaming, edge analytics and clearer operational insights across the LV networks.

Cost-Effective Modernisation

With backward compatibility, utilities can easily upgrade to AMI 2.0 with the Itron Gen6 network platform and Riva meters without costly infrastructure replacement. UtilityIQ® (UIQ), the universal headend system for AMI 2.0, provides centralised control of events, alarms, device provisioning and maintenance policies—helping utilities deliver timely, consistent updates across the entire meter fleet.

More importantly, utilities can opt to scale the deployment in phases, helping them unlock the value of DI applications and edge analytics over time while minimising disruption to everyday grid operations and customer service.

The Itron Riva Electricity Meter: A High-frequency Grid Edge Device & Analytic Engine

The Riva meter functions as an intelligent grid-edge sensor, delivering high-frequency, granular data essential for the timely detection of voltage sags, swells, flicker, rapid load changes and power quality events. Equipped with the CPU, it has edge-compute capability that processes and analyses data in real time at the edge supporting the implementation of GEI use cases such as advanced outage management, safety, improved asset management, advanced analytics of power quality, as well as real-time disaggregation of rooftop solar generation and EV load.

The Riva meter is designed to balance high-frequency data capture with signal fidelity, processing efficiency and cost-effectiveness—enabling DI applications to perform reliably and efficiently.

Secure, Open and Interoperable Platform

The Itron Gen6™ network platform is the cornerstone of Itron's proven Intelligent Connectivity portfolio. It provides a secure, open and interoperable foundation that gives utilities the flexibility to choose the network connectivity best suited to their operational needs. Supporting industry-standard protocols such as IEEE 2030.5, along with Wi Fi and power line communication (PLC) for peer-to-peer connectivity, the platform enables resilient, efficient communications for next-generation distributed intelligence applications.

PLC helps offload network demand, preserve core field area network (FAN) capacity and support precise transformer-level device alignment with efficient one-to-many communications. Enhanced capabilities, including last-gasp functionality, strengthen the seamless deployment of GEI use cases such as safety and outage awareness. The interoperable platform also supports a broad spectrum of DI-enabled devices including Riva meters, while its defense-in-depth security approach helps protect critical data, devices and communications.

Future Proofing with Innovative Design

Built on DLMS/COSEM standards, the Itron Riva electricity meter enables secure, interoperable communication across multi-meter vendor AMI environments, supporting the utilities with meter choice flexibility while reducing deployment complexity.

Developed with the ability to securely isolate core metrology, accurate and reliable meter-to-cash transactions are protected across system upgrades and new project implementations. Its future-ready, modular design supports efficient upgrades, easy maintenance, seamless integration, and evolving GEI use cases.

Proven Scalability, Built to Last

Today, the utilities can easily deploy Itron's curated DI applications that support a wide range of GEI use cases, including reliability, LV visibility and safety as well as DER management. With peer-to-peer communication supported by PLC, backed by a strong partner ecosystem and the Itron DI Developer Program, new and future DI applications can be developed, deployed and updated easily on Riva meters. The Riva meter is built for harsh climate conditions and designed for a proven value of more than ten years, supporting seamless adaptation to emerging use cases as the grid becomes more complex.

INTELLIGENT ORCHESTRATION WITH IEOS

The Itron Intelligent Edge Operating System (IEOS) provides the orchestration layer required to securely deploy, manage and scale Grid Edge Intelligence applications across distributed devices and increasingly complex LV networks.

By integrating edge intelligence with centralised operational systems, IEOS enables utilities to combine distributed analytics with broader operational applications and network management strategies while maintaining secure lifecycle management of edge applications at scale.

SECURE APPLICATION MANAGEMENT

The Itron Enterprise Application Center provides a secure framework for managing and deploying DI applications across the network, enabling utilities to maintain full control over application deployment, lifecycle management and operational monitoring of both Itron and authorised third-party applications.

MAXIMISING VALUE FROM EXISTING GRID INFRASTRUCTURE

GEI helps utilities maximise the value of existing infrastructure by improving reliability, enhancing operational efficiency, supporting safety outcomes, and enabling more effective utilisation of network assets. By evolving existing AMI investments into an operational platform, utilities can unlock new value streams associated with outage awareness, fault prevention, grid visibility, electrification readiness and future flexibility services.

Unlike standalone operational technologies, GEI enables multiple operational capabilities through the same AMI infrastructure investment, supporting improved capital efficiency and more informed network investment decisions. Greater visibility into localised network conditions and emerging constraints helps utilities optimise existing infrastructure before committing to traditional network augmentation.

To date, Itron has issued more than 27 million DI applications, shipped over 18 million DI-enabled endpoints, and now has more than 3 million endpoints actively running DI applications at the world's most innovative utilities.

ACCELERATING GRID EDGE INNOVATION

Itron's APAC Center of Excellence based in Melbourne, Australia provides a collaborative environment for utilities to explore, validate and accelerate GEI initiatives through demonstrations, technical workshops, interoperability testing and operational use-case validation.

Grid Edge Intelligence enables utilities to transform AMI from a metering system into a grid orchestration platform, delivering greater visibility, improved reliability, and a practical path to managing electrification and distributed energy resources at your own pace.



To set up an appointment to visit our center of excellence, please contact us at the Melbourne office +61-3-9236-5222 OR [email us your enquiry.](#)

To learn more visit itron.com

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