



The Itron Edge Gateway for Utility Distribution Automation

Use Cases



The Itron Edge Gateway is a versatile, highly secure distributed intelligence device that enables intelligent connectivity using LTE and PLTE cellular and Itron Gen5 Mesh communications between field devices and back-office systems. It represents a critical component of modern utility distribution automation systems. As utilities transition towards more intelligent, more resilient grids, the need for efficient data collection, analysis, and control at the grid edge becomes increasingly vital. This solution brief explores the role of the Edge Gateway in addressing the challenges utilities face in distribution automation and outlines its key features and benefits.

CHALLENGES IN UTILITY DISTRIBUTION AUTOMATION:

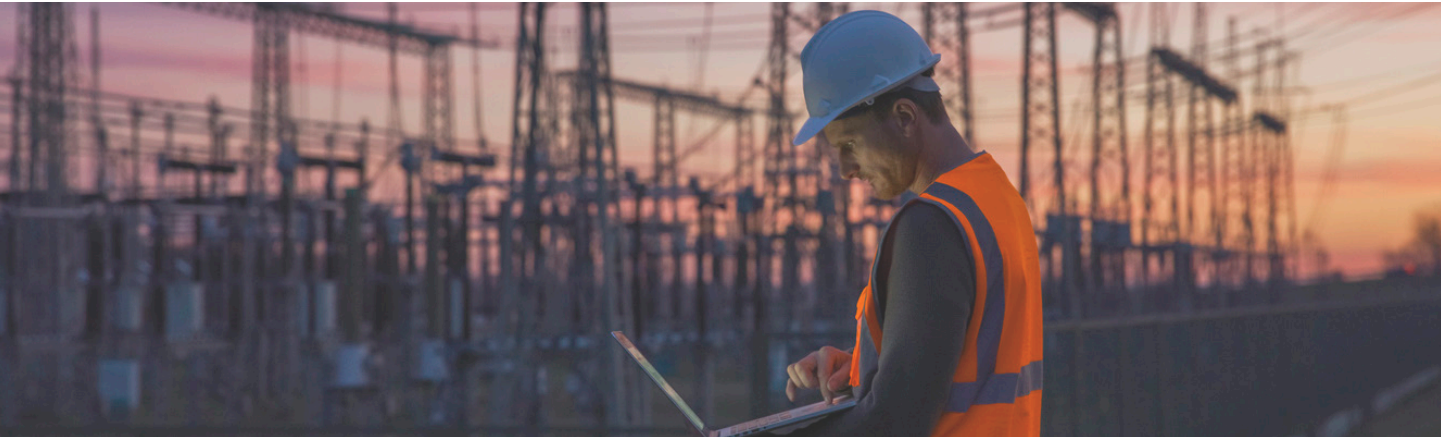
- 1. Limited Data Visibility:** Traditional distribution systems lack real-time visibility into grid conditions and performance at the edge, making it challenging to detect and respond to faults and anomalies promptly.
- 2. Reliable Communications:** For critical operations, utilities rely on their networks to be highly available and resilient to disruption from storms and outages.
- 3. Remote Monitoring and Control:** Remote monitoring and control capabilities are essential for optimizing grid operations, minimizing downtime, and improving service reliability, but traditional systems often need more capabilities at the edge.
- 4. Scalability and Flexibility:** As the grid evolves with the integration of renewables and DERs, utilities require scalable and flexible solutions that can adapt to changing grid dynamics and requirements.

The Edge Gateway designed with intelligent connectivity enables utilities to plan and operate distribution systems to maintain voltage across their network and reroute power in case of disruptions. With flexible communications including cellular and, in the future, Gen5 mesh communications in a single device, utilities can achieve reliable communications and endpoint connectivity while creating a smarter, flexible, and more secure grid.

Edge Gateway: Key Features and Benefits:

- 1. Data Aggregation and Integration:** The Edge Gateway serves as a centralized hub for aggregating and integrating data from diverse sources such as voltage regulators, capacitor bank controllers, reclosers, switches, sensors, and other devices, providing utilities with a unified view of grid operations.

- 2. Real-time Monitoring and Analytics:** By processing data at the edge, the Edge Gateway enables real-time monitoring and analytics, allowing utilities to detect and respond to grid disturbances, voltage fluctuations, and equipment failures proactively.
- 3. Edge Intelligence and Control:** The Edge Gateway provides edge computing capabilities to perform localized data processing and decision-making, enabling autonomous control and optimization of reclosers and switches, voltage regulators and capacitor banks, remote substations, and other distribution automation devices.
- 4. Interoperability and Standards Compliance:** The Edge Gateway supports industry standards and protocols such as DNP3, IPv6/IPv4 addressing, and TCP/UDP/Serial interfaces for Modbus, ensuring interoperability with existing utility systems and facilitating seamless data exchange across devices and platforms.
- 5. Secure Remote Access:** The Edge Gateway provides secure remote access and management capabilities, enabling utilities to monitor, configure, and update edge devices and systems remotely, thereby reducing maintenance costs and improving operational efficiency.
- 6. Multi-Carrier Failover:** The Edge Gateway is designed to operate across private and public carriers, enabling automated failover from one carrier to the next while having the option of providing a single IP address to SCADA. The ability to failover from a primary to secondary carrier for critical DA infrastructure provides a more reliable and resilient network where downtime can be reduced.



As utilities continue to build out and automate their grid operations, it is important to have access to solutions which are reliable, flexible and secure. Many use cases classified as distribution automation are critical in terms of latency and the Edge Gateway is specifically designed for this purpose. With both 4G and 5G models operating on private and public cellular networks; and a future Gen5 mesh enabled version; the Edge Gateway brings intelligent connectivity to the utility grid operator.

To support critical use cases both single and dual radio models are available, enabling hot failover. There are units designed to mount in an existing RTU cabinet or outdoor weatherproof models that can hang directly on the pole. Multiple SIM slots are enabled with two on the single radio model and three on the dual radio model. Also supported is a multi-profile eSIM for the most flexible carrier support available.

Edge Gateway: Key Use Cases:

- 1. DA Connectivity:** For utility locations without fiber or other connectivity access the Edge Gateway can provide the primary connectivity where fiber installation or mesh is cost prohibitive. This ensures these substations can still communicate effectively with the central monitoring systems. In addition, for locations with a primary fiber connection, they can also serve as a backup connection. By leveraging the edge gateway in this use case, it dramatically reduces loss of communication with the substation, allowing for continuous monitoring and control until the primary connection is restored.
- 2. Remote Substation Monitoring:** The Edge Gateway connects multiple devices in substations via cellular and presents aggregated interfaces to SCADA or other cloud data systems. By reducing the amount of traffic being pushed upstream the data flow is more efficient, and communication costs are reduced. The Edge Gateway translates data from a multitude of protocols, ensuring compatibility between legacy devices and modern systems. This is crucial for utilities upgrading their communication systems while maintaining existing infrastructure. The gateway can implement control logic using programming languages, allowing for automated decision-making and control actions based on predefined criteria. The key benefit is enabling greater distribution system visibility and control for either a single device or a group of devices.



Edge Gateway: Advanced Security:

Itron Secure Edge provides utilities with secure and reliable data communication for critical infrastructure and secure automated tunneling over cellular networks without complex setup, along with multi-carrier failover functionality. The Secure Edge application introduces modern SD-WAN-like networking architecture, enabling an enhanced security profile, automated tunneling for SCADA traffic, remote worker connectivity, and providing a static IP address for SCADA polling regardless of the carrier a device is communicating on. This solution replaces the classic hardware-based tunnel termination and manual configuration that usually comes along with this solution. The application relies on software-based tunnel termination and admin UI, automatically configuring tunnels for devices as they are deployed, significantly reducing the manpower and operational overhead typically seen with distributed automation deployment projects.

The Itron Edge Gateway plays a pivotal role in enabling utility distribution automation by providing real-time data visibility, edge intelligence, and control capabilities at the grid edge. By deploying the Edge Gateway, utilities can enhance grid reliability, optimize asset utilization, and unlock new opportunities for grid modernization and optimization in the era of distributed energy resources and smart grids.

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