

The Nokia logo is displayed in white, uppercase letters in the top left corner of the image. The background is a composite image featuring a power line tower on the left, a drone in flight in the center, and a large white arrow pointing from the left towards the drone. The sky is a vibrant mix of orange, red, and purple, suggesting a sunset or sunrise.

NOKIA

High grid observability with drones

Use case

Power utilities face increasing challenges in maintaining reliable operations across large, remote regions with aging infrastructure. Timely inspections and real-time data collection are critical to ensuring grid stability, but difficult-to-reach areas and the scale of operations often hinder effective monitoring. As the demand for a more digital, efficient grid grows, utilities recognize the need for advanced communication and monitoring systems to improve safety, enhance reliability, and meet the evolving requirements of modern energy distribution.

Challenges

In distribution networks, utilities often face difficulties in accessing field devices and assets located in remote or hazardous areas, making routine inspections, fault detection, and maintenance cumbersome and costly. When equipment in these areas experiences issues, delays in sending personnel can increase downtime and disrupt service. The limited ability to inspect critical distribution infrastructure hampers the utility's ability to maintain grid reliability and respond to faults quickly, leading to increased operational risks.

Aging infrastructure further complicates the situation, as many distribution assets, such as switches, transformers, and reclosers, require more frequent monitoring and maintenance to ensure reliability. With equipment often in service for decades, the likelihood of wear and failure increases, demanding a proactive approach to inspections. However, scaling traditional inspection methods to meet these growing needs is challenging, leaving utilities vulnerable to unexpected failures and extended outages if faults are not detected early.

In addition to these physical challenges, collecting and analyzing real-time data from field assets is crucial for optimizing grid operations. As grid complexity increases, particularly with the integration of distributed energy resources (DER), the demand for continuous, reliable data grows. However, traditional communication networks often lack the capacity and reliability to support real-time monitoring at the scale required. This limits the ability to quickly identify and respond to emerging issues, making it difficult to maintain grid stability and optimize performance.

Solution

To address these challenges, power utilities can deploy a combination of Nokia Drone Networks, Nokia Core Enterprise Solutions, and AI-driven tools to enhance grid observability and operational efficiency.

Nokia drones, equipped with high-resolution cameras and IoT sensors, provide a scalable solution for inspecting remote and hazardous areas, minimizing the need for manual interventions. These drones can conduct regular inspections of critical infrastructure, such as transformers and switches, delivering real-time data to utility operators without the delays or safety risks associated with manual inspections.

Nokia Core Enterprise Solutions delivers a private 4G or 5G wireless network, enabling seamless, secure data transmission from field devices to control centers. This dedicated network ensures continuous, high-bandwidth communication across the distribution network, even in remote areas, improving the reliability of critical data delivery and enabling faster, more informed decision-making.

Nokia's Core Enterprise Solution for Power Utilities and Nokia Drone Networks make infrastructure inspection operations safer, faster, and more efficient.



Benefits

Power utilities achieve significant gains in operational efficiency with this approach. Drones reduce the need for manual inspections, allowing for faster and more frequent monitoring of critical infrastructure. This not only lowers operational costs but also frees up personnel for higher-value tasks. The ability to quickly gather real-time data from remote areas ensures that issues are identified and resolved before they escalate, streamlining grid management.

The use of drones also improves safety for field personnel by reducing their exposure to hazardous environments. Drones can perform inspections in areas that would otherwise be dangerous or difficult to reach, minimizing the need for human intervention in potentially risky situations. This enhances overall safety while maintaining high levels of service reliability.

Finally, the combination of private wireless networks and AI-driven predictive maintenance strengthens grid reliability and resilience. With real-time monitoring and advanced analytics, utilities can proactively detect and address infrastructure issues before they lead to failures or outages. This increases grid stability, ensuring that utilities can meet the growing demands of modern energy distribution while minimizing downtime and service disruptions.

Results

By deploying Nokia Drone Networks and Nokia Core Enterprise Solutions, power utilities can transform the way they manage their grid infrastructure. With seamless, real-time data collection and AI-driven insights, utilities gain unparalleled visibility into their operations, enabling faster, more informed decisions. Critical issues can be detected and addressed before they escalate, resulting in fewer outages and improved service reliability.

Field operations are streamlined, with drones conducting routine inspections and gathering data from even the most remote or hazardous locations, reducing operational costs and improving safety. Personnel are no longer exposed to dangerous conditions as frequently, and maintenance can be performed proactively rather than reactively, minimizing disruptions to the grid.

This modernized approach delivers a more resilient, efficient grid that can adapt to future energy demands. Enhanced observability and control allow utilities to optimize their distribution networks while maintaining high levels of reliability. As a result, power utilities are better equipped to meet sustainability goals and ensure consistent service delivery, even as grid complexity increases.

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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