

An Intelligent Private Wireless Network to **Power the Smart Grid**

Electric utilities of all sizes can benefit from the cost savings, efficiency, and safety gains enabled by smart devices for remote, real-time grid management. **But these new grid devices are only as “smart” as the communications network they run on – and the most intelligent network for the job is Rajant Kinetic Mesh.**

Continuous Connectivity Anywhere: **Ultra-Reliable High Throughput Performance to Keep Communications & Power Flowing**

A private wireless network with the built-in intelligence to operate autonomously, Rajant is the choice for smart grid communications of any scale. The unique nature of our Kinetic Mesh architecture is driven by Rajant's InstaMesh® networking protocol, which enables the network to dynamically self-optimize to achieve mission-critical reliability, routing around adverse conditions even when network elements are in motion.

Smart devices place new strains on existing utility networks. In constant bi-directional communication with the operations center, they demand high throughput that even newer SCADA communications systems still running on low speed, low capacity telephone circuits cannot provide. Utilities also have little control over these leased lines, and any operating benefits of applications like automated metering and remote substation monitoring can be quickly negated by long network outages – even resulting in regulatory fines when lack of network reliability impacts the ability to continuously deliver and rapidly restore power.

To truly modernize their power grid, utility companies need a smarter network solution, engineered from the ground up to support their demanding uptime requirements and the exponential growth of smart grid devices with resilient, flexible, high performing functionality.

Deploy Rajant's ruggedized BreadCrumb® nodes on poles, at substations, and on vehicles.

These compact, lightweight nodes are built to operate in harsh outdoor environments and can be easily affixed to static or moving equipment. Each BreadCrumb can hold multiple connections over multiple frequencies simultaneously, and work peer-to-peer to form a Kinetic Mesh network with hundreds of potential paths over which to direct traffic.

If new BreadCrumbs are added after initial configuration, they automatically begin communicating with other nodes in the area, making the network seamless and scalable. That means with one platform, Rajant can provide support for the wide-reaching coverage required by investor-owned utilities (IOUs), the focused communications requirements of specialist utility groups, and the urban and rural connectivity needs of municipal utilities and cooperatives in between.

InstaMesh upholds real-time communications with smart devices and your mobile workforce.

InstaMesh works intelligently to select the fastest path or paths among the BreadCrumbs for delivery at multi-Mbps speeds. If a path becomes unavailable or blocked – from storm conditions for example – InstaMesh will dynamically route communications via the next-best available path to ensure they reach their destination in real time.

Because InstaMesh always has multiple paths and frequencies to leverage, utilities gain the high capacity they need to communicate with their multitude of deployed smart devices. And, because all BreadCrumbs can be mobile, this high-performance, ultra-reliable coverage can be easily extended to bucket trucks and other work vehicles to support the connectivity requirements of field personnel.

Powering New Value: What's Enabled with Kinetic Mesh

With Rajant's intelligent network, utilities of any size – and at any stage of power grid modernization – can rapidly reap the benefits of smart grid technologies and the value of a private wireless network solution.

Optimize Outage Management

Ultimately utilities' performance is measured by the number and duration of outages, and minimizing both is critical to customer satisfaction and avoiding regulatory penalties. Key to reliable power delivery is a reliable network – if communications go down, the utility is blind to the status of their grid.

Rajant's unique network architecture gives it the resiliency to meet these demanding uptime requirements, providing the reliable real-time communications link to utility field devices needed to gain up-to-the-second insights into system statuses, remotely analyze and deploy fixes for rapid restoration, and even predict failures that could cause outages before they occur.

Prevent Loss of Assets and Lives

Rajant enables the proper functioning of next-gen smart grid applications to automate previously manual processes and remove workers from hazardous situations, as well as to monitor and proactively maintain field assets to maximize their lifespan.

Secure against today's diverse cyber-attack threats.

Hackers are a constant threat to power grids, particularly as utilities integrate more IP-based smart systems into their infrastructures. Rajant's technology was born from military applications, and today our networks are running in many of the largest mines, ports, and oilfields across the globe – all environments where security breaches are a critical threat. We understand the unique security requirements that must be accounted for in utility networks, and offer multiple cryptographic options with security down to per-hop, per-packet authentication.

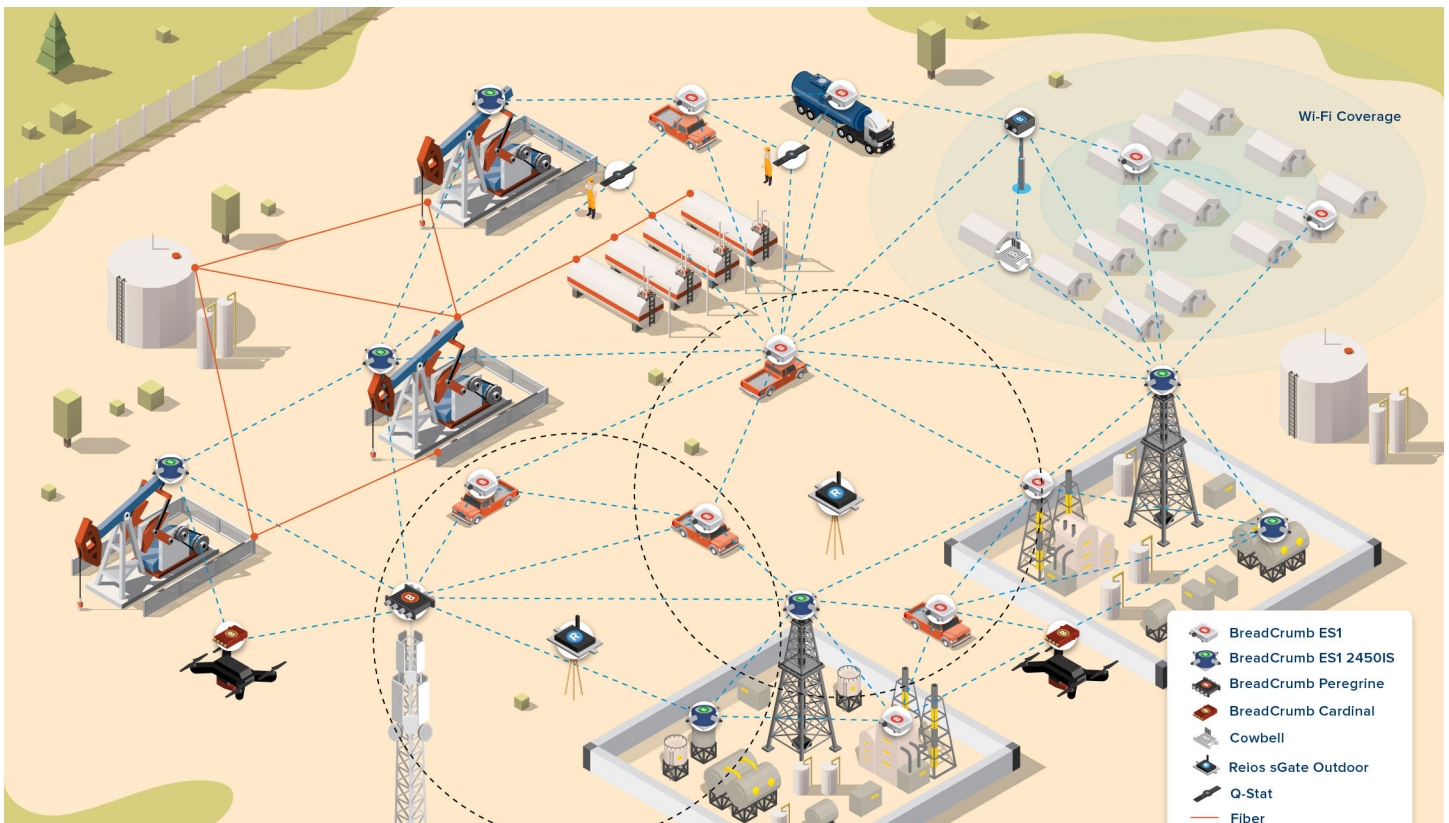
IDEAL BREADCRUMBS FOR UTILITY NETWORKS



The BreadCrumb ES1 is an IP67 device with multiple mounting options, making it ideal for IIoT applications like those running on smart grid devices and for deployment on light-duty vehicles.



The Sparrow is an IP67 radio ideal for non-autonomous tele-remote IIoT heavy-duty machinery and light-duty vehicle applications with dual 2X2 MIMO transceivers and four antennas having multiple mounting options.



Support the Mobile Workforce of the Future

Today's field personnel want and need to be connected everywhere they travel on and between sites. By deploying BreadCrumbs on work vehicles, the vehicles themselves become hot spots for worker connectivity. The nodes operate on standards-based frequencies and include integrated Wi-Fi Access Point service for compatibility with a multitude of smartphones, laptops, and other IP devices.

Additionally, BreadCrumb nodes deployed on these trucks can communicate directly with each other to enable V2V communications between both manned and unmanned vehicles. In fact, Kinetic Mesh is the only wireless solution able to deliver on the continuous connectivity mandate of tele-operated and autonomous systems: any breaks in coverage can cause these systems to stop running, and Rajant never breaks for handoff.

Rapidly Enable Emergency Response Communications

The simple set up and self-optimizing nature of Kinetic Mesh makes it easy to establish ad-hoc networks even in extreme environments such as storm-affected zones. BreadCrumbs can be used to create a common communications network for utility workers, first responders, insurance companies, and other constituents gathered at disaster sites to disseminate and share critical information. The network is extensible to include V2V communications between dispatched trucks and even tethered drones collecting data on site damage.

Gain Control Over Network Management

Instead of relying on third-party carrier solutions, which put network uptime out of your control, Rajant's private wireless solution gives you the ownership advantage. What's more, ongoing network management is possible with minimal technical resources because the network operates largely autonomously. Paired with Rajant's intuitive management systems, utilities gain a global view of real-time and historical network performance with tools to ensure continual optimization.

Right-size the Network to Your Requirements

Whether you are an IOU serving millions of customers, a municipal-owned utility (MOU) providing power as part of all municipal department requirements, a member-owned electric cooperative covering a rural area, or a specialist providing transmission, distribution, or generation services, Rajant has the functionality you need. Our network operates optimally in both dense and sparsely populated environments, and can be flexibly scaled to provide the coverage you need without unnecessary features that inflate your costs.

Transform Costs and Take Advantage of Incentives

With a private wireless network, utilities can transform their operating expenses for using carrier solutions into capital investment. And, because all Rajant products are made in America, there are additional cost savings opportunities from US government incentives.

APPLICATIONS ENABLED

Kinetic Mesh supports all the smart devices and applications used by electric utilities **to improve grid efficiency, reliability, and security, including:**

Advanced Metering Infrastructure (AMI)

- Outage Management Systems (OMS)
- Remote Meter Reading
- Remote Meter Control

Security

- Substation Video Surveillance
- NERC/CIP Compliance

Distribution Automation

- Fault Location, Isolation and Supply Restoration (FLISR)
- Volt/VAr Optimization (VVO)
- Conservation Voltage Reduction (CVR)

Substation Management

- Equipment Health Monitoring
- Telemetry from Remote Sensors
- Predictive Maintenance
- Substation Automation

Transmission Line Monitoring

- Line Assessments via Drone
- Intrusion Detection
- Real-time Power Flow

Tele-operated and Autonomous Systems

- Tethered Drones
- Autonomous Vehicles

Mobile Workforce Management

- Dispatch Management
- Real-time GPS Tracking
- Field-Based Internet Access
- V2V Communications
- Emergency Response Communications

Load Management

- Automatic Load Shedding

Rajant Private Wireless Networks: The Intelligence Behind the Smart Grid

In order for utility companies to fully capitalize on the opportunities presented by new smart grid devices, they must ensure their network can fully support the applications that enhance services and reduce costs. Rajant's network brings its own intelligence to optimize the journey of grid digitization, becoming a strategic asset to power next-level performance.

We'll show you the opportunities that a robust mobility component can bring to your network. [Visit **rajant.com/markets**](https://rajant.com/markets) to get started.



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