

RAJANT KINETIC MESH®

An Intelligent Private Wireless Network to **Power SMARTFields**

Onshore oil & gas operations of all sizes can benefit from the cost savings, efficiency, and safety gains enabled by smart field devices for remote monitoring and real-time performance management. To enable these next-generation capabilities and future-proof your “SMARTField” communications, you need a network that is equally intelligent: Rajant Kinetic Mesh®.

Smart devices are helping to enhance oil recovery by enabling automation and real-time remote control of equipment such as downhole pumps – but the quantity of data they generate is exponentially more than traditional PLCs or RTUs, placing new strains on existing networks. These devices are also being used to implement new methods to increase production, like fracking, but with those operations often tightly packed on just a few acres, Wi-Fi or LTE communications can be plagued by interference and other deployment issues.

Unconventional oil exploration and production demands an unconventional network, engineered from the ground up to support the explosion of smart field devices and the demanding uptime requirements of your fields with resilient, flexible, high-performance functionality.

If It's Moving, It's Rajant: **The Ultra-Reliable, High Throughput Network to Keep Wells Flowing**

Rajant Kinetic Mesh® takes a completely different and highly innovative approach to address the shortcomings of traditional wireless architectures in oil & gas environments. Powered by the built-in intelligence of Rajant's InstaMesh® networking protocol, which enables the network to dynamically self-optimize, it is the only solution that can truly deliver on the promise of real-time, mobile-enabled SMARTField communications.

Multi-radio, multi-frequency redundancy to uphold next-gen application performance.

The compact BreadCrumb® nodes that form a Kinetic Mesh network are able to hold multiple connections over multiple frequencies simultaneously, creating hundreds of potential paths over which to direct traffic. InstaMesh works in real-time to select the fastest path or paths for delivery at multi-Mbps speeds. If faced with interference or signal blockage, InstaMesh will dynamically route communications via the next-best available path to guarantee application performance.

Because InstaMesh always has multiple paths and frequencies to leverage, onshore operations also gain the high capacity they need to communicate with a multitude of Wi-Fi enabled smart field devices.

Ruggedized, fully mobile nodes support real-time communications across personnel and assets.

Because BreadCrumbs work peer-to-peer, each node can be fixed or mobile, and easily deployed to extend coverage in hard-to-reach areas of remote well sites and crew camps, or on moving equipment, drilling rigs, and construction crews to support the connectivity requirements of field personnel. This mobile functionality also makes it the only network that can enable machine-to-machine (M2M) communications to automate wellhead operations.

Built to operate in harsh outdoor environments, Rajant BreadCrumbs are available in C1D1/ATEX0 and NEMA4X/IP66 versions.

Military-grade security for mission-critical onshore operations.

Rajant's technology was born from military applications, and today our networks are running in many of the largest oilfields, mines, and ports across the globe – all environments where security breaches are a critical threat. We understand the unique security requirements that must be accounted for in oil & gas networks, and offer multiple cryptographic options with security down to per-hop, per-packet authentication.

Powering New Value: What's Enabled with Kinetic Mesh

With Rajant's intelligent network, upstream operations of any size can rapidly reap the benefits of smart devices and IIoT applications for real-time monitoring, analytics, and control – optimizing your ability to maximize efficiencies and yield.

Optimize Production

In upstream operations, performance is measured by cost per barrel, which is affected by your ability to know when equipment is not functioning in an optimal fashion, and the real-time operating variables needed to optimize reservoir reserves and minimize hardware failures.

Rajant's unique network architecture ensures the throughput and resiliency to meet these demanding data access requirements, providing a reliable real-time communications link to the field devices that provide up-to-the-second insights into your operations.

Long-term scalability managed with minimal technical resources.

Kinetic Mesh networks are readily scalable to hundreds of high-bandwidth nodes, ensuring you can easily support deployment of new smart field devices over time. After initial configuration, when new BreadCrumbs are turned on, they automatically begin communicating with other nodes in the area, autonomously and without outside intervention, to streamline ongoing management.

Rajant also uniquely offers cross-generational forward and backward compatibility to ensure you never have to forklift your existing infrastructure investment and have full control over when upgrades are made. Our solutions integrate with existing satellite, LTE, 3G/4G, fixed wireless, and Wi-Fi networks to rapidly optimize and extend coverage where needed.

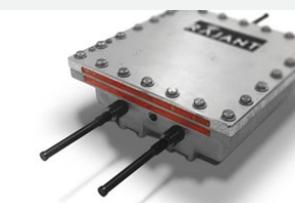
IDEAL BREADCRUMBS FOR SMARTFIELD NETWORKS



The BreadCrumb ES1 is an IP67 device with multiple mounting options, making it ideal for IIoT applications like those used for rod pump control (RPC) and for deployment on light-duty vehicles.



The BreadCrumb KM3 is intended for deployment inside pre-existing outdoor NEMA enclosures, featuring flexible DIN rail mounting to make deployments simple and fast.



The ES1-IS-2450 BreadCrumb, ES1, featuring an explosion-proof enclosure rated for use in hazardous oil & gas environments.



The BreadCrumb JR3's small footprint makes it ideal for deployment on light-duty vehicles, edge devices, and remote Access Points.



Enhance Worker Safety & Productivity

BreadCrumb 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. Combined with their ease of deployment, they are a perfect solution to enable connectivity at crew camp sites.

When deployed on vehicles, BreadCrumbs also act as hot spots that give field workers access to important information on real-time measurement reads, monitoring reports, equipment statuses and more as they drive or make their rounds on site. This enables them to react rapidly to issues and proactively identify potential fixes, while remaining in constant communication with the command center for safety.

Ensure Reliable Remote Pump Control

Downhole pumps used to lower bottom hole pressure are critical to improving well production rates, but these pumps are typically spread over hundreds to thousands of square miles. Rajant's system can be deployed in a variety of wired and wireless platforms, such as LTE, satellite, and Wi-Fi, adding mission-critical infrastructure and mobile nodes at existing pads and thus enabling reliable remote monitoring and applications to control dispersed pumps from a centrally located command center.

Liberating Stranded Reserves, Minimizing Environmental Impact

Rajant networks are fast and simple to deploy and bring value to operations from day one. With Rajant, you can liberate stranded reserves previously uneconomical to develop due to the high cost of tower infrastructure required for LTE networks or unavailability of spectrum.

BreadCrumbs can be deployed on existing infrastructure and wellheads, limiting the impact to the environment and landowners by removing the need for costly tower construction and additional land acquisition.

Brownfields projects can also be positively impacted by removing the need for new and additional cabling to bring online Industry 4.0 devices. They can be integrated directly to the IEEE 802.11x compliant Rajant nodes.

Implement Advanced Surveillance, Monitoring & Measurement Applications

The differentiated multi-radio architecture of a Kinetic Mesh network means that Rajant is the only industrial wireless solution that can offer high availability for any number of real-time oil & gas applications. This includes those running on new IIoT-enabled field devices powering smart surveillance, automation, real-time production analytics, autonomous systems, and more.

APPLICATIONS ENABLED

Kinetic Mesh supports all the intelligent devices and applications used in upstream oil & gas processes to **improve uptime, operational efficiency, reliability, and security, including:**

Rod Pump Control (RPC)

- Enhance Modeling
- Use All RPC Devices in Real-Time
- Remote Monitoring and Control

Closed Circuit Monitoring (CCTV)

- Infrared Monitoring (IR)
- Flare Monitoring
- 1080p Realtime
- Real-Time Power Flow

Distribution Automation

- Centralize All Distributed Data
- Access to Tank and Metering Skid Information
- Automation of Daily Production Reports (DPR)

Real-Time Stimulation

- Receive Data from All Sites
- Optimize Productivity and Efficiency
- Enable Predictive Maintenance

Pump Off Control (POC)

- Instant Feedback to Dynagraph Application
- Enable Real-Time Statistics

Drones

- Use of Autonomous Drones for Inspection, Secondary Measurement, Leak Detection, and Surveying

Mobile Workforce Management

- Enable Automated Workflows for Field Crews
- Dispatch Management
- Real-Time GPS Tracking
- Field-Based Intranet / Internet Access
- Emergency Response Communications

Security

- AES256 Encryption
- Whitelist / Blacklisting



Rajant Private Wireless Networks: **The Intelligence Behind Your SMARTField**

Make Kinetic Mesh an asset to your onshore operations, ensuring every aspect of your exploration and drilling activities, no matter where they occur, can be monitored, managed, and continually optimized for maximum output.

We'll show you the opportunities that a smart network can bring to your oilfield.

Visit rajant.com/oil-gas to get started.

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