RAJANT

The Smart Private Wireless Network to
Power Downstream Refinery Modernization

The demand for refined product and chemical feedstock continues to increase with population growth and new economies entering the market. The need for motor vehicles, textiles, and electronics is only accelerating, not slowing down. End-use industries are driving the need for refineries and plants to seek out new ways to efficiently improve production yield. Instrumentation upgrades which tap into the power of the Internet of Things (IIoT) are one key way to boost productivity, but they require an Industry 4.0-ready network that is as smart as the devices and applications it runs. **That is why they need Rajant Kinetic Mesh®.**

Digitalization is revolutionizing all types of manufacturing by making it possible to access and apply more data to innovate operations and in turn, produce more product. Downstream facilities are critical hubs in the energy supply chain and employ numerous discrete processes to convert crude oil and liquid gases into usable materials, but many of these processes have not yet been fully modernized.

Part of the challenge is that Industry 4.0 technologies demand more network flexibility, security, and reliability than Wi-Fi or two-way radio WAN typically used in refineries and plants. The network must also operate around an abundance of explosive and flammable gases, which means the infrastructure used must meet stringent safety standards even as it scales. Plant and process modernization calls for a modern network engineered to support Industry 4.0 applications with safe, high-performance functionality everywhere throughout the plant environment.

If It's Moving, It's Rajant:
The Network to Drive Plant-Wide Innovation & Productivity Forward

Rajant Kinetic Mesh® takes a completely different and highly innovative approach to address the shortcomings of traditional wireless architectures in downstream oil & gas environments. Our technology delivers secure, scalable broadband coverage to every corner of a facility using hazardous environment-certified nodes that form an ultra-resilient, IIoT-enabling network. **Here's how.**

Multi-radio, multi-frequency redundancy for high capacity and mission-critical performance.

Rajant's compact BreadCrumb® nodes are able to hold multiple connections over multiple frequencies simultaneously, creating a robust Kinetic Mesh network with hundreds of potential paths over which to direct traffic. Each node is equipped with the intelligence of Rajant's InstaMesh® networking software which works in real-time to select the fastest path for delivery from these meshed connections. If a path becomes unavailable or interference occurs, InstaMesh will dynamically route communications via the next-best available path, upholding mission-critical performance with no dropped packets or communications loss.

The network's ability to leverage multiple paths and frequencies also ensures the high capacity refineries and plants need to effectively transport and access the high volumes of data generated by their sprawling sensor networks — with scalable bandwidth to support new data-intensive IIoT applications as they are deployed. Our technology easily integrates with existing wired, fixed wireless, and Wi-Fi networks to rapidly improve and extend coverage where needed.

Plug-and-play solution to safely establish a resilient network in hazardous environments.

Our ES1 BreadCrumb nodes come pre-integrated with a Class I, Division 1 and Class II, Division I ready explosion-proof enclosure. This enables you to rapidly deploy Rajant's powerful, commercial-grade meshing capabilities in hazardous locations throughout your refinery. These BreadCrumbs are also available with UL, IECEx and ATEX certifications to ensure they can be deployed globally.

Military-grade security for mission-critical downstream processes and operations.

Network security is a major concern for downstream oil & gas operations. Hackers… pose major risk not only to loss of data and IP, but also lives if safety functions are compromised. Initially created for military applications, Rajant's network is the only wireless network to offer multiple cryptographic options inclusive of NSA Suite B algorithms and down to per-hop, per-packet authentication.

Long-term scalability managed with minimal technical resources.

Kinetic Mesh networks are readily scalable to hundreds of high-bandwidth nodes; in fact, the network only grows stronger as more nodes are added because more paths become available. After initial configuration, when new BreadCrumbs are turned on, they automatically begin communicating with other nodes in the area. This makes it fast and easy to scale the network, increasing capacity or extending coverage where needed throughout the plant without the need for a team of network engineers.

Rajant also uniquely offers cross-generational forward and backward compatibility so you always remain future-ready for upgrades.

Powering
Industry 4.0 Efficiencies:
What's Enabled with Kinetic Mesh

With Rajant's intelligent network, downstream operations can optimally support smart devices and IIoT applications for real-time monitoring, analytics, and control of processes across their plants – optimizing their ability to maximize efficiencies and yield.

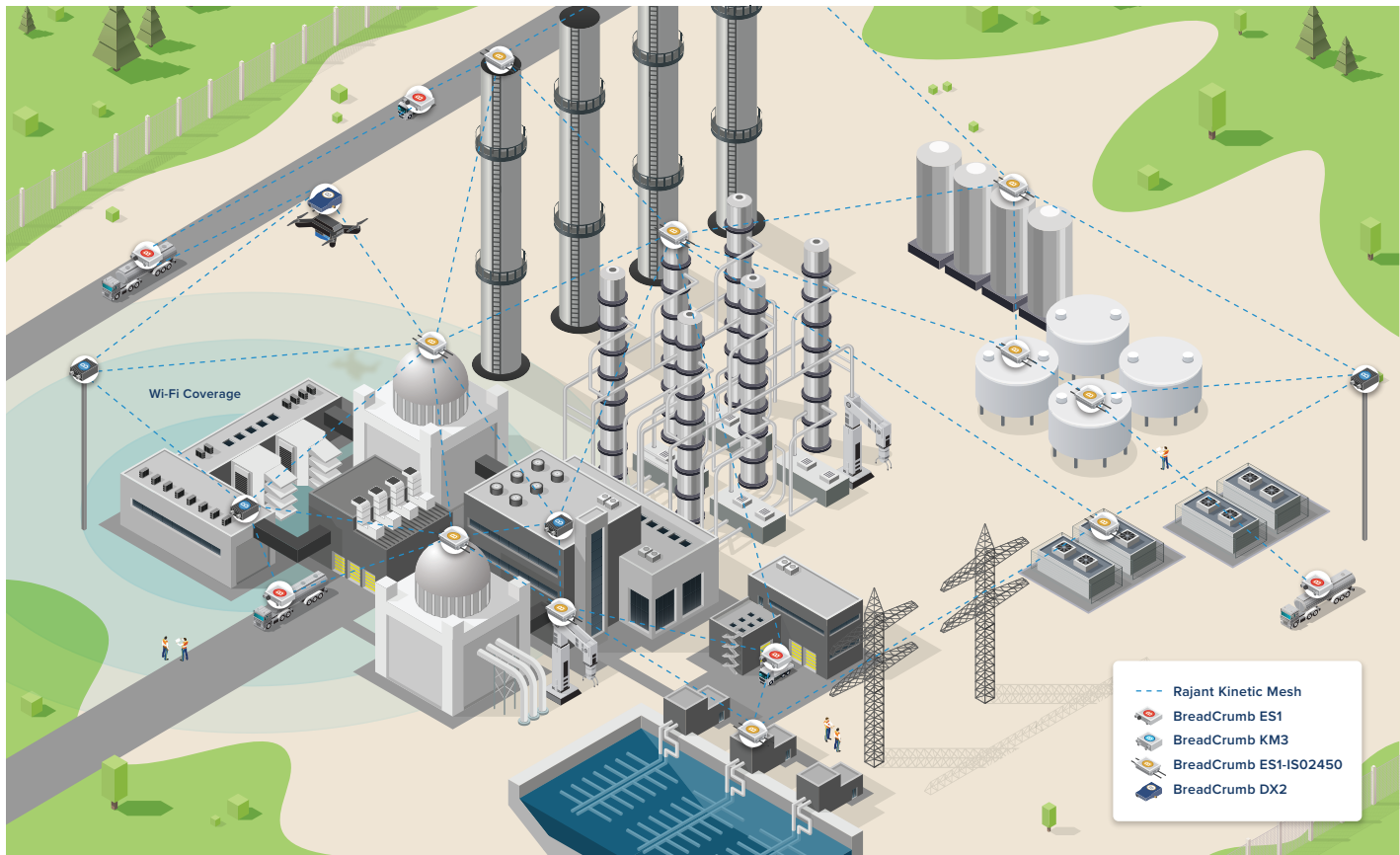## IDEAL BREADCRUMBS FOR DOWNSTREAM NETWORKS

The ES1-ISO2450 Hazardous Environment Enclosure is a C1D1/C1D2-ready enclosure with the ES1 BreadCrumb inside. It is a plug-and-play solution for establishing a Kinetic Mesh network in refineries and chemical plants.

The KM3-ES-2450 Harsh Environment Enclosure is constructed of thermoplastic polycarbonate material that is RoHS compliant and UL F1-rated for outdoor UV resistance, providing an impenetrable home for Rajant's KM3 BreadCrumb which is ideal for supporting SCADA, real-time monitoring, and video surveillance.

Maximize Process Yields

Improving efficiency and increasing throughput are vital requirements to maximizing yield and profitability in downstream operations. With the right insights, refineries and plants can identify under-performing assets or areas to enhance processing effectiveness, predict maintenance needs to reduce downtime, and more. The ability of facilities to use data in these efforts however has been hampered by aging instrumentation and network infrastructure. These legacy technologies cannot singularly support high-volume, real-time voice, video, and data applications needed to modernize operational processes.

Rajant's unique network architecture ensures the throughput and real-time performance to meet demanding data access requirements, providing ultra-reliable real-time communications that enable up-to-the-second insights into your operations. Now you have the links you need to collect, analyze, and act on the troves of information generated throughout the plant and drive rapid, effective optimization.

Wi-Fi Coverage

Legend:
- - - Rajant Kinetic Mesh
BreadCrumb ES1
BreadCrumb KM3
BreadCrumb ES1-IS02450
BreadCrumb DX2

Ensure Accurate Daily Production Reporting (DPR)

Because operations are taxed according to production, high accuracy in daily production reporting is a critical component to cost savings. Measurements from hundreds of thousands of sensors must be continually collected with spot-on precision. As more sensing technologies are added, the demands on the network increase even further with more bandwidth needed to transport all the data. Rajant Kinetic Mesh's resilient multi-radio, multi-band network ensures real-time communications with mission-critical reliability, so that no data is dropped or missed even in the face of interference or a node outage. It also has numerous paths to leverage, providing the high capacity required to collect all the data that will provide an accurate view of production yield.

Enhance Worker Safety Facility-Wide

In addition to being compatible for use in hazardous locations throughout refineries or plants, 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. Kinetic Mesh can enhance or expand coverage for personnel to easily connect their devices anywhere throughout the facility, and access real-time information on sensor readings, equipment health, and process performance wherever they are. This connectivity also ensures real-time communications and location tracking of workers in critical emergency situations.

Secure Downstream Data in Transit

As a critical piece of the energy supply chain, refineries are also a prime target for security hacks. Data breaches can have devastating consequences to your operations and the network you choose must employ multiple layers of security to mitigate those risks. With military-grade security features, Rajant Kinetic Mesh provides end-to-end information assurance across the network, offering many levels of encryption to protect packets from devices and people accessing them directly.

Optimize Costs and Plant Performance with IIoT

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 downstream oil & gas applications. This level of reliability and capacity is required to run new IIoT-enabled devices powering smart plant operations, from automation to real-time process analytics, robotics, and more. With Rajant, you can rapidly modernize for Industry 4.0 efficiencies without overhauling your entire network infrastructure.

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

Asset Tracking & Optimization

- Equipment Health Monitoring
- Telemetry from Sensor Networks
- Real-Time Asset Tracking
- Predictive Maintenance
- Daily Production Reporting

Automation & Remote Control

- Remote Process Control
- Remote Machine Guidance
- Machine-to-Machine (M2M) Communications
- Process Monitoring & Automation

Safety & Security

- Video Surveillance
- Theft Monitoring
- RFID Tracking
- Real-Time Voice, Video, and Data Communications
- Emergency Response Communications

Next-Gen Applications

- Augmented Reality (AR)
- Autonomous Systems
- Robotics

Rajant Private Wireless Networks:
An Evolved Network for Modern Downstream Operations

Digitizing downstream oil & gas processes can have a significant impact on cost savings and productivity, but requires network performance and capacity that cannot be effectively met by traditional infrastructures used in plant settings today. Kinetic Mesh's highly differentiated multi-radio, multi-frequency technology, infused with the intelligence to continuously self-optimize, provides the low-latency, high-throughput, resilient performance required to ensure the uptime of bandwidth-intensive Industry 4.0 applications. Expand and enhance IIoT-enabling coverage in every corner of your refinery or plant, and easily deploy the next-gen applications needed to modernize your operations, fast.
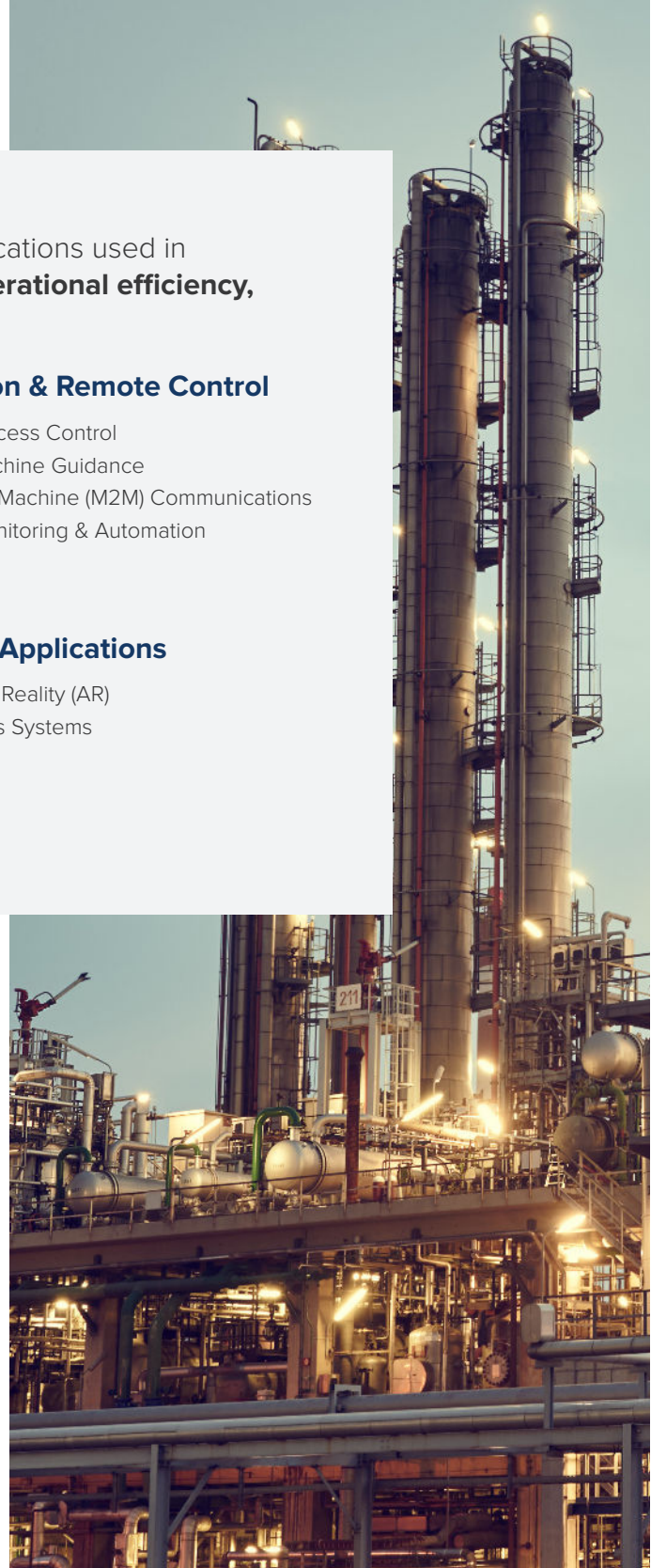
We'll show you the opportunities that a smart network can bring to your refinery.
Visit **rajant.com/oil-gas** to get started.

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If it's moving, it's Rajant.
Industrial Wireless Networks Unleashed.