

The Smart Network to **Power Industry 4.0** Capabilities in Petrochemical Plants

As the petrochemical industry prepares to take advantage of market growth and capitalize on productivity gains, it will need a robust Industry 4.0 ready network. A network used for the Industrial Internet of Things (IIoT) requires more flexibility than Wi-Fi networks or two-way radio WAN typically used in such facilities.

Enter Rajant Kinetic Mesh®.

Continuous Connectivity Anywhere: **The Network to Drive Plant-Wide Growth, Innovation & Safety Forward**

A private wireless network engineered from the ground up to perform in harsh industrial environments, Kinetic Mesh networks are infused with the intelligence of Rajant's InstaMesh® networking protocol, which enables the network to dynamically self-optimize to ensure reliable real-time performance. It rapidly delivers secure, reliable broadband coverage anywhere you need throughout the plant – even hazardous locations. **Here's how.**

Investments in the petrochemical industry are focused on growth, flexibility, and optimization. Fueled by abundant raw materials and increasing demand, new petrochemical plants are being established around the world while existing plants are quickly expanding to capitalize on new market opportunities.

As the industry grows, however, so does competition. Today, leading petrochemical plants require ways to rapidly optimize their production in order to get ahead, while maintaining and even increasing safety in all aspects of the chemical production process. While it is clear that establishing Industry 4.0 capabilities like real-time analytics and autonomy will greatly advance these efforts, deploying a network to support the connectivity demands of next-generation applications in the dynamic and inherently hazardous plant environment can be difficult. Modern plants require a future-ready network built for these needs.

Serious safety and wireless performance in a C1D1/C2D1 package.

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. Our ES1-IS-2450 Hazardous Environment Enclosure comes with our ES1 BreadCrumb pre-integrated in a Class I, Div1 and Class II, Div1 ready enclosure. It provides an ideal plug-and-play solution to leverage Rajant's powerful, commercial-grade meshing capabilities in hazardous settings throughout the petrochemical plant, enabling data, voice, and video applications.

Self-optimizing, self-healing infrastructure for mission-critical reliability.

InstaMesh® networking software is the smart technology that connects each BreadCrumb node, autonomously directing traffic over all meshed connections. By dynamically load balancing and routing data around signal blockage and potential interference, InstaMesh ensures that data packets get to their destination via the fastest path available at the moment. In addition, by eliminating the need for a controller node, InstaMesh also guarantees that Kinetic Mesh networks have no single point of failure.

Broadband scalability for growing plants with minimal technical management needed.

The network is ideal for petrochemical plant operations that are dispersed over widespread areas and that are regularly adding new bandwidth-intensive applications to support continued growth. With high-bandwidth speeds across multiple mesh node hops, BreadCrumbs offer extremely low latency for real-time, plant-wide connectivity, even at the network edge. In fact, as more nodes are added, more paths to direct data are naturally formed—and with more paths, the network gains capacity and becomes even more resilient. Once initially configured, new BreadCrumbs added to the network automatically begin communicating with other nodes in the area, minimizing technical set up and maintenance time.

Improving Safety, Powering Growth: What's Enabled with Kinetic Mesh

Rajant's network provides petrochemical plants with the network flexibility, reliability, and scalability needed to power Industry 4.0 applications, enabling you to remain competitive by dynamically connecting the people, assets, and devices that comprise every aspect of your current and future operations.

Lower Operational Costs

Many petrochemical plants are currently operating multiple networks in order to fulfill separate communications needs for their personnel. The burden of maintaining a Wi-Fi network for data and a two-way radio WAN for voice generates significant added costs and resource demands for your petrochemical operation.

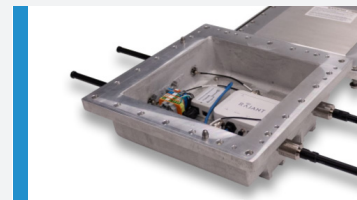
Ubiquitous connectivity to connect people and assets – in place or moving – throughout the plant.

BreadCrumbs can be attached to fixed or mobile assets including equipment, vehicles, and facility infrastructure. This means that they can never be “out of network” because they *are* your network. 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 that your plant personnel can use to stay seamlessly connected as they work.

Military-grade security built-in.

Petrochemical plants are potential targets for high-risk network security attacks. Originally developed for military applications, Kinetic Mesh protects your plant from security breaches with multi-layered, military-grade security for network traffic. Robust security features include multiple cryptographic options, configurable data and MAC address encryption, and configurable per-hop, per-packet authentication between BreadCrumbs.

IDEAL BREADCRUMBS FOR PETROCHEMICAL NETWORKS

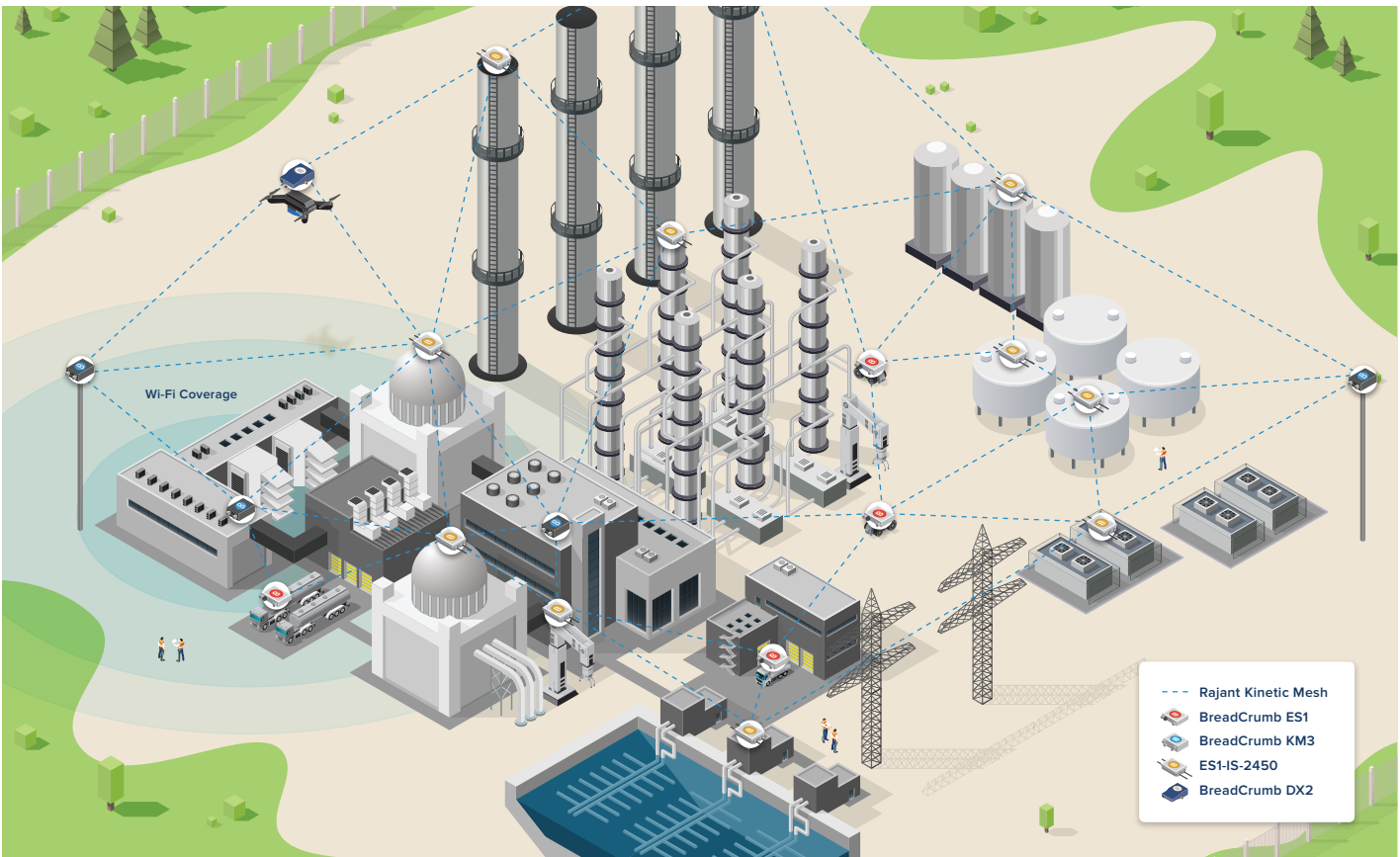


The ES1-IS-2450 Hazardous Environment Enclosure is C1D1/C1D2-ready with the ES1 BreadCrumb inside. It is a plug-and-play solution for establishing a Kinetic Mesh network in petrochemical plants.



The BreadCrumb ES1 comes in a compact, lightweight, IP67 package ideal for use on light-duty autonomous vehicles, operating in challenging network environments that can utilize a less ruggedized solution.

Kinetic Mesh eliminates the need for petrochemical plants to maintain multiple networks by flexibly supporting data, voice, and video on one network. Not only does Kinetic Mesh reduce the total cost of ownership, but it also simplifies the work life of personnel by allowing them to centralize their communications to a single device.



Maintain Safety in Danger Zones

Petrochemical plants contain an abundance of explosive and flammable gases, such as ethylene, propylene, butadiene, and other vapors. To keep equipment from sparking and starting a fire, networking infrastructure must be deployed in explosion-proof enclosures. Rajant's hazardous environment enclosure solution which pre-integrates our BreadCrumb within a C1D1/C1D2-ready package provides a cost-effective way to streamline deployment time of nodes in 'danger zones'.

What's more, the network protects plant worker safety by providing everywhere connectivity to enable real-time tracking of personnel and contractors across the facility. This not only allows operators to monitor personnel's ongoing safety status, but also aids in emergency extraction in case of an incident.

Future-Proof Expanding Operations, Keep Ahead of the Competition

Petrochemical plants are undergoing a period of significant expansion. Choosing the wrong industrial network solution today could mean that your investment will not be able to adequately connect your operations tomorrow.

Rajant's simplified, secure IIoT-enabling network solution rapidly enables Industry 4.0 capabilities in your plant, giving you a strong competitive edge in today's increasingly crowded petrochemical market. Plus, Kinetic Mesh networks can scale seamlessly to provide ubiquitous coverage in all corners of the plant, with BreadCrumb nodes easily deployed to augment or create infrastructure ad-hoc – growing to support your operations of tomorrow.

Achieve IIoT-Enabling Connectivity for Next-Gen Applications

Once your petrochemical plant has enabled IIoT connectivity with Kinetic Mesh, there are a multitude of Industry 4.0 applications that can be implemented to drive optimized production and increased employee safety. It can support bandwidth-intensive applications to monitor your assets in real-time as well as predict equipment maintenance needs and maximize efficient machine movements on the production line. It can also help you protect products and equipment from theft with real-time video surveillance plant-wide.

Rajant's network also lays the groundwork for innovative IIoT applications such as augmented reality (AR) for workers and 24/7/365 equipment autonomy with plant-wide asset mobilization, which increase petrochemical output while keeping employees out of dangerous areas.

Minimize Downtime, Mitigate Risk

The operations carried out in petrochemical plants are the epitome of mission-critical; from the moment of deployment to ongoing 24/7 plant operations, you cannot afford to risk any downtime. Dropping signals even for a short span of time can not only mean productivity loss, but puts plant workers' safety at risk. Kinetic Mesh's fully redundant, self-optimizing infrastructure virtually eliminates downtime for your mission-critical petrochemical applications and also allows you to leverage predictive maintenance to keep all assets operating at peak efficiency.

APPLICATIONS ENABLED

Kinetic Mesh provides **the ubiquitous plant-wide connectivity needed to support IIoT devices and Industry 4.0 applications** that maximize productivity and enhance safety, including:

Worker Safety

- RFID Tracking of Personnel and Contractors
- Real-Time Voice, Video, and Data Communications
- Plant-Wide Video Surveillance
- Emergency Response Communications

Asset Tracking & Optimization

- Real-Time Asset Tracking
- Video Surveillance
- Theft Monitoring
- Equipment Health Monitoring
- Telemetry from Remote Sensors
- Predictive Maintenance

Automation and Control

- Vehicle-to-Vehicle Communications (V2V)
- Machine-to-Machine Communications (M2M)
- Remote Process Control
- Remote Machine Guidance

Next-Gen Applications

- Augmented Reality (AR)
- Autonomous Systems
- Robotics

Rajant Private Wireless Networks: The Intelligence Behind Your Industry 4.0 Capabilities

By rapidly enabling IIoT connectivity across your site via hazardous environment-approved BreadCrumbs equipped with InstaMesh technology, Rajant Kinetic Mesh ensures your ability to scale growing plant operations smoothly and safely while keeping a leading edge over rising petrochemical competition.



We'll show you all the benefits that a smart network can bring to your plant.
Visit rajant.com/markets to get started.

Tel: 484.595.0233 | www.rajant.com

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