# Rajant Intrinsically Safe BreadCrumb® Nodes Form a Ubiquitous Kinetic Mesh® Network to **Power Industry 4.0 Capabilities for Petrochemical Plants**

As the petrochemical industry prepares to take advantage of new market growth and capitalize on the productivity gains of Industry 4.0 applications, plants require an Internet of Things (IoT)-enabling network more flexible than Wi-Fi networks or two-way radio WAN typically used in such facilities.

The influx of investments in the petrochemical industry has been described by experts as a true "renaissance". Fueled by abundant raw materials and increasing demand, new petrochemical plants are being established around the world, and existing plants are quickly expanding to capitalize on the recent market growth.

As the industry grows, however, so does competition. Today, leading petrochemical plants are searching for 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.

## Industry 4.0 Revolutionizes Petrochemical Plant Productivity and Safety

Industry 4.0 technologies—such as augmented reality (AR), autonomous robots, real-time equipment analytics, and more—have emerged as a next-gen solution that satisfies plant's need for enhanced productivity as well as mitigates the constant concern for personnel safety. These advanced applications need full Industrial Internet of Things (IIoT) connectivity in order to function; this is a requirement that Wi-Fi and two-way radio WAN cannot fulfill.

**Instead, your petrochemical plant needs the flexibility, reliability, and broadband scalability of IIoT, enabling you to remain competitive by dynamically connecting the people, assets, and devices that comprise every aspect of your current and future operations.**

The global petrochemical market is expected to grow at a **CAGR of 9%** over the next five years, reaching **$814.3 BILLION IN 2023.**[1]

In the U.S. alone, chemical manufacturers announced **nearly 320 chemical production projects** in 2017, with a cumulative **VALUE OF OVER $185 BILLION.**[2]

[1] https://www.energiasmarketresearch.com/global-petrochemicals-market-outlook/
[2] http://analysis.petchem-update.com/engineering-and-construction/us-2018-downstream-capital-projects-maintenance-outlook-surges

# Top IIoT Challenges In Petrochemical Plants

While it is clear IIoT is a critical part of establishing Industry 4.0 capabilities plant-wide, deploying a network to support these kinds of connectivity demands in your dynamic and inherently hazardous environment can be difficult. In the petrochemical industry, balancing facility and production growth with employee safety is paramount, but your network must keep up with demands to:

- **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.

- **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 your equipment from sparking and starting a fire, networking infrastructure generally must be kept in an explosion box as a precaution, further complicating installation.

- **Achieve Constant Connectivity:**
  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.

- **Covering Expanding Operations:**
  As was previously mentioned, 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.
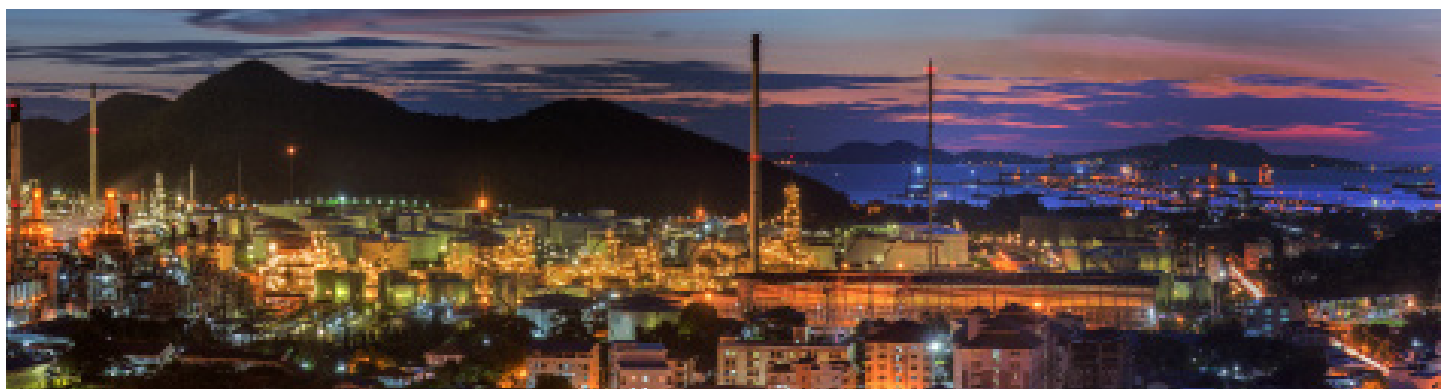
In order to overcome these significant hurdles and successfully enable innovative Industry 4.0 capabilities, your petrochemical plant requires a different kind of IIoT network.

## Industry 4.0: On The Rise In Petrochemical Operations

**Industry 4.0 digitalization** in the chemicals industry is expected to **CREATE A 3.9% COST REDUCTION** through 2020.[3]

**60% of surveyed chemical companies** state that Industry 4.0 data and analytics are of high importance today, and **88% BELIEVE** they will be of high importance in 5 years.[3]

[3] https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf

**Rajant Kinetic Mesh®:**

# Simplified, Secure IIoT Networking for Petrochemical Leaders

A private wireless network that thrives in harsh industrial environments, Kinetic Mesh networks use ME4-2450R-C1D2 BreadCrumb® nodes, equipped with smart InstaMesh® networking software, to create a Living Network™ that moves with and adapts along with your petrochemical operations. As a result, it is able to rapidly deliver secure, reliable broadband coverage anywhere you need it. **Here's how:**

- **A Secure Converged Solution**
  Kinetic Mesh eliminates the need for petrochemical plants to maintain multiple networks by flexibly supporting data, voice, and video. 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. Our intrinsically safe BreadCrumb nodes are also safe to deploy in any corner of your petrochemical plant without the need for mounting in explosion boxes.

- **Ubiquitous Connectivity for Mission-Critical Operations**
  With a compact form factor and ruggedized enclosure, the BreadCrumb can be attached to fixed or mobile assets including equipment, vehicles, and facility infrastructure. BreadCrumb nodes maintain multiple simultaneous connections between peers and can send and receive data on up to four different frequency bands. They never break connections to form new ones, maintaining connections until they are no longer needed. 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.

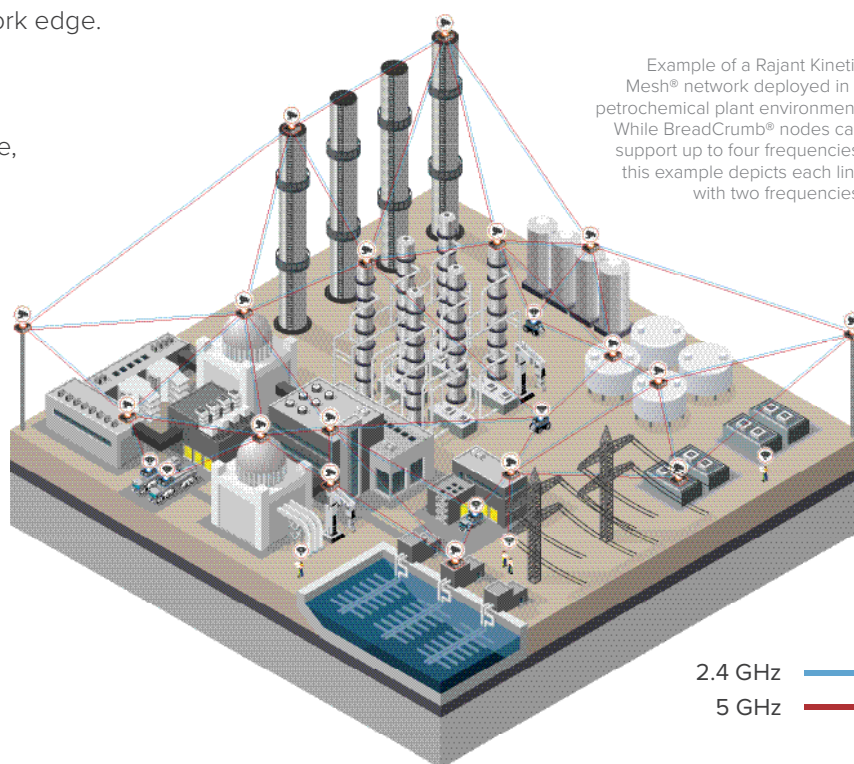- **Self-Optimizing, Self-Healing Infrastructure**
  InstaMesh® networking software is the smart technology that connects each BreadCrumb node, autonomously directing traffic over all meshed connections. By dynamically load balancing and routing data around signal blockage from moving assets and potential interferences, 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**
  Petrochemical plants are dispersed over widespread areas and are regularly adding new bandwidth-intensive applications to support continued growth. Because each BreadCrumb is equipped with the intelligence of InstaMesh, a Kinetic Mesh network is a readily scalable solution that can rapidly evolve with your plant's expansion. In fact, as more nodes are added, more paths to direct mission-critical data are naturally formed—and with more paths, the network becomes even more resilient. This means that your petrochemical assets can never be "out of network". With Rajant's IIoT-enabling solution, they **are** the network.

- **Military-Grade Data Security**
  Petrochemical plants are potential targets for high-risk network security attacks. Kinetic Mesh protects your plant from security breaches with multi-layered, military-grade security for network traffic, which includes multiple cryptographic options, configurable data and MAC address encryption, and configurable per-hop, per-packet authentication between BreadCrumbs.



Example of a Rajant Kinetic Mesh® network deployed in a petrochemical plant environment. While BreadCrumb® nodes can support up to four frequencies, this example depicts each link with two frequencies.

2.4 GHz ▬
5 GHz ▬

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**Powering Petrochemical Innovation:**

# Next-Gen Industry 4.0 Applications Run On Rajant Kinetic Mesh®

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.

- **RFID Tracking of Personnel and Contractors**
  Everywhere connectivity enables real-time tracking of workers across your plant facility. This not only allows operators to monitor personnel's ongoing safety status, but also aids in emergency extraction in case of an incident.

- **Asset Tracking and Optimization**
  Kinetic Mesh supports 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.

- **Automation and Control**
  Lay the groundwork for innovative IIoT applications such as 24/7/365 equipment autonomy with plant-wide asset mobilization, which increases petrochemical output while keeping employees out of dangerous areas.

- **Video Surveillance and Theft Monitoring**
  Protect products and equipment from theft with real-time video surveillance of your petrochemical plant. With round-the-clock views into operations, you can also gain insights into plant performance and events on the production floor.

- **Augmented Reality (AR)**
  AR application roll-outs can help you multiply the productivity of plant employees while also removing them from potentially hazardous petrochemical environments.

### ME4-2450R-C1D2 BreadCrumb® Nodes:
## Serious Safety In A Small Package

Made for C1D2 Hazardous Locations, Rajant's no-spark BreadCrumb nodes are built for use in petrochemical plants. Its intrinsically safe design enables you to deploy the BreadCrumb to function on plant infrastructure, equipment, and vehicles without mounting in an explosion box. This mounting flexibility greatly enhances ease of installation and ensures that nodes can be easily deployed to create reliable coverage in every corner of the plant.



## Key Rajant Kinetic Mesh® Features:

- Up to 300 Mbps physical-layer data rate
- Multiple, 2x2 MIMO-enabled antenna ports
- Military-grade security
- Scalable to hundreds of high-bandwidth nodes
- Multiple radios for interference mitigation
- Low latency, typically less than 1 ms latency

- IP67-designed dust-tight and water-tight enclosure
- Fully redundant—no single point of failure
- Nodes can be fixed or mobile, infrastructure or edge
- Self-configuring and self-healing operations
- Wi-Fi Access

# ROI: Maximize Productivity and Innovation, Minimize Risks and Costs

**Increase Output:**
The anywhere, anytime connectivity enabled by Kinetic Mesh® helps you better utilize plant resources while maximizing efficiency by enabling unified communications, remote asset monitoring and performance management, real-time decision-making, and data sharing to aid collaborative processes.

**Mitigate Risks:**
Not only are Rajant's no-spark, ME4-2450R-C1D2 BreadCrumbs® safe to deploy in any area of your plant, but with the power to enable real-time personnel tracking, augmented reality (AR), and remote monitoring and control of all valves and systems in the plant, Kinetic Mesh helps keep your employees out of harm's way.

**Decrease Downtime:**
Kinetic Mesh's fully redundant, self-optimizing infrastructure ensures zero downtime for your mission-critical petrochemical operations and also allows you to leverage predictive maintenance to keep all assets operating at peak efficiency.

**Lower TCO:**
With no cables to run, Rajant wireless networks can be deployed cost effectively in just days or weeks instead of months. The network's ongoing maintenance and management costs are also minimal.

**Scale Rapidly:**
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. In fact, the more nodes you add, the more resilient the network becomes.

**Stay One Step Ahead of Competition:**
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.

**Reduce Costs:**
Rajant's Kinetic Mesh is the single IIoT network your petrochemical plant needs to support current and future operations, allowing you to do away with costly, disparate Wi-Fi networks and two-way radio WAN.

**Improve Security:**
Real-time video surveillance streaming reduces loss due to theft, and military-grade network security protects your plant from high-risk data breaches and other malicious attacks.

# Summary

Rajant Kinetic Mesh is the solution for smart, safe petrochemical plant networking. By rapidly enabling IIoT efficiencies across your site via intrinsically safe BreadCrumbs equipped with InstaMesh® technology, Rajant creates ubiquitous plant-wide connectivity to support Industry 4.0 applications that maximize productivity, enhance safety, and give you a leading edge over rising petrochemical competition.

20+ YEARS OF GAME-CHANGING WIRELESS

RAJANT