



# Optimizing Rail Velocity with a Fully Mobile, Never-Break Network

Rajant's wireless broadband network is the **only RF solution that enables constant communication between train and wayside and within the dynamic environments of ever-moving railyards** – because the network itself is dynamic too.

## If It's Moving, It's Rajant: Coverage that Keeps Up with Rail's Speed and Mobility Demands

**In Rajant's unique Kinetic Mesh® architecture, all network nodes – known as BreadCrumbs® – can be mobile and hold multiple connections simultaneously over multiple frequencies.**

Deployed on wayside points and on the train itself, they work peer-to-peer to form an adaptable, resilient mesh between both fixed and in-motion rail assets, creating hundreds of potential paths over which to direct traffic.

Rajant's InstaMesh® networking protocol provides for the continuous and instantaneous routing of data, voice, and video communications over these connections by selecting, in real-time, the best pathway between any two points on the network, even when those points are in motion.

From the transit agency to the railyard, operations are going digital. Keen to modernize their passenger and freight systems to improve transport speed, safety, and the commuter experience, rail operators are integrating innovative applications for automation, real-time tracking and control, and more.

Unfortunately, **traditional wireless networks such as Wi-Fi Mesh, Point-to-Multipoint, and LTE cannot deliver the high availability these new applications need to run effectively because they operate from fixed infrastructure and must break connectivity for handoffs.**

Even momentary drops of coverage can compromise an agency's visibility into their trains' exact locations and status, or the functioning of autonomous railyard equipment, or a passenger's ability to connect to onboard Wi-Fi.

If a path becomes unavailable or blocked, InstaMesh will dynamically route communications via the next-available path.

### **No connections need to be broken for new ones to be made.**

Unlike Wi-Fi clients which can only have one live connection at a time, Rajant's network never has to break for handoff, delivering continuous connectivity on the move. Low latency communications are maintained with mission-critical reliability even at speed, and because the network does not use a controller node, there is no single point of failure.

## Robust fault tolerance in challenging RF environments.

BreadCrumbs can similarly be deployed on railyard equipment and vehicles, and are ideal for these difficult-to-network environments which must deal with signal blockage caused by large and moving metal container stacks and cranes. Multiple data path and frequency options in the network provide for redundancy and enable the network to mitigate the effects of interference to maintain high availability.

## Self-optimizing network managed with minimal technical resources.

Rajant Kinetic Mesh offers the additional benefit of low cost of ownership because it can be maintained without dedicated IT resources. After initial configuration, new BreadCrumbs added to the network automatically begin communicating with their neighboring nodes, autonomously and without outside intervention. This also makes the mesh easily scalable to hundreds of high-bandwidth nodes.

## Powering Real-Time Rail Applications Communications & Control on the Move

With Rajant's network, **updates on the location, status, and performance of trains, freight, and associated rail equipment can be sent and received in real time**, allowing for an accurate end-to-end view of intermodal operations and enabling timely analysis and decision making.

## Improving Speed, Safety, and the Passenger Experience

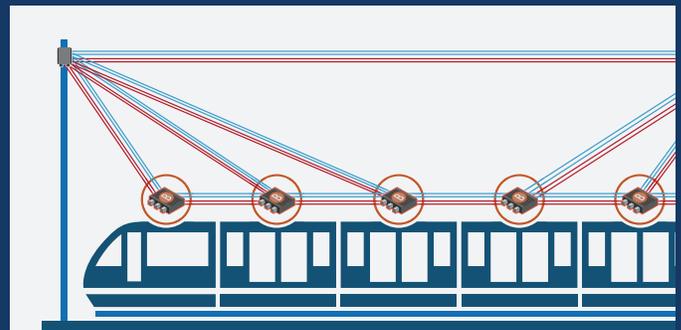
Rajant delivers all four of the vital components of mass transit system networks in one single solution, enabling train-to-wayside connectivity, car-to-car connectivity, intelligent routing between mesh and backhaul, and onboard Wi-Fi distribution. This enables:

### Communications-Based Train Control (CBTC)

**BreadCrumbs enable constant communications between trains and the wayside** to allow CBTC systems to perform precise real-time location tracking and control railway traffic for safer, more efficient movement of passengers.

### Onboard Wi-Fi

Transit riders have high expectation for – and heavy reliance on – in-transit mobile connectivity. **Rajant can provide high-speed Wi-Fi accessibility in every car** and because the network does not break for handoffs, there is no loss of capacity while distributing this connectivity.

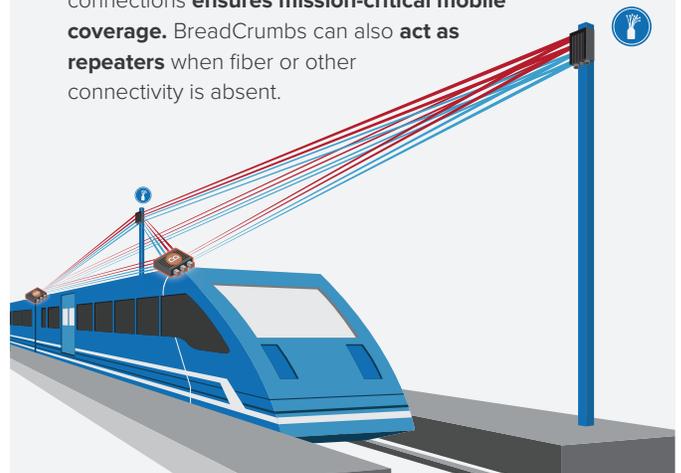


### Multi-Radio, Multi-Band Advantage

BreadCrumbs work peer-to-peer to **enable intra-car connectivity while simultaneously connecting to the trackside** to further increase capacity.

### Kinetic Mesh is Always Connected

The redundancy of multiple simultaneous connections **ensures mission-critical mobile coverage**. BreadCrumbs can also **act as repeaters** when fiber or other connectivity is absent.



— 5 GHz Traffic    — 2.4/4.9/3.65 GHz Traffic

## Making Railyards Smarter and More Efficient

In the intermodal yard, Rajant provides the resilient, high-bandwidth links that enable intelligent applications used to improve freight and container movement efficiency, increase worker safety, and optimize stack management. These could include:

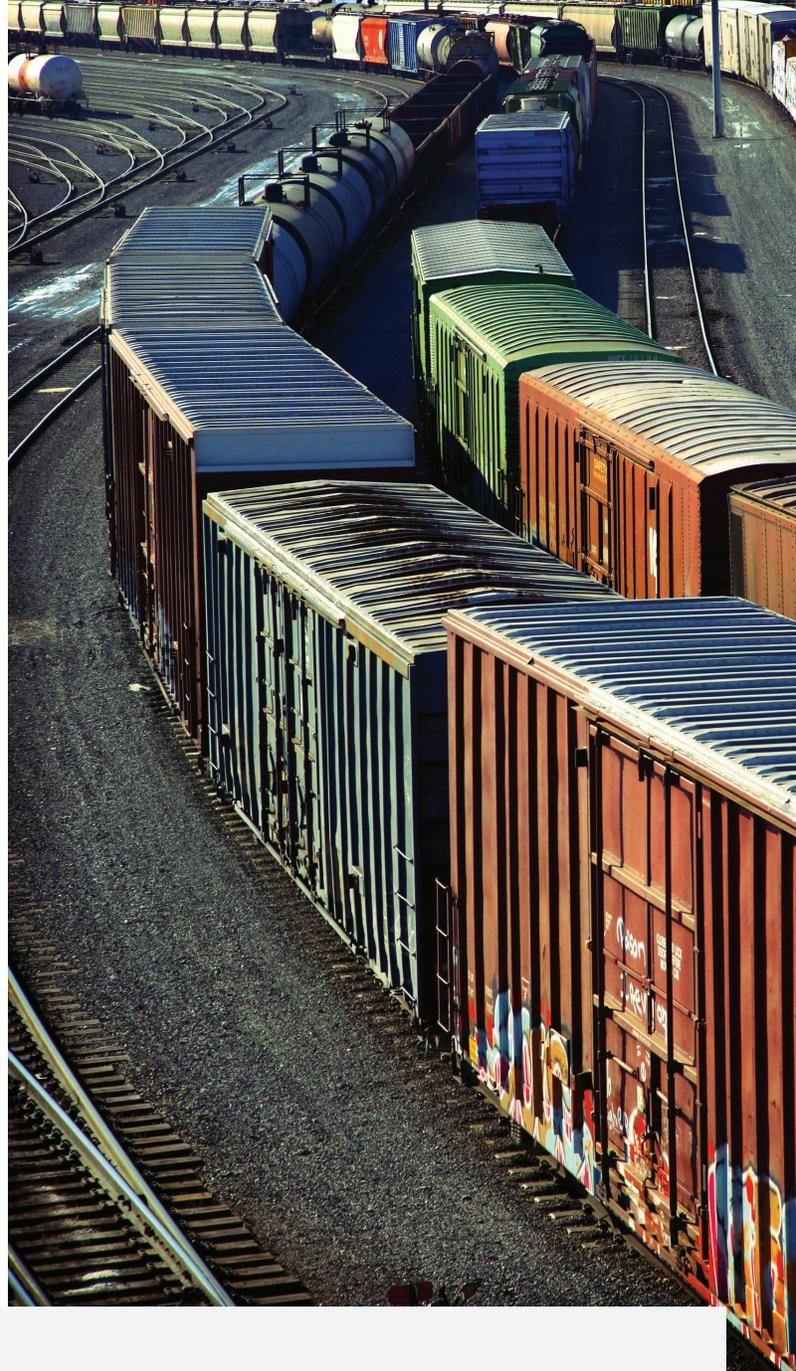
### Smart Cranes

Gantry cranes equipped with position detection systems running on Rajant's network can be used to **track the position of equipment in real time around the yard** to streamline stacking processes and decrease truck dwell time.

### Smart Container Management

Optical recognition software running on cameras attached to cranes can **auto-scan and identify containers in their stack, and easily locate the proper ones to be dispatched**. This not only saves time, but keeps drivers out of hazardous areas as they do not need to track down containers manually.

**These are just a few of the real-time applications that Rajant can support with the highest levels of reliability and with multiple security protocol options to be keep communications transmissions secure.**



## Delivering Best-in-Class Technologies to Rail, Together

Through our strategic partnership with Wabtec, leading supplier of value-added, technology-based products and services for freight rail, passenger transit, **we are at the forefront of advancing transportation systems through continuous mobile connectivity.**

Our connectivity solutions for real-time data are a perfect complement to Wabtec's comprehensive portfolio of products and services, and together we are bringing new capabilities to support the continued digitalization of modern rail operations.

## Ready to Accelerate Your Rail Operations? Make Your Move to Rajant.

Gain a network with the agility and adaptability you need to take full advantage of next-generation applications for improving safety and security, increasing operational efficiency, and implementing autonomy.

**With over 50,000 BreadCrumbs operating in the field today, Rajant's networks are powering mission-critical, fully mobile communications for military, government, and industrial operations around the world – including mass transit systems and railyards with proven reliability and performance.**

**Interested in learning how  
Rajant can connect your rail  
system to new value?**

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

Tel: 484.595.0233 | [www.rajant.com](http://www.rajant.com)

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