

# Broadband Solutions for “Last Mile” Connectivity

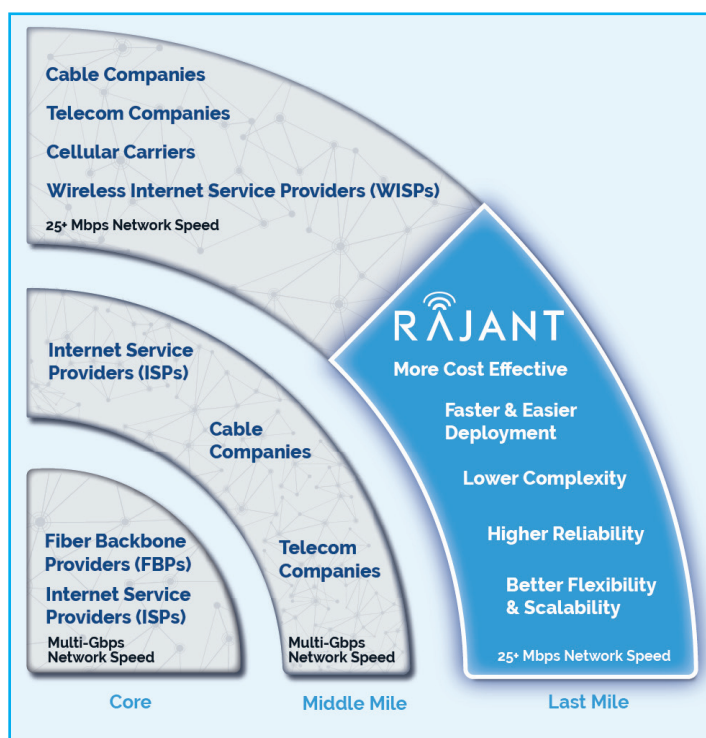
Wireless broadband has become a necessary part of everyone’s life. Transformative as water and electricity to the vibrancy of daily living, businesses, governments, schools, and households cannot function in a “digital desert” without the Internet. Connectivity is an essential public service, and **Rajant delivers a cost-effective coverage solution to underserved and unserved areas.**

As everyone knows, water systems and electricity grids were first deployed in cities, and then they sprawled out into the suburbs – until they eventually reached rural areas. The same thing is happening to wireless broadband; believe it or not, it still has not reached rural areas in most parts of the world.

Many people think satellite connectivity is the only solution for wireless broadband in rural areas. Still, those providers can typically only provide minimal megabits per second (Mbps) for a rather expensive monthly fee. The top satellite providers can reach impressive speeds, but it is not cost-effective for anyone to pay those monthly rates.

Today, however, there are other options. As DSL, fixed wireless, cable internet, and fiber-optics are becoming more prevalent, they continue to spread their networks into rural areas. In fact, in the United States, the Federal Communication Commission is making significant efforts to entice these types of providers to spread out into more rural areas to reach these “digital deserts” and address the digital divide. So, while satellite companies may still seem like the only option, other connection types such as DSL, fixed wireless, cable internet, and fiber-optics are now becoming more ubiquitous and economical options.

As telecom, cable, and other traditional internet service providers are beginning to spread out networks to remote rural areas, it often becomes cost prohibitive for those types of wireless providers to cover the “last mile” – the term given from the termination point of the fixed line to where all the homes and businesses are that require this essential resource. As a result, wireless Internet service providers (WISPs), local governments, and system integrators are turning to Rajant to extend broadband service areas, creating a high-capacity wireless mesh network like no other.



# Connecting the Unconnected With Critical Broadband Reliability

Everyone wants and needs failover redundancy in the most far-reaching corners of any community. Whether it is lifesaving access to telemedicine or remote learning, Rajant's multi-frequency BreadCrumbs® provide a Layer-2 network that is proven resilient and reliable in some of the world's most challenging environments.

Without infrastructure and high-tech support, a Rajant Kinetic Mesh® wireless network is up and running within minutes for customers in the military, mining, port, agriculture, and more. As a result, Rajant has designed a system to operate in extreme environments, and so it is uniquely capable of overcoming the challenges related to rural deployments. Rajant technology can hold and maintain multiple connections simultaneously, given an array of radio options allowing for real-time data routing. Rajant BreadCrumb radio nodes work peer-to-peer to form robust and redundant links between assets. In turn, the network delivers fully mobile, rapidly scalable, high-capacity connectivity that is now required in rural towns.

All mesh networks are not created equal. Rajant BreadCrumbs make hundreds of potential paths to direct data traffic. Each node has the intelligence of Rajant InstaMesh® networking software on board, which dynamically selects the fastest path or paths for delivery from these meshed connections. As a result, the effects of interference, even in harsh RF environments, can be mitigated. If faced with adverse network conditions, signal blockage, or a jammed frequency, InstaMesh will instantly route communications via the next-best available path(s) and/or frequency, ensuring no single point of failure. The ability to leverage multiple paths and frequencies also provides high capacity to guarantee the performance of bandwidth-intensive applications.

## Continuous Connectivity Anywhere: Expand and Create Networks Where They Did Not Exist Before

The Rajant BreadCrumb nodes comprising a Rajant Kinetic Mesh network can be deployed virtually anywhere and on almost anything to extend or enhance essential voice, video, and data communications coverage.

### Multi-radio, multi-frequency redundancy to ensure essential reliability

Rajant BreadCrumbs simultaneously can hold multiple connections over multiple frequencies, creating hundreds of potential paths to direct traffic. Each node has the intelligence of Rajant's InstaMesh® networking software on board, which dynamically selects the fastest path or paths for delivery from these meshed connections. As a result, the effects of interference, even in harsh RF environments, can be mitigated. If faced with adverse network conditions, signal blockage, or a jammed frequency, InstaMesh will instantly route communications via the next-best available path(s) and/or frequency, ensuring no single point of failure. The ability to leverage multiple paths and frequencies also provides high capacity to guarantee the performance of bandwidth-intensive applications.

## Hardened, industrial-grade nodes built to function optimally under challenging conditions

BreadCrumb nodes are built to withstand harsh outdoor environments and extenuating conditions, which can be the case in rural areas. Nodes can be easily affixed to both stationary and moving equipment or vehicles. They can even be vest-mounted to provide police and other first-responders with real-time communications and live streaming capabilities on the move.

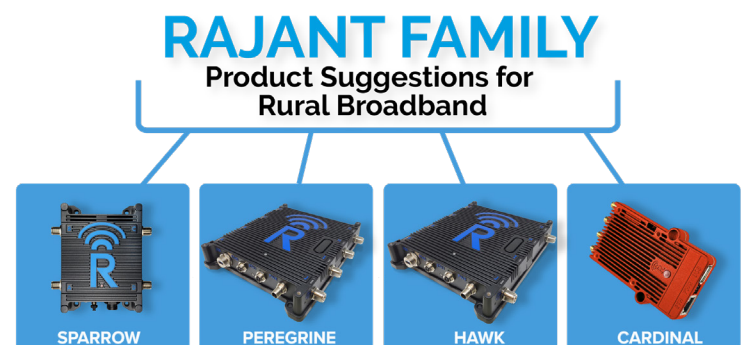
### Deployable anywhere with self-managing functionality

The architecture of a Kinetic Mesh network makes it uniquely able to augment existing mobility-challenged networks and to be deployed where no infrastructure yet exists. It seamlessly integrates with existing network infrastructures, making it possible to readily fill gaps in coverage where other network systems do not or cannot reach for instant coverage expansion.

In addition, the deployment does not require a team of network engineers. After initial configuration, when new BreadCrumbs are turned on, they automatically begin communicating with other nodes in the area, autonomously and without outside intervention. Set up and maintenance time is minimized to allow the network to be utilized as soon as possible.

### Revitalize Downtown with Main Street Mesh

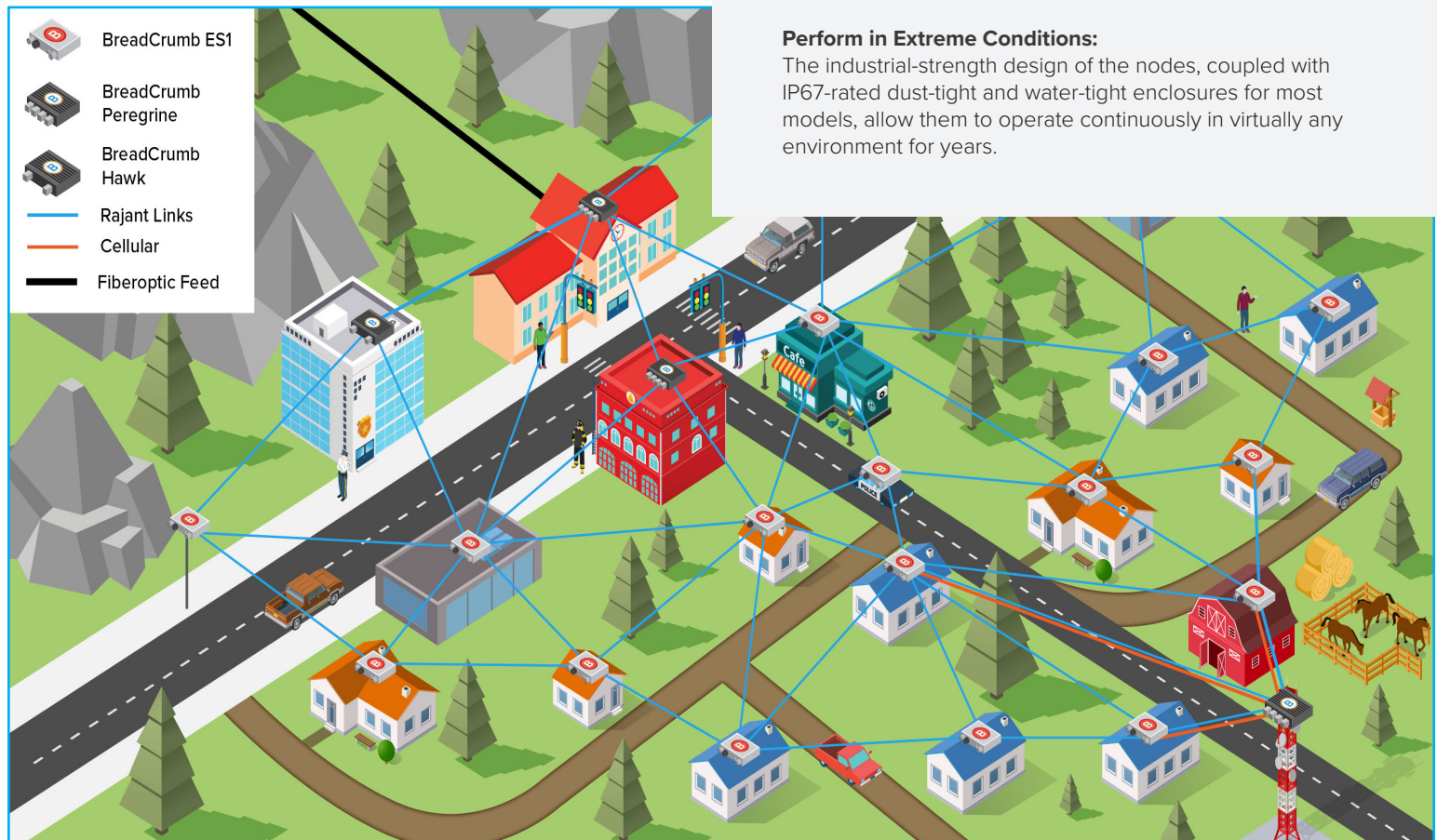
High-speed internet coverage brings renewed possibilities to communities attracting commerce, services, and amenities. "Smart City" enablement of IoT devices becomes possible with Rajant Kinetic Mesh. Traffic lights, surveillance video, public Wi-Fi, and public safety equipment are easily affixed with low latency, high bandwidth BreadCrumbs. Whether mobile or stationary, any ready node becomes part of the wireless network for broadband connections wherever they need to go. Rajant is compatible with other existing infrastructure. The radio nodes have integrated Wi-Fi access point service for compatibility with millions of commercial off-the-shelf (COTS) client devices, like laptops, tablets, and smartphones.





# The Ultimate Solution for Bringing Wireless Broadband to Rural Areas

High-capacity DSL, fixed wireless, cable internet, and fiber-optics typically terminate in a rural city at a government building like a courthouse or a first-responder facility. Since Rajant BreadCrumbs can be affixed almost anywhere, you can easily understand that attaching Rajant BreadCrumbs directly outside of that building in fixed positions like on streetlights, traffic lights, telephone poles, and surrounding structures. In addition, since the BreadCrumbs can be attached to virtually anything, whether fixed or mobile, they can also be mounted onto elements in motion like police cars, fire engines, and even people. You can quickly envision how all these wireless multi-frequency nodes, which are constantly connected using Rajant's patented InstaMesh protocol, can create a robust, essential wireless mesh network. In short, Rajant BreadCrumbs can easily be deployed ad hoc to bring connectivity where no communications infrastructure exists. As a result, that network can easily be extended to schools, churches, and even homes – extending the high-capacity broadband line throughout the “last mile” of a rural city or town.



## Benefits of Rajant Kinetic Mesh

### Peer-to-Peer Functionality:

Every Rajant BreadCrumb can hold multiple simultaneous connections, over multiple frequencies, with other nodes in the mesh, eliminating the need for a controller node while adding network reliability.

### Deployable as Fixed or Mobile Nodes:

Compact, lightweight BreadCrumbs can be affixed to static equipment or deployed directly on moving assets – so machines and personnel can take connectivity with them wherever they go.

### Infused with InstaMesh Intelligence:

All BreadCrumbs have Rajant's patented InstaMesh networking software onboard, which dynamically evaluates and directs traffic via the best available paths at any given moment.

### Self-Optimize without Intervention:

InstaMesh enables the nodes to adapt quickly or constantly moving network elements in real-time. No connections must be broken for new ones to be made, providing resilient mobility.

### Support Seamless Scalability:

If new BreadCrumbs are added, they automatically begin meshing with neighboring nodes and further strengthen the network by providing additional paths to send traffic.

### Perform in Extreme Conditions:

The industrial-strength design of the nodes, coupled with IP67-rated dust-tight and water-tight enclosures for most models, allow them to operate continuously in virtually any environment for years.

## IDEAL BREADCRUMBS FOR PUBLIC SAFETY NETWORKS



The **BreadCrumb ES1** comes in a compact, lightweight, IP67 package ideal for use on pick-up trucks light-duty vehicles, robots, and wearables with flexible mounting options.



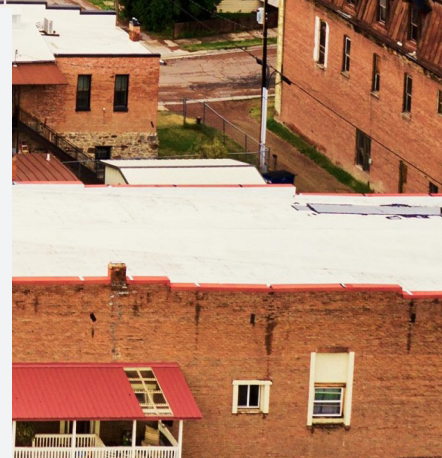
Optimized for mobility, the **Hawk BreadCrumb** is a high-performance industrial-grade node providing higher throughput with enhanced security performance using 256QAM, 80 MHz channels, and hardware acceleration.



The **Peregrine** is a quad transceiver BreadCrumb platform that supports a maximum combined data rate of 2.3 Gbps. It offers multiple MIMO radio interfaces, high throughput, and enhanced security performance with up to 256QAM and 80 MHz channels.

## Rajant Private Wireless Networks: Readily Deploy Reliable Communications to Rural Areas

Rajant's multi-radio, multi-frequency architecture provides the low-latency, high-throughput, resilient performance required to ensure the uptime of bandwidth-intensive communications. Rajant Kinetic Mesh rapidly enables essential data, voice, and video applications wherever needed. It is the ideal wireless network for the "last mile" to address the "digital deserts" in rural areas.



Interested in learning how Rajant can connect your Rural Community?

See how Rajant's Kinetic Mesh wireless networking supports diverse applications with unmatched real-world success.

Visit [rajant.com/markets/](https://rajant.com/markets/) to get started.

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

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