Pushing the Envelope: What is Possible with Mesh Networks
By Geoff Smith, Executive Vice President, Global Sales and Marketing

The global mesh network market is anticipated to grow exponentially over the course of the next decade, with significant potential in commercial applications. That's partially due to the dependence on mobile devices, but it's also connected to the growth of artificial intelligence (AI) and Internet of Things (IoT) technology. So, what is mesh networking, and how is it aiding our devices? There are three key advantages to mesh networking: resiliency, scalability, and cost-effectiveness. This technology can be used in emergency response, automated industrial spaces, rural connectivity, and an array of other applications, such as mining, ports, and warehousing—the opportunities are endless.

A mesh network is a transformative technology providing online connectivity to devices, just like Wi-Fi or LTE. But unlike Wi-Fi or LTE mesh networks are unique because instead of each device depending on access to fixed infrastructure, mesh networks feature nodes, or signal-bridging devices, arranged in a mesh or web-like structure serving as points of connectivity between each other. Mesh networking offers a decentralized and dynamic approach that can bring internet access to even the most challenging locations, making it a true game-changer.

Unlike a traditional network, such as the earlier mentioned Wi-Fi, that connects to a central hub like a router, mesh networking creates a network where devices, or nodes, link directly to each other and self-optimize the flow of signal connectivity to ensure consistent, reliable coverage. This connectivity prevents a single point of failure, like a Wi-Fi router going out, and offers several advantages to users with assets that require uninterrupted coverage.

What Makes Mesh Dependable & Resilient

Metal racks and heavy equipment, signal interference, and limited capacity may challenge the integrity of other networks. But, mesh networking can self-heal, connect M2M to "see around obstacles", ensure sufficient network capacity, and deliver extremely low latency. If a node in the network fails or is disconnected, data can find alternative paths to reach its destination. This redundancy ensures the network remains functional even if individual nodes experience technical issues, allowing for continuous connectivity for mobile systems moving through the network.

Mesh Can Scale to Match Any Need

Mesh networks are inherently scalable. New devices join the network and contribute to its overall capacity and coverage. Its redundant web-like structure makes mesh networking ideal for expanding connectivity in challenging industrial environments or growing business operations. To extend the mesh network, users add additional nodes wherever or on whatever they're needed.

Scaling traditional networks requires a base station and tower placement, frequency availability, and the number of access points within the network must all be considered. Gaps or dead zones in coverage can be common when moving far away from fixed towers. If scaling is necessary, base stations, towers, and additional access points must be added at fixed locations—and those get expensive quickly. With a mesh network, equipping an asset with a node and properly distributing nodes throughout a space, ensures that everywhere that asset needs to go will have coverage.

They Are Cost Effective Networks

Simply put, mesh networking requires less infrastructure, reducing costs for businesses and organizations while providing better coverage with a more consistent signal and speed. The superior coverage makes mesh networking an appealing investment to most users. On the commercial side, industries will experience 5x equipment cost and operating expense reduction over LTE, for example.

Here's more about the practical uses for mesh networks in 2023:

Helping Facilitate Emergency Response

Mesh networks play a crucial role in emergency response and disaster-stricken areas where traditional communication infrastructure is often jeopardized. Utilizing mesh networks to establish communication and coordinate relief efforts is especially important. Enhancing interoperability between multiple agencies responding to the same emergency is critical. But mesh networking also bolsters early warning systems for natural disasters like tsunamis, hurricanes, and tornadoes while providing connectivity in disaster areas for using things like drones for rescue and recovery efforts, as well as damage assessment.

Mesh Networks are Transforming Smart Facilities

Mesh networks are increasingly becoming the backbone of smart facilities, contributing significantly to their efficiency and reliability. With interlinked nodes that evenly distribute network connections and data amongst each other, mesh networks provide a robust infrastructure for IIoT devices. In a smart facility, sensors, controllers, and other connected devices can communicate seamlessly through the mesh network, ensuring constant connectivity and real-time data exchange. This allows for efficient monitoring and control of systems such as lighting, HVAC, and security, resulting in lower energy consumption and improved facility management.

Mesh Networks are Transforming Rural Connectivity

Bringing internet access to rural and underserved regions is a significant challenge. Mesh networks can bridge that digital divide. Access to the internet and higher connection speeds

allow residents an essential pathway to online education, remote work opportunities, and virtual healthcare.

Mesh networking has emerged as a leading technology for expanding connectivity to remote and underserved areas. Its adaptability, scalability, and cost-effectiveness make it an ideal solution for various applications. As technology grows exponentially, mesh networking will continue to bridge the digital divide and reshape how we connect with the world.

About the Author
Geoff Smith has over 25 years of experience designing, managing, marketing, and selling innovative communication solutions. Mr. Smith joined Rajant as Executive Vice President of Global Sales and Marketing in 2017, focusing on growing Rajant's V2X sales in IIoT markets and driving the company's global expansion. He oversees multiple teams to ensure partners and end-user companies understand how the breadth of Rajant solutions can help achieve strategic advantages in their respective markets.