Smarter solutions for industrial efficiency

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Automation

April 2022

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M2M communication in smart factories

Geoff Smith, Executive Vice President of Global Sales and Marketing for Rajant, states that, once considered innovative, the idea of a smart factory with ample automation is now the norm

Factories are becoming "smarter" at a remarkable rate. A 2021 survey from Plex on the annual *"State of Smart Manufacturing"* reveals a more than 100% growth in the adoption of technologies like Industrial IoT, smart devices, machine learning, AI, robotic process automation and cobots. One out of every four manufacturers worldwide has implemented smart manufacturing, and nearly out of four are in pilot stages; an overwhelming 80% see smart technologies crucial to future success.

At the core of every smart factory is the connection of various devices (and people) that work together in an automated ecosystem. Cooperation and communication are critical to making the smart factory work. And that's why it's essential for companies building smart factory capabilities to start at the foundational level: at the network that's supports everything. Machine-to-machine (M2M) communications, i.e., computers sharing information directly with each other, are only possible in an environment with consistently reliable connectivity. But too often, the network slows down the smart factory.

Wi-Fi, LTE and 5G

Many warehouse systems run M2M communications through Wi-Fi that rely on fixed infrastructure. Wireless technologies keep advancing year over year, but there are limitations. Limited by distance, wireless local area network (WLAN) technology is best suited for indoor facilities where most people and machines are relatively stationary. Wi-Fi networks are unable to work around physical and RF interferences, which means signal drops are rather common, which is unacceptable in a manufacturing, smart-factory setup. According to Aberdeen Research, machine downtime can cost manufacturers as much as $260,000 per hour. In addition, abrupt disruptions create safety issues for workers and the health of the machines.

Long Term Evolution (LTE) networks provide wider area coverage than Wi-Fi. However, industrial environments pose significant challenges to LTE networks – reach is impacted by obstructions (steel racks or cement walls, etc.), and adding a new base station to improve coverage is time-consuming and costly.

Beyond that, LTE data rates degrade the farther mobile equipment moves from the tower, and LTE lacks the upstream speeds industrial operations need to run mission-critical applications like real-time machine guidance and closed-circuit television (CCTV).

5G, the fifth-generation mobile network, promises significantly higher performance and improved efficiency. Next-gen 5G will take advantage of higher frequencies to deliver data rates faster than 4G. However, 5G frequencies have a much shorter range and require line of sight, which in turns means more towers, which adds to deployment and maintenance costs.

Optimising M2M communications

Wireless and LTE networks have their pros and cons, as discussed. A third option can work in tandem with other networks to keep machines connected and communicating in any environment.

A mesh network like Rajant's Kinetic Mesh enables machine-to-machine communication that extends coverage past the limitations of fixed infrastructure, and creates large-scale connectivity through various devices without loss of communication. Innovative manufacturers can implement a self-optimising and self-healing network that enables continuous autonomous operations.

Several providers create instant networks, while the best create more resilient, fully-mobile coverage within an industrial setting.

Wireless mesh networks that include several nodes (the connection points that form the communication link) can simultaneously hold multiple connections over multiple frequencies. This creates a setup with hundreds of potential paths available to connect devices without any network degradation. Nodes can be fixed or mobile, which means they can be deployed across a variety of manufacturing and industrial environments. This ultimately enables M2M communication in any dynamic environment. And those that support Wi-Fi communication can connect to any Wi-Fi IoT device.

In an era when efficiency is mission-critical, wireless mesh networks can be the answer in bringing an even smarter smart factory to the fold.

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