

DOES A FASTER NETWORK MAKE FOR SAFER FOOD?

Fast 5G networks fuel fourth agricultural revolution and accelerate improvements to supply chain.

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When people talk about revolutions in agricultural history, they generally agree that the first revolution was the transition from hunting and gathering to farming. The second transformation coincided with the industrial revolution and mechanized farming while increasing farmers' market access with faster transportation. The third revolution revolved around hybridization and genetic engineering with the increased use of chemical pesticides and fertilizers. Thanks to the speed, reliability, and scalability of 5G networks, the fourth revolution in the form of smart farming has already begun, and it extends throughout the food supply chain.

Safety and Tracing

The entire food supply chain has always seized on advances in technology to produce, ship, and sell food. Enterprise resource planning (ERP) software systems, GPS, and other monitoring

technologies are currently used to track, transmit, and analyze product data in real-time. 5G-enabled advancements in Internet of Things (IoT)-type sensors are the next step forward in fine-tuning the supply chain process. Just google "IoT sensors for farming," and you'll be rewarded with pages of merchandise and information. According to VAI CIO Kevin Beasley, "5G-enabled IoT devices can go with the food products and report their condition, temperature, safety, humidity level, and other related factors in real-time." Obviously, that's a safety improvement that could calibrate any product tracing for recalls, or any other purpose, from an entire crop or manufacturing period to a granularity of a storage facility or specific delivery vehicle. In fact, if 5G-enabled IoT sensors are used on farms, any produce in question could be narrowed down from an entire farm to an acre or a row.

In the U.S., these advancements support the FDA's Food Safety Modernization Act (FSMA). The European Union has similar food traceability requirements.

Efficiency Just in Time

Farming enterprises that implement private 5G networks can enable high-bandwidth use cases (for example, crop monitoring using drones or autonomous vehicles). They can also collect, aggregate, and share the data from thousands of transactional or triggered IoT sensors in real-time, just in time for regular tasks such as planting, watering, or harvesting. They can also use this data for predictive analytics modeling for any number of targeted improvements in yield or sustainability. In short, 5G could enable lean farming.

Sustainability

Obviously, it's not just the tracing and delivery parts of the food supply chain that benefit from

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5G networks' capabilities: Farms can be made more efficient and sustainable in their use of natural resources. Again, using IoT devices to monitor soil conditions, temperature, water quality, and use, the health and location of animals, the temperature of refrigerators or ovens, or the presence of contaminants in real-time and across an entire enterprise not only frees up human labor for actual problem solving and innovation but introduces opportunities to reduce water, feed, energy, and fuel consumption, to name a few.

The edge monitoring and computing power of 5G networks is also key to these improvements in sustainability. In an interview with Forbes magazine, Cristina Rodriguez, vice president of Intel Corporation's Network and Edge Group and general manager of the Wireless Access Network Division, asked, "How many things could you do in agriculture when you introduce technology at the edge, such as sensors for water, sensors for the health of the crops, for energy saving? Think of the amount of waste we can reduce, but also the ability to have more food available for people." Now, Rodriguez noted, "you can introduce humidity sensors, temperature sensors, all kinds of sensors that are going to help you,

depending on what crop or what kind of agricultural product you have. This helps you determine what you need. More water? Less water? Fertilizer?"

Autonomous Robots and Vehicles

Spurred by the COVID-19 pandemic's depletion of the workforce and increased requirements for cleaning and disinfecting, manufacturers and warehouses, among others, are turning to autonomous cleaning robots, which can meet expanded cleaning regulations. Floor-scrubbing robots use artificial intelligence (AI)-driven navigation and 5G to provide consistent and ceaseless cleaning for warehouse and factory floors.

Autonomous vehicles are also revolutionizing food production in farm fields. Both Monarch and John Deere announced fully autonomous tractors in 2022. These tractors, and others like them, rely on the low-latency connectivity 5G offers for real-time response and remote monitoring and control. Currently, it seems as if these tractors only require farmers to fuel them—if needed, electric and hydrogen-fueled tractors exist—and move them from field to field. That's hundreds of person-hours saved with one smart machine.

Looking Ahead

Currently, the importance of 5G-enabled IoT devices for safety, tracing, efficiency, and planning in the modern food supply chain can't be denied. They're becoming integrated into mainstream food production and could soon be as necessary as they are ubiquitous. Whether a communications service provider (CSP) provides the connectivity or an enterprise opts for private 5G, smart farming requires a network that is secure and allows for visibility all the way to the edge. At NETSCOUT, we use Smart Data to offer solutions that allow end-through-end monitoring. We call it Visibility Without Borders, and it allows you to monitor any application or service, from any vendor, on any network.

Looking Out Over the Edge

I can't help but wonder if 6G will allow tractors to drive themselves from field to field. I even wonder if innovations in 5G—and 6G after it—might revolutionize cooperative, small-scale, local farming. What if a group of small farms could share a tractor that was so well connected to fine-tuned IoT sensors that it knew which field it should be in at any given time for any number of purposes? Could a quiet, electric (or other) tractor operate 24/7 in closer quarters to residential areas, producing



food for the community? Could 5G+ technology-driven just-in-time farming be the solution for food insecurity? Be the solution for food security? What could this scenario mean for increasing farmers' incomes? Or for reducing the price of food while increasing its

availability? Could a resurgence of small, local farms act as insulation against global price and supply fluctuations such as those the war on Ukraine is having on grains and vegetable oils?

Whatever happens in the long

term, the advances in smart farming and food supply chain monitoring enabled by 5G technologies are already revolutionizing food production and delivery.

