



HPE aruba
networking

How private 5G is reshaping agriculture

HPE 
GreenLake

Why is agriculture adopting private 5G networks?

Agricultural technologies have changed how crops and livestock are managed, how resources are deployed, and how data is collected and used to achieve greater levels of precision and efficiency. An increased reliance on advanced technologies to inform decision-making and optimize operations—from Global Positioning Systems (GPS) and Global Navigation Satellite Systems (GNSS) to connected devices and autonomous vehicles—necessitates real-time, secure access regardless of location or device.

Dependable connectivity to wide areas has become critical to leveraging the technologies that agriculture relies upon to maintain, manage, and expand business and research. In addition to eliminating the geographical constraints and isolation of the past, farmers rely on accurate and timely access to market data, weather forecasts, and crop and livestock data to drive decisions and operations. In fact, the precision agriculture market is projected to reach \$27.81 billion by 2031, in part due to increased government initiatives that promote the use of modern technologies in the agriculture sector.¹

But challenges exist. The expansive geographies and rural nature of agricultural enterprises, as well as the growing reliance on Internet of Things (IoT) devices, autonomous vehicles, and automated machinery, can put a strain on public cellular networks and require coverage in addition to what can be provided by Wi-Fi networks.

That's why agricultural enterprises are increasingly turning to private 5G technology to deliver reliable and secure connectivity that augments Wi-Fi networks. In addition to ensuring robust and secure connections, private 5G provides 8x to 10x the outdoor coverage of Wi-Fi because it operates at higher power levels and can be deployed quickly and efficiently for reliable coverage in both indoor and outdoor settings, from greenhouses and warehouses to crop fields and ranches.²

HPE Aruba Networking reduces the multivendor complexity traditionally associated with deploying and managing a private 5G network. Based on technology acquired from Athonet, a Hewlett Packard Enterprise acquisition, our complete end-to-end solution provides everything agricultural enterprises require to deploy private 5G, including cloud management, mobile core software, hardware appliance, indoor and outdoor radios with a spectrum access system (U.S.), and SIM/eSIMs. With HPE Aruba Networking, agriculture can leverage the wide area coverage, low latency, and high levels of reliability provided by private 5G with a purpose-built solution that's easily managed and built upon proven technology. HPE Aruba Networking also offers scalable, extensible private 5G core software that can be deployed fully on-premises, in the cloud, or hybrid with any standards-based radio.

¹ [“Precision Agriculture Market to be Worth \\$27.81 Billion by 2031,”](#) Meticulous Research, 2024.

² Based on ongoing research and testing within the HPE customer base in both Wi-Fi and private 5G networks. The latest data is from 2024.



Deploying private 5G in agricultural environments delivers several key benefits

Agricultural entities that have deployed private 5G are realizing several benefits: reduced resource consumption (for example, water, grain, fertilizer, pesticides), improved operational and distribution efficiency, increased crop yield, the ability to respond quickly to changing conditions, the ability to address labor shortages, and greater sustainability with less environmental impact.

Private networks deliver	Agricultural requirement	Advantage of private 5G
Wide-area coverage	Coverage required over large outdoor areas and in warehouses and processing plants	Can cover large areas with minimal infrastructure, due to high power and receive sensitivity. This could provide a significant cost saving compared to other technologies
High-speed mobility	Need to connect mobile applications such as robotics and autonomous vehicles	Can meet the throughput and latency requirements of autonomous vehicles in both indoor and outdoor environments
Predictable, reliable quality of service	Reliability to support critical applications and operations in real time, such as the ability to manage and monitor crops and livestock and ensure employee safety	Strong resilience and network availability through SLAs as private networks are unaffected by issues on public networks
Rapid network deployment	Need to quickly deploy and take down portable private networks quickly	Provides connectivity on a temporary basis to support seasonal crops and rotating livestock and can also be used for Wi-Fi backhaul

Use cases for private 5G in agriculture

Private 5G networks provide reliable wide-area connectivity for agriculture, eliminating the challenges associated with farmlands, greenhouses, and expansive outdoor environments.

Designed to operate at high power levels and to cover wide areas, private 5G technology keeps personnel and assets connected, both indoors and outdoors, across sprawling geographic areas. Providing reliable coverage over vast areas with just a few small cell radios can make private 5G a cost-effective solution compared to wired or other wireless networks.

Some of the use cases enabled by private 5G for agricultural applications include:

- **Precision farming.** By connecting the IoT devices necessary to support the remote monitoring needed for precision farming, private 5G enables the gathering, tracking, and sharing of data to make informed decisions. By leveraging real-time data and analytics, such as soil quality and livestock health, remote staff can proactively address concerns and modify conditions for a more strategic, and data-driven approach to maximizing farm efficiency, minimizing waste, and optimizing yields.
- **Asset management.** Private 5G provides the high-speed mobility and wide-area connectivity needed to accurately manage—and make timely, informed decisions about—agricultural assets. In addition to contributing to higher yields, lower waste, and a more sustainable agricultural system, private 5G-enabled asset management supports the collection and dissemination of data from vehicles, robots, livestock, crops, and other essential agricultural investments.



- **Connected and autonomous vehicles.** With reliable connectivity and high-speed mobility, private 5G networks allow farmers to remotely operate driverless machinery, such as tractors and harvesters, using GPS and computer vision for guidance. This enables the movement of machinery between crops without requiring manual resources and creates greater flexibility to respond to weather conditions and crop concerns while also reducing human error and labor costs.
- **Livestock monitoring.** Private 5G supports wearable IoT-connected devices for real-time monitoring of livestock. This includes location tracking and the ability to collect data on health trends and gain insights into the physical and reproductive health of livestock to facilitate early intervention. Private 5G also enables automated feeding and geofencing to manage diet, identify and prevent the spread of disease, and maintain a defined and restricted perimeter.
- **Smart greenhouses.** With the ability to leverage IoT devices to control and optimize environments, private 5G enables advanced agricultural structures to integrate SIM-supported sensors, actuators, and automated systems for optimal crop conditions. This facilitates the ability to optimize plant growth by responding in real time to changes in weather and growth patterns by adjusting temperature, humidity, light levels, and CO₂ concentration.
- **Drones.** Private 5G-supported drones can provide real-time monitoring of crops, livestock, and machinery while also serving as first responders during natural events, such as earthquakes, severe weather, and fire, and when areas are unreachable by manned vehicles.
- **Employee safety.** Private 5G-supported drones and autonomous driving vehicles can perform tasks that are difficult, dangerous, or impossible for workers to do safely, reducing injuries by removing human exposure to risky environments.

Private 5G networks in action

An Australian farm with more than 1.5 kilometers of strawberry fields wanted to leverage private 5G to support several initiatives aimed at making farming operations more efficient and productive. In addition to implementing robotics to harvest strawberry crops across the farm's expansive outdoor areas, the customer wanted to deploy video capabilities to support new point-to-point push to talk and video, as well as new group calling and video functions that would allow workers to better communicate in the fields during extreme and potentially dangerous conditions.

Because deploying radios in fields can be difficult without existing fixed structures, and the dynamic nature of farming required the ability to move structures as harvesting needs moved across the fields, the customer also knew that it needed a portable solution with highly mobile coverage. HPE Aruba Networking was able to cost-effectively deliver exactly what the customer needed. Today, the farm takes advantage of a portable, low-power, highly flexible private 5G network built from the ground up to meet the specific needs of enterprises. The small form factor and attractive cost of entry versus other private cellular solutions have not only enabled the customer to meet its goals of increasing productivity by 15% in the first year, but the farm has also realized improved crop yields and reduced labor costs.





About HPE Aruba Networking

HPE Aruba Networking Private 5G helps organizations around the world deploy mission-critical networks in even the most challenging environments. With market-leading technology, HPE provides customers with reliable and secure private 5G networks that can be deployed in minutes. By integrating all the components of a private 5G network from core to SIM, HPE brings the simplicity of Wi-Fi to private 5G networks. For agricultural organizations that require greater flexibility, we also offer the choice of radios and on-premises/cloud deployments.

HPE has deep experience enabling mission-critical enterprise IT networks and data centers from edge to cloud, including more than 500,000 customers who rely on HPE Aruba Networking infrastructure every day. HPE is also one of the world's leading telecoms suppliers, with a portfolio serving 300 service provider customers across 160 countries, connecting more than one billion subscriber devices.

Learn more at

[HPE.com/us/en/networking/private-5g.html](https://hpe.com/us/en/networking/private-5g.html)

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