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Empowering Warehouse Automation with Wireless Networks

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Organizations' indoor operations are under mounting pressure to advance their efficiency and productivity while lowering overhead costs. The pandemic has made the population's purchasing behavior more virtual even as labor has become less available. [In 2021, e-retail sales surpassed 5.2 trillion U.S. dollars worldwide](#), and this figure is expected to reach new heights in the coming years. Unsurprisingly, the pace of warehouse production is evolving, meaning more innovative processes and operations must be adopted to keep up with this demand.



Indoor industrial enterprises must now operate at peak efficiency 24 hours a day to support customer demand in the current and upcoming climate. Only by harnessing the most optimal and reliable next-generation technologies can operations thrive. By becoming more efficient and productive, operators can transform operational effectiveness and generate increased return on investment (ROI). This is why many modern warehouse operators are turning to advanced applications such as robotics and automation. However, introducing these new technologies does not wholly overcome the increasing demand of warehouse use—what is often overlooked is the role wireless connectivity plays. Networking provides foundational support for warehouses to remain at or reach peak efficiency. Traditional fixed networking infrastructure has challenges when it comes to the enablement of continuous machine-to-machine (M2M) wireless connectivity.

Augmenting manual work

Warehouse operations can be hazardous to personnel if certain tasks are not performed correctly. Manual processes also risk human error, resulting in costly inventory loss and putting workers in unsafe predicaments. Undoubtedly, technology is making many warehouse processes more efficient as it is augmenting the

work of humans. Introducing automatic equipment, such as robots and drones, in warehouse facilities can make dangerous, complex, or repetitive processes autonomous to improve safety and quality throughout the fulfillment process. Space optimization is another benefit of warehouse automation,

allowing warehouses to maximize the use of vertical space by storing items in higher locations that are typically difficult for humans or forklifts to reach. Drones, cranes, and some automated storage and retrieval systems (ASRS) solutions make accessing these higher storage locations easier, so warehouses can monetize more cubic feet.

Overall, robotics for automation offers tremendous benefits for stakeholders who deploy them wisely. However, robots are not completely taking over the vital work of humans in the warehouse industry. Automating tedious, manual tasks frees workers to focus on more complex tasks.

These automation benefits are nothing without a strong and consistent wireless network to retain connectivity. Enterprise Wi-Fi, sufficient for office connectivity, falls short with its limited range, leaving gaps in the continuous, uninterrupted communications indoor warehouses and factories require. Machines can stop functioning when disconnected, and when they do, this can completely halt production or reduce the benefits automation provides by having to resend the same information multiple times. Productivity, efficiency, and safety gains are negatively impacted when communication to and from the machinery breaks down.

The core solution is figuring out how to maintain dependable, reliable, and wide-ranging communications across all aspects of an automated warehouse and acknowledging that a stable and efficient wireless connection can prevent these common issues. This continuous mobile connectivity is a must for any warehouse, and failure for this to work consistently throughout the entire warehouse can cause costly delays. Focusing on coverage, resiliency, mobility, and M2M communications is key to overcoming traditional wireless challenges in a warehouse environment.

As technology advances, so does the need for faster connectivity, networks, and communications worldwide. Due to this, automated equipment is becoming the norm for warehouses. This need has been increasing since the turn of the century with the entry of artificial intelligence (AI) and the Industrial Internet of Things (IIoT).

Obstacles preventing warehouse automation

Wireless communications use radio frequencies (RF) to communicate, and metal is very bad for RF as it cannot go through it but must go around it. Using 5G worsens the problem as it uses millimeter wave (MmWave) frequencies, which are very short distance and any obstruction halts communication. In many cases, the only way to get around physical obstructions is by using machine-to-machine broadband wireless communications. In an industrial environment, dense infrastructure and radio frequency obstructions are ever-present. Further, there are variable operating temperatures and conditions, large volumes of operational data, and fleets of moving assets and people.

A solution connecting warehouse assets and autonomous systems using minimal infrastructure is paramount everywhere they roam. Being able to link directly with each other for M2M communications is the solution. A network that can extend Wi-Fi using multiple frequencies to avoid interference and M2M to extend range will allow operators to support more applications, including handheld devices, radio frequency identification wands, and additional Wi-Fi-based IIoT sensors. The appropriate wireless network can also give warehouse managers confidence that there are no data collection gaps. By accessing and using the data being transferred between devices in real time, warehouses can make informed decisions about their operations to maximize their productivity gains. Continuous mobile connectivity from these networks can also be used to monitor the health of equipment on demand and in real time.

Shortfalls of fixed wireless networks

To enable automation and unlock the full potential of new technologies, warehouses require real-time data access. They cannot afford any network downtime, data loss, or lag. Typical enterprise Wi-Fi is designed and built for fixed and predictable office settings. Operators may deploy one method to combat this by adding extensive and costly access points on additional fixed infrastructure to deliver reliable and mobile coverage—but coverage gaps can remain. Maintaining unfailing and continuous connectivity with autonomous systems and automated assets constantly in motion can be very difficult using this method as radio frequency signals cannot overcome the obstacles mentioned. M2M wireless systems can ensure that warehouse operations run at optimum efficiency. They enable improved safety and accuracy and allow operators to meet fulfillment demands.

Adopting a reliable network to amplify warehouse automation

Transmitting and receiving data from autonomous or remotely controlled assets can allow businesses to analyze real-time telemetry and situational data. These insights enable more significant levels of autonomy that can help critical industrial sectors. Automated assets, whether drones, robots, or machinery, are a game-changer for companies looking to grow and harness the power of IIoT securely. IIoT is rapidly increasing the number of connected devices, equipment, and vehicles. It's also bringing new potential clients to enterprises looking for ways to ensure their automation is supported by low-latency, highly reliable networks that can improve their companies' productivity and save them money.

True M2M-enabling mesh networks are not traditional. They are uniquely designed for environments and applications in which client devices and even the network itself are in a state of constant change and motion. A wireless mesh network that is fully mobile can empower drones and robotics with continuous on-the-go connectivity for M2M communications. Wireless nodes can be deployed directly on all mobile assets, allowing for a robust and resilient network. Attributes of this type of mesh network are that the radio nodes are lighter in weight and easily placed where needed to work around obstructions.

In the near future, autonomous systems and robotics will become operational necessities as online shopping and warehouse operations continue to boom. And their ability to move and communicate will be entirely network dependent. By taking advantage of the most optimal wireless mesh network, businesses can ensure their connectivity is reliable and effective. With a network that can provide a proactive insight into the status and performance of personnel and machines throughout the warehouse, operators can minimize disruptions, downtime, and danger.

Unlocking the potential of automation in dynamic environments

Harnessing autonomy can transform warehouse operations, but this is only possible with the most reliable wireless network. Added mobility and autonomy can transform warehouse operations to

flourish in the IIoT age. With the right network, warehouse operations can become smarter, more autonomous, and more mobile because the network itself is intelligent, self-optimizing, and uniquely able to support M2M communications between equipment on the move.

A network that supports intelligent, automated technology will maximize fulfillment efficiency in busy warehouses. The deployment of a unique network that is reliable and redundant can vastly improve warehouse operators' productivity, efficiency, and profitability stakes. Access to effective communications in such a dynamic and robust environment can ensure that operations thrive now and in the future.

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