



IoT + 5G Will Redefine Your Smart Warehouse Ecosystem

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Introduction

5G can change the way smart devices communicate with each other, making this an exciting time to be thinking about revenue and operations improvements. Warehousing needs vary wildly by industry and may differ significantly for the same company at different times of the year. The flexibility and efficiency offered by 5G will provide substantial value in addressing these issues.

Why You Should Care About 5G

As 5G rolls out, it will offer new capabilities to address a variety of challenges and prompt new innovations for IoT in warehouses. Not only can smart devices now optimize many processes already implemented, but with the help of 5G, IoT will catalyze a new wave of consumer-, employee-, and environmental-centric innovations. There are new cost reduction and carbon footprint improvement strategies coming due entirely to 5G.

Before we dive into specifics, let's clarify why there is so much buzz about 5G, particularly concerning IoT. How is 5G fundamentally different from previous technologies?

A major difference that's responsible for many of the improvements of 5G over 4G is the significantly higher frequencies on which it operates. Where 4G operates on frequencies between 700 MHz – 2500 MHz, 5G networks operate around 28 GHz (Vella 2019). What does this mean practically? Tim Fisher, writing for Lifewire, summarizes:

• • • • “**These high frequencies are great for a number of reasons, one of the most important being that they support a huge capacity for fast data. Not only are they less cluttered with existing cellular data, and so can be used in the future for increasing bandwidth demands, they're also highly directional and can be used right next to other wireless signals without causing interference.**” (Fisher)

Another significant advancement with 5G is the extraordinary increase in the number of devices that 5G can support compared to 4G. 5G can support around one million devices per km², compared to 4G's 4000 devices (Vella 2019). For IoT, this means that many more devices can be used in the same space or via the same hub—and be used effectively.

Related to 5G's increased capacity for devices, 5G also implements a newer technology known as Massive MIMO, or Multiple Input Multiple Output. Heidi Vella provides a useful analogy for its benefits:

“[5G] uses multiple targeted beams to spotlight and follow users around a cell site, improving coverage, speed and capacity. Current network technologies operate like floodlights, illuminating an area but with lots of wastage of the light/signal. Part of the roll-out of 5G involves installing Massive MIMO and 5G New Radio to all mobile network base stations on top of the existing 4G infrastructure.” (Vella 2019)

This component of 5G implementation enables energy efficiency as well as lower latency for connected devices.

5G also promises advanced implementations of Sleep Modes. The idea behind sleep mode—to switch a device off or let it hibernate while there is no traffic—is straightforward enough, and 4G networks do have some capabilities in this regard. However, 4G interfaces are designed with, “a base station that has to transmit reference signals about 1,000 times per second, even without an active mobile in the cell” (Hello Future). 5G on the other hand, supports “transmission-free time” to make sleep mode even more energy efficient.

These are just a few of the new or improved network features that 5G brings with it. Exactly how these features can support warehouse management efforts are still being explored, but major logistics companies are already leading the way. Here are a few ways that 5G can significantly enhance new and existing IoT workflows.

BENEFITS INCLUDE:



- Picking efficiency
- Reduced overhead via eco-compliance
- Increased accuracy
- Lower device maintenance costs

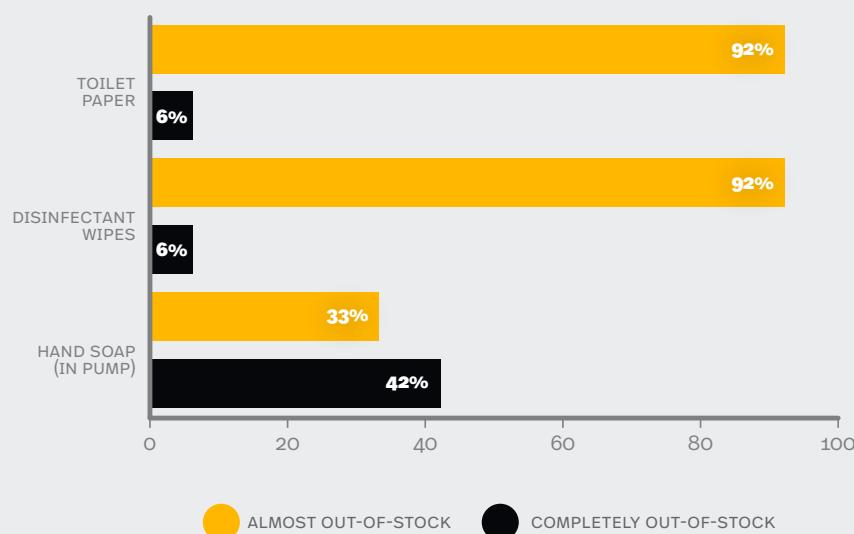
How 5G and IoT Address Common Warehousing Challenges

The challenges facing individual warehouses are as varied as the business ecosystems they exist in. However, it's easy to find common threads that can be addressed with smart solutions, the main focal point being revenue loss prevention. The related benefits intersect with picking efficiency, reduced overhead via eco-compliance, increased accuracy and lower device maintenance costs.

Prevent Revenue Loss via Picking Efficiency and Accuracy

One of the most important and consistent challenges is maintaining accurate inventory. The global pandemic forced consumers to turn to online shopping across the globe. This put inventory strategies to the test as warehouses suddenly ran out of essentials like toilet paper and hand soap. Though it might seem like an extreme example, suppliers and retailers frequently face massive runs on products that unexpectedly sell out. Shopify, a major eCommerce company based in Ottawa, identifies inventory shortages as a major economic growth killer for companies, noting errors in inventory data as a significant factor heavily contributing to inventory shortages and lost revenue (Moore 2021). When inventory counts are wrong, businesses risk both losing sales and negatively impacting the customer experience.

Inventory inaccuracies impact operations within the warehouse as well. Inaccuracies cause delays in the picking process, which in turn slows down operations. It's impossible to know how much time employees spend searching for inventory that isn't where it's supposed to be. Picking efficiency is ripe for optimization. A 2020 article estimated that manpower "usually accounts for 70% of operations cost within a warehouse and 50–60% of manpower cost is spent on order picking" (Parashar). Many warehouses already make use of automated picking via robots or other devices which can help with efficiency.



Statista 2021

Some of these questions are addressed by “smart” approaches to inventory management that include sensors that measure shelf weight and inventory tracking to monitor the location and movement of inventory within the warehouse. However, there are limitations to what such sensors can do.

Solution: Augmented Reality (AR) Can Support the Picking Process

We’re not talking about filters that will make employees look like butterflies or astronauts. For logistics companies, AR has far-reaching potential beyond being a novelty. AR-guided navigation is quickly becoming commonplace for companies wanting to use web applications to guide pickers to the most efficient route to retrieve inventory. Today, companies like DHL Supply Chain are considering upping their AR investment to include AR glasses for hands-free implementation known as “Vision Picking”:

- • • • **“AR-glasses can provide a picker with key pieces of information: what am I looking for (specific items are tagged with barcodes, which can be read by the glasses), where is it located (the most efficient path between stacks in the warehouse can be calculated and displayed), and where does it need to go (a picking trip may include items for multiple orders that need to be kept separate).” (DHL)**

Recent trials for Vision Picking have gone smoothly according to DHL’s article, and they are now looking to make it standard for their operations.

Solution: Reach New Heights with Robotics + AGV

Lower latency provided by 5G means that navigation and auto-guided picking robots are much more effective than before as warehouses shift to vertical storage for logistic and energy efficiency. Not only does this offer increased safety for employees who won’t have to pick inventory from the highest locations, but self-guided vehicles will also get a boost when navigating difficult-to-reach spaces (Supply Chain Dive).

Reduce Overhead by Reducing Carbon Footprint

Another issue facing modern warehouses is the challenge to reduce their carbon footprint while watching their overhead. Like virtually every industry, retail and logistics companies face a global demand for more efficient energy use. Zebra Technologies published a report analyzing the state of warehousing in 2020, describing a vision for what the next five years in warehousing may look like. The report asserts that “Over the next few years, warehouses will become increasingly eco-friendly. As ‘conscious capitalism’ has moved from the margins to the mainstream in business practices, the warehouse industry is no exception... While most respondents said they view green initiatives as an expense, they also see it as a savings opportunity.” (Zebra 2020).

Companies have much to gain economically—both in money saved and in consumer loyalty—by embracing the green movement. According to the report, the move toward more environmentally conscious operations will include:

- Adding timers or sensors for environmental controls such as lighting, heating, and cooling
- Reducing energy consumption
- Implementing vertical warehousing strategies to use their space more efficiently (Zebra 2020)

Solutions for each of these challenges may come in the form of new and improved IoT technologies and their ability to effectively communicate with each other as well as the humans that work with them. Current technologies offer solutions such as smart home technologies and energy efficient devices. But while these advances have sparked innovation, 5G promises to bring IoT tech from the consumer to the supplier, moving smart logistics forward by leaps and bounds.

Solution: Sensors can monitor and automatically adjust warehouse environments

According to Zebra Technology's report, 44% of participants said they intend to add timers or sensors to better control lighting, heating, and cooling. While there is still a need to optimize energy efficiency across 5G networks, warehouses can use the advantages of 5G connectivity to optimize their energy consumption using fewer devices with more accuracy than ever before.

Solution: Fewer devices can cover a much larger physical area

As mentioned previously, 5G promises a significant upgrade concerning the power and number of devices connected to a single hub. This means less equipment to maintain and potentially more efficient use of power.

Keep in mind that, depending on warehouse conditions, device connectivity could be impacted by factors like obstructed lines of sight and even humidity in the air, which could degrade the connection (Fisher). To combat this, consider your environment conditions, floorplan, and picking strategies when implementing new equipment.

Solution: Network boosts make facilities and their connected devices run more smoothly

In 2017, the GSMA introduced the concept of “network slicing”, which they define in the following way: “Network slicing is the embodiment of the concept of running multiple logical networks as virtually independent business operations on a common physical infrastructure in an efficient and economical way” (GSMA 2017). Essentially, a warehouse can parse its networks to divvy up power and provide each of its systems with the latency requirements necessary. 5G means that not only will demanding latency needs be met with more ease, but also that warehouses will be able to connect more devices to a single network, allowing them to scale more seamlessly.

Summary

Today, the Smart Logistics industry exists in one of the most demanding consumer ecosystems yet. Between mounting customer expectations and increasingly remote delivery destinations,

warehousing is a balancing act. However, there are encouraging opportunities for logistics and warehousing on the horizon. The dawn of 5G coupled with recent advancements in IoT technologies and networking capabilities promise brighter days ahead.

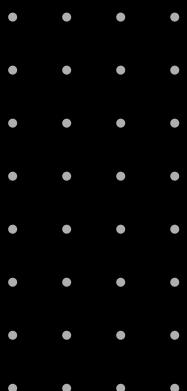
Conclusion

This is a fantastic moment for warehouse managers to think creatively about their needs and how those needs are evolving. 5G is potentially more than a utility; it can be an ecosystem in which various connected devices and systems operate. There are so many opportunities on the horizon thanks to the dawn of and promise of 5G. Let us help you turn your innovative idea into reality.

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on the horizon thanks to the
dawn of and promise of 5G.**

LET US HELP YOU TURN YOUR INNOVATIVE IDEA INTO REALITY.

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