Optimizing Warehouse Wi-Fi

A Strategic Approach

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Introduction

Getting your warehouse lit up with Wi-Fi is easier said than done. Environments like these -- which are not only demanding on the signal, but structurally challenging -- need very careful design for their wireless systems.

Mirazon has decades of experience designing Wi-Fi for warehouses. We've learned what works, what doesn't, and why.

Here's a quick guide on how to design stable and performant Wi-Fi for your warehouse.

1 Design Around the Floorplans and Materials

Step one is to take the floorplan (or emergency exit plan if you are in a pinch) and map out where the wireless equipment will go. We call this a **predictive survey**. This helps us estimate how the signal will travel, where the main distribution frame (MDF) and the independent distribution frames (IDFs) belong, and where cabling may need to be run/put into place.

Additionally, it's critical to **factor in what will be inside the warehouse**, such as racks and what the inventory is. Some materials, like liquids, attenuate the signal. Others, like metal, reflect it. If your warehouse is storing a significant amount of a type of material, it's important to understand how it interacts with your Wi-Fi signal so that you can design around it.

However, sometimes it's not simple. Take a beer producer for instance – some days, they may have an area full of metal kegs stacked all the way up. Other days, that area will be clear, but in its place could be piles and piles of sacks of grain. **You need to account for all possibilities.**

2 Consider Your Heights

This is somewhat related to the floorplan, but it's frequently overlooked, so we're calling it out specifically. The **height of the ceiling** and the **height of the equipment and storage racks impact the design of the Wi-Fi**, from model choice to placement. Figure out how high your ceilings are, and if you have storage racks, figure out how high those are, as well. For example, we may choose directionally focused sectorized APs in each row to mitigate ceiling-height shelves that could block the Wi-Fi signal.

A really tall ceiling may not be an issue if you don't need signal up near the roof, and you can hang the APs halfway down on a ceiling-mounted rod, or on a wall. However, if you need to get on a forklift with a hand scanner to scan barcodes of inventory all the way up at the top, well, you'll need to ensure the Wi-Fi signal reaches that high.
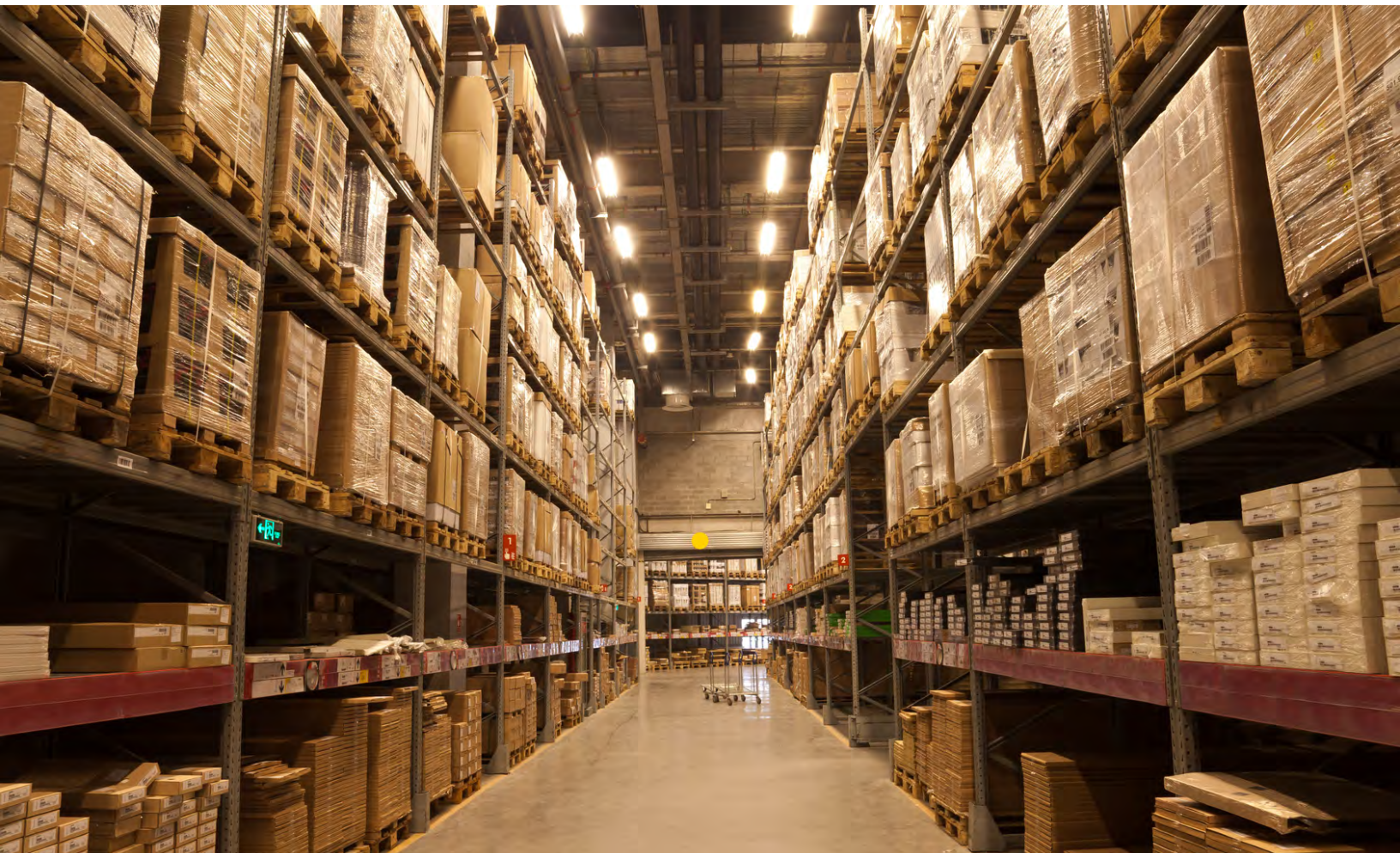
# Identify Your Least Capable, Most Critical Devices

In a perfect world, we'd keep everything new and up to date. But the world isn't perfect and neither are we. Sometimes we have **legacy equipment** that we just can't upgrade because of old programs being used, budgetary constraints, etc. Regardless, it's crucial we identify these items so we can make sure that the Wi-Fi can still support these devices. For example, there may be hand scanners that are a little old that don't connect to 5 Ghz. We need to know that to set up the Wi-Fi so they can still **connect effectively.**

Select Appropriate AP Models

Now that we know the size of the area we need to cover, what's in it, and what's connecting to it, we can **pick the right models of APs to do the job**. As previously mentioned, we might select a few **high-powered directional** APs to hang between your tall shelves to ensure that the signal doesn't get blocked. In other areas, we may opt for more **omni-directional** APs that can cover more ground if they don't have particular obstacles.

If you need assistance with this, please contact us - our experts will make sure you have exactly what you need, without anything you don't.
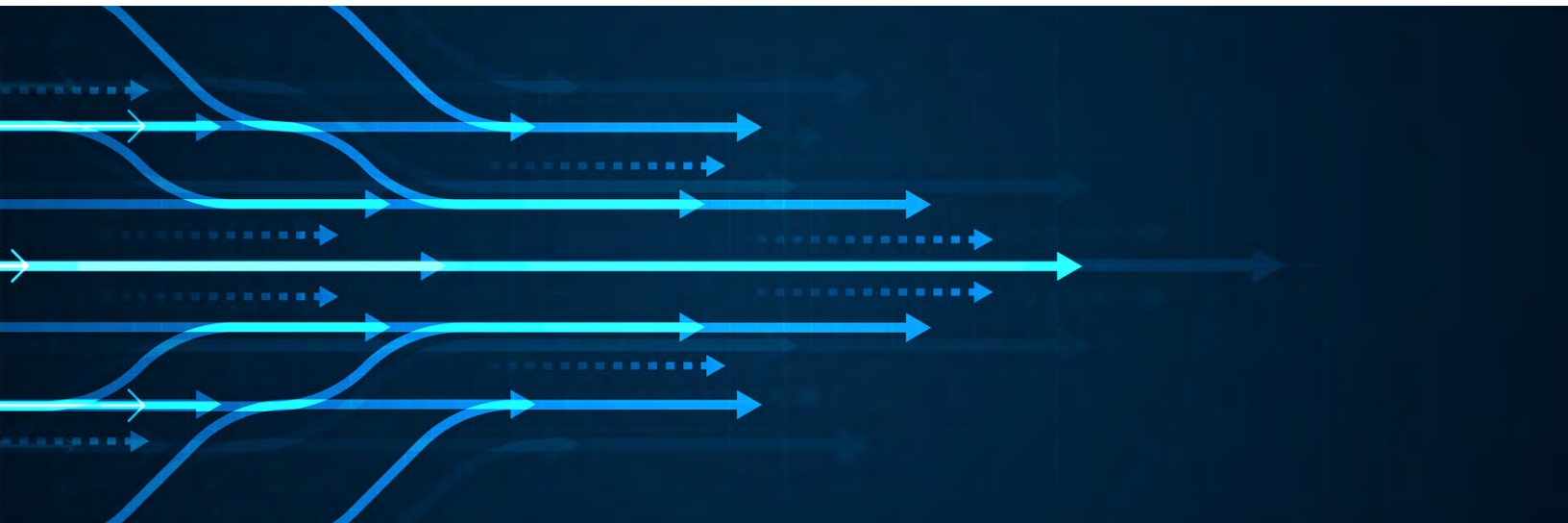
5 Dodge Interference

One of the most **unconsidered killers of Wi-Fi** performance is **interference**. Namely, interference is caused by other devices that are putting out signal that competes with the signal of your APs. There are tons of things that can cause interference, from Bluetooth to microwave ovens, and wireless phones to other Wi-Fi networks. **Warehouses are notorious for having a large amount of interference-causing equipment**, like wireless CNC machines, hand scanners, phones, and more.

It's important to get a good idea of **what is hitting the wireless spectrum**. That way when you deploy your Wi-Fi network, you can **adjust channel width** to support the fastest speeds with as little interference as possible.

There is also the strange phenomenon of **causing interference within your *own* network**. We typically recommend modifying power settings on the APs to run on lower power, so that each AP keeps its interference to itself. We also make sure the **AP placement** isn't too close together.

It might be worth **running a survey** with spectrum analysis in the space to **identify sources of interference**. You'd be surprised what might cause a problem. Wall-mounted digital clocks can cause a *huge* problem on 5 Ghz, but they can be hard to locate because majority of them don't run on the 802.11 standard.

If you're in doubt, contact us and we will run a survey to ensure you're accounting for every possible interference that could impact business efficiency.

6 Review Your Network Backbone Capabilities

Your Wi-Fi is only as good as the network behind it. **Check the uplinking switches and WAN connections** to make sure they can support the capacity of the wireless network. Wi-Fi 7 speeds are awesome, but they will only work if your switches and wiring can **keep up**.

Your APs will also need to draw a certain amount of power off your switches unless you opt for PoE injectors everywhere (and that's cumbersome for AP placement on ceilings or walls). With the newer standards of 802.11, PoE **requirements are increasing,** and your switches should be at least PoE+, or maybe even PoE++.

And then there's the blessed math. **Your switches have a power budget**. Do the math on the power draw of all the APs you intend to plug into that switch. **Don't overwhelm it** or your AP performance will suffer.

7 Best Practice for Setup

There are many settings that can be modified in a warehouse environment to help **give end users the best experience.** Settings, such as power modifications, help to limit interference between your own networks, and modifying the supported data rates help minimize how far away clients are able to connect from the AP. These two settings alone can really help **limit interference** and keep the clients **connecting at the highest speeds**.

Pick Well-Designed Hardware

Not all APs are created equally. For environments that need finesse when it comes to Wi-Fi signal, like a large warehouse or manufacturing facility, Ruckus Networks' APs are head and shoulders better than any other brand. When selecting hardware, remember that not only does the gear have to work great for end users, but it also has to be *very* **friendly to connect with and manage.**

In addition to being the **industry leader** in robust physical antenna design, Ruckus Networks pioneered several features that **ensure better signal delivery** to devices, BeamFlex and PD-MRC.

Ruckus separates itself from competitors by implementing **patented technologies**, such as PD-MRC and BeamFlex. These are **extremely helpful in warehouse deployments.**

PD-MRC (Polarization Diversity with Maximal Ratio Combining)
Ruckus APs adjust signal polarization to align with device orientation, fine-tuning each antenna independently and merging signals for optimal strength. This polarization adaptation is crucial as signals interact with the environment. By utilizing PD-MRC on a packet-by-packet basis, APs effectively listen to each antenna's dual polarizations, merging them to improve signal quality.

BeamFlex
BeamFlex is an AP technique that adjusts individual antenna radiation patterns, providing end devices with stronger signals and reduced interference. Imagine the signal pattern as a picture; the Ruckus AP directs it towards the end device, enhancing the Wi-Fi experience. This adjustment occurs multiple times per second, benefitting handheld and user devices - such as barcode scanners - in challenging environments.

Designing stable and high-performing Wi-Fi for warehouses requires meticulous attention to detail and expertise. By following the steps outlined in this guide, from mapping out floor plans to selecting appropriate AP models and dodging interference, you can **ensure a robust Wi-Fi network** tailored to your warehouse's needs.

At Mirazon, we're **more than just a tech company**; we're your **partners in navigating networking** infrastructure. With over two decades of experience, our team of talented architects and professionals is here to **make your tech dreams a reality**.

As the **region's premier provider** of technology solutions, we'll show you how technology isn't just a tool, but a **game-changer** in your journey to success.

Contact us - we're here for you.

CONTACT US

www.mirazon.com

(502) 240-0404

1640 Lyndon Farm Ct., Suite 102
Louisville, KY 40223