SAVVIUS™ | TECH BRIEF

Managing WiFi Performance in Warehouse Environments

For many organizations, the warehouse represents the heart of operational activity. This is particularly true in the competitive retail industry where organizations invest in cutting edge wireless technologies to help merchandise flow quickly and efficiently through warehouses, from receiving to shipping, as cost-effectively as possible.

Many of these retailers, including giants such as Amazon, Walmart, and Home Depot, stock their inventory and process their orders in massive warehouses that sometimes occupy more than one million square feet. From tasks like receiving and slotting to picking and shipping, these warehouses and distribution centers increasingly rely on wireless technologies to streamline logistics and bring tangible improvements to speed and order accuracy.

WiFi is the perfect enabler for these critical warehouse functions. While there are many challenges to providing a high-performing wireless infrastructure in these environments, there are effective tools that can be used to manage and troubleshoot WiFi deployments.

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WiFi in the Warehouse

Wireless and mobile technologies have revolutionized the efficiency and productivity of warehouse operations. These technologies give warehouse and distribution center managers a clear, real-time control of every activity. This enables the organization to efficiently count and track inventory, improve order fulfillment accuracy, and provide workers with real-time WiFi-based VoIP communications anywhere in the warehouse or store environment.

However, these large-scale WiFi deployments do have challenges. Metal racks are stacked high with pallets while handheld WiFi devices and portable radios can be found everywhere. The warehouse is a constantly changing environment where connectivity can become problematic. A WiFi deployment in any large building such as a stadium, corporate office, or hospital poses its own complications, but those in warehouse environments are truly unique. Here are a few things that need to be considered:

- Wide-open spaces: At first glance, the wide-open spaces of a warehouse may seem like the perfect environment for a wireless network. Long aisles and high ceilings allow WiFi signals to propagate further with less attenuation. But the latest WiFi technologies, 802.11n and 802.11ac, actually rely on signals bouncing around in order to utilize the multiple-input, multiple-output (MIMO) technology. With no interior walls, and Access Points (APs) mounted high up on ceilings, there are fewer "multi-path" signals bouncing around, making MIMO technologies less effective. Additionally, these high-mounted APs require increased transmit power, but there is a fine line between too much and too little power. Too little results in dead spots, while too much results in interference between APs on the same channel and poor roaming decisions for clients.

- Dynamic physical environment: A typical enterprise WiFi environment is quite static. The walls, though sources of attenuation, don't move; the furniture is rarely rearranged; and the most dynamic part is caused by people moving around, which doesn't happen all that often in a typical office. In contrast, warehouses are very dynamic environments. Goods with all different types of radio frequency attenuation properties are continually moved around and stacked to various heights, constantly changing the environment for WiFi signal propagation. Now add in forklifts with on-board WiFi for location tracking, and a device for navigation and inventory location, then move that device around at 10 to 20 mph, and things start getting really interesting. Not only are the forklifts and all WiFi devices on them constantly changing the environment, but they are also roaming from one AP to another very quickly. Roaming remains one of the primary issues with WiFi connectivity, so the warehouse environment pushes this to its limits.

- Harsh physical environment: Warehouses are also dirty and dusty. Everyone and everything moves as fast as possible. The mobile devices used in these environments must be designed to cope with harsh physical conditions while still meeting industry WiFi standards that ensure interoperability. Many of the connectivity problems that do arise stem from device and driver issues rather than faults within the wireless infrastructure.

- Device proliferation: BYOD is everywhere, including the warehouse. Unless companies enforce a strict policy banning personal devices, employees' mobile phones and tablets will compete for bandwidth on the WiFi network, and may introduce additional and unforeseen problems. Personal devices either need to be factored into the initial design or completely banned from the warehouse.

The Solution

While WiFi has enabled organizations to significantly increase warehouse efficiencies and boost productivity, it has also made them critically reliant on a technology that can sometimes be complex to troubleshoot. Any interruption in the network that leads to downtime can completely halt operations at the expense of the organization.

Up-front planning is key in warehouse WLAN designs. A detailed site plan should be developed and "tested" using site planning software before any hardware is purchased or deployed. The plan should include multiple scenarios that model different merchandise with various attenuation properties on the shelves. Roaming and hand-off times should also be modeled very early in the process.

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The overall system design and budget should also include a 24x7 WLAN troubleshooting and analysis solution, preferably one that stores all WLAN traffic on an ongoing basis so problems can be identified and analyzed the instant they occur. This is often overlooked in the initial design, potentially leading to expensive downtime.

The good news is that there are solutions available to ensure efficient design and operation of WiFi in the warehouse, regardless of the demands placed on it by the unique and challenging environment. Packet-based network monitoring solutions give network engineers real-time visibility and analytical capability for the complete network, providing a means to quickly identify, analyze, and fix performance bottlenecks anywhere within the WiFi infrastructure.

Omnipliance WiFi

Savvius Omnipliance® WiFi is the industry's only WLAN analysis solution that enables network engineers to monitor, analyze, and troubleshoot up to multi-Gigabit-speed 802.11ac traffic. Deployed at the WLAN controller, Omnipliance WiFi has the ability to capture data directly from APs, and to analyze and store days or even weeks of network data.

Omnipliance WiFi simultaneously collects data on all channels in use, providing a 100 percent complete and accurate overview of the wireless landscape. This allows IT staff and network engineers to monitor the warehouse environment's overall performance to quickly find and isolate problems or intermittent events, analyze wireless conversations and authentications, and even find rogue access points.

Summary

Omnipliance WiFi delivers the most comprehensive collection of WiFi analysis, offering multi-channel analysis, roaming analysis, voice over wireless (VoFi) analysis, rogue detection and expert event alerts. This enables IT and network engineers to find the root cause of problems with unprecedented speed and ease. Whether the problem is a simple issue like limited or no connectivity from an AP, to complex issues such as intermittent dropped connections on specific BYOD devices, Omnipliance WiFi addresses them all.

Learn more about Savvius Omnipliance WiFi

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