The Guide to Industrial WiFi

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It's impossible to imagine a smart, digitized facility without wireless. However, the path to reliable wireless at this type of facility hasn't always been smooth.

In the past, operational teams (OT) have been skeptical about industrial wireless. In fact, some have deployed miles of cable to avoid it. This approach is expensive and time-consuming. And with facilities increasing focus on digital transformation, wireless lays the foundation necessary to begin down this path.

Operations' skepticism exists for good reason in some instances. IT teams have deployed wireless solutions meant for enterprise environments. These solutions can be unreliable and frustrating in an industrial environment. Often, they sour OT on the idea of wireless in this type of setting.

This creates tension between the IT and OT, and can leave facilities with a solution that's behind the curve.

The fact is, deploying wireless in an industrial setting is not nearly as simple as deploying it in an office. Industrial environments face unique challenges and conditions, including dense infrastructure and hazardous environments. Overcoming these challenges requires a different approach.

Reliable and effective industrial wireless is possible, but it requires careful planning. The process is more complex than in enterprise settings, but purpose-built industrial wireless products and design can aid in making it successful.

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In this guide, we'll share practical tips for how companies can bring their IT and OT teams together to make digital transformation happen. We'll cover:

01 The business benefits of deploying industrial wireless

02 The top 4 misconceptions about industrial wireless

03 Tried and true tips for getting it right the first time

The Business Benefits of Deploying Industrial WiFi

The process industry is competitive and constantly changing.

To keep up, companies are upgrading their facilities and network infrastructure. Ultimately, their goal is to build a connected facility that is more responsive to customer needs, shifts in demand, and operational conditions.

These changes increase the need for data gathering, control, analytics, connectivity of machines and people, network capacity, and security. And in turn, those new demands create more complexity and require more advanced networks.

Today's industrial wireless tools can help support these new requirements, paving the way for business benefits such as:

- Uptime and productivity
- Cost reduction
- Real-time decision making
- Turnaround
- Mobility
- Safety

In this section, we'll explore these benefits and their impact on the connected facility.

The Business Benefits of Deploying Industrial WiFi
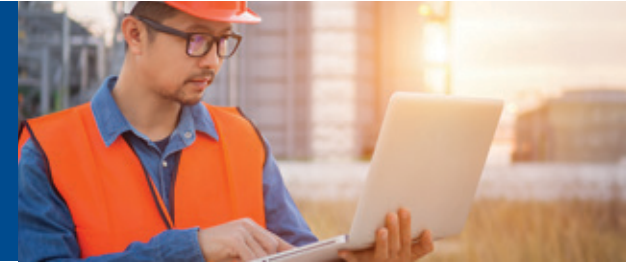
UPTIME & PRODUCTIVITY

Production issues are costly. In some cases, a facility might lose as much as $20,000 a minute. That's why uptime and productivity are critical success factors. But how can wireless contribute to improving them?

Connecting people and machines
With effective wireless technologies, operations workers are no longer confined to a control room. Instead, they can track critical data on hand-held devices and receive real-time alerts from equipment. This allows operations leaders to respond quickly to actionable information. They can immediately contact the right expert, collaborate securely, and address any issues. This accelerates decision making, decreasing downtime.

Adding redundancy
Wireless can add a layer of redundancy for the network. This helps ensure that critical data gets through and that outages do not take down an entire network. Quality of Service (QoS) features enable manufacturers to prioritize critical traffic, helping ensure that it is not delayed or dropped due to network congestion.

COST REDUCTION

One of the most obvious benefits of wireless is its cost: it is significantly more affordable than devices requiring wiring. However, the cost difference is not the only way wireless can help companies save money. Other benefits include:

Faster time to market.
Wireless enables more flexibility with configuration, which is critical when introducing new product lines or changing processes. This flexibility creates a financial advantage, improving time to market, fostering greater scalability, and enabling innovation.

Increased efficiency through analytics.
Real-time wireless analytics help operations manage asset and worker utilization for greater efficiency. Connecting machines, databases, and people is not only possible with wireless, it is often more efficient than cable.

Reduced complexity.
Today, companies want to align enterprise business systems with production technologies. The reason is simple: it reduces operational costs and complexity. However, this is possible only with a unified wireless infrastructure that supports both IT and OT. Uniting these systems will save money, improve operations, reduce maintenance, and allow for increased automation.

REAL-TIME DECISION MAKING

Wireless networks give OT leaders access to vital production information across the supply chain. This enables more competitive manufacturing through:

Remote expert collaboration.
Wireless can support secure, high-definition video conferencing. This helps when the use off-site experts is needed, speeding problem resolution and lowering costs.

Visibility across the facility.
Wireless sensors help monitor environmental conditions. They can trigger alerts to OT if a problem is on the horizon. Then, OT can resolve the issue before it causes a long downtime period.

Mobile workforce.
OT personnel are no longer tethered to their desks. Wireless enables connectivity across the plant. This means OT can get the information they need throughout the day on their tablets or handheld devices, while giving them more time in other areas of the facility.

The Business Benefits of Deploying Industrial WiFi

EFFICIENT TURNAROUND

For industrial operations, turnarounds are an unavoidable activity that cost valuable production time and resources. Wireless technology provides facilities with the ability to achieve successful and cost-effective turnarounds through:

- **Reduced turnaround times and labor costs.** Industrial wireless networks offer enhanced visibility to asset data for clear and comprehensive insight into process conditions. Real-time access to the most up-to-date data helps facilities achieve successful turnaround planning and allocation of labor.

- **Real-time task management and reprioritization.** During turnarounds, wireless technology allows operators to easily communicate current status. This reliable wireless communication enables personnel to quickly and effectively reprioritize turnaround workflow, ensuring time and resources are not wasted on unnecessary maintenance.

MOBILITY

The industrial plant environment is constantly on the move and requires advanced technology capable of adapting to a complex and dynamic setting. A wireless network solution meets these demands with:

- **Reliable connectivity.** Wireless industrial solutions ensure communication remains uninterrupted across facilities regardless of structural changes and facility size. With a network that offers increased mobility, personnel are empowered to conduct business while on the move. This technology enables mobile operators and personnel to monitor processes across the plant floor, improving data sharing efficiency and performance, even in the most challenging locations.

- **Simple monitoring and tracking of assets.** Industrial process environments are in a continual state of flux, which means assets are often moved and relocated. Wireless networks help better track assets throughout operations to minimize loss and save replacement costs.

SAFETY

Industrial wireless network solutions are able to monitor processes that were previously located in inaccessible or hazardous environments. The increased flexibility to add measurement points in difficult locations improves personnel safety and positively impacts the entire operation. Benefits include:

- **Improved process and personnel visibility.** Additional measurement points in hard-to-reach or hazardous areas help improve control strategies to ensure facilities meet safety and environmental regulations. Locations services keep personnel safe and accountable and help streamline maintenance activities for improved efficiency.

- **Removal of plant floor cabling.** A wireless network allows for cabling to be removed from the plant floor for fewer obstacles and potential personnel injuries.
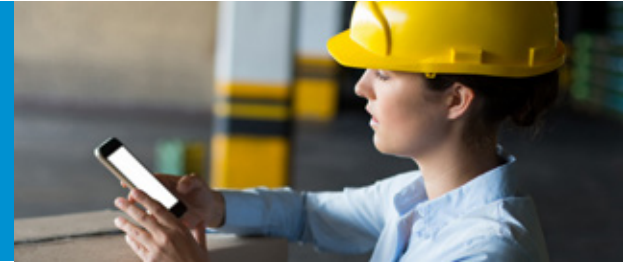
The Top 4 Misconceptions About Industrial WiFi

As we have discussed, early forms of wireless technology were not well suited for industrial environments. Newer solutions have totally changed the game for process facilities.

- Reliability
- Security
- Bandwidth
- Latency & Throughput

The Top 4 Misconceptions About Industrial WiFi

1) RELIABILITY

Reliability has always been a key concern for process facilities. However, today's wireless has matured and now supports a much wider variety of applications. Still, one of the lingering concerns regarding these wireless networks is radio interference.

Thankfully, modern wireless technology such as Cisco CleanAir® analyzes and classifies all radio frequency (RF) activity and mitigates interference. CleanAir® technology operates 24x7, constantly monitoring for interference and air quality issues. This allows for a more proactive approach to wireless spectrum management. Using multiple antennas also improves link quality and reliability. Features such as multiple-input multiple-output (MIMO) allow manufacturer's to use multiple antennas simultaneously, increasing the reliability of a connection.

2) SECURITY

Security is paramount for industrial operations, and some companies see wireless as a potential security threat. They worry it will create new vulnerabilities in the network. One key concern revolves around rogue access points.

Wireless intrusion detection systems and intrusion prevention systems (wIDS/wIPS) address this issue. They detect, locate, mitigate, and contain wired and wireless rogues and threats at Layers 1 through 3. Access points can now process over-the-air traffic to a large library of wireless intrusion attacks and anomalies. This allows them to determine whether the network is being attacked or if impersonation is in progress. And this processing occurs on the edge to allow for greater scalability.

Scans can detect rogue access points, rogue clients, spoofed clients, and client ad hoc connections across all channels without affecting performance. Real-time visibility across the wireless network allows for authentication, authorization, and accounting (AAA) as well as configuration and investigation. Mitigation actions can be logged and traced. In conjunction with CleanAir® technology, spectrum intelligence can detect rogue devices and traffic behavior. These improvements help companies experience the benefits of wireless without compromising security.

3) BANDWIDTH

Early industrial wireless deployments often focused on lower-bandwidth communications. Wireless technology was limited, so deployments centered on applications with simple data reads.

But times have changed. Industrial facilities need support for high-bandwidth applications such as real-time data, collaboration, and video. Wireless can meet those high-bandwidth requirements through a variety of technological advancements.

For instance, intelligent routing allows the access point to sense the best possible path for each packet of data. Newer standards such as 802.11ac wave 2 with 4 x 4 MIMO technology can offer sustained 867-Mbps rates over a greater range. This creates more capacity and reliability.

The Top 4 Misconceptions About Industrial WiFi

4)) LATENCY & THROUGHPUT

Industrial settings need low latency and high throughput. These standards were initially hard for wireless to achieve. Because wireless is a "shared" medium, it is more prone to environmental factors that cause interference and delays.

To achieve low latency and higher throughput within wireless networks

- Identify the number of nodes, clients, and devices to manage the amount of traffic across the network topology.

- Reserve bandwidth for specific essential applications and peak access hours.

- Identify what industrial protocols are being used and which are better suited for wired or wireless environments.

- Correctly mount access points—ideally away from areas where there is high interference. (Note: 5 GHz frequency bands are generally better than 2.4 GHz for industrial networks. They have more channels and are less prone to interference. 2.4 GHz is an option for noncritical traffic or where latency and throughput are not factors.)

Tried and True Tips for Getting it Right the First Time

Every industrial environment has its own challenges. From challenging building layouts to harsh environmental conditions, each is different. And if you fail to account for these conditions, your wireless project may fail.

To ensure you get it right the first time, start with the right equipment and the right partner.

Every successful industrial wireless deployment starts with an effective site survey. This helps identify the critical elements of a strong wireless network. These include antennas, access point placement, security components, availability, and any potential obstructions.

Tried and True Tips for Getting it Right the First Time

CHOOSE THE RIGHT EQUIPMENT

Enterprise-grade wireless equipment is not built with extreme conditions in mind. In an industrial setting, that equipment could fail. Even worse, it could interfere with day-to-day operations. There's a good reason almost everything in an industrial setting meets ruggedized standards. The same should be true for your industrial wireless infrastructure. Off-the-shelf wireless equipment might seem like a more cost-effective answer at first. However, equipment that does not meet industrial standards may be unreliable, and could cause the network to fail or become difficult to manage. Ensure that your equipment meets industrial ratings and is certified for industrial environments (Class 1, Div2, IP66, and IP67 are examples). You should also consider the proper antennas that will meet the range, coverage, and connectivity you need.

SELECT THE RIGHT PARTNER

The right wireless partner helps you reduce risk and provides support throughout the process. They should have expertise with both industrial and enterprise IT networks. They should also leverage reference architectures, best practices, and consistent models. Also, ensure that the partner has considered security at every level of the solution. Work with your partner to assess, plan, design, deploy, and care for the lifecycle of the wireless solution, so you can get the most from your technology investment.

BRING IT AND OT TOGETHER

Historically, IT and OT have seen little convergence. They often manage different, segregated networks. However, it is critical to any wireless project that OT and IT teams collaborate. Together, they can coordinate priorities, overcome organizational inertia, and prepare for change management. IT and operations should work together on all aspects of network design, deployment, and management. This collaboration ensures that the wireless project will meet the needs of the factory floor. At the same time, it can build trust between the two functions and help operations leaders understand the capabilities of IT.

Set up your facility for digital transformation success

The Emerson and Cisco Wireless Access Point is designed to manage complex industrial systems and networks without compromising productivity, safety or security. This scalable technology creates the foundation for enabling Plantweb™ digital ecosystem technologies, connecting WirelessHART® self-organizing field networks to any host system with integrated Wi-Fi backhaul.

By combining the Emerson 1410S Wireless Gateway with the Cisco Catalyst IW6300 Heavy Duty Series Access Point facilities can create the most robust, secure wireless infrastructure from the two leading IIoT providers. Emerson and Cisco have decades of experience designing and installing wireless networks in industrial facilities and are leading the market for industrial wireless networking.

48.5% | **CISCO**
Wireless Access Point Market Share (#1)

Source: IHS Markit Industrial Edge Networking Components Report - March 2019

43.5% | **CISCO**
Industrial Router Market Share (#1)

Source: IHS Markit Industrial Edge Networking Components Report - March 2019

#1 | **EMERSON**
Choice for Industrial Wireless Infrastructure

Source: Control Readers' Choice Awards 2019

EMERSON
47,000+
WirelessHART Networks

EMERSON
17B+
Wireless Operating Hours

Cisco and Emerson will consult and partner with you to help you streamline implementation of this solution, helping you create the backbone for future success for your facility.

Learn more here.