

Design the Optimal Wireless Network Solution with an Engineering Assessment



With the emergence of industrial wireless technology, businesses in the process industries recognize significant opportunities to improve safety, productivity and efficiency by implementing a plant-wide wireless network. But simply placing wireless devices in the field without proper evaluation of the radio frequency (RF) environment rarely works. Many times correcting the issue requires additional hardware that was not budgeted. It is also difficult to optimally expand network usage without proper planning.

Other than some proprietary licensed applications, most of the industrial wireless technologies being developed today use the unlicensed Industrial, Scientific and Medical (ISM) frequency bands which provide limited bandwidth for your plant. Plants must manage this frequency allocation to support system coexistence, avoid interference and provide maximum performance.

The bottom line is that creating a reliable and secure wireless network does not happen by accident, but requires a combination of the right equipment and the right design. And it all starts with an RF engineering assessment.

Before implementing a wireless network, Honeywell recommends you ask these questions:

- Do you really know what is using the radio frequency (RF) spectrum in your plant today - specifically in the unlicensed bands (ISM and the Unlicensed National Information Infrastructure bands for 802.11a) that today's solutions are most likely to use? Even plants that think they know are often surprised when an RF spectrum analyzer uncovers previously unknown access points and radio systems, which are possible interference sources and potential security vulnerabilities. There may also be other sources of noise and interference that can cause problems but would be otherwise undetected.
- Are you collaborating with the stakeholders of other wireless systems in your facility to ensure coexistence and reduce interference? At a minimum, RF channel assignment needs to be shared among wireless system supporters in overlapping coverage areas.
- Are you effectively managing the security vulnerabilities in your wireless systems? Today's wireless solutions are secure when properly designed and implemented, but unfortunately this is frequently not the case.
- Do you know the required wireless system coverage area? Will it grow in the future? It is important to factor expandability and scalability into your initial solution.
- Are you confident that your wireless system radios are optimally located? Do your radios and fixed devices have the proper antenna configuration? How will these radios affect the integrity and speed of the network? Improper placement and antenna configuration can lead to weak and lost signals, interference and poor coverage areas.
- Are you satisfied your wireless system meets government regulations for RF power output? Even though these systems operate in unlicensed bands, there are limits on radiated RF energy that must be considered.
- Have the interface(s) between the wireless network and the wired network been optimally engineered?
- Are you confident your expected wireless system performance will be realized? How do you know?
- Do you have a plant vision/roadmap for industrial wireless applications? How will you be sure your wireless design will be compliant?

To address these concerns and be confident your wireless solution will perform reliably, Honeywell recommends the following activities, at a minimum, be included for the design and engineering of a wireless solution:

- Evaluate the existing RF environment in the intended coverage area with a spectrum analyzer for existing channel usage and possible noise and interference sources.
- Meet with other wireless system "owners" in the intended coverage area to allocate RF channels as well as to discuss security, application and integration issues.
- Perform a field RF survey to include actual equipment that will make up the wireless network and actual devices that will be used to access the wireless network. This field RF survey will help determine optimal location for radios, determine antenna configurations for radios and fixed devices, validate performance (distance, signal and

bandwidth), define RF power levels for government regulation compliance and ensure the wireless signals stay inside the intended coverage area.

- Determine security requirements and configurations.
- Determine network integration requirements and configurations.

For these reasons, Honeywell's wireless network design experts combine their knowledge of RF fundamentals and signal propagation with their experience in process control systems, network security and advanced applications to help you design a high performance and robust wireless network. Honeywell's Site Assessment Services provide:

- Detailed analysis report reflecting the following:
 - Signal strength, integrity and speed
 - Channel utilization
 - RF coverage area
 - Security issues
- Comments about the current RF environment that may have a negative impact if not corrected
- Recommended antenna type and location
- Precise infrastructure placement and mounting
- Integration to the process control network
- Training
- Best practices related to RF network security and maintenance
- Network topology drawings reflecting switches and access point connection to the network point of entry at each location
- Complete bill of materials required for implementation

Honeywell's approach to creating a system and network design includes an on-site study of the coverage area, existing power and network infrastructure, the goals for the implementation (both immediate and future), and a thorough assessment of interfering and operating frequencies currently in use or ambient in the environment. Honeywell designs a robust security plan and will document security requirements, identify network security threats, review existing security practices, procedures and safeguards, and identify the causes of any potential security exposures.

Honeywell builds a detailed analysis of the RF spectrum in the ISM bands in the intended coverage area, offering detailed mapping for the access points location and the coverage areas where the access points are accessible. We design and detail your sensor networks and can integrate hard wired Ethernet locations into the wireless backbone. The assessment considers all the aspects of coverage, capacity, interference and data content so that you know your information is never compromised.

Comparing it to the wired world, this planning is needed to avoid trying to communicate over a wiring conduit that is already full. Developing a plan for allocating the ISM bands helps ensure solid wireless operations to with optimal scalability and reliability.

More Information

For more information on Honeywell's OneWireless solutions, visit our website www.honeywell.com/ps/wireless, or contact your Honeywell account manager.

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