Western Refining Reduces Wiring Costs, and Improves Performance Thanks to Honeywell OneWireless

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At Western Refining's Gallup, New Mexico, refinery, process unit and tank operations have been upgraded thanks to Honeywell's OneWireless technology. This advanced wireless mesh network has proven to be a reliable, cost-effective solution for a wide range of process plant applications.

Based on Western Refining's experience, wireless is a desirable alternative in applications where traditional copper wiring often brings not only added cost, but also high maintenance and unreliability. With wireless, plant infrastructure investments reduce immediately, and the ROI can be significant. Projects that previously could not occur now become immediately worthwhile.

Background

Western Refining is an independent oil refiner and marketer headquartered in El Paso, Texas. The company has a combined crude oil processing capacity of approximately 221,000 barrels per day (BPD). Its refineries and affiliated companies serve a broad customer base in Arizona; Southern California; Colorado; Nevada; New Mexico; Western Texas; Utah; and the U.S. Central East Coast region.

Western Refining's production operations, which are concentrated in the Southwestern and Mid-Atlantic regions of the U.S., produce high-value light products such as gasoline, diesel and jet fuel. The company markets under its own brands of Giant, Mustang and Sundial.

As the only active refinery in the Four Corners region, Western's Gallup facility primarily relies on a locally produced, high-quality crude feedstock known as "Four Corners Sweet. This crude supply is supplemented with feedstock from outside the area (See Fig. 1).

Figure 1. Western Refining's production facility near Gallup, New Mexico.

Project Challenges

Western Refining's Gallup operation is situated at nearly 7,000 ft. elevation on rocky and mountainous terrain. Its production processes and storage facilities cover a large geographical area. As such, instrumentation for monitoring the refinery's remote offsite units can be very costly.

The Gallup refinery utilizes a legacy Honeywell TDC 3000 Distributed Control System (DCS). Management at the site sought to extend monitoring capabilities to remote tank farm areas. However, the cost of traditional wiring and conduit for monitoring outside storage units was estimated at $15K to $22K per tank.

Western Refining's motivation for adopting wireless was clear: Up to 90% of the installed cost of conventional measurement technology can be for cable conduit and related construction. With wireless field devices, wired infrastructure is largely unnecessary. Today's industrial wireless solutions reduce the cost for comprehensive process monitoring and connect to points that are physically or economically difficult to access. Wireless also allow for easy expansion for additional measurement or actuation points for simply the cost of the transmitter. It offers robust security, predictable power management, and multi-speed monitoring, and provides WI-FI coverage at no additional cost.

Wireless Solution

Western Refining recognizes the promise of industrial wireless technology. Wireless solutions are revolutionizing process measurement, offering new opportunities to optimize plant performance, reliability and safety while reducing installation costs. Wireless transmitters are an affordable and accurate alternative for applications involving supervisory control, monitoring, indication and alarming.

Recent advancements in radio technology and communications protocols have paved the way for wireless networks operating in the most demanding plant environments. Beyond wireless-enabled versions of conventional field devices for process automation, there are numerous industrial applications benefitting from the versatility of self-healing wireless mesh networks.

In 2008, the Gallup refinery began implementing Honeywell's OneWireless system. This wireless solution incorporates a multi-protocol, multi-standard wireless network communicating simultaneously with Wi-Fi and industrial I/O devices. It also utilizes optional redundant synchronized gateways, which link the wireless network into the Process Control Network (PCN).

The OneWireless "backbone mesh" architecture incorporates both field- and plant-level applications on a single, unified network. The network uses externally powered multi-nodes scattered throughout the coverage area. These devices support all industrial wireless standards for process control applications and provide sensor data transmission redundancy at all levels (See Fig. 2).

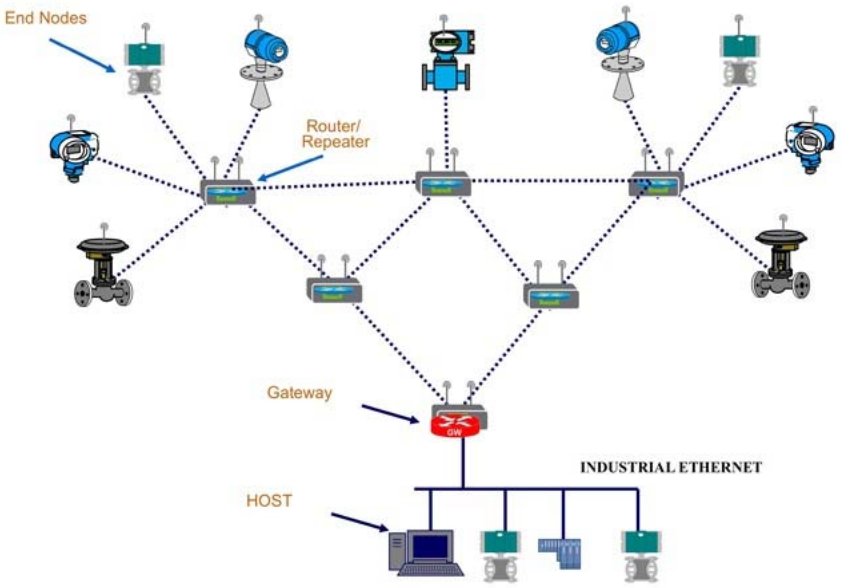

Figure 2. Honeywell's wireless mesh network architecture utilizes externally powered multi-nodes scattered throughout the coverage area.

As part of the OneWireless solution, multi-nodes communicate with each other and provide a backhaul for bringing information to a gateway, where it passes into the larger wired PCN. This approach is unique, since the meshing action takes place between multi-nodes—not at the instruments. For safety, at least two multi-nodes receive data from each instrument, creating a redundant path (See Fig. 3).

Before moving forward with wireless installation at the Gallup refinery, Honeywell conducted a complete onsite survey to determine the project scope and challenges. This survey addressed the coverage area desired at the plant, existing power and network infrastructure, the goals for the implementation (both immediate and long-term), as well as a thorough assessment of interfering and operating frequencies currently in use or ambient in the environment. The survey also identified any potential security exposures (See Fig. 3).

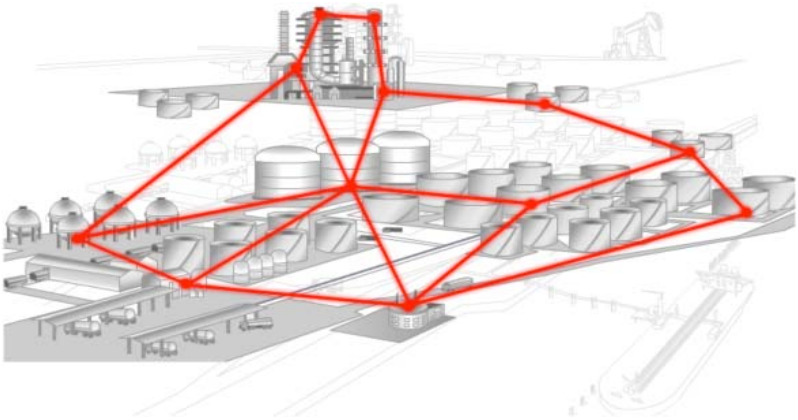

Figure 3. A wireless site survey addressed the coverage area desired at the Gallup refinery, existing power and network infrastructure, and interfering and operating frequencies currently in use or ambient in the environment.

System Design

The multi-functional wireless mesh network implemented at the Gallup refinery supports a variety of applications within a single network. Wireless technology was first employed for tank gauging, and is now being introduced for high-level analog and digital indications in the process units. Wireless monitoring data is integrated into the refinery's existing DCS and advanced applications.

Honeywell XYR wireless transmitters have replaced outdated pneumatic devices used for valve positioning and process variable indication. An optimized wireless infrastructure with narrow band radio frequency hopping ensures maximum performance. Wireless devices transmit measurements to a base radio connected to the plant control system

Western Refining's current installation includes one wireless system gateway and four redundant multi-nodes connecting 38 wireless instruments. The wireless field devices send information to a series of multinodes, creating a mesh infrastructure that maximizes uptime and data security (See Fig. 4).

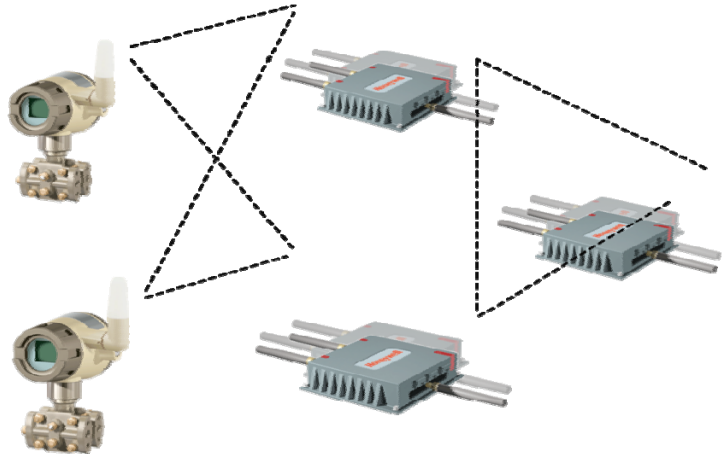

Figure 4. An optimized wireless infrastructure with narrow band radio frequency hopping ensures maximum performance.

At the Gallup refinery, wireless transmitters have broken down barriers to monitoring variables in areas where traditional hard-wired transmitters were too costly, difficult, or time-consuming to implement. These instruments are designed for applications with no access to power, are remote or difficult to access, require frequent changes in instrumentation schemes, or where manual readings are typically taken.

With wireless transmitters, engineers at the refinery can easily increase the number, frequency and type of measurements. In addition, they can improve accuracy and consistency of measurement by replacing manual readings with automated online data collection. Online communication with the control system also helps ensure precise time tracking of information for use in trouble-shooting process problems.

Project Results

For Western Refining, wireless has proven to be a desirable alternative to traditional copper wiring, which brings not only added cost, but also high maintenance and unreliability. ISA100 DSSS wireless transmitters can be used to monitor a variety of processes and assets in hazardous and remote areas, and this data can be utilized in a variety of systems.

Wireless frequency hopping spread spectrum technology also adds security and ensures that noise interference at any one frequency does not block communications or cause security concerns. A single, scalable wireless network conserves spectrum and power.

Furthermore, the wireless installation was fast, inexpensive, and easy. Operators, engineers and technicians have one system to learn, operate and maintain. Wireless allows plant personnel to react quickly to changing conditions, and gather information they need to optimize processes. Plant infrastructure investments reduce immediately, and significant ROI can be realized. I/O costs have been significantly lowered, and projects that previously could not occur now become immediately worthwhile.

By 2011, Western Refining plans to install more than 100 Honeywell wireless transmitters throughout the Gallup refinery for various process monitoring tasks, as well as non-critical control applications. Wireless instrumentation will be installed on at least six additional process units. The first control-related wireless applications will be in offsite blending (See Fig. 5).

Figure 5. By 2011, Western Refining plans to install more than 100 Honeywell wireless transmitters throughout the Gallup refinery.

Conclusion

At Western Refining, Honeywell's Wireless applications have helped to optimize plant productivity and reliability, improve safety and security, and ensure regulatory compliance. Much more than just avoiding the cost of wire, the key value of wireless lies in the ability to integrate valuable data into existing control systems and advanced applications, while also sharing that data with other networked applications.