

Solution Note

HC900 and OneWireless



Background

A reliable, cost-efficient way to transmit data from field instruments to the control room is essential in a variety of industries across the globe. Automation vendors are currently investing in developments to provide such a solution. However, the combination of large plants and remote field instruments – with all the associated maintenance time and costs – make it difficult for reliable and secure wiring to be provided to implement this information transfer. Increasingly therefore, companies are looking at wireless solutions, which can be as secure as a wired solution, and lead to cost savings.

This Solution Note presents the Honeywell solution, which consists of two key components:

- **Honeywell HC900 Process Controller** – an advanced process and logic controller offering a modular, scalable design that is sized to meet the automation needs of a wide range of process equipment.
- **OneWireless™ Network** – a multi-application, multi-standard wireless network that extends process control network into the field. It can be tailored to offer the wireless coverage needed for industrial applications from a simple wireless field instrument network to a completely integrated plant-wide multi-application wireless network.

Key issues

OneWireless addresses some of the most challenging business problems – reliability, efficiency, cost and compliance.

- **Reliability:** When a wire is lost, so is communication. With multiple pathways from the field to the control room, the redundancy built into the OneWireless system delivers better-than-wired performance. This kind of protection against communication failure was not possible with wired devices. What's more, a wire to a field device can only support that single device while OneWireless can support that device and countless other wireless applications as well.

- **Efficient and cost-effective:** Thanks to the mobility tools possible with OneWireless, operators are no longer tethered to the control room and with the Mobile Station can take their control system data with them. Technicians have real-time maintenance data at their fingertips. Plants can implement new field instruments rapidly and take efficiency to a new level with just one infrastructure to manage.
- **Cost-effective:** Cabling and installation for an existing automation project can run as high as 80% of total system cost and can exceed \$1000 per linear foot in regulated environments such as power plants. Relocating such a cable even a short distance away from its original location is a time-consuming and expensive operation. In addition, process control areas are often remotely located and it is often difficult to get process control data directly to the central control room. The OneWireless solution is significantly more cost-effective than wired.
- **Compliance:** OneWireless is a validated application for 21 CFR Part 11 regulations as well as global, European and local protocols.

Applications

Below are three applications where wireless technology could be a better option:

Tanks in explosion-proof areas

A key issue here is spills caused by improper monitoring and control of the tank level. A wireless transmitter can monitor the tank levels, does not need availability of safety personnel to perform the analysis, and avoids wiring costs.

Compressors

Compressors are common items of equipment in a broad range of industries, and are frequently located a distance away from the control room, often in inaccessible locations. This necessitates considerable trenching or suspended wiring. In addition, each compressor is equipped with thermocouple and local indicator, and operators must make rounds to document temperature

hourly. The cost to a plant of failure is significant, and can reach up to \$1 million per day. A wireless solution can lead to considerable financial savings as well as reduced engineering time and effort.

Process monitoring kilns

These frequently require ad-hoc designed electro-mechanical links to transmit the signal. The readings are often not reliable (due to dust, dirt, grease, etc.), and the links require regular maintenance. Adding measurement points is also expensive; an IR solution could cost \$50-75k/kiln.

Description of solution

In each of the scenarios described above a wireless solution with the technology to support it using a low cost controller would have been more than sufficient. Honeywell provides a powerful combination of the Honeywell OneWireless Network along with the HC900 Process Controller to solve some of the issues mentioned above.

OneWireless™ Network

OneWireless Network is a single wireless mesh network capable of simultaneously supporting ISA 100.11a field instruments (transmitters, actuators), Wi-Fi devices and any Ethernet/IP based devices. The OneWireless Network comprises the following components:

- **Cisco Aironet 1552S Outdoor Access Point** – a flexible, secure and scalable mesh network that provides high-performance wireless coverage for both Wi-Fi clients and ISA100.11a field instruments.
- **Field Device Access Point** – an industrial meshing access point for ISA 100.11a field instruments.
- **OneWireless Firewall** – a security appliance designed specifically for Experion® PKS to extend the process control network into the field with the OneWireless network.
- **OneWireless Server** – hosts applications required to manage the OneWireless Network.
- **Wireless Device Manager** – manages the wireless field instrument network and all wireless field devices, including ISA 100.11a field instruments, Field Device Access Points, the Cisco Access Point and any wired field devices with an ISA 100.11a Adapter.

OneWireless Network is equipped with the following features:

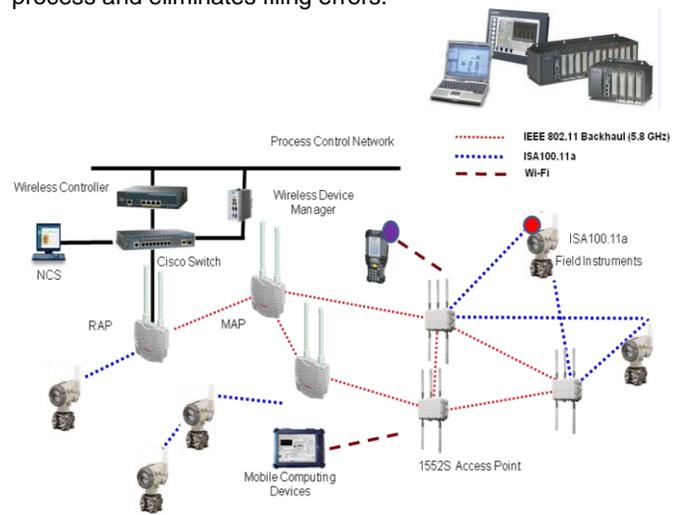
- IEEE 802.11 a/b/g high-speed, self-organizing, self-healing mesh network for multi-applications.

- ISA 100.11a self-organizing, self-healing mesh network.
- Routing and non-routing ISA 100.11a field instruments.
- Up to one-second reporting with latency control and the ability to configure sensors on the same network at different update rates.
- Built-in wireless field instrument redundancy for assured communications.
- End-to-end industrial security with industry standard 128-bit encryption.
- Over-the-air firmware upgrades and configuration.
- Support of all key field protocols.
- Antenna diversity for wireless field instruments access, improving reliability and range.
- Certified to be used in hazardous environments.
- Preconfigured QoS with Process Data set at highest priority.

Honeywell’s OneWireless Network extends the process control network into the field. It is a flexible and scalable network, and easy to commission and maintain. It is reliable, being field-proven for the best uptime, and extremely cost-efficient.

HC900 Process Controller

This is an advanced process and logic controller with a modular, scalable design that is built to work with a wide range of process equipment in a cost-effective way. It comes with a touch-screen operator interface which makes it very easy to operate. HC900 possesses a flexible architecture that can accommodate the most demanding application, and with its advanced features and versatile connectivity, is capable of customized pinpoint control. The HC900 Process controller also simplifies the documentation process and eliminates filing errors.



HC900 with One Wireless Network

The HC900 is available in three rack sizes and three CPU performance levels to handle a wide range of automation requirements, providing users the flexibility of starting with what they need, and then expanding as desired. It provides superior PID loop control and more robust analog processing than most logic controllers without compromising on logic performance.

Its Windows-based Control Designer software operates over Ethernet, making it easy to configure the process controller and operator interface. The design of HC900 reduces hardware and software costs, training and support needs, and the requirement for spares, bringing significant cost savings to users.

The touch-screen operator interface and user-friendly custom displays enable streamlined, intuitive operation, help in eliminating errors, and provide improved data access speed and process supervision.

It is an ideal solution for needs ranging from thermal control in boilers, furnaces, kilns, and dryers to unit processing in pharmaceutical, chemical, bio-fuel and pilot-plants.

analysis of data easier and faster. The data is recorded in a secure digital format, and is easily exported to a spreadsheet program like Excel for further analysis.

The OneWireless network supports Modbus applications, where the Wireless Device Manager (WDM) functions as the Modbus server (Modbus TCP or Modbus RTU) and allows clients to access measurement, status and diagnostics data from wireless field devices that are networked to the WDM.

In this application, the HC900 Controller serves as a Modbus Master and is connected to the WDM Process Control Network (PCN) via an Ethernet Switch, using the Modbus TCP protocol for communications with the WDM. A PC is also connected to the PCN Ethernet Switch and is used to configure communications settings for the WDM.

HC900 can provide alarming with Digital Outputs. When combined with the CS900 Alarm Annunciator displays it provides a powerful and easy-to-use solution.

HC900 is easy to operate. It can easily share its information with other peer controllers or third-party solution packages via Modbus TCP/IP or through OPC Server. HC900 has a dedicated Matrikon OPC Server package which helps communicate with third-party PLCs.

Features of the combined solution*

- WDM Interfaces: Modbus, HART, OPC, Enraf and generic tunnel.
- Redundancy.
- Integrated firewall.
- Enables firmware upgrades on HC900 controllers via the OneWireless network.
- HC900 controllers can communicate with each other (peer-to-peer) over the OneWireless network.
- Host PC can be used with the OneWireless network to communicate with redundant HC900 controllers.
- HC900's Modbus/TCP initiator function block can communicate with Modbus/TCP slave devices over the OneWireless network.
- Modular control system with loop and logic for unit process applications requiring analog measurements with discrete actions.
- The redundant platform provides redundant CPU's, power supplies, and network communications for additional process security.
- Lexicon Multi-language support

*Where these refer to OneWireless, it is the latest release: OneWireless R210.



HC900 Control Station Touch Screen

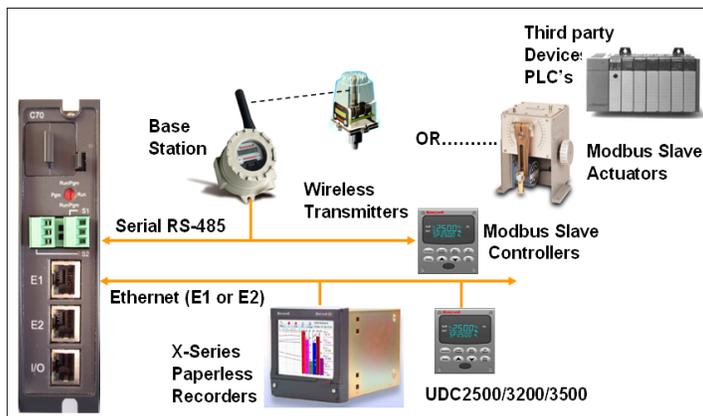
OneWireless + HC900 + 900 Control Station

The Honeywell HC900 Controller along with 900 Control station are the perfect complement to a Honeywell OneWireless system for performing trending and logging of process data parameters. The HC900 along with Control Station provides the ability to capture continuous and batch data electronically, making

Benefits of the combined solution

The combination of the HC900 Process Controller and the OneWireless Network provides a range of added-value benefits to end customers:

- Lower total cost of ownership (wiring engineering, installation, equipment, maintenance costs).
- Reduced engineering effort to design commission and maintain an ISA 100.11a system.
- Efficient monitoring of remote assets (additional process and asset data without additional wiring).
- Savings in wiring costs.
- Increased reliability of data transfer.
- Easier access for maintenance to plant areas with difficult accessibility.
- Easy interfacing (both are Honeywell products so engineering and configuration are simplified).
- Increased safety.
- Increased productivity.
- Use the same controller for wired and wireless transmitters.



HC900 for wired and wireless solutions

Case study: Wells Concrete

Wells Concrete of Minnesota, US, provides building owners, developers and contractors with architectural and structural precast products for commercial and industrial buildings, stadiums and parking ramps. Much of its business is focused on developing customized, precast concrete panels that become the walls, roofs, and supporting structure of new buildings.

The precast production process involves pouring concrete into molds, or beds, and curing it for a certain period of time before removing the newly formed concrete structure from the bed and shipping it to the customer for installation. The size, shape and

complexity of the product will determine the type of process and mould form that is required.

Today's operational challenges

Concrete is the most widely used material on earth after water, and similar to other global resource-intensive industries, the concrete industry is getting smarter. Producers and their business partners alike are looking to develop a more intelligent manufacturing footprint, as well as better capabilities for satisfying customer demands.

In a precast concrete plant, curing is one of the most important steps in the production operation, since it has a significant impact on concrete strength and durability. Concrete hardens as a result of hydration: the chemical reaction between cement and water. However, hydration occurs only if the concrete's temperature stays within a suitable range.

Traditionally, manufacturers have used oil- or gas-fired steam boiler systems to cure precast concrete. With these systems, about a third of the energy goes up the flue. Also, energy is lost in the pipes, which run from the boiler to the bed. The hot pipes must transfer their energy to the air around the pipe. The air then transfers its energy to the steel form, which, in turn, provides energy to the concrete.

Since the curing process for concrete consumes a lot of energy, precast producers have been challenged to maintain their profitability while facing issues such as increasing utility rates, more expensive and scarce skilled labor, and rising material and equipment costs.

Process control requirements

At its Wells, Minnesota, manufacturing site, Wells Concrete previously utilized analog chart recorders to monitor the curing process of both precast concrete beds and sample boxes in the facility's West Plant (Architectural Building). The sample box temperature was controlled by using the actual temperature of the concrete bed as a set point. The set point was fed to a digital controller, which regulated the heat source (300-Watt light bulbs) in the sample box. The concrete beds were heated by gas-fired radiant heaters, which were turned on after a pour and turned off the next day – usually a 12-14 hour run.

Wells Concrete recognized the high natural gas consumption and costs associated with its concrete curing process and turned to Honeywell Process Solutions to find a better way to control the operation of its heating systems, and thus reduce production-related energy costs.

Improved automation solution

Wells Concrete contracted Honeywell to implement a new, automated process control solution in the Architectural Building at its Wells facility. This project included installation of Honeywell's XYR 5000 wireless temperature transmitters and a HC900 controller to monitor and control the temperature of eight concrete beds in the building, as well as the sample boxes associated with each of the forms. Specview software provided the necessary supervisory control and data acquisition (SCADA) capability.

The Honeywell XYR 5000 temperature transmitters eliminated the need for long thermocouple wiring runs around the concrete beds, cut down on the number of I/O modules required with wired transmitters, and simplified the overall control system design. The wireless transmitters reliably and securely transmit up to 2,000 feet on a 3-5 year battery life with an accuracy of ± 0.1 percent.

With the new control system, the bed temperature is monitored and sent from the wireless transmitter to a base unit, which is hardwired to the HC900 controller. This temperature reading is used to control the sample box as it was before. However, the current temperature also controls the operation of the radiant heater. When the concrete has reached the desired curing temperature, the heater shuts off automatically and the concrete will hold enough heat to continue the curing process. When the concrete temperature goes below the desired curing temperature, the heater is once again turned on.

Impressive project results

The operational benefits of enhanced process automation technology were seen in only a few weeks. The control system in the Architectural Building went on-line in January, and by March of that year the local natural gas provider wanted to check the accuracy of its gas meters as the facility's gas usage had dropped dramatically.

Where plant operators previously ran gas heaters for up to 15 hours per concrete bed, they now apply heat to the beds for an average of only 3 hours. The new control solution quickly paid for itself by enabling 60-70 percent savings in energy costs.

Conclusion

The combination of the Honeywell HC900 Process Controller and the Honeywell OneWireless Network provides a highly cost-efficient and reliable way to transmit data from field instruments to the control room. This has been proved by multiple installations of this solution in a variety of industries throughout the world. In addition, the combined solution leads to a lower total cost of ownership, reduced engineering effort, more efficient monitoring of plant assets, increased safety, improved productivity, and easier maintenance.

OneWireless™ is a trademark of Honeywell International Inc.

For More Information

Learn more about Honeywell's HC900 and OneWireless visit our website www.honeywellprocess.com or contact your Honeywell account manager.

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