Successful Applications Using ISA100 Wireless Technology

Phil Ng
Honeywell
Sr. Product Manager – Wireless
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Phil is presently a Sr. Product Manager with responsibilities for Honeywell Process Solutions’ (HPS) OneWireless product line.

Over his 25 years with Honeywell, Phil has been responsible for a variety of products including the current ISA100-compatible wireless products, Honeywell’s first generation of wireless product (XYR5000); the industry leading online, real-time corrosion product (SmartCET); and other notable HPS process control system products.
Abstract

The ISA100.11a wireless communication standard was designed with help from end users, experts, suppliers, and consortia representatives. Any product manufacturer would relish this type of international, voice of the customer-type input for their product development since it ensures that the solution will end up being rigorous, with the ability to meet the needs of end users.

ISA100 Wireless products that have been released so far have proven their ability to meet end users’ application needs. This presentation will provide a look at real wireless application solutions in use now.
Agenda

• Successful ISA100 Wireless Applications
  1. HART tank gauging
  2. Gas detection
  3. Conditioning monitoring using vibration

• Design of ISA100
Influence on ISA100 Wireless

• The open consensus process of ISA incorporated the requirements from end users, suppliers, experts, consortia and academia

• End users have a large installed base of applications that are based upon many different protocols.
  – ISA100 Wireless must support multiple application protocols
  – Requires a flexible application layer

• Developing and designing a *communication protocol* will allow multiple applications to share a common infrastructure
  – Versus basing upon one existing protocol would have precluded being the ability to support others.

• The goal is to support all of them
Customer Challenge

- Limited time in the project schedule; must meet government’s environment regulations.
  - Local government needs to confirm compliance to waste water statues by monitoring real time tank level data, in the aim to protect the environment
- Retrofit without affecting current site setup and without disturbing normal operations
China Shanghai Shipping Group

Solution

- Five (5) Honeywell Enraf wired HART radar level gauges
- Five (5) OneWireless HART Adapters to send HART data wirelessly and level data
- OneWireless network consisting of one (1) Field Device Access Points, and one (1) Wireless Device Manager
- Honeywell Entis Pro software
Why Honeywell?

- High performance radar level gauge and OneWireless architecture’s high performance HART Adapter.
- Mesh network of HART Adapters
- Honeywell solution and services eliminated customer risk.

Customer feedback

“Honeywell’s OneWireless solution saves us time in project schedule to the government’s environment regulations, without disturb normal operations and destroy existing site infrastructure and saves us capital and operating expense”
Solution Benefits to Users and Suppliers

- ISA100 Wireless support for other protocols
  - HART data tunneled through ISA100 network
- Enable wireless communication for wired HART transmitters
  - Unlock stranded diagnostics from HART devices
  - Send HART data over the ISA100.11a network
- Benefit
  - Applications continue without change

Wired or Wireless – It Doesn’t Matter
Update: New ISA100 compatible version

Future projects at China Shanghai Shipping to use Honeywell Enraf wireless FlexLine

• Provides more data over HART version
  – Additional diagnostics to detect hardware failures, while a 1oo2D voting algorithm will detect, report and isolate failures on the boards without interruption.
  – Validated for use in SIL-2 and SIL-3 applications allowing it to be used in overfill protection applications.

• Certified for use in custody transfer applications

• Customer application remains the same
  – Data sent to the same Entis Pro software
2. GasSecure - Statoil

**The first wireless, infrared hydrocarbon gas detector**

- Successful offshore installation at Gullfaks C platform in the North Sea
- 20 detectors were installed on the Statoil-operated platform by a team from Statoil, GasSecure and ABB.

“*Time for system installation is estimated to 5-10% of a wired system. Total cost saving is estimated to 80% compared to a wired solution.*”

As featured in Automatisering Feb 2013
GasSecure – ISA100 Wireless

GasSecure’s Design and Development Challenge

• Low Energy Consumption and Rapid Response

GasSecure selected ISA100 Wireless due to its advantages

• Quality of service
  • Bandwidth and latency
  • ISA100 defines five hopping sequences
• Multi-protocol ability
  • Tunneling
  • Native application layer that is not encumbered by an existing protocol
• Flexible infrastructure design and configuration
  • Hides complexity from users
  • “Installation was easier than anticipated. One person installed six gas detectors in one hour.”
GasSecure – GS01 Gas Detector

Product Features

• PROFIsafe over ISA100.11a
• SIL2 certified safety system usage
• Mesh communication
• Asymmetrical bandwidth allocation
• Battery life > 2 years
• Continuous monitoring
• Fast response
• No calibration
The new detector (GS01) responds surprisingly fast.

In comparison tests against wired detectors, both the wired and the wireless detectors are well within the response time acceptance criteria (7 seconds).

The offshore tests prove that the GS01 gas detector has comparable performance to existing wired solutions on key areas such as response time and accuracy.

They have been set up in a mesh network and communicate wirelessly using the ISA100.11a protocol with a PROFIsafe layer to achieve communication according to the required safety standards (SIL 2).

Radio coverage was documented to be even better than anticipated and well inside acceptance criteria. A large part of the platform was covered by direct communication to one gateway.
GasSecure – Statoil Comments

Field proven that the GasSecure detector and wireless technology and compare with existing wired solutions.

• Successful side-by-side testing with wired detectors and installation in problem areas with harsh weather and where the operator has experienced special challenges.

Statoil, GasSecure and ABB worked together in this installation.

• ABB was responsible that the ProfiSAFE data via Profinet was usable by the existing application.
• Verified that no changes are needed for the application.

“Statoil’s requirements are the same to wireless equipment as for wired with respect to regularity, security and safety.”

Jens Erik Tømte, Senior Engineer Operation and Maintenance
3. Large Fertilizer Company

Validation and Demonstration Project

- Original intent is to validate the ability of the wireless system to get data through a huge maze of pipes and plant infrastructure.
- Interest in using wireless for monitoring remote pumps and motors; infeasible to run cables.

Project evolved to a wireless vibration project and interoperability project.
Large Fertilizer Company

Project Scope

• Honeywell Gateway and Network/System Manager
  – OneWireless WDM

• GE Bently Nevada Wireless Vibration transmitters
  – GE wSIMs, ISA100, 4 Channel,
  – GE Repeaters, ISA100

• Cisco Access Point
  – Cisco 1552S AP

• GE Bently Nevada Wireless Vibration Analysis Application
  – GE System 1
GE Bently Nevada – ISA100 Wireless

GE Bently Nevada selected ISA100 Wireless due to its advantages

• Multi-protocol ability
  • Tunneling
  • Native application layer is not encumbered by existing protocol
  • ISA100 designed to be more than just typical process variable type
• Support for burst mode data links
• Support for distributed backbone router architecture
  • Easy access to high speed backbone network
• Quality of service
• Flexible infrastructure design and configuration
  • Hides complexity from users

Courtesy of Jay Werb and WCI
Large Fertilizer Company

End Result

- Interoperability demonstrated across three (3) vendors
  - Example, GE devices visible in Honeywell’s user interface

- GE Bently Nevada’s System 1 accesses wireless data like wired data
  - No changes needed

- Acceleration enveloping with full waveform and spectrums
  - Also On-Demand data; no restrictions on using the system.
Summary of Application Success Stories

- China Shanghai Shipping Group
  - HART data over ISA100 Wireless
  - Addresses a compliance issue

- Statoil
  - Gas detection over ISA100 with a PROFIsafe layer
  - Addresses a safety need

- Large Fertilizer Company
  - Vibration waveform data for condition monitoring
  - Addresses an asset management need
ISA100 Design Enables These Applications

ISA100 Native Application Layer and More

1. Native mode
   1. Basic function blocks supported by standard
      - Analog input/output, binary input/output
   2. Services
      a) Publish (input) / Subscribe (output)
      b) Alerts (events and alarms)
      c) Contracts
   3. Upload / Download (bulk transfer of blocks of data)

2. Extensions to Native mode
   - ISA100.11a native mode uses an extensible object model
   - New WCI specification build upon the ISA100.11a standard

3. Tunneling
   - Support for legacy process industry application protocols
   - In this presentation, protocols include:
     - HART, ProfiSAFE, GE Bently Nevada waveforms
Conclusion

Demonstrated usage of ISA100 in real world applications.
  • More applications to come
  • Made possible by ISA100 Wireless and WCI

| Multiple Application Protocols | ISA100 Native Application Layer Tunneling
|                              | Burst mode
|                              | Flexible time slots
| Quality of Service            | Bandwidth, latency, five hopping sequences
| Flexible infrastructure       | Independence of functions (e.g. Network Management, Gateway, BBR)
| Interoperable products        | Stable design as a result of input from an international group of users, suppliers, experts, academia and consortia reps.
|                              | Rigorous testing and supportive, collaborative vendor environment in WCI. |
Summary

The benefit and reason for selecting ISA100 Wireless

- They chose ISA100 to support their specific needs
- They chose ISA100 so that they didn’t have to change their upper level applications
- They chose ISA100 because it is a fully vetted wireless standard and offers stability
- The supportive environment in WCI allows for faster time to market.

They = Suppliers and Users too
Thank You