THE PEPPERL+FUCHS GROUP

WirelessHART Overview

Karsten Fischer - Global Account Manager Invensys
• Introduction to Wireless
• Wireless devices are everywhere
• Introducing WirelessHART as the first global standard for industrial applications
• HART over Wireless versus WirelessHART
• Elements of WirelessHART
  – Band and Radio
• History of HART / HART specification
• WirelessHART for Process Applications
• WirelessHART business opportunities
Introduction to Wireless / WirelessHART

- WirelessHART is one possible wireless standard (protocol) for wireless communication
- Others are
  - WLAN
  - Bluetooth
  - ZigBee
  - OneWireless
  - Smart Wireless Solution
  - ...
We use wireless devices in everyday life.

- Devices are simple and often work out of the box.
- We sometimes accept poor battery life.
- We seem to accept that the reception is bad.
- We even seem to accept loss of signal (no access due to bandwidth availability or local obstruction – driving through a tunnel).
- We seem to accept interference from other WiFi users using the same channel as our network.
Wireless devices in industry applications!

- Industry has special requirements
  - The network needs to be reliable
  - Adding new participants to a network needs to be simple
  - We expect to use standard configuration tools such as Handhelds for configuration
  - The network needs to be safe to any external intruders or spies
  - The network itself should be based on a common international standard (WirelessHART) to ensure that each vendor can provide compatible and interoperable field-devices or adaptors to join the open network
Open Wireless Standards for Process Automation

- The main end user requirement is:
  - An OPEN and INTEROPERABLE standard
- Two wireless standards are in discussion for Process Automation
  - WirelessHART → industrial standard (HART spec 7.1 available)
    → Integrity Test Kit (ITK) available today
    → products available today
  - ISA SP100 → no industrial standard yet (specification pending)
    → no Integrity Test Kit (ITK) available today
    → no products available today
    → still under development
- At the moment Pepperl+Fuchs supports WirelessHART only. Once
  the ISA SP100 specification and ITK’s are available we will also
  support this standard.
HART over Wireless and WirelessHART

- Expensive to commission
- Expensive to integrate
- Security, Reliability ???

- Use existing tools
- Use existing system
- Security, Reliability built in

Industry standard WirelessHART
Elements of WirelessHART – Band / Radio

- WirelessHART has selected the License Free 2.4 GHz Industrial Scientific Medical (ISM)-Band as the preferred radio frequency along with the standard radio IEC 802.15.4
Elements of WirelessHART – Band / Radio

• Advantages:
  – 2.4 GHz is a worldwide usable band without any permission for using this Bandwidth (rare restrictions apply)
  – Cheap and freely available Hardware due to WLAN standard IEC 802.15.4
  – Designed for very low power consumption = battery powered devices

• Disadvantages:
  – Already used frequency band (WLAN, Bluetooth, ZigBee), therefore transmission reliability seems to be <100%. With WirelessHART and with the built-in features as specified under release 7.1 the reliability is ensured though.
History of WirelessHART

Source: HART Communication Foundation

Jun 08
HART Spec 7.1

2004 2005 2006 2007 2008

Nov 04 1st Wireless Discussion at HCF Meeting
Mar 2005 HCF Wireless Working Group Formed
Jul 06 Wireless Specification Team Formed
Apr 07 Draft Specifications Completed
Jul 07 Ballot Comments Reviewed
Jun 07 Specifications Approved by HCF Membership
Sep 07 HCF Board Releases Specifications

HART Protocol Specification
Approved
Compatibility and HART Specification

- Hart specification 7.1 was released in June 2008.
- WirelessHART is a part of HART specification 7.1
- All functionalities supported by HART specification 5 and/or 6 are supported by HART specification 7.1 as well
- Therefore it is ensured that WirelessHART is backwards compatible to previous revisions.
• HART means:
  "Highway Addressed Remote Transducer"
• Besides of the physical layer as described above, HART standardizes the protocol which is transmitted by the sinus waves.

• The protocol offers different services to parameterise, set up, service and maintain field equipment.

• New DCS systems use HART IOs (HART FBM)s for continuous monitoring and integration of advanced diagnostic and multi-variable capabilities of smart devices.
Layout of Wired HART Structure

4...20mA

RS 485

KFD2-HMM-16

ON

13 14 15

16 17 18

KFD2-STC4-Ex2

PWR

7  8 9 10 11

12 13 14 15

1 2 3 4

5 6

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Layout of WirelessHART Structure

RS 485 - WirelessHART Gateway - WirelessHART Adaptor - Mesh Network

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WirelessHART opportunities

• WirelessHART is a new enhancement to the HART Technology
• Idea
  – Keep the well known and proven protocol
  – Change the physical layer from the modulated sinus on the 4 to 20 mA loop to radios an create the first wireless standard for Process Automation

⇒ What are the opportunities here?
Question 1

Based on market surveys, how many analog field devices are out in the market today?

approx.

a) 10 Mill.
b) 20 Mill.
c) 30 Mill.
Question 2
Based on market surveys, how many of those analog field devices are HART enabled?
approx.
a) 30 %
b) 50%
c) 70%
Question 3

Based on market surveys, how many of those HART enabled field devices are digitally integrated into DCS systems?

approx.

a) 10 %
b) 30%
c) 50%
WirelessHART is well suited for Process Applications

- **Process monitoring**
  - Hard to reach / expensive to install locations
  - Full access to multivariable devices

- **Asset Management**
  - Condition monitoring
  - Configuration database

- **Control**
  - Open loop
  - Closed loop
    - Where appropriate for wireless

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Class Template from ISA
• Objectives
  – An Open and Interoperable Standard
  – As easy as using wired HART
  – Enable wireless access to existing HART Devices
  – Use the same configuration, maintenance, diagnostic tools and procedures
  – Require little additional training
  – Worldwide usable
  – Hardware must be available from the shelf
Your business opportunities

In total the survey showed that **approx. 30 Mill. analog field devices** are installed in plants worldwide. **70% of these are HART enabled**, but **only 10% are digitally integrated** into a DCS.

⇒ This indicates a total business opportunity of nearly 20 Mill. field devices that can be digitally integrated into any DCS by enabling them to WirelessHART.

⇒ This would allow to
  – Enable the DCS to retrieve asset management information from the field device
  – Add additional process variables (2\textsuperscript{nd}, 3\textsuperscript{rd} and 4\textsuperscript{th} variable) to the existing PV (from the 4 to 20 mA signal) for further process optimization
  – “Pimp-Up” your plants by making full use of the field device installed in the past and by providing more variables into the DCS
Thank you very much for your attention!
PROTECTING YOUR PROCESS