FieldComm Group Technology Update

Sean Vincent
FieldComm Group
Thank You to Event Sponsors
Current Technology Update
Process Industry in IIoT – FieldComm Technologies

- HART, FF, Update (EDD and FDI separate)
- Future with APL
- Working Group Summary
HART Specification Update

- **HART-IP** (*Network Management Specification*)
  - Security TLS, DTLS, J-PAKE
  - "Direct" messaging format
  - Profiles for Servers - Field device, I/O

- **Maintenance Updates (clarifications and corrections)**
  - *Command Summary, Common Practice Command Specifications*
  - *Block Transfer, Universal Command Specification* (Approved by WG)

- **Common Tables Specification**
  - Routine release - update Manufacturers and Device Types
  - Identify SI Units (Approved by WG)

- **Anticipate Ballot package Q4 2018**
  - Ballot Package to include 6 Specifications - mostly Clarifications and Corrections
HART Test Specifications

- **Released** -
  - Slave Data-Link Test Specification r4.0
  - Slave Common Practice Command Test Specification r6.0

- **Test Specification Improvements**
  - Refactoring Burst-mode Testing
  - Separates Application Layer testing from Data-Link timing
    - " Token-Passing test only timing, arbitration
    - " TDMA test only timing
  - Functionally same test coverage but allocated differently
HART Test Specifications Update 2018

- **HART-IP Server Test Specifications**
  - Addressing, Message Framing
  - Support for multiple clients
  - Largely derived from existing test specifications.

- **WirelessHART Gateway Test Specification**
  - Application Layer - Gateway Commands
  - Application Layer - Functional test (e.g., caching, device lists)

- **FSK Physical Layer Test Specification**
  - WG action in-process

- **Master Token-Passing Data-Link**
  - Completed detailed review / investigation of tests
  - Identified additional requirements
HART Test Automation

Current Versions:
- HART Test System v3.5 (released October 2017)
  - Maintenance Update + Condensed Status
- WirelessHART Test System v1.8 (released September 2017)
  - Clarifications and corrections only

Next – 12/2018
- Refactored Burst Mode test major impact to test automation
  - Common Practice suite updated to be Data-Link agnostic
  - Same behavior Token-Passing or TDMA (or HART-IP server)
- HART Test System v3.6
  - HSniffer update - Supports manual operation, improved UI
  - conv (new utility) - converts Hsniffer files to text. Multiple output formats
- WirelessHART Test System v1.9
  - Native HART-IP Server - eliminates need to buy commercial Gateway
HART Test Automation – Development 2018/2019

- **HART-IP Server Test Tool**
  - Similar to Token-Passing Data-Link Testing
  - Tests PDU parsing, responses, different packet types, etc.

- **HART-IP I/O Systems / Gateways Test Tool**
  - Confirms compliance to I/O system Commands, etc
  - Need tooling to enable regression testing

- **FSK PHY Test Tool**
  - Automates FSK PHY Tests.

- **Token-Passing Master Test Tool**
  - Automatic assessment tools and poorly behaved field device
  - Need tooling to enable regression testing

- **Generic Host Test Tool**
  - Target all hosts independent of host technology
  - Includes and formalizes host backward compatibility testing done in 2007
Next Ballot Scope

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Scope</th>
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</thead>
<tbody>
<tr>
<td>o Function Block AP Part 1</td>
<td>o ITK 7 Profile Definition</td>
</tr>
<tr>
<td>o Function Block AP Part 2</td>
<td>o Host Profile D Definition</td>
</tr>
<tr>
<td>o Function Block AP Part 3 (tbd)</td>
<td>o SCP incorporation</td>
</tr>
<tr>
<td>o Transducer Block Common Structures</td>
<td>o Clarifications (ARs)</td>
</tr>
<tr>
<td>o Positioner Transducer Block</td>
<td></td>
</tr>
<tr>
<td>o Common File format</td>
<td><strong>Ballot in Q1 2019</strong></td>
</tr>
<tr>
<td>o H1 ITK Profile</td>
<td><strong>Minimum of 2 years before mandatory for FF products</strong></td>
</tr>
<tr>
<td>o H1 Communication Profile</td>
<td></td>
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<tr>
<td>o Host Profile</td>
<td></td>
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<tr>
<td>o Network Management</td>
<td></td>
</tr>
<tr>
<td>o System Management (tbd)</td>
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</table>
FF Test Automation – ITK 6.3.1

● **New Features**
  - Updated Standardized Connection Point test cases based on ballot changes
  - Updated TFB Firmware
  - Automation Tool 64-bit OS Support
  - Bug fixes

● **Release includes a firmware update to the TFB**
  - No charge for active maintenance holders
  - Must return unit to FieldComm Group for update
Usability Initiative – Scalable Integration

- Control Integration
- Asset Integration
- Process Variable Integration

- Control in the Field
- Advanced Applications

- EDDs for setup and maintenance
  Automated Like Device Replacement
  Template-based Commissioning

- No EDDs Required
- PV Device Interchangeability
  Unlike Device Replacement
Standardized Connection Points

Key enabler is distribution network configuration using known rules.

System Engineer and Field Technician roles are de-coupled. Supports device replacement without any system interactions.
Simplified PV Integration Key Facts

- Access fieldbus using familiar work practices
- Restricted to AI/AO MAI/MAO (and discretes)
- Standard scaling and linearization
- No EDD files for PV access
- Full sensor range (not just 4-20mA)
- No 4-20mA loop tests
- Integrated data quality
- Integrated position feedback
- Simpler host interfaces (cost, availability)
- Interchangeable “unlike” device replacement
- Easy 2am replacements
Like Device Replacement Example

<table>
<thead>
<tr>
<th>Commissioned</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture: Acme</td>
<td>Manufacture: Acme</td>
</tr>
<tr>
<td>Device Type: Pressure</td>
<td>Device Type: Pressure</td>
</tr>
<tr>
<td>Device Revision: 1</td>
<td>Device Revision: 2</td>
</tr>
<tr>
<td>Compatibility: 1</td>
<td></td>
</tr>
</tbody>
</table>

No new files to install!

Spare device is a Rev 2 ‘Like’ Device
New devices you purchase tomorrow are compatible with those installed today!
Like Device Replacement Key Facts

- No new EDD files to install
- No offline configuration changes required
- Supports Automated Download
  - Set device tag with a maintenance tool and attach
- Immediate access to all existing device features
- New device features integrated as needed
Key Usability Improvement Use Cases

● Device Replacement Improvements
  ▪ Interchangeable device replacement without controller downloads
  ▪ Backward compatibility for full device asset integration
  ▪ Download automation

● Device Setup Improvements
  ▪ Basic PV access without any EDD/CFF files
  ▪ With EDDs, template-based configuration for quicker, accurate offline configuration
APL – Advanced Physical Layer
Introduction

The three leading vendor organizations for suppliers of process automation are cooperating on a project to promote the development of an Advanced Physical Layer for Industrial Ethernet suitable for use in hazardous locations. A group of suppliers to the process industry are supporting the project with resources to accelerate the development of the advanced physical layer.
Automation suppliers currently supporting the APL Project

- ABB
- Endress+Hauser
- Krohne
- Pepperl+Fuchs
- Phoenix Contact
- Rockwell Automation
- Samson
- Siemens
- Stahl
- VEGA
- Yokogawa

Other suppliers interested in supporting the project should contact the chairperson of the steering committee, Dr. Jörg Hähniche
Endress+Hauser
APL for the Future

APL starts definition of conformance

2018

APL specification of protection methods, port profiles

2019

IEEE 802.3cg ready

2020

APL Specification of conformity/tests

2021

Products to Market

2020

IEC Standardization (IS, HazLoc, EMC)

2021

2025
Current Activities to Bring an Advanced Physical Layer to Industrial Ethernet

Advanced Physical Layer will bring the benefits of industrial Ethernet to process automation and instrumentation, PLUS . . .

- A converged long-distance communication network for process automation and field instrumentation.
- Ability to locate Ethernet-based field devices in hazardous areas by virtue of being intrinsically safe.
- Two-wire using industry standard fieldbus cable with loop-powered devices.
- Increased bandwidth provided by 10 Megabit, full-duplex Ethernet communication enables productivity gains over the lifecycle of field devices.

One expectation is that an Advanced Physical Layer for Industrial Ethernet will enhance Digitization of Typical Field Devices in the Process Industry
Technology Overview of Advanced Physical Layer

Supports proven trunk-and-spur topology used in fieldbus installations today

Trunk
- Installation in hazardous areas Zone 1, Class 1/Division 1
- Cable length <=1000 meters
- Data transmission at 10 Mbps, full duplex
- Intrinsic safety: communication only
- Increased safety: communication and power <= 50 field devices @ 500 milliwatts
- Topologies: Ring, Line, Star (depending on powering concept)

Spur
- Installation in hazardous areas Zone 0, Class 1/Division 1
- Cable length <=200 meters
- Data transmission at 10 Mbps, full duplex
- Intrinsic safety: communication with loop-power or communication only

Installation Considerations
- Trunk and Spur compatible with 2-wire, shielded fieldbus cable according to IEC 61158 type A.
- APL Ethernet Switch separately powered or trunk-cable powered (increased safety)
- Intrinsic Safety verification similar to FISCO
Technology Overview of Advanced Physical Layer

Compatible with proven Ethernet-based Industrial Protocol standards used today and future Ethernet standards such as Time Sensitive Networking

<table>
<thead>
<tr>
<th>Session, Presentation and Application Layers</th>
<th>EtherNet/IP</th>
<th>HART-IP</th>
<th>PROFI®NET</th>
</tr>
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<tbody>
<tr>
<td>Transport Layer</td>
<td>TCP/UDP</td>
<td></td>
<td></td>
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<tr>
<td>Network Layer</td>
<td>IP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Link Layer</td>
<td>Ethernet (real-time, non-real-time, TSN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Layer</td>
<td>Ethernet PHY (according to IEEE 802.3cg)</td>
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</tr>
<tr>
<td></td>
<td>Frontend for Advanced Physical Layer</td>
<td></td>
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Impact
- None to protocol stack
- Devices must integrate Ethernet physical layer for IEEE 802.3 standards emerging from cg Task Force and frontend circuitry for the Advanced Physical Layer
- Network architecture must use APL Ethernet switches
Outlook for the Future

The Advanced Physical Layer provides familiar and proven installation techniques for Zone 1, Division 2, and Zone 0, Division 1, installations . . .

. . . and all of the other benefits of Industrial Ethernet

► Improved diagnostics
► Easy engineering
► Less specialized training
► Complementary to Namur Open Architecture and Industrie 4.0 initiatives
► Increased performance
► Easier device integration

To prepare for potential future enhancements to the Advanced Physical Layer, industry will investigate the potential to support systems that could benefit from increased bandwidth.
FieldComm Group Working Groups
Technical Working Group Structure

President & CEO
Ted Masters

Change Control Committee
Technology Directors • WG Chairmen • Profibus

FOUNDATION Fieldbus Technology Director
Stephen Mitschke

Integration Technology Director
Achim Laubenstein

HART Technology Director
Wally Pratt

FOUNDATION Fieldbus Technology WG
Chair: Souichirou “Sota” Katsushima
Yokogawa

Advanced Applications WG
Chair: Marc Baret
Endress + Hauser

Integration WG
Chair: Dan Ryan
Emerson

Cyber Security WG
Chair: Ragnar Schierholz
ABB

HART Technology WG
Chair: Eric Rotvold
Emerson

Physical Layer WG
Chair: Robin Pramanik
Siemens

Project Groups
Project Groups
Project Groups
Project Groups
Project Groups
Project Groups

Legend
Staff
Contractor
Volunteer
Mixed
FieldComm Group Working Groups

- Meet face-to-face 3 times per year
- Meet via web/phone as needed
- Open to FieldComm Group member companies

- Create, Maintain, and Improve FieldComm Group Technologies
FieldComm Group Working Groups - Summary

- **Advanced Applications**
  - Encoded file format for configurations (application templates, system data exchange)

- **Cyber Security**
  - Security Review

- **FF Technology**
  - SCP
  - ITK 7/Host Profile D

- **HART Technology**
  - HART-IP update

- **Marketing**
  - Promotions of FieldComm Group Technologies

- **Physical Layer**
  - HART Test Specification for Latest Specification Update

- **Integration**
  - FDI HTML5
  - PA-DIM (Process Automation Device Information Model)
  - Unified Host Test Specification
Future Working Group Meetings

- Working Group Meeting, Annual Meeting and End User Seminar
  - Singapore
  - December 3 – 7 2018
- North America Working Group Meeting
  - Denver, CO, USA
  - February 25 – March 1 2019
- Asia Working Group Meeting
  - Sapporo, Japan
  - February 24 – 28 2019
- Working Group Meeting and Annual Meeting
  - Berlin, Germany
  - December 9 – 13 2019
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Attention: FieldComm Group President
FieldComm Group
9430 Research Blvd., Ste. 1-120
Austin, TX 78759, USA
Voice: (512) 792-2300
Fax: (512) 792-2310
http://www.fieldcommgroup.org

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