FieldComm Group™

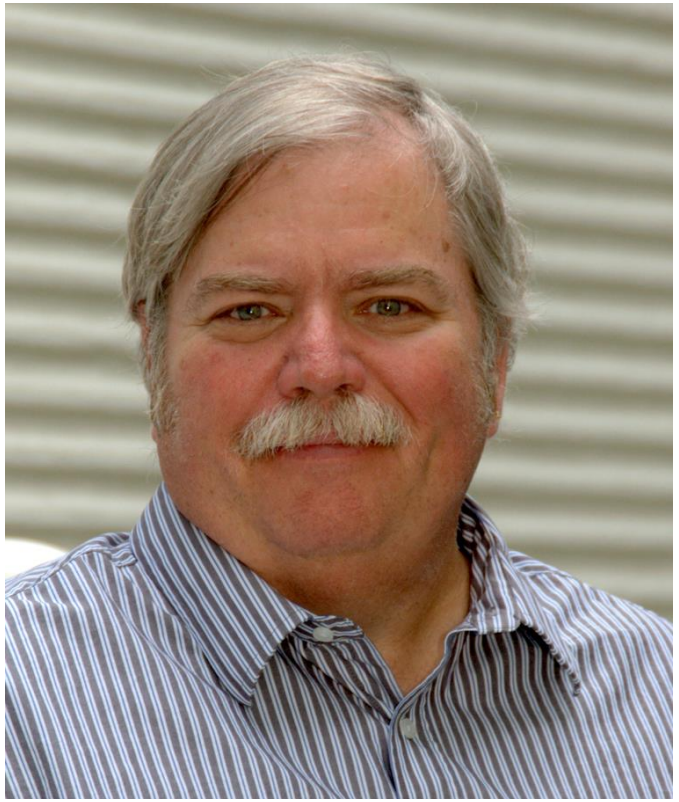
Connecting the World of Process Automation

SafeHART™

Safety System Support for all HART Technologies

Agenda

- About the Speakers
- What is a safety system?
- Introduction to SafeHART™
- SafeHART™ and Safety Instrumented Systems
- Applying SafeHART™ - Benefits and Opportunities
- Q&A



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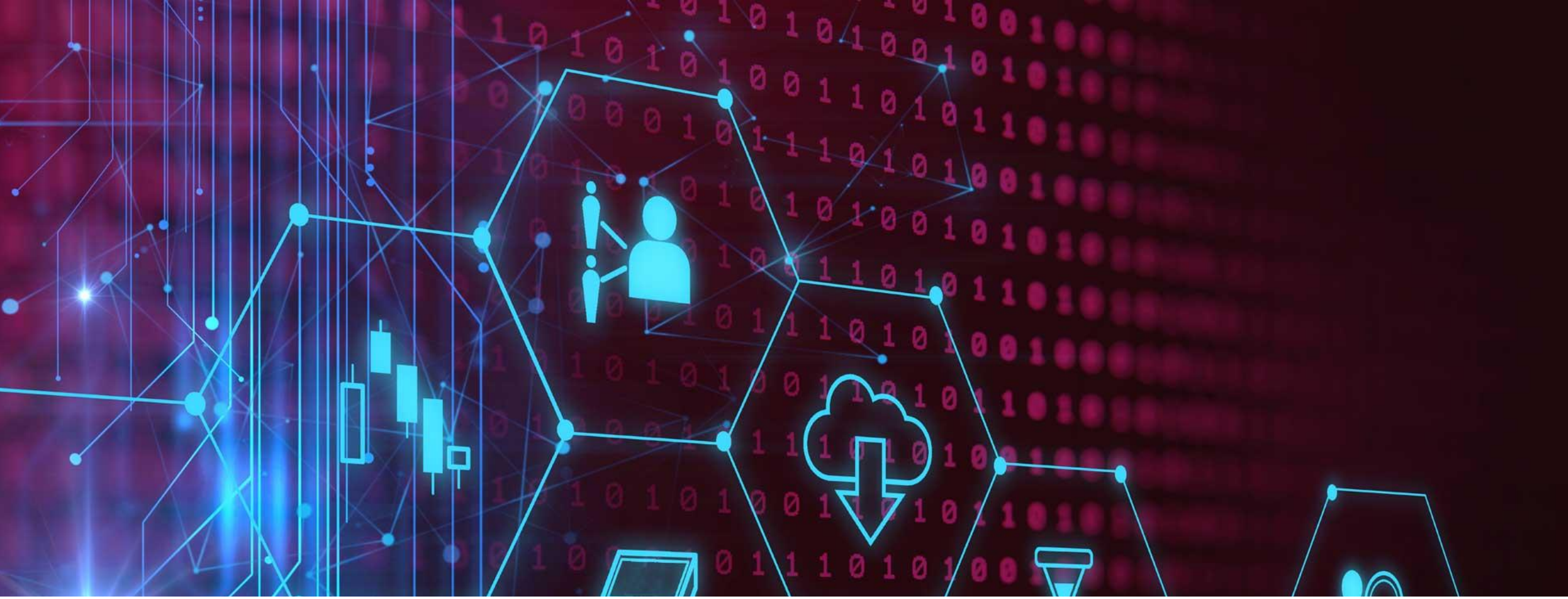
Software Engineering Manager
Honeywell Performance Materials
and Technologies

Webinar Speakers



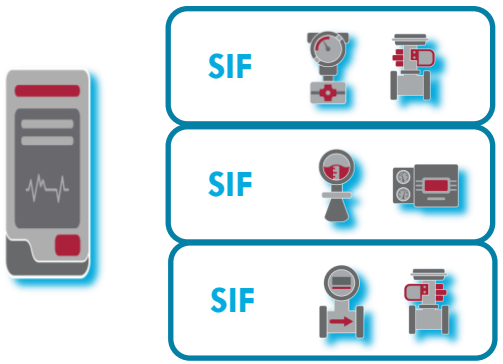
What is a Safety System?

What is a Safety System?

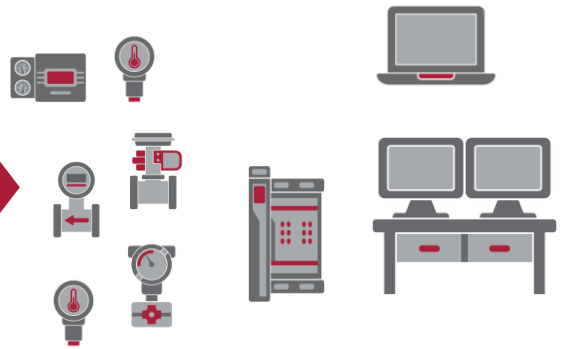
- Safety vs process control
- Hazards and risk reduction
- Safety Instrumented Function (SIF)
- Role played by HART today
- How SafeHART™ enables evolution to digital comms

Process Automation Plant Systems

Safety Instrumented System (SIS)



Basic Process Control System (BPCS)



- Ensure safety of people + property
- Monitor process silently when it is nominal
- Take process to safe state to prevent potential hazards

- Efficiently control the process to make good product
- Enhance availability
- First line of protection / safety

Planning for Safety

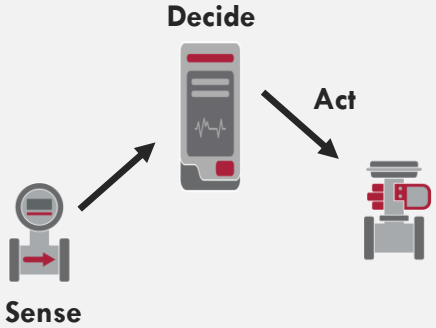
Hazard

- ✓ Risk
- ✓ Consequence

Safety Integrity Level (SIL)

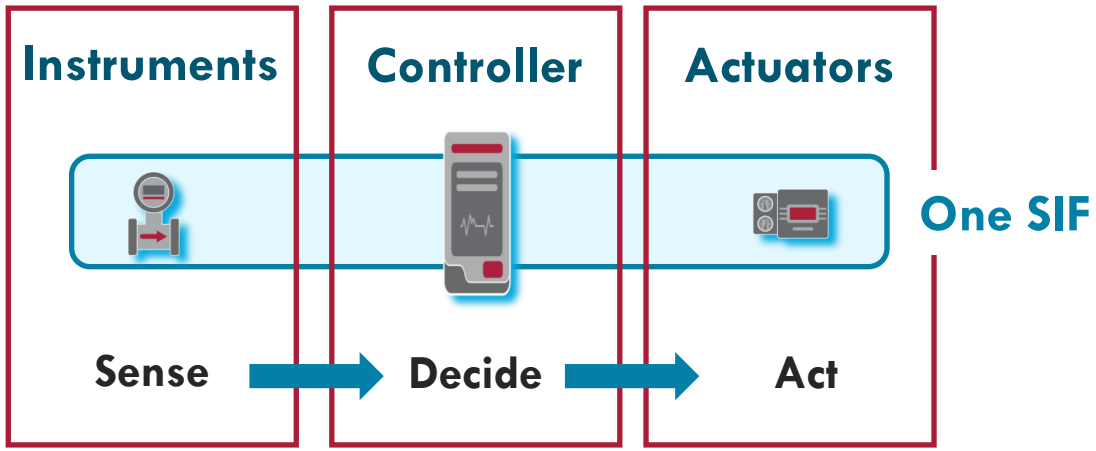
- ✓ Analysis: How much risk reduction is needed

Safety Integrated Function (SIF)



- ✓ Reduce risk due to a potential hazard
- ✓ Take action to mitigate the consequences

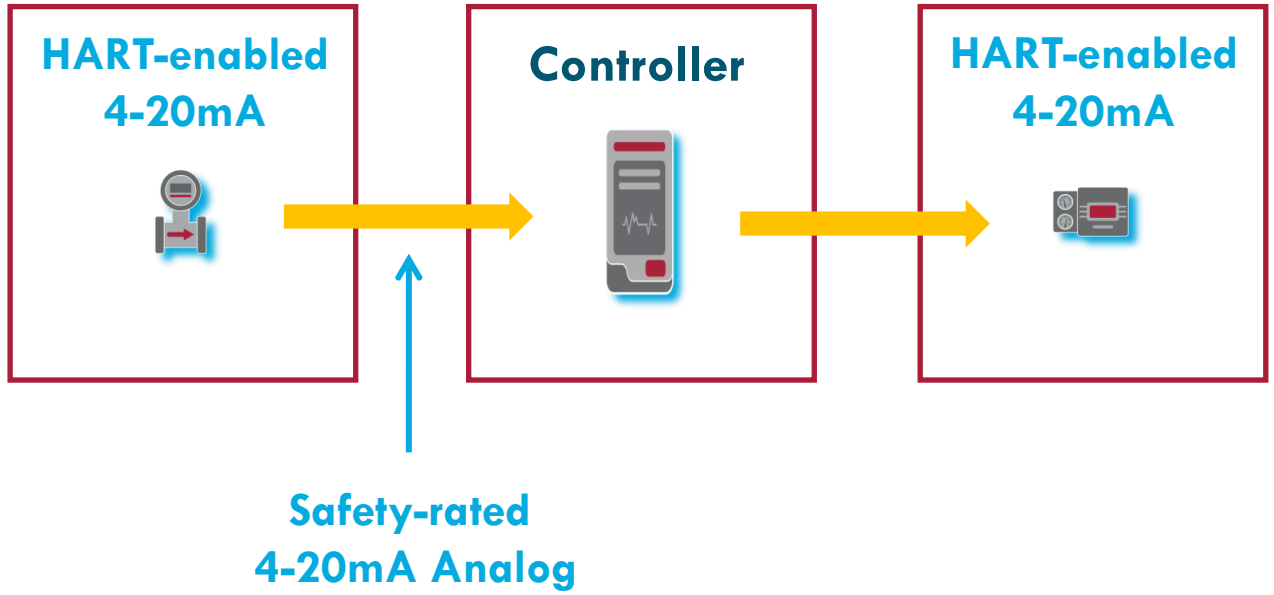
Safety Instrumented Function (SIF)



Safety Instrumented System (SIS) = Collection of SIFs

- **Objective:**
  - Reduce risk due to a single potential hazard
- **Role:**
  - Permit a normal process operation when conditions allow
  - Automatically take process to a safe state when hazardous conditions detected OR
  - Take action to mitigate the consequences of a hazard.

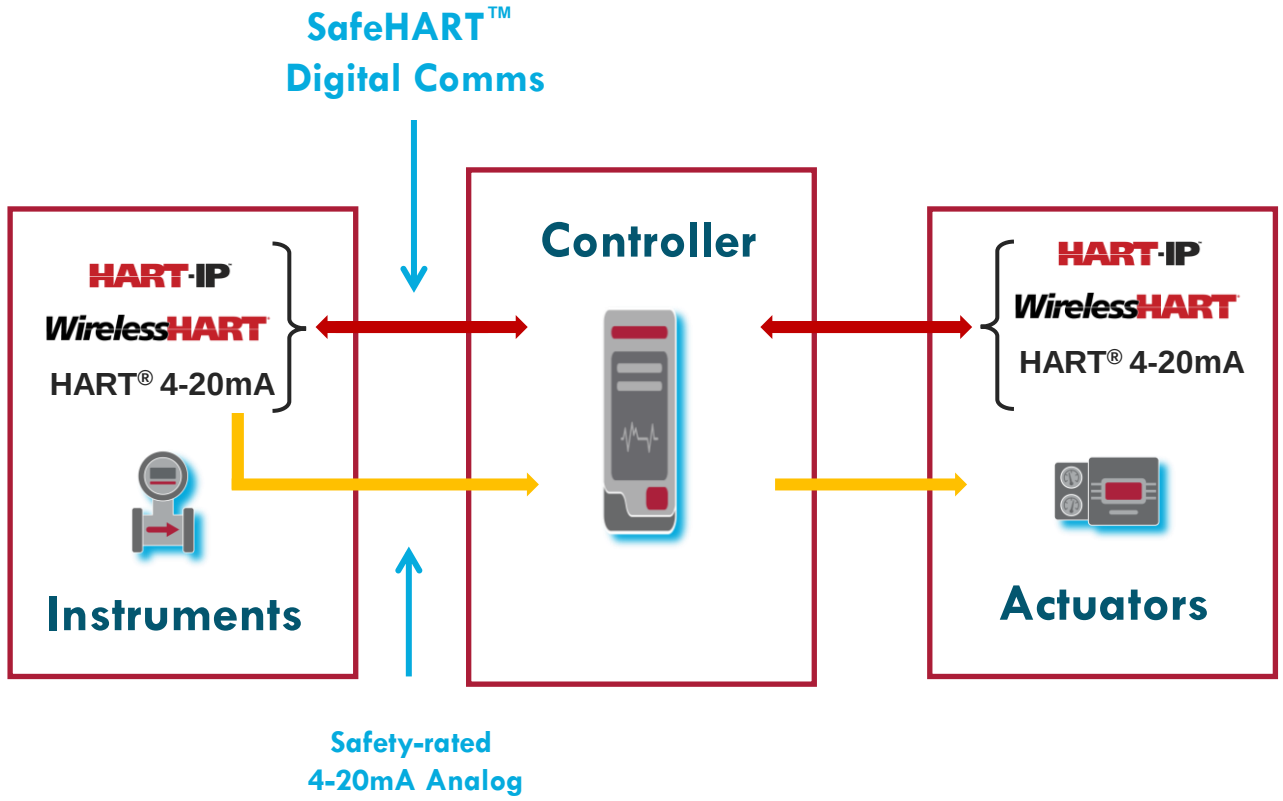
Communicating Safe Process Values Essential



- **4-20mA analog dominates safety on process automation**

- **HART 4-20mA beneficial to safety**
  - Diagnostic access improves availability
  - Secondary process values benefit operation and control
  - Write Protect for field device configuration control critical

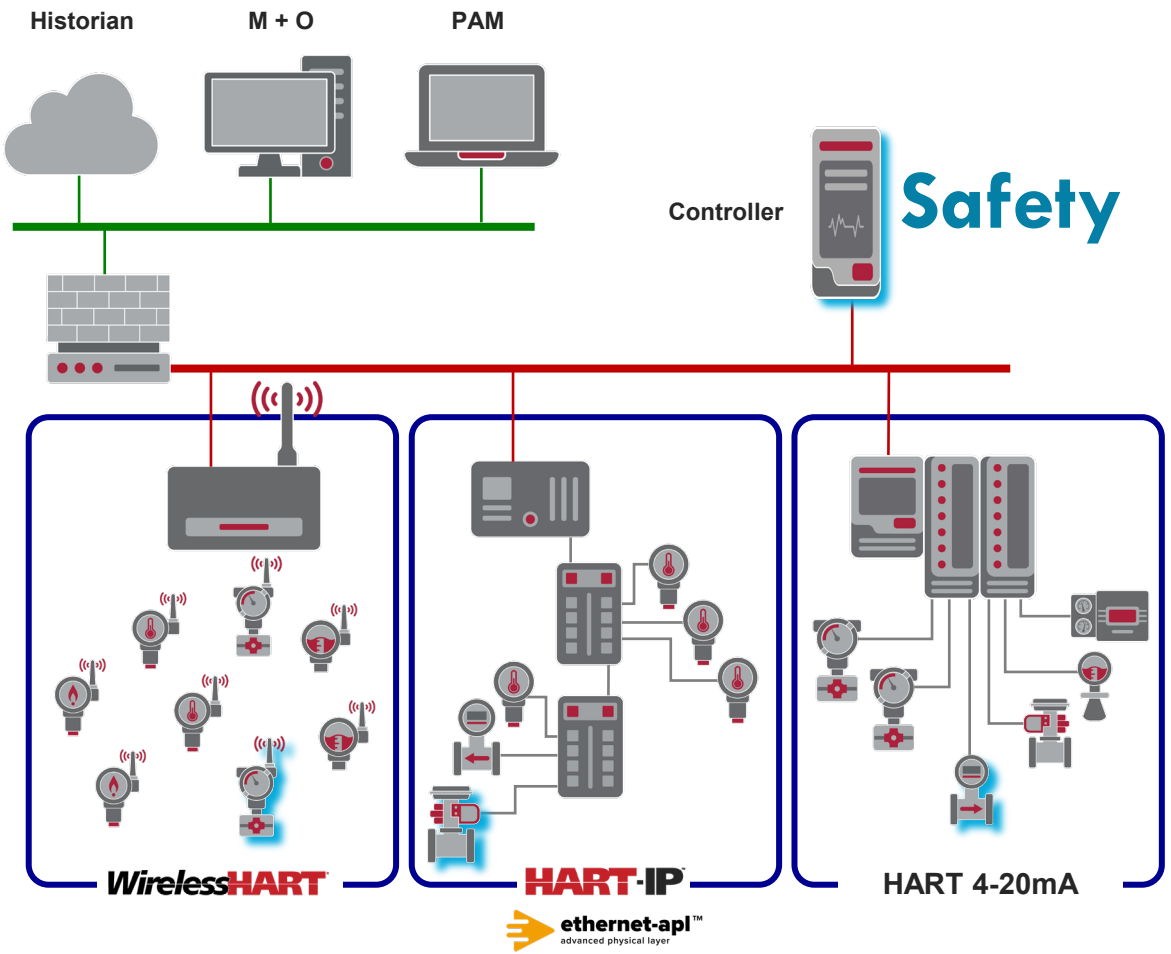
SafeHART™



- Enables safe digital communication
- Expands SIS architecture possibilities to wireless and IP comms
- SafeHART™ 4-20mA retains current loop - add digital comms
- It is HART: easy-to-use; high-value, backward compatible; etc.

Introduction to SafeHART™

SafeHART™: Features and Benefits



* SafeHART™ devices indicated by blue shadow

Enables "Safe" 2-way HART® digital communications

- Safe = probability of undetected error very low (e.g., $< 10^{-9}$)

SafeHART™ features

- Compatible HART® 4-20mA; WirelessHART®; and HART-IP®
- Safe and normal communications coexist simultaneously
- No special modifications needed for HART® 4-20mA I/O or WirelessHART® Gateways

SIL-rated HART® 4-20mA can be upgraded to include SafeHART™

Introduction to SafeHART™

Overview

- Qualitative Mitigation Measures
- Enhanced communication error detection
- Safety controller requirements
- SafeHART *exida* certification

Operation

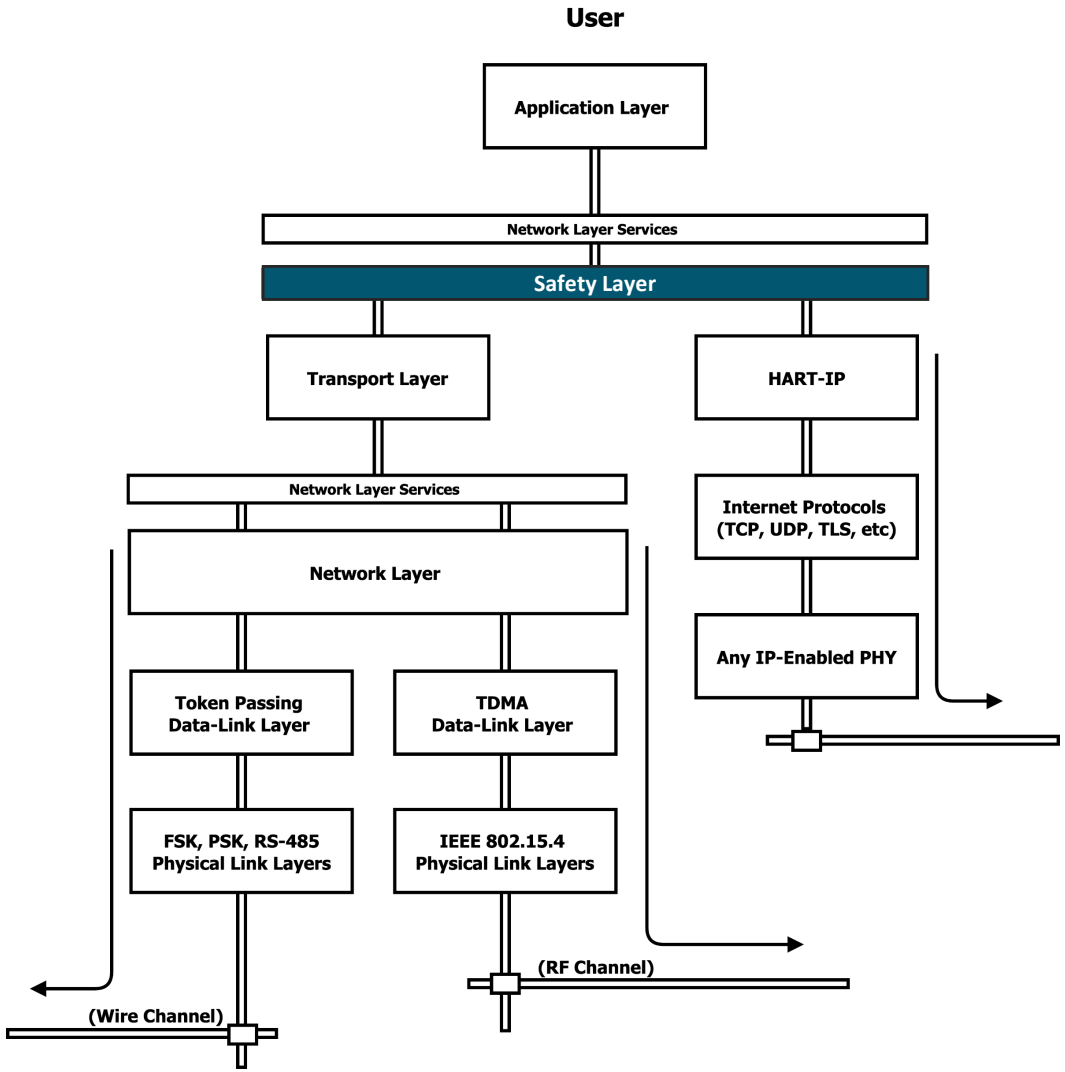
- Communication rules
- SafeHART™ operation
- Interoperability / coexistence

Digital Write Protect

- Compliments SafeHART™ and SIF
- Uses Lockout / Tagout as a guide
- Easily adapted to plant policies

SafeHART™ Overview

- **SafeHART™ a new HART Protocol "layer"**
- **Key elements**
  - CRC and Sequence Number added to packets
  - Watchdog timers (detects comms loss)
  - Dropped / duplicate packet detection
  - "Device Ready for SafeHART™ Operation" Status
- **SafeHART™ field devices must be SIL-rated**
  - Safety Integrated Function (SIF) requirement
- **Safety Controllers must**
  - Subscribe to digital Safety Process Value
  - Support watchdog timers, etc

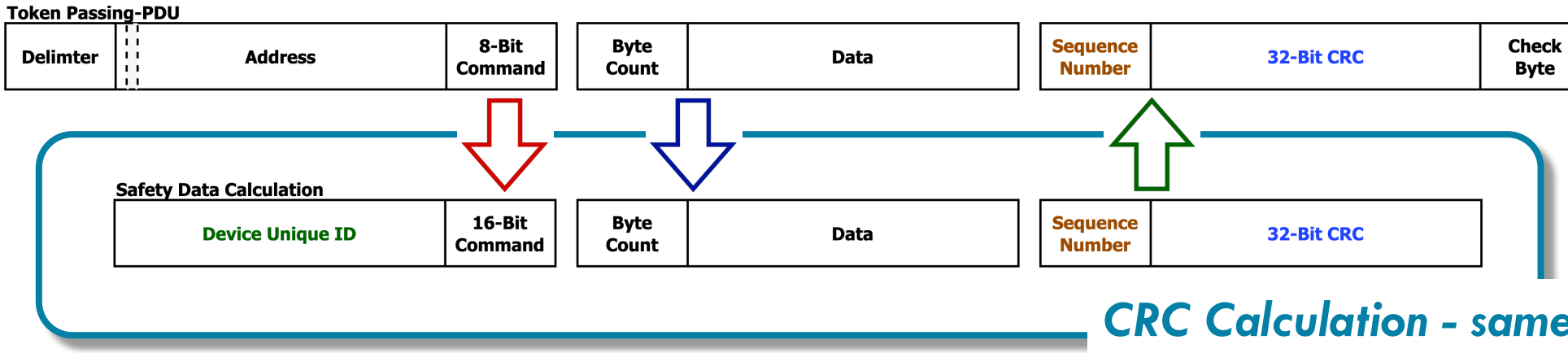


Qualitative Mitigation Measures*

Communication Failure Mode (Error)	Countermeasure			
	Sequence Number	Watch-dog Timer	Unique Addresses	Data Integrity (CRC)
Corruption				x
Unintended Repetition	x			
Incorrect Sequence	x			
Loss	x	x		
Unacceptable Delay		x		
Insertion	x		x	
Masquerade			x	x
Addressing			x	

* *exida* "SafeHART™ IEC 61508 Assessment Report"

Data Integrity + Unique Addresses



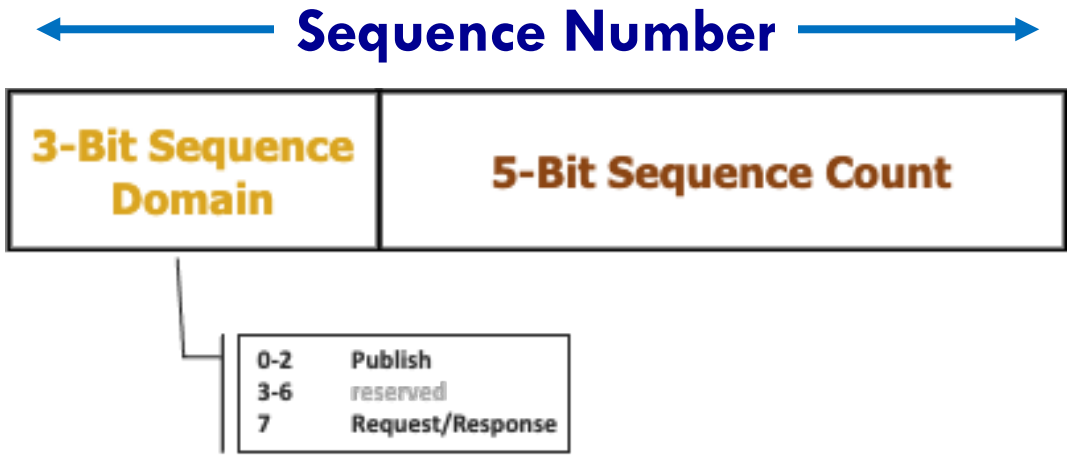
CRC Calculation - same HART® 4-20mA, HART-IP® and WirelessHART®

- **Device Unique ID (surrogate address)**

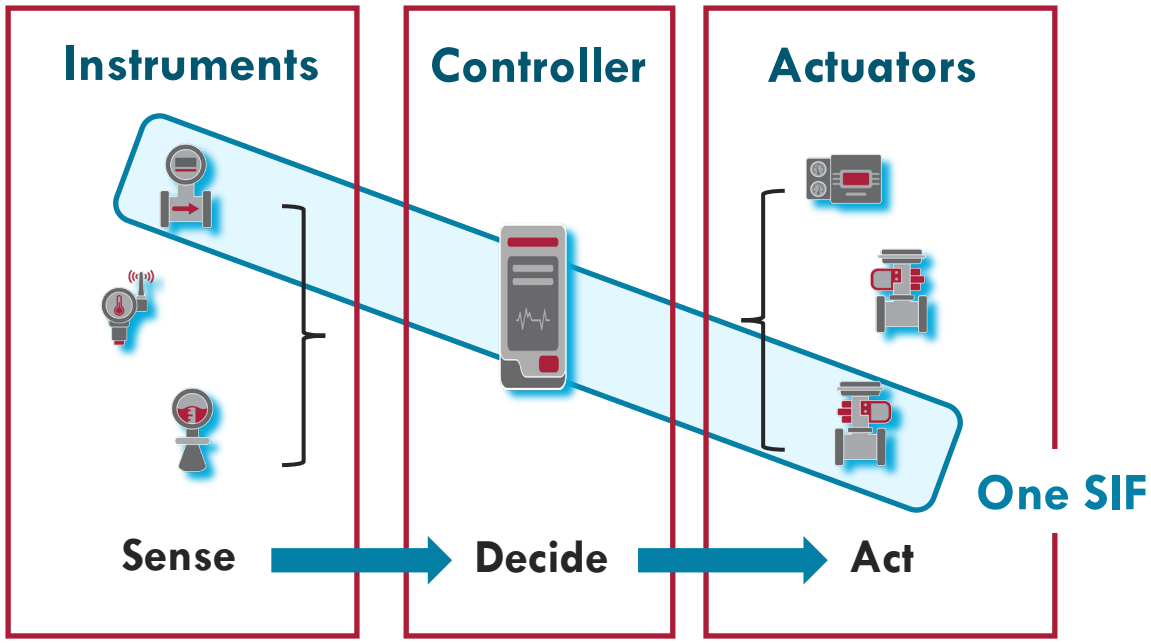
- **CRC**
  - CRC-32K/6sub8 = $x^{32} + x^{7} + x^{6} + x^{5} + x^{2} + 1$
  - **HD = 6** for up to 4113 bits (514 bytes)

Sequence Number

- **Domain - Source of the packet**
  - Controller: Request/Response
  - Instrument: Published message with Safety Process Value
- **Sequence count - Incremented each transaction**
  - Only the Source increments
  - Request sequence number copied to Response



Safety Controller Responsibility

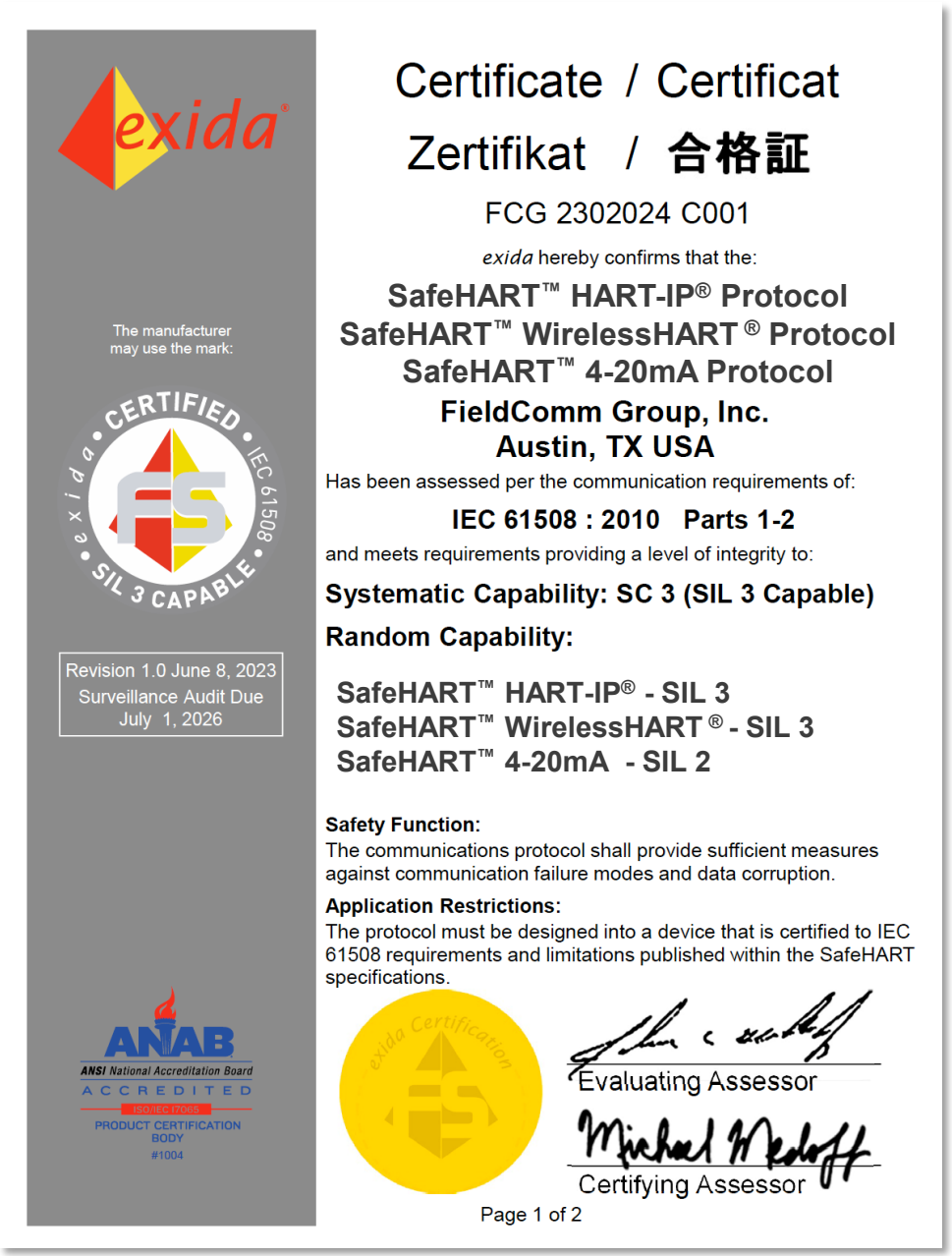


Safety Instrumented Function (SIF)

- **Subscribe to publications by instruments**
  - Duplicates discarded at safety layer
  - Discarded is packet has error (bad CRC)
- **Evaluate the safety process values**
  - Confirm process value in acceptable range
- **Maintain watchdog timer**
- **Calculates number of dropped packets**
- **Execute safety function:**
  - Safety process value out of bounds
  - Watchdog time exceeded
  - Too many dropped packet

exida SafeHART™ evaluation

- **2-step Certification process**
  - Researcher performs numerical assessment
  - Peer review reviews confirm assessment, generates final report
- **Conclusion**
  - No changes required to SafeHART™ Protocol as written
  - HART-IP® and WirelessHART® exceed SIL 3 by 10^5
  - HART® 4-20mA comms meets SIL 2.
- **Redundancy to achieve SIL 3 is best practice**
  - SIL 2 field devices the majority
  - SIL 3 device require redundant internal hardware (>$$$)



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The manufacturer may use the mark:

exida CERTIFIED IEC 61508 SIL 3 CAPABLE

Revision 1.0 June 8, 2023
Surveillance Audit Due
July 1, 2026

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17065
PRODUCT CERTIFICATION BODY
#1004

Certificate / Certificat
Zertifikat / 合格証

FCG 2302024 C001

exida hereby confirms that the:

SafeHART™ HART-IP® Protocol
SafeHART™ WirelessHART® Protocol
SafeHART™ 4-20mA Protocol
FieldComm Group, Inc.
Austin, TX USA

Has been assessed per the communication requirements of:

IEC 61508 : 2010 Parts 1-2

and meets requirements providing a level of integrity to:

Systematic Capability: SC 3 (SIL 3 Capable)

Random Capability:

SafeHART™ HART-IP® - SIL 3
SafeHART™ WirelessHART® - SIL 3
SafeHART™ 4-20mA - SIL 2

Safety Function:
The communications protocol shall provide sufficient measures against communication failure modes and data corruption.

Application Restrictions:
The protocol must be designed into a device that is certified to IEC 61508 requirements and limitations published within the SafeHART specifications.

exida Certification

Evaluating Assessor

Certifying Assessor

Page 1 of 2

SafeHART™ devices must support Digital Write Protect

Enables remotely Write Protecting field devices

Benefits:

- Write Protecting without opening field device enclosure
- Simple: write-protected can be normal state
- Prevents well-intentioned field device changes via handhelds
- Digital Write Protect allows plant to set policy and procedure

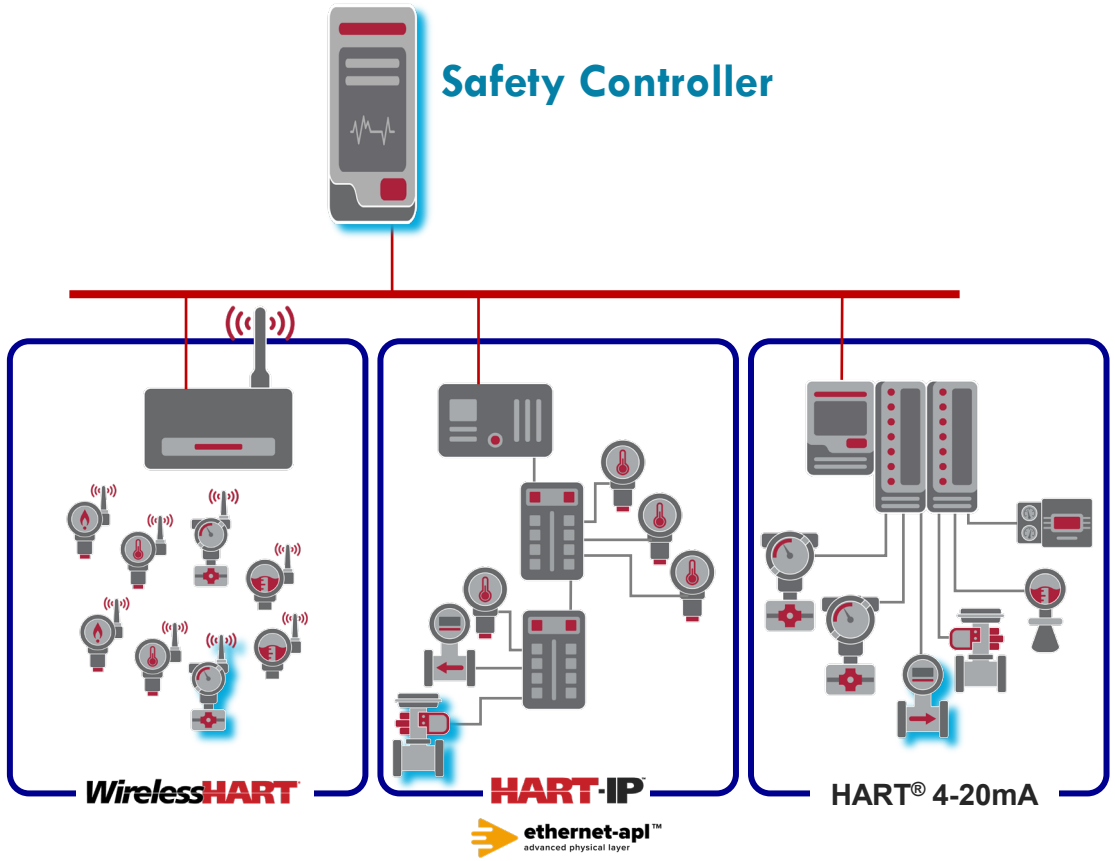
Features:

- 2 virtual digital safety locks with {Combination + User}:
- Attaching a lock asserts Write Protect
  - Same as HW Write Protect jumper
- Remove lock to remove Write Protect
- 2nd lock could be for supervisor, etc.

"Device Ready for SafeHART™ Operation"
FALSE if device not Write Protected

SafeHART™ Operation

Basic Comm Rules



General

- **If Request is "Safe" then Response is "Safe"**
- **Configure publishing messages normally**
  - Publishing essential to SafeHART™ operation

Initiating Pub/Sub

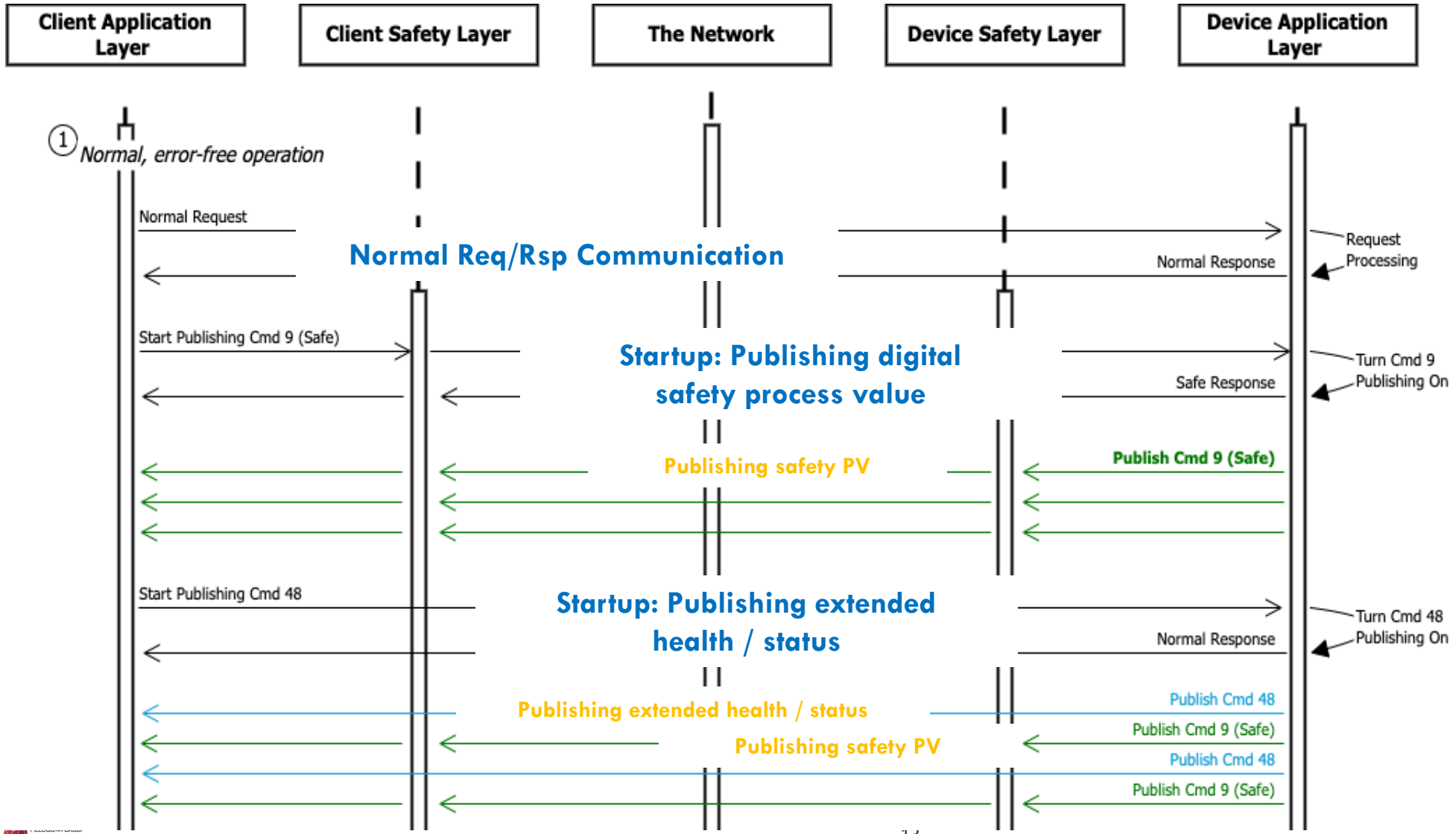
- **HART-IP® Server**
  - Client requesting Safe subscription gets Safe publish message
- **HART® 4-20mA, WirelessHART®**
  - Turn publish message on (Command 109) Safe
    Then that publish message is sent safe

HART-IP® Gateway; 4-20mA I/O

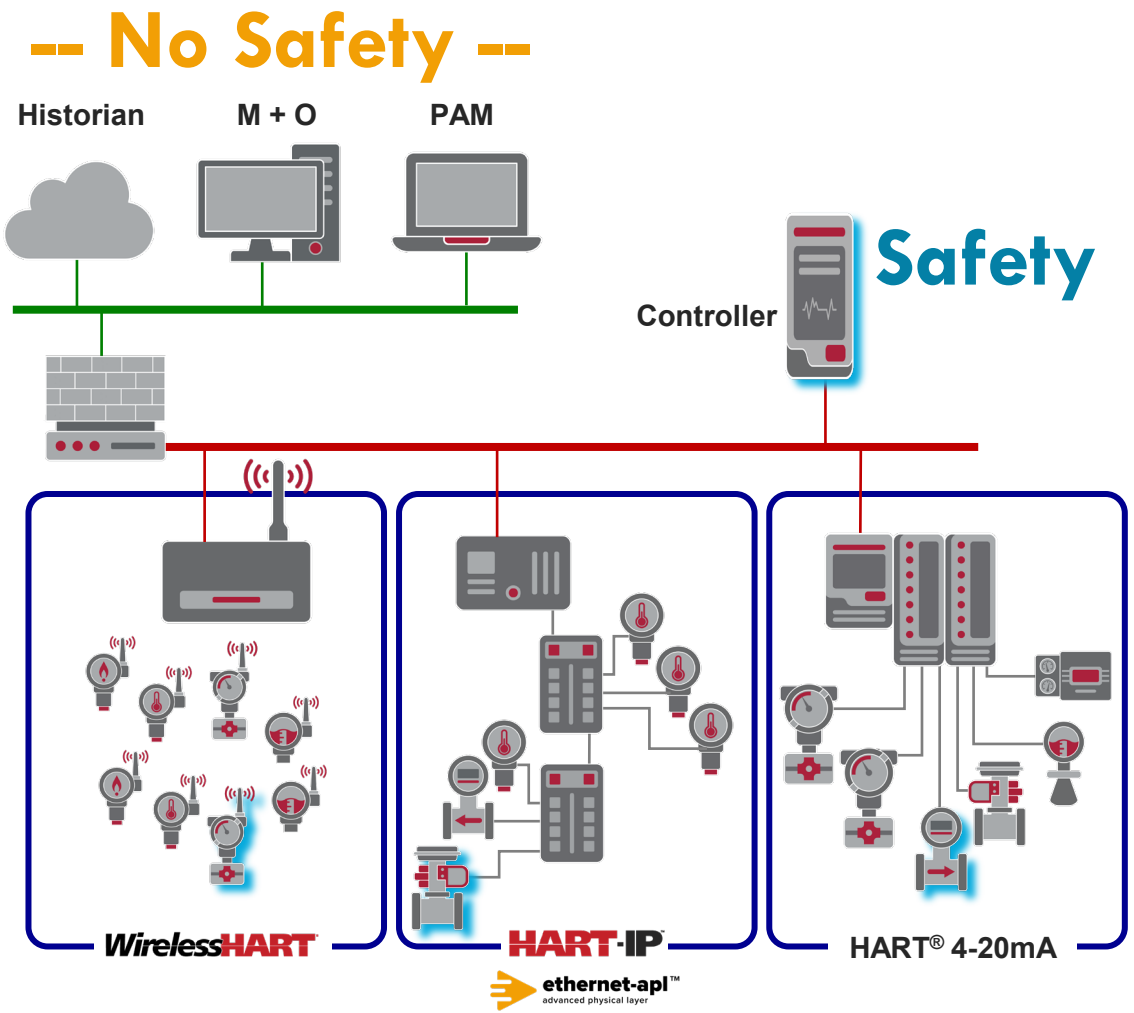
- **Passes-thru publish messages (HART-IP® v2)**
- **No knowledge of SafeHART™ needed**
- **No safety approvals needed**
- **No special configuration needed**

* SafeHART™ devices indicated by blue shadow

SafeHART™ Operation



Interoperability / Coexistence



* SafeHART™ devices indicated by blue shadow

- **General**
  - SafeHART™ Interoperable with existing applications
  - Safe and normal communication simultaneously
  - Mix SafeHART™ and normal HART® field devices same networks.
- **SafeHART™ Comms**
  - Safe publishing configured once (non-volatile)
  - Publishing has own bandwidth HART® 4-20mA and WirelessHART® - minimizes latency, jitter
- **Safety controllers**
  - Watchdog timers set per Process Safety Time
  - Using digital safety process values simplifies implementations.

HART Digital Write Protect

Overview

Objectives

- Remote assertion of Write Protect - same effect as hardware jumper
- Addresses SIF/SIS requirements
- Protection from well-intention handheld users (and others)

Key Elements

- Backward compatible: same procedure to confirm Write Protect
- Robust - 2 digital safety locks with {Combination + User}
- Attaching "Locks" asserts Write Protect
- Procedure to cutting the locks if combination(s) lost/forgotten.

Inspired by Lockout / Tagout standard

Lock Out / Tag Out (LOTO)

- Lock Out: Place a lock to secure the equipment
- Tag Out: Add a tag so you know who to call

HART® Digital Safety Lock

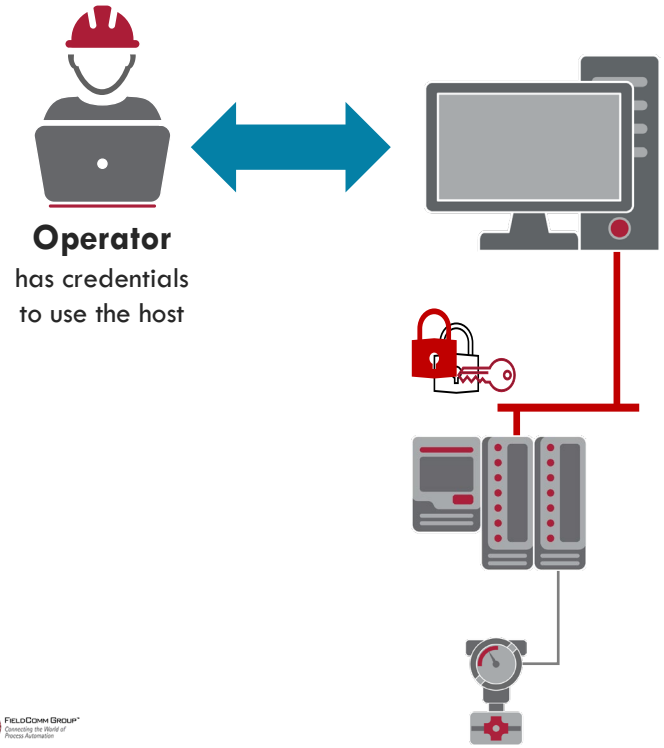
- "Combination": The write-only key to the lock (Lockout)
- "User": Who installed the Write Protect jumper (Tagout)
- 8-character minimum (~ 3 trillion possibilities)
  24 character maximum

References: [1] Wikipedia *Lockout–tagout*
(https://en.wikipedia.org/w/index.php?title=Lockout–tagout)
[2] US OSHA 1910.147 The control of hazardous energy (lockout/tagout)
(https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.147AppA)
[3] EN 50110-1 Operation Of Electrical Installations. General Requirements

Using Digital Write Protect

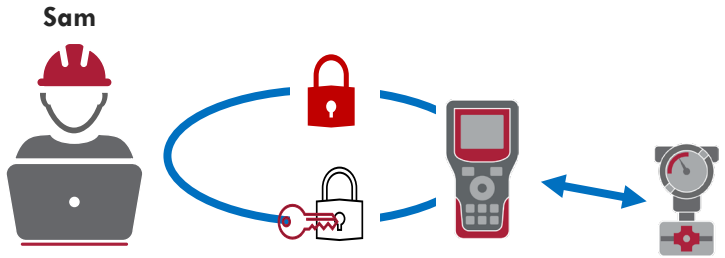
- **Scalable: Can align with plant's policies**
  - Small plant: manually manage the locks
  - Large plant: dedicated host securely managing locks

Integrated plant-wide policy



Operator
has credentials
to use the host

Host
- Supports multiple operators
- Generates locks per plant policy
- Locks opaque to operator(s)
- Securely manages lock database



Simple solution

- **User = Person**
- **Manually lock/unlock**

Robust: Second lock provided - can be used by supervisor

Summary

SafeHART™ Summary

- **SafeHART™ meets IEC-61508 requirements for safe digital communications**
  - HART-IP® and WirelessHART® exceed SIL 3
  - HART® 4-20mA comms meets SIL 2
  - Redundant instruments commonly used to achieve SIL 3
- **SafeHART™ adds**
  - Safety CRC and sequence number to communications
  - Safety controllers must support watchdog timers and dropped packet detection
  - Includes "Device Ready for SafeHART™ Operation" status
  - HART 7.9 Digital Write Protect complements SafeHART™
- **SIL safety requires system approach**
  - Requires SafeHART™ field devices and Safety controllers
  - Digital safety process values published from field devices
  - I/O does not need safety approval*

*Must pass-thru published messages

SAFEHART™ AND SAFETY INSTRUMENTED SYSTEMS

Dr. William Goble
exida

Functional Safety

Functional Safety Goal the automatic safety protection function will perform the intended function correctly or the system will fail in a predictable (safe) manner - exida

~~Dangerous Undetected~~

Dangerous Undetected Hardware Failures

Dangerous Undetected Communication Messages

IEC 61508 / IEC 61511are **"performance-based"** standards:

- No prescriptive, specific designs must be followed
- No specific communication protocols must be used

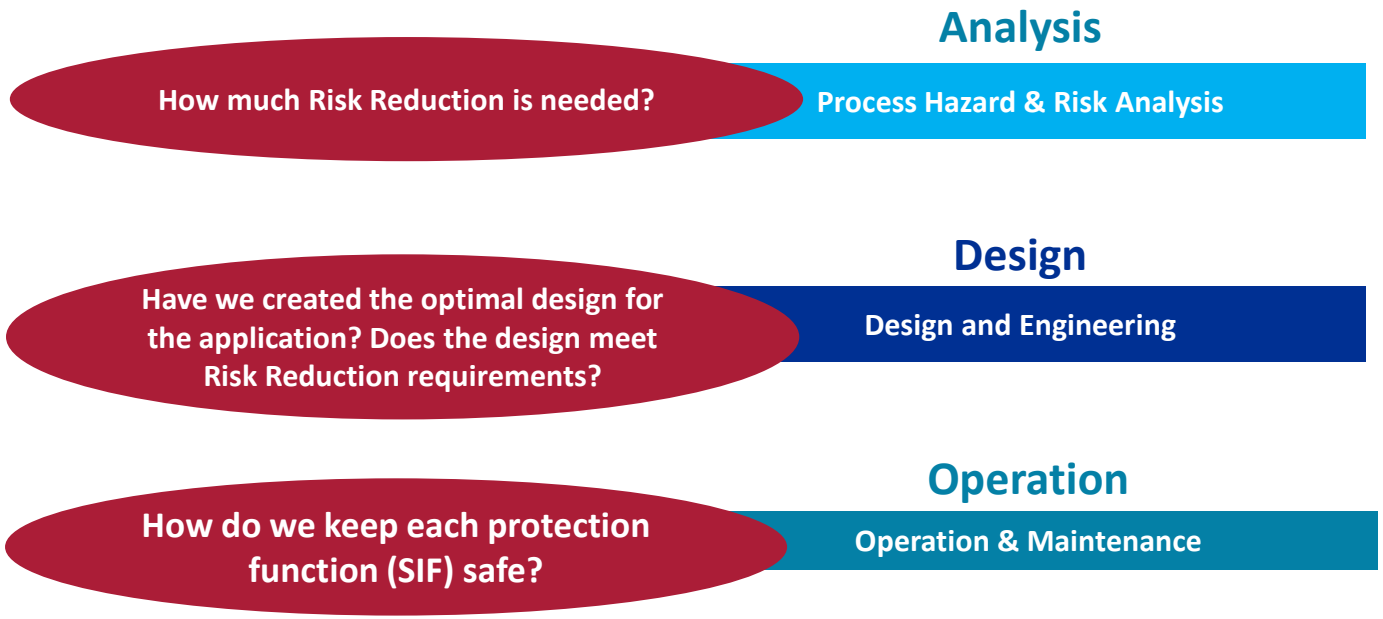
HART COMMUNICATION PROTOCOL WirelessHART HART-IP

This allows engineers to:

- Innovate new architectures
- Invent new diagnostic methods
- Take advantage of new technology
- Address new threats such as cyber
- Create new communication protocols

Functional Safety

Engineering Process - The Safety Lifecycle



SIF – Safety Instrumented Function, IEC 61511

SafeHART™ can allow more innovation in design.

SafeHART™ can positively impact activities during operation.

Functional Safety

Functional Safety Goal the automatic safety protection function will perform the intended function correctly or the system will fail in a predictable (safe) manner - exida

The resulting design is verified by a calculation based on probabilities of safe and dangerous failures.

Dangerous Undetected Communication Messages

During functional safety certification, the SafeHART™ protocol was analyzed by exida to determine the probability of a dangerous undetected message. This metric cannot exceed 1% of the PFH (probability of failure per hour) of the SIL level. The analysis was done for thirteen different bit error probabilities from 10^{-2} per bit to 10^{-6} per bit.

SafeHART Impact

SafeHART™ Impact during Design

What is the optimal design?

Does the design meet Risk Reduction requirements?

- Response Time versus Process Safety Time
- Configuration Change Control – Write Protection
- Detected Failure Annunciation and Response
- Reliability – Safety
- Cybersecurity

4-20 mA SafeHART™ Impact existing installations

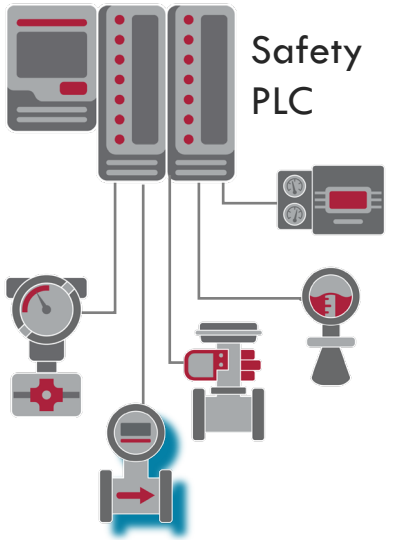
Existing installations can certainly use field devices with SafeHART™.
This will be a move toward better designs without impacting existing design parameters.

Response Time versus Process Safety Time

One can easily specify field devices with SafeHART™ while maintaining the primary safety critical variable as 4 – 20 mA. This choice has no impact on the Response Time of any well-designed SIF.

Configuration Control - Write Protection

A potential safety issue occurs when field device configuration changes and the safety PLC is not updated to match. Procedures must be followed when configuration changes are made to ensure safety. Write protect is used to prevent inadvertent changes. SafeHART™ supports existing HART commands so configuration synchronization issue may remain.



HART 4-20mA

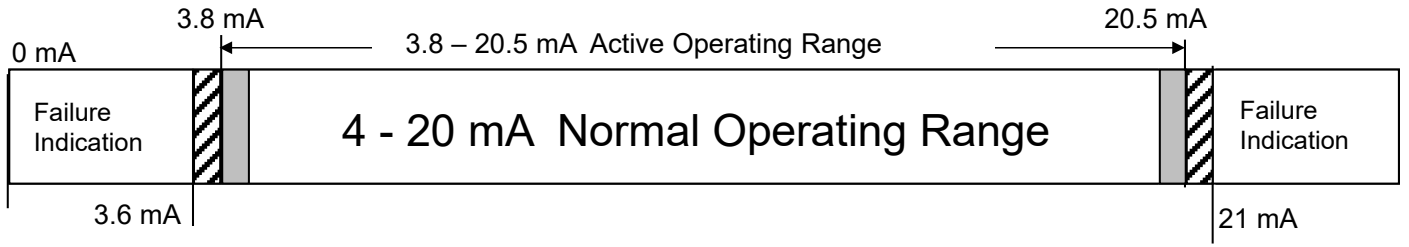
* SafeHART™ device indicated by blue shadow

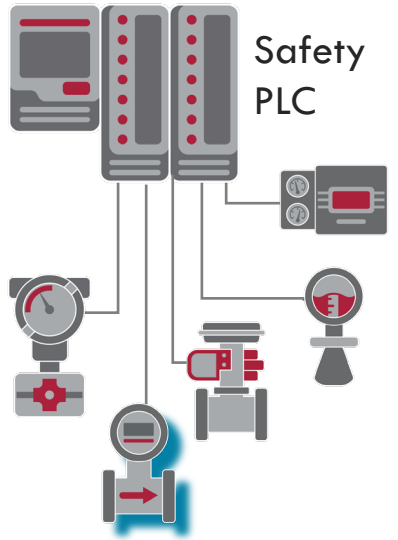
4-20 mA SafeHART™ Impact with Existing Installations

Existing situation does not change – but ready for the future.

Detected Failure Annunciation and Response

Field device failure detection is conventionally done with an out of band current signal. The safety PLC must be capable of detecting those current levels and configured to respond to failures appropriately.





HART 4-20mA

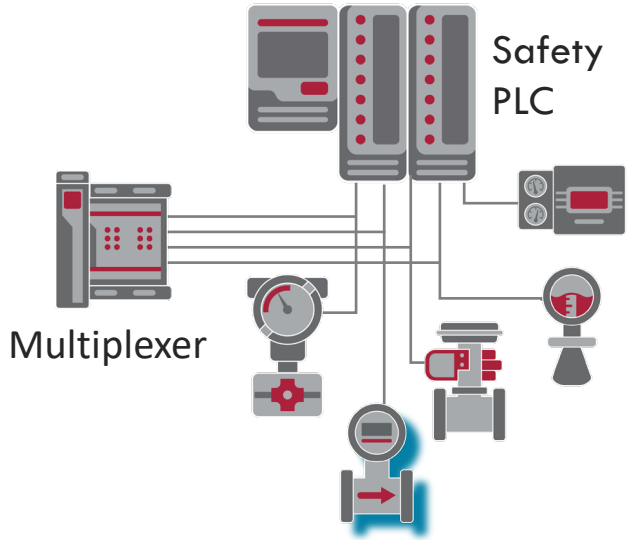
* SafeHART™ device indicated by blue shadow

4-20 mA SafeHART™ Impact with Existing Installations

Testing and Calibration

Since its inception, HART has significantly improved the testing and calibration during commissioning. HART Multiplexers were used before safety PLCs had HART capability.

Testing was limited to the field devices. There was a need to also test that the PLC was properly configured.



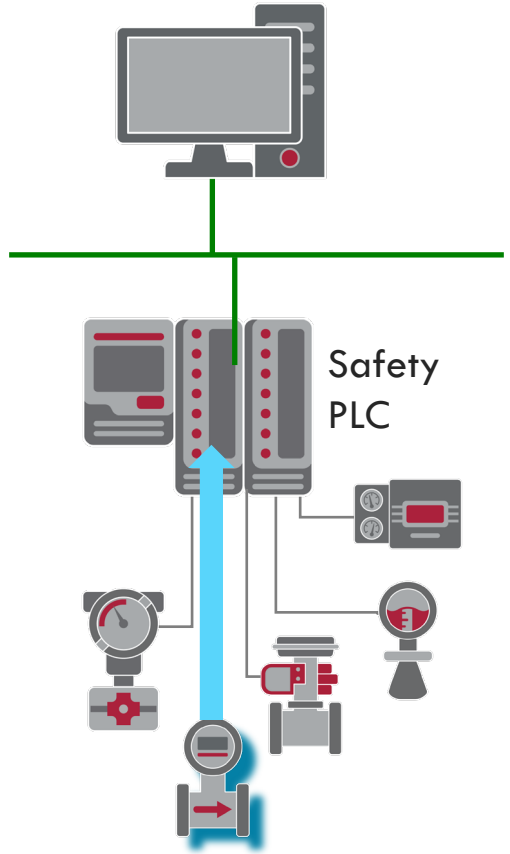
* SafeHART™ device indicated by blue shadow

4-20 mA SafeHART™ Impact with HART in PLC

Today some safety PLCs have HART capability.
HART information can be used within the PLC and sent to higher level data management systems.

The testing and calibration can now go through to the PLC.

The HART information used within the PLC can be valuable.
But the existing HART protocol is not safety rated and HART information should not be used for safety critical variables.



HART 4-20mA

* SafeHART™ device indicated by blue shadow

4-20 mA SafeHART™ Impact with SafeHART™ in PLC

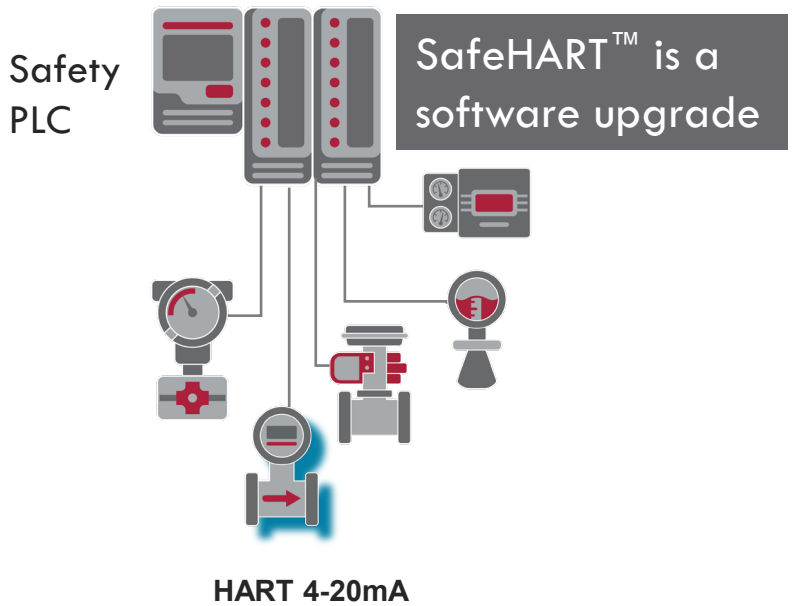
Those PLCs that provide HART capability in hardware can be upgraded to SafeHART™.

As SafeHART™ support arrives in the safety PLCs:

1. Much safer and more reliable methods for configuration synchronization and write protection will be available.

2. Field device failure detection can be annunciated via SafeHART™ digital communications rather than out of band current levels. In many cases this will allow continued vision of the 4-20mA process variable.

3. Equipment failure reporting can be simplified resulting in better and more cost-effective response to field device failures.



* SafeHART™ device indicated by blue shadow

4-20 mA SafeHART™ Impact with SafeHART™ in PLC

Those PLCs that provide HART capability in hardware can be upgraded to SafeHART™.

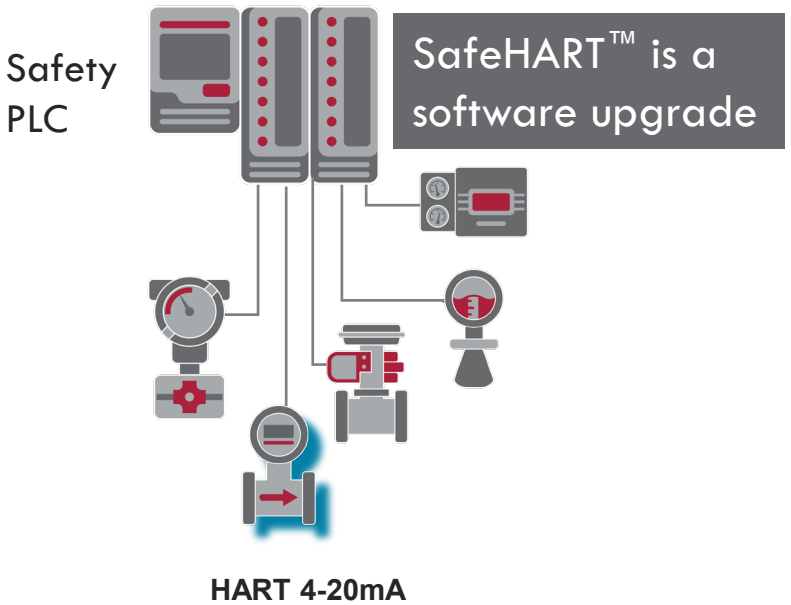
As SafeHART™ support arrives in the safety PLCs:

4. Failure annunciation reports can include field device identification, location information and a record of error codes.

5. Failure incident data can be directly sent to failure analysis tools.

6. Remote proof testing possibilities exist without changing wiring. Automatic bypass initiation and release can be done, improving safety by ensuring and limiting bypass times. Maximum bypass timeouts are possible. Proof test data and results can be directly sent to failure analysis tools.

7. Keep innovating!



* SafeHART™ device indicated by blue shadow

WirelessHART®, HART-IP® SafeHART™ Impact

Response Time

SIF Response Time can be improved.

Write Protection

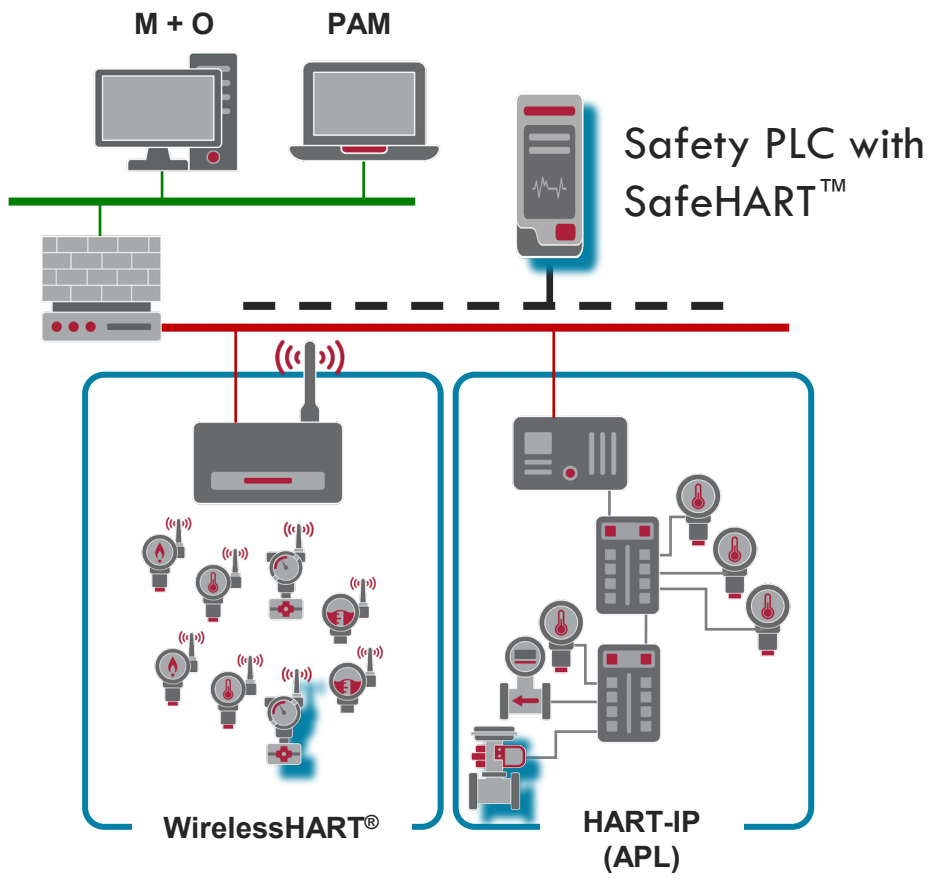
Digital Write Protection is stronger and easier.

Fault Detection and Annunciation

As with the 4-20 mA delivery mechanism, failure metrics are digitally annunciated with faster response and less complex PLC logic.

Reliability - Safety

Digital communications require less electronic circuitry resulting on lower failure rates in all failure modes, especially in the dangerous mode.



* SafeHART™ devices indicated by blue shadow

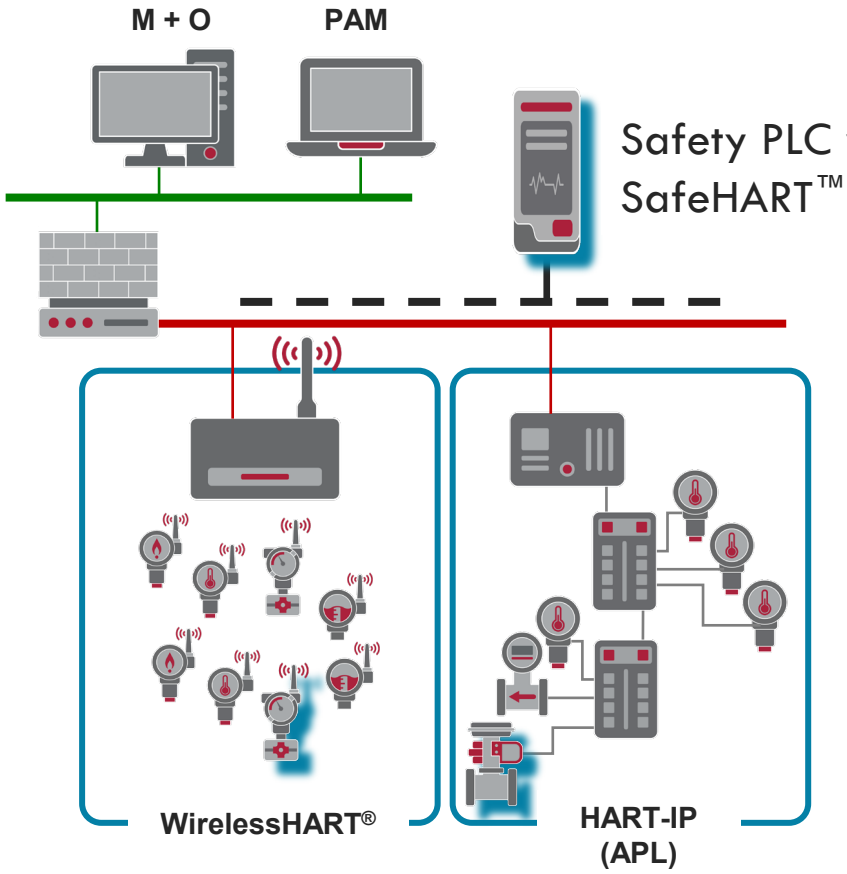
WirelessHART®, HART-IP® SafeHART™ Impact

Wiring Complexity

Wiring can be significantly reduced, simplified

Cybersecurity

SafeHART™ over HART-IP or WirelessHART combines safety integrity with strong AES128 bit cybersecurity encryption minimizing shutdown risk (or worse) via black hat hackers.



* SafeHART™ devices indicated by blue shadow

Summary

SafeHART™ - Functional Safety

The performance-based functional safety standards (IEC 61508, IEC 61511) do not require predesigned SIFs. Therefore, we can take advantage of new technology to improve reliability and safety.

Digital communications that meet the requirements of IEC 61508 (via IEC 61784) can provide improved reliability and safety in Safety Instrumented System design.

Engineering Process - The Safety Lifecycle

Applying SafeHART™

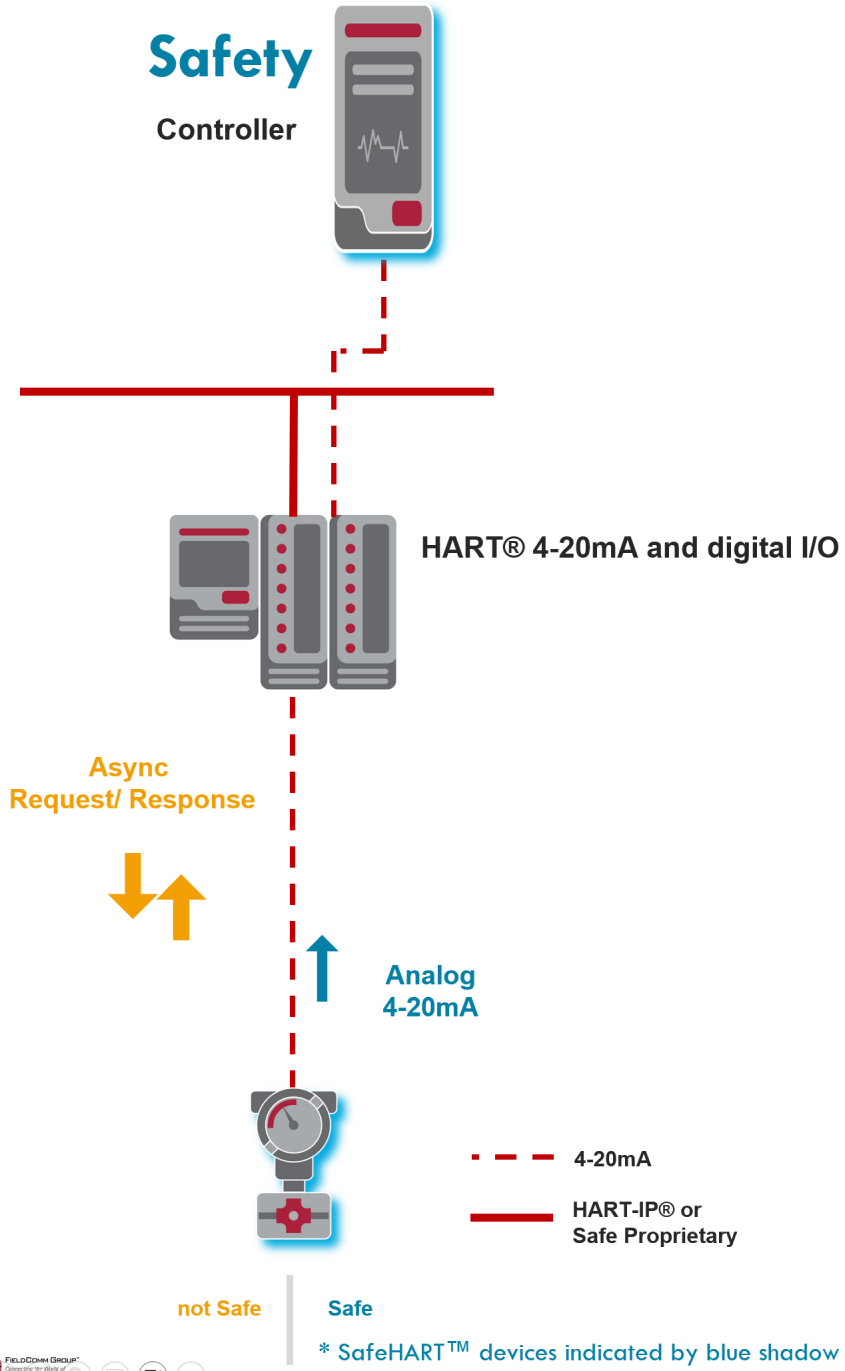
Benefits and opportunities

SafeHART™: A Valuable Addition to HART® Protocol

HART® COMMUNICATION PROTOCOL

- **HART® will be around for a long time**
- **HART® instruments still dominate the installed base**
- **HART® represents the greatest market share for new instrument shipments**
- **HART® used widely in safety to:**
  - minimize incidents
  - maximize production uptime
  - reduce the cost of compliance
  - and manage plant risk
- **SafeHART™ is a great upgrade**

Safety Today – 4-20mA Centric



Typical topology

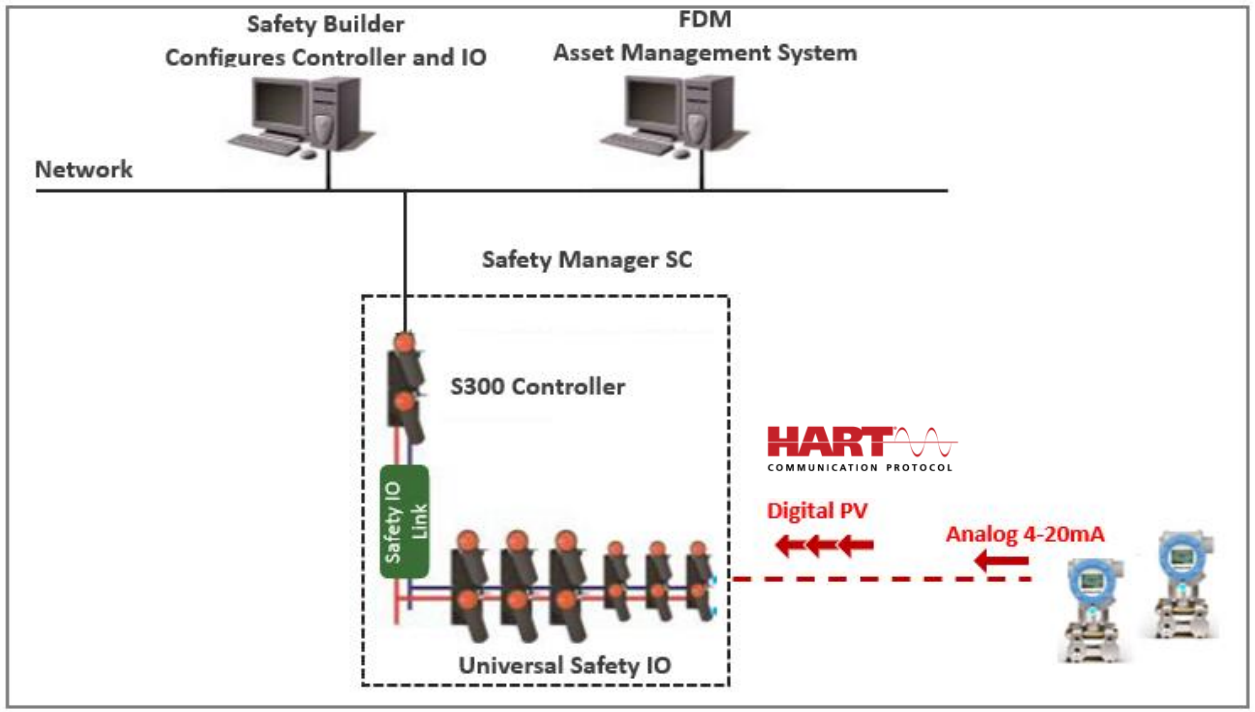
- 1 Field Device
  - Modulating the SIL-rated 4-20mA
- Safety I/O connected to the 4-20mA
  - Measures the 4-20mA
- Safety controller
  - Uses 4-20mA value in SIF.

HART®'s role:

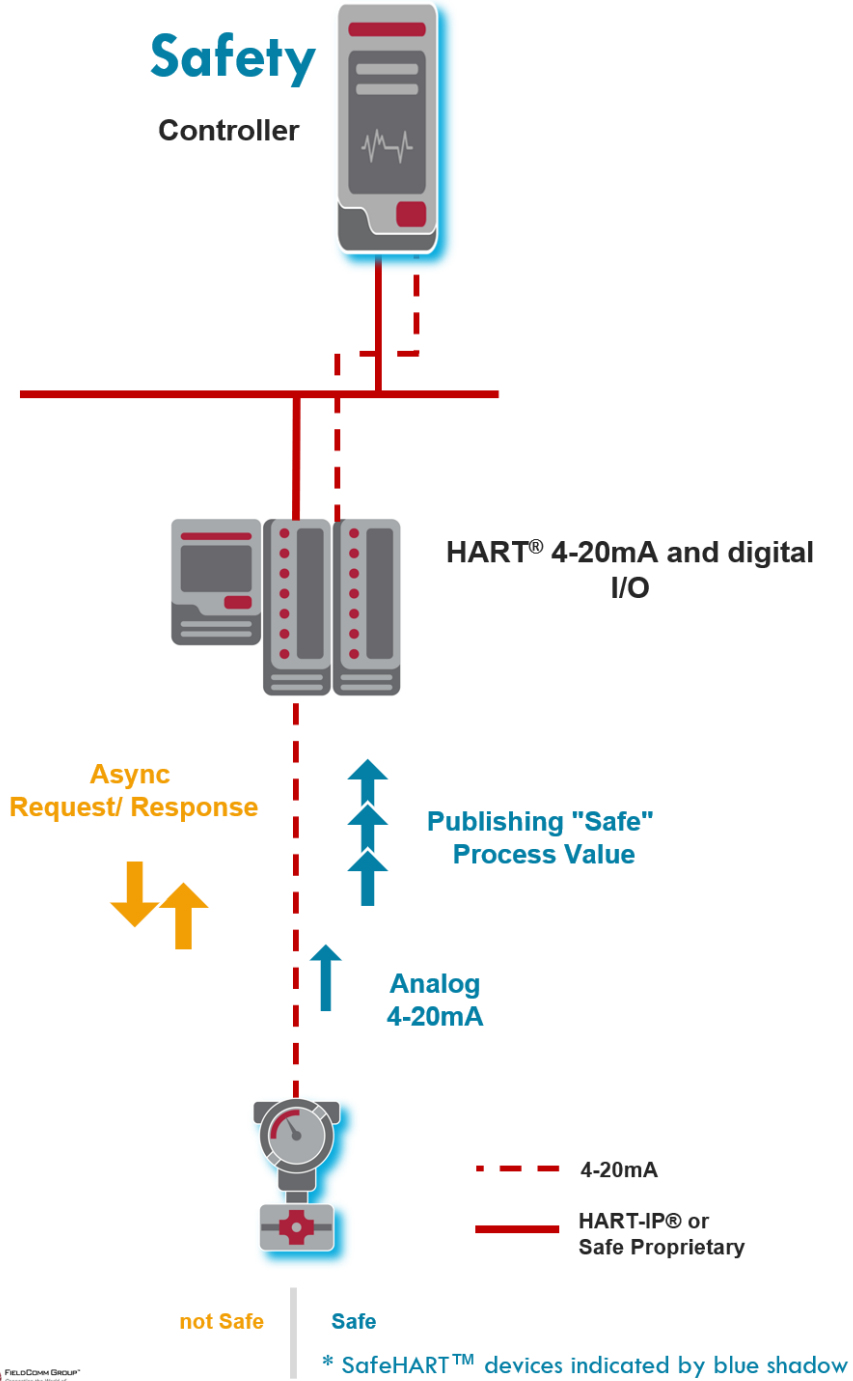
- Provisioning and lifecycle management*
- Monitoring and Optimization
- Health Monitoring and Diagnosis

* Field device must be write-protected when operational

Honeywell Safety Manager SC with 4-20mA HART® devices



- **Overview**
  - Includes S300 Controller and Universal Safety IO in Series-C form factor
  - Controller and IO scan for HART® 4-20 Analog and digital value. FDM may use the digital value
  - Analog is used for Safety. Path for SafeHART™ is simple
  - Integrates process safety data, applications, system diagnostics and critical control strategies.
  - Executes SIL-defined safety application logic in a fully redundant (2oo4D) architecture
  - TÜV SIL 3 certified
  - Provides highest levels of safety and protection
- **Network with HART® 4-20mA field device/s**
  - Field Devices : Modulate the SIL-rated 4-20mA signal
  - Universal Safety I/O connected to the 4-20mA : Measures the 4-20mA signal
  - HART Data from pass-through communication is automatically integrated in Honeywell Field Device Manager.
  - FDM Has extended security measures to avoid unwanted HART parameter changes
  - Safety S300 controller : Uses the 4-20mA value in SIF
- **Applications :**
  - Emergency shutdown and other critical applications
  - Fire and gas
  - Burner management



SIF with SafeHART™

Two safety channels

- 4-20mA value
- Published digital process values

Requirements: SafeHART™ upgraded field device and controller

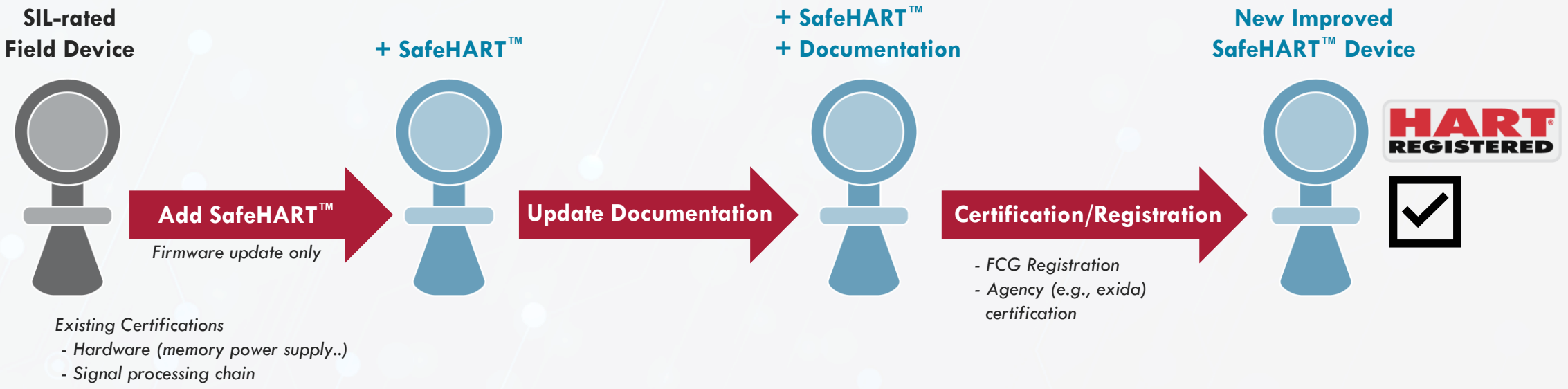
Plant upgrades can be incremental and opportunistic

- Start buying SafeHART™ capable field devices as replacements / spares (provides future proofing)
- Upgrade controller when / if desired.

Benefits

- Use safe digital process values to detect and eliminate 4-20mA errors (bad range values, calibration, etc.)
- Retains 4-20mA - backward compatible

Evolve to digital safety architecture at your pace



SIL-rated HART® 4-20mA Field Device → SafeHART™ Device

- Plan and begin upgrading SIL rated field device to include SafeHART™
- I/O vendors - confirm support for pushing safety packets to client Apps
  - HART-IP® and proprietary I/O backbones
- Safety controllers - begin plans for SafeHART™ support

Developers

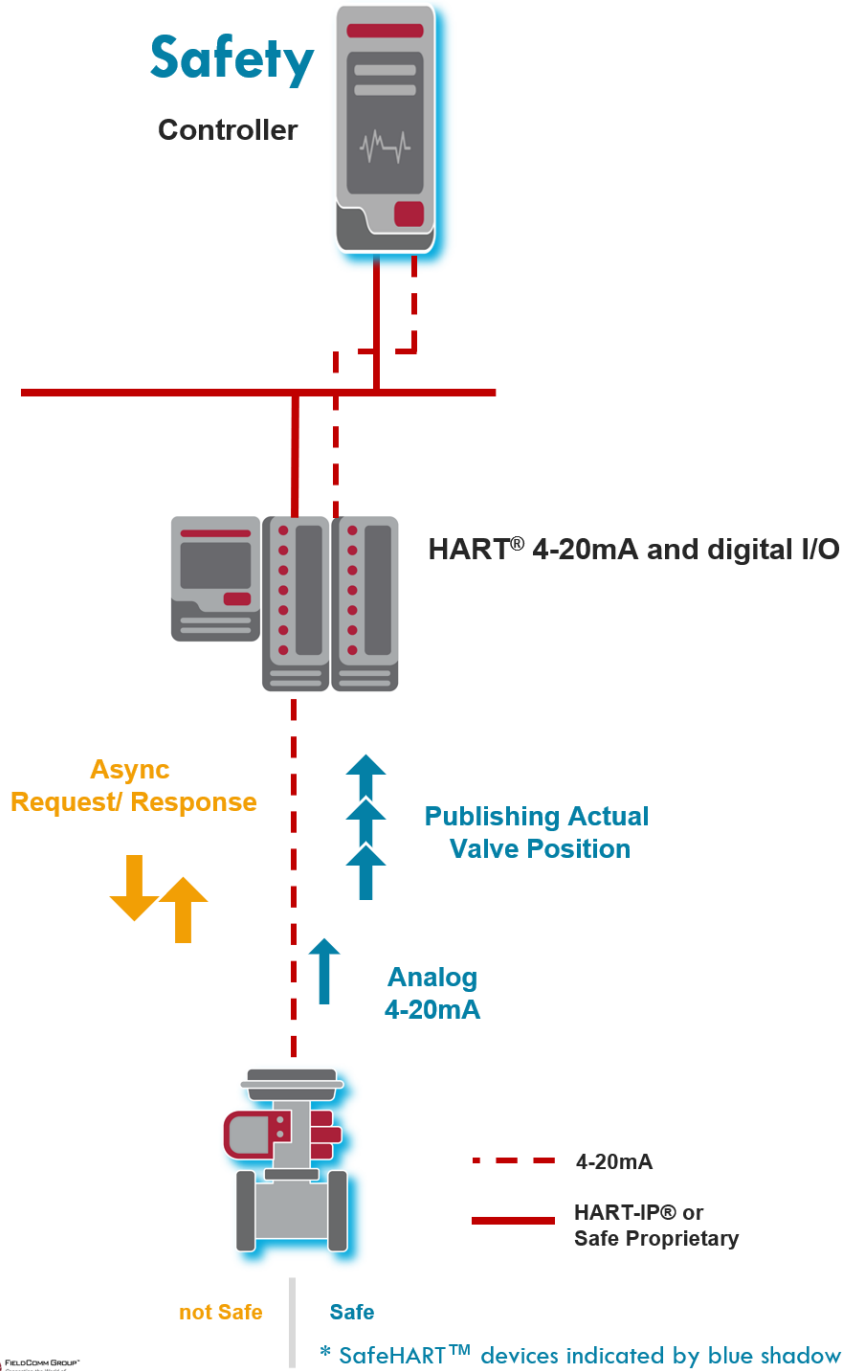
- Begin requiring SafeHART™ compatibility for new spare devices purchases
- Assess impact of incrementally updating safety systems and strategies
  - Updated field device will support current safety plans but offer additional risk reduction over time

Users

- Same planning, installation, operation, know-how as today
- Offers additional risk reduction
- Additional safety process values beyond the one on the 4-20mA possible

New builds - require SafeHART™

Recommend Evolutionary Adoption



Valve / Actuator

Similar upgrade to Valve/Actuator possible

Software and certification update

- Safety process value is at least the setpoint
  - SafeHART™ allows setpoint to be read-back

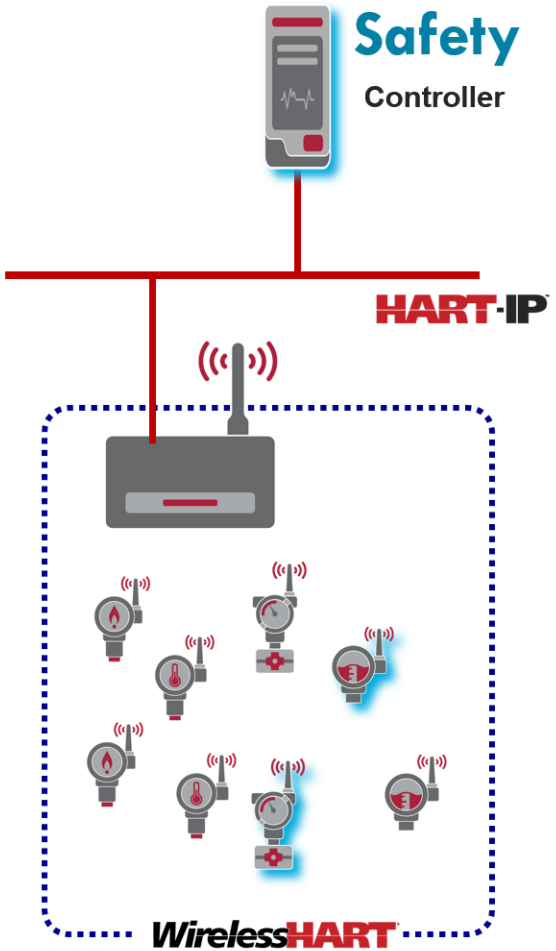
Actual valve position

- Would confirm valve movement
- May (or may not) already in actuator
- May note b safety-rated
  - If not, then SIL certification required

Benefits:

- Digitally read-back setpoint in use
- Knowing Valve position is very valuable and it can enable partial valve stroking

SafeHART™ + WirelessHART®: Expand Safety Function Coverage



* SafeHART™ devices indicated by blue shadow

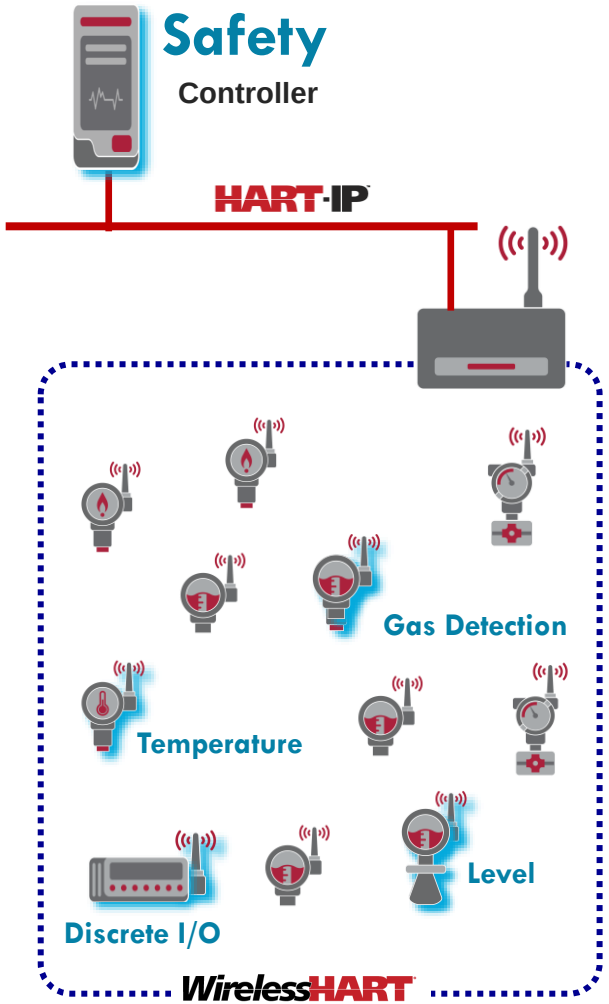
WirelessHART®

- 99.99% end-end communication reliability
- Inexpensive, easy, reliable way to add more safety function
- Once WirelessHART® network is installed; mesh can be expanded organically

SafeHART™

- WirelessHART® + SafeHART™ great solution for adding new safety function
- Interoperates with WirelessHART® mesh network, Gateway and HART-IP®
- Requirements:
  - Update safety controller to support SafeHART™ / HART-IP®
  - Start adding SafeHART™ devices to the WirelessHART® network

WirelessHART possible safety applications



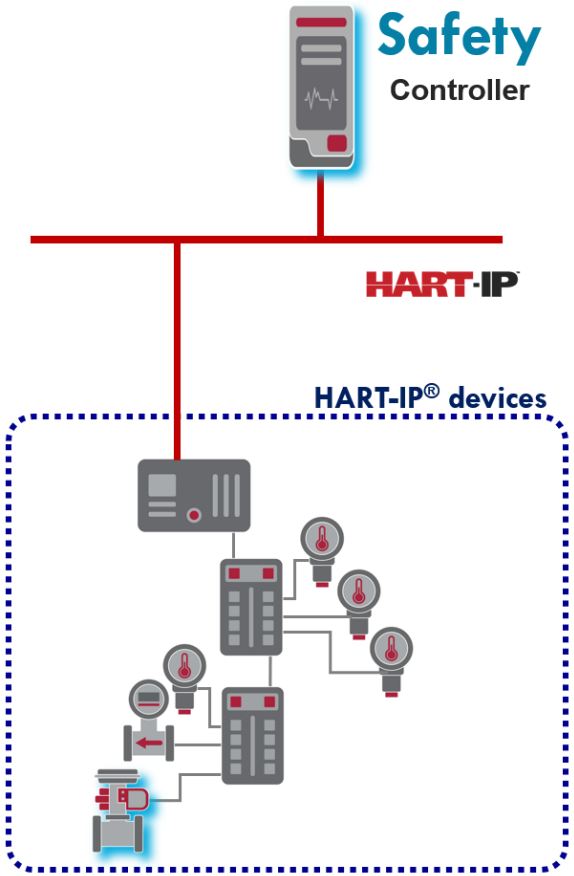
* SafeHART™ devices indicated by blue shadow

- **Tank farm monitoring**
  - Temperature
  - Hybrid Level
    - Level Gauge (safe digital process value)
    - HART® Discrete device + Hi/Lo safety switch
- **Hazardous gas detection**
- **"Proving" valve position**
  - WirelessHART® Discrete I/O + Limit switches

HART-IP® Applications

- **Early HART-IP® adoption needs Remote I/O and WirelessHART® Gateway**
  - Traditional HART-IP® in the device removes the need for Gateways

SafeHART™ + HART-IP®



* SafeHART™ devices indicated by blue shadow

HART-IP®

- Uses familiar HART® protocol
- Application over common Ethernet or Wi-Fi media
- Uses well established TCP/IP transport and networking protocols.
- HART-IP® with APL 2-wire Ethernet allows communication into safety area

SafeHART™ with HART-IP®

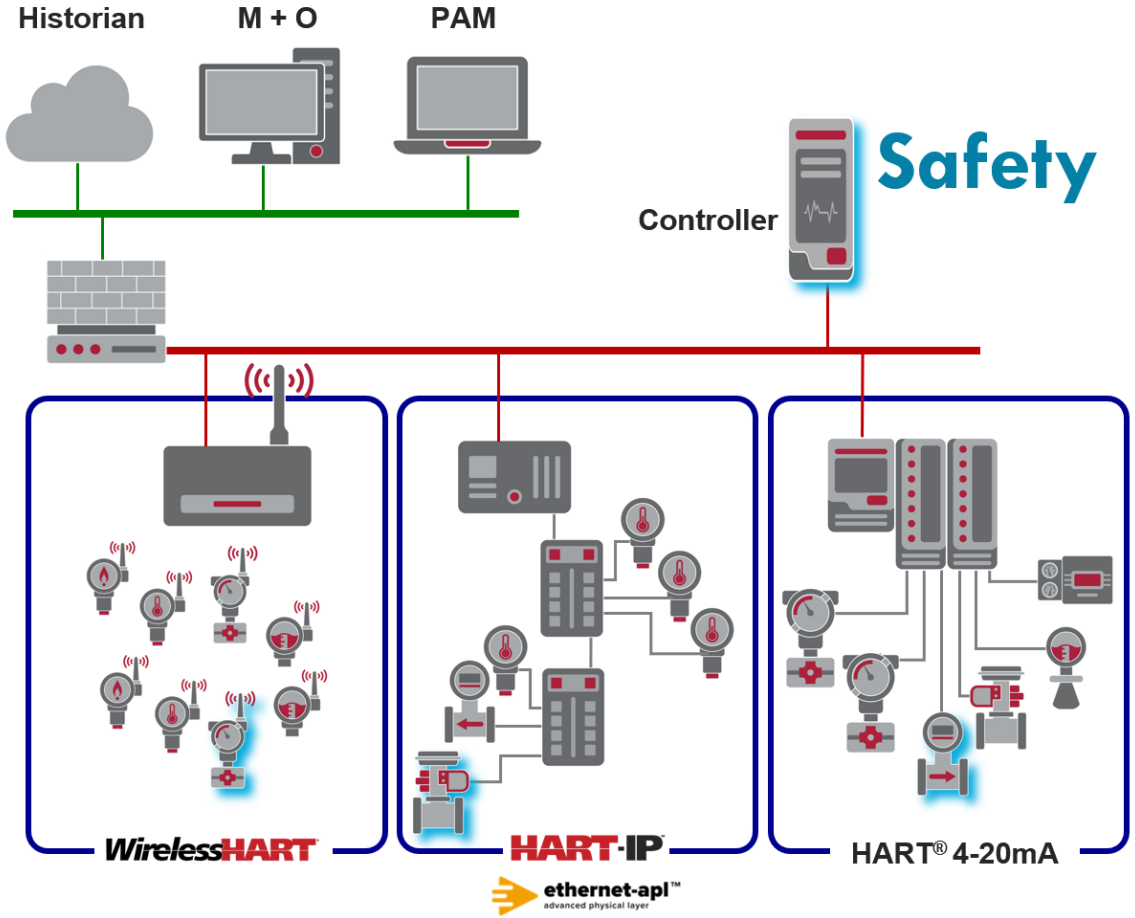
- Interoperates with mesh network, Gateway and HART-IP®
- Requirements:
  - Update safety controller to support SafeHART™ / HART-IP®
  - Start adding SafeHART™ devices to the network

Applications

- Flow and pressure applications needing high speed – supported by HART-IP®

Example System Topology

-- No Safety --



* SafeHART™ devices indicated by blue shadow

SafeHART™ interoperable

- Passes thru infrastructure seamlessly
- Mix of safety and normal HART® coms on same wire
- Mix SafeHART™ and traditional devices in same networks

Connectivity: Field ↔ Controller essential

- I/O Systems and WirelessHART®

HART® 4-20mA, WirelessHART®

- Turn Burst on (Command 109) Safe
  Then Bursts are sent safe
- I/O System acts as publisher
- **Requirement**: No Modifications of I/O

HART-IP®

- Publish safe process value over high-speed APL and Ethernet

Recommendations

Users

- Apply WirelessHART® + SafeHART™ to new SIF demands
  - Good fit for brown field
  - Process Safety Time often compatible with WirelessHART® performance
- Identify WirelessHART® instruments supporting measurements needed
  - Level, flow, gas detection, temperature, remote discrete I/O, etc
  - Ask vendor to support SafeHART™
- WirelessHART® safety instruments can be dual use to reduce spare part inventories, too

Developers

- Identify potential safety applications of your WirelessHART® devices.
- Assess and plan "art of the possible" for SafeHART™
- Talk to your key customers
- Safety controllers should add HART-IP® support

Summary of SafeHART™ Benefits and Opportunities

- HART® already has digital PV value. Adding SafeHART™ will be easier and simpler than adding a new protocol and safety such as ProfiSafe
- Integrating well known HART® protocol with added SafeHART™ to existing DCs and host systems is simple
- HART® is simple. Upgrade to SafeHART™ involves only firmware change and documentation update
- Devices already tested for SIL need only additional testing and approval for SafeHART™
- No additional installation cost
- No additional training needed for the end user, leverage the existing knowledge of HART®
- SafeHART™ and existing HART® devices can co-exist on the same network
- Compatible with existing hosts. Provide DD / FDI package with new SafeHART™ device
- Seamless integration with seamless operation and safety
- Additional safety process values beyond the one on the 4-20mA possible

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