

Webinar

Adoption of Wireless for Safety

Jay Werb – WCI Penny Chen – Yokogawa Diederik Mols – Honeywell Knut Sandven – GasSecure Presentation will begin at 11:03am EST (GMT - 5)

Access voice using the telecon numbers:

US +1 866 506 1209 PIN: 5231931

INT + 1 678 302 3569 PIN: 5231931

Once you enter the pin, you will hear silence until the presentation begins. VoIP is not available at this

time

ISA100 Wireless Fast Facts

- International standard IEC 62734 since 2014
- Complies with ETSI EN 300 320 v1.8.1 (LBT)
- ISA100 Wireless Device Portfolio exceeds 44 devices
- Certified ISA100 Wireless Devices exceeds 25 devices
- April 2015 GasSecure GS-01 gas detector achieves a world first with SIL-2 Certification in Wireless Gas Detection
- Focus on Certification to Ensure Interoperability and best-in-class solutions
- Availability of ISA100 Wireless Modules / Stacks (see contact details on <u>www.isa100wci.org</u>)
 - 1. Nivis
 - 2. Murata
 - 3. Yokogawa
 - 4. Honeywell



ISA100 Devices Added 2015

	Device Type / Manufacturer	Certified
1	Yokogawa Stack	Yes
2	Yokogawa Adapter	Yes
3	Yokogawa Adapter	Yes
4	TLV Steam Trap	Yes
5	TLV Steam Trap	Yes
6	Armstrong Steam Trap	Yes
7	Spirax-Sarco Steam Trap	Yes
8	Cosasco Corrosion Sensor	Yes
9	Bitherm Steam Trap Monitor	Yes
10	Flowserve Valve Positioner	Yes
11	SKF Vibration Sensor	Q4 2015
12	CDS Vibration Sensor	Q4 2015
13	Murata Comm. Module	Q4 2015
14	Scott Safety Gas Detector	Q4 2015
15	Nexcom ISA100 to WIFI bridge	(2016)



Visit the ISA100 Wireless Website

- ISA100 Wireless Whitepaper available for download from website authored by Jay Werb, Technical Director
- Event News
 - 1. Achema Field Communication Lounge ISA100 Wireless Demo June 2015 in Frankfurt showing 3 live networks with 36 devices from 17 vendors
 - 2. JEMIMA Field Communication Lounge ISA Wireless Demo Dec 2015 in Tokyo
- Full list of certified/registered ISA100 Wireless devices
- Use cases and customer stories
- ISA100 WCI website receiving over 20,000 web views per month

www.isa100wci.org



Presenters Today



Jay Werb Technical Director WCI



Knut Sandven CEO GasSecure



Penny Chen Sr. Principal Technology Strategist Yokogawa



Diederik Mols Business Manager Industrial Wireless Solutions Honeywell



Andre Ristaino Managing Director

Wanaging Dire



Adoption of Wireless for Safety Webinar Overview

- Design Principles
- Six Case Studies
 - GasSecure
 - Yokogawa
 - Honeywell
- Q & A



Commonly Cited Benefits of Wireless Instrumentation

Cost Savings	• Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction.		
	Typically: 1/5 the time, 1/2 the cost.		
	 New and scaled applications are now economically feasible. 		
Improved Reliability	• Wired sensors may be prone to failure in difficult environments.		
Kenability	Wireless can add redundancy to a wired solution.		
Improved Visibility	Condition monitoring (equipment)		
VISIONICY	Process monitoring		
Improved Control	 Add wireless to existing processes for more optimal control. 		
Improved Safety	Safety related alarms		



Adoption of Wireless for Safety Design Principles

- ISA84 WG8 (Draft)
 Purpose and Focus of the Technical Report
- Latency and Availability
- Network Design Common Best Practices
- Security Matrix
- Denial of Service
- Some Other Considerations

The following slides are derived from recent ISA84 WG8 drafts, <u>and other materials</u>. This is not intended as a summary of ISA84 WG8. Emphasis and summaries might not match WG intent. Author's involvement in ISA84 WG8 has been minimal.



ISA84 WG8 Draft Technical Report

Title

Guidance for Application of Wireless Sensor Technology To Non-SIS Independent Protection Layers

Purpose

- "This Technical Report was developed to document guidance and considerations to users for application and implementation of wireless sensor technologies for fully non-SIS process Independent Protection Layers. The guidance provided is not intended for the use of wireless as a SIF."
- *"This TR provides guidance to demonstrate the wireless system is sufficiently robust to support meeting the requirements of a Non-SIS IPL."*



Scope of ISA84 WG8





ISA84 WG8 Focus

- *"For the purposes of this Technical Report it is assumed that the risk analysis team has already determined that the protection layer comprised of an alarm with operator action generated from a wireless transmitter meets the specificity and independence criteria. Instead the Technical Report will focus on providing information on how to establish a design that satisfies the dependability and auditability criteria for an alarm with operator action that is generated from a wireless transmitter. "*
- "...Risk reduction claimed is less than 10."



Latency, Availability

Latency

• *"Wireless sensor network data latency is the time between the acquisition of a measurement value and the delivery of that data via the wireless network to a gateway."*

Availability

• Percentage of values received within the required response time. Can be measured per device or for an overall system.



Mesh Networks Latency Considerations





Publication





Request-Response

Field Device

Gateway





Hybrid (Example)



RELESS

INSTITUTE

Publish heartbeat periodically.

Alarms are transmitted immediately. Acknowledged by gateway to squelch retransmission.

Network Design Common Best Practices

"... it is critical to closely **adhere to manufacturer's best practices** when designing and laying out a wireless sensor network."

- Conservative communication range
- Reporting Rates
 - Device and router battery capacity
 - Wireless channel capacity
 - Infrastructure capacity
- Centrally located infrastructure
- Control hop depth
- Path redundancy (Infrastructure and/or mesh)
- Avoid bottlenecks
- Use network layout and simulation tools
- Documentation!!!

Design network with plenty of margin, and monitor that margin carefully.

Derived from ISA84 WG8 draft.



Security Matrix

	Authentication	Verification		Encryption	Access	Кеу
		Integrity Check	Time		Control	Management
Sniffing			 ✓ 	\checkmark		\checkmark
Tampering		\checkmark	\checkmark			\checkmark
Spoofing	\checkmark		\checkmark	\checkmark	\checkmark	
Replay Attack		\checkmark	~			\checkmark
Routing Attack	\checkmark			\checkmark	\checkmark	\checkmark
DoS Attack			See I	Next Slide		

Authentication, Integrity Check, TAI, and Encryption are generally features of an interoperable communication standard such as ISA100 Wireless. User should not be able to disable or mis-apply these features.

Access Control and Key Management generally involve adherence to manufacturer's best practices.

Similar table is in ISA84 WG8 draft.



Denial of Service

Radio standards and implementations should apply a variety of techniques to operate reliably in the presence of interference.

- Unintentional interference ≈ coexistence
- Intentional interference ≈ denial of service attack

Common strategies

- Spread spectrum modulation
- Redundant routing
- Channel blacklisting
- LBT Disable (Listen Before Talk)
 - LBT may be required due to regulations, policies, or coexistence with other systems
 - LBT is configurable in ISA100 Wireless
 - Regulations and/or policies may allow LBT to be disabled only at reduced power
- Diagnostics!!!
 - For example, LBT backoff counts
- Proven in Use



Some Other Considerations

Gateway-Host Communications

- Use well-known standards for Gateway-Host communications
- Security considerations for Gateway (ISA99)

Alarm Management

- General ISA84 HMI considerations apply, especially alarm management
- Large numbers of wireless devices may raise concerns about alarm floods

Battery Management

- Battery life should exceed instrument's natural service interval
- > Avoid network configurations and processes that randomize battery life

Data Quality Diagnostics

- > Early detection and prevention of stale data conditions
- Include information about health & timeliness of wireless sensor data
- General device diagnostics

Network Diagnostics

- Include ample margin in the wireless design.
- *Real-time recovery from reduced margin, while meeting availability targets.*
- > Diagnostics, HMI, processes for systematic loss of margin.



Case Studies

GasSecure

- Tank Farm Gas Monitoring
- Gas Detection, Safety System Integration (SIL-2 example)

GAS
SECURE
A Dräger Company

Yokogawa

- Tsunami Warning System
- Fire Prevention in Coke Pretreatment

YOKOGAWA

Honeywell

- Time Critical Perimeter Monitoring
- Tank Farm Safety Compliance



Wireless Gas Detection Systems in the Context of Safety Critical Applications



GAS SECURE **A Dräger Company**

SIL2 and Non-SIL Application Case Studies

Knut Sandven, CEO, GasSecure





Wireless Detectors Increase Safety with Higher Coverage and Reduce System Costs by 60-80%

Easy installation, increased flexibility... ... and reduced system costs





Gateway

GAS

SECURE

A Dräger Company





Remote Tank Farm Gas Monitoring System

- Installed: March 2013
- 7 Detectors
- I Gateway
- Highlights:
 - Remote area
 - Very easy installation (half day)
 - Integration to Honeywell TDC 3000





GAS

SECURE A Dräger Company



Gas Detection with Executive Actions and Integration into Safety System

GAS SECURE **A Dräger Company**

Upgrade Project

- Replace wired combustible detectors
- 73 units GasSecure GS01
- Integrated into Siemens S7 control system
- Sixteen fire zones
- 90-95% reduction in installation time
- 80% cost saving compared to wired





GAS SECURE A Dräger Company

Thank you for your attention.

Knut Sandven

CEO GasSecure





Yokogawa 🔶

Use Cases

References & Testimonials Industries Solutions Products & Services Brand Promises & Businesses News & Events

Press Release - July 23, 2015

Detection System for LNG Facility

interest in maintaining safe and secure operations.

Home > About Yokogawa > News > 2015 Press Releases > Press Release - July 23, 2015

Yokogawa and GasSecure Provide SIL2-certified Wireless Gas

Yokogawa Electric Corporation and GasSecure AS, a Dräger owned company, announce

the delivery of the world's first SIL2*1-certified wireless gas detection system for use at

an LNG production facility in Northern Europe. On this date, the two companies will begin

promoting the unique capabilities of this system solution to companies that have a strong

About Yokogawa Company Overview

Tokyo, Japan - July 23, 2015

Background

Investor Relations News

2015 Press Releases
2014 Press Releases
2013 Press Releases
2012 Press Releases

- 2011 Press Releases
 2010 Press Releases
 2009 Press Releases
- ▶ 2008 Press Releases
- 2007 Press Releases

▶ 2003 Press Releases

- 2006 Press Releases
 2005 Press Releases
- 2005 Press Releases
 Yokogawa has been developing a wide variety of ISA100 Wireless*2 technologies and field
 wireless Releases
 wireless devices such as adapters that enable conventional wired devices to access
 - wireless devices such as adapters that enable conventional wired devices to access wireless networks, and provides them to plants and other facilities primarily in the upstream oil and gas sector. GasSecure has developed ISA100 Wireless gas detectors





Penny Chen

Sr. Principal Technology Strategist Yokogawa





Use Case 1: Tsunami Warning System

Application

 Lessons learned from the great east Japan earthquake disaster -- Tsunami is usually preceded by a sudden tidal wave, detecting a sudden lowering of tide level from shore may indicate a tsunami to come

Challenges

- Long distance (over 600m without repeaters)
- Reliable communication systems
- Rapid response time

Solutions

- Level meters with wireless adaptor installed on a storm surge barrier near the plant to monitor the tide level
- Fully redundant communication paths with Duocast

Benefits

Quick project execution with low cost





9 December 2015



YOKOGAWA

Use Case 2 -- Fire Prevention in the Coke Pretreatment Process

Application

 Ensure plant safety by monitoring a sign of fire and activated fire extinguishers of the coke pretreatment process in a steel plant

Challenges

- High speed and high reliable monitoring
- Difficult environment with lots of obstacles

Solutions

- Single wireless system with 50 wireless temperature transmitters
- 5s update rate with very low PER
- Sky mesh with full redundant wireless communication path to ensure reliability

Benefits

• Enhance plant safety, reduce project time and cost







YOKOGAWA

Reasons for Adopting Wireless for Plant Safety

Preventive measures

- Process condition / status monitoring: Temperatures / Pressures / Flows / Levels / etc.
- Asset condition monitoring: Vibration / Corrosion / Temperature / etc.

Accident avoidance / Limit the extent of damages

- Alarm / Warning: Gas leak detection / Safety shower detection /Tsunami detection
- Emergency shutdown: Fire detection and extinguishers / etc.
- Human safety
 - People tracking / Communication or navigation during evacuation / etc.



 \rightarrow Plant wide monitoring



Tsunami disaster → Predictive monitoring



Fire prevention → Emergency shutdown



YOKOGAWA Conclusion – Wireless Improves Plant Safety



- Field Wireless Devices -- Safety layer / Long distance / Multivendor interoperability / etc.
- Wireless Infrastructure -- Redundant network / Backbone to support large network / Co-existence management / Security / etc.
- Network Engineering Flexible network topologies / Sky Mesh network design / Support safety protocol (PROFIsafe) / etc.
- Network Operation and Maintenance -- Network Monitoring tools / Predicable and long battery life / etc.



Honeywell Case Studies





Diederik Mols Business Manager Industrial Wireless Solutions Honeywell



Case Study 1 Perimeter Monitoring – Time Critical

LNG Facility in Middle East - Brownfield

Challenges	 Alarming system for detection of gas leaks without extensive cabling. Meet 3 seconds alarm requirement. 	
Solution	 FDAP based ISA100 Wireless network with XYR6000 Universal Transmitters and solar power panels. 	23 06 201
Results	 Improved site safety system within budget. 3 seconds alarming requirement met. Compliance to government regulations for HSE. 	



Project FAT Results

- FAT successfully completed March 2014.
- The wireless solution consistently delivered an activation time of 2.9 seconds with the horns and beacons activating simultaneously.
- The system met and exceeded the stringent customer requirement of 3 seconds.
- The customer put the system through rigorous tests that were beyond the scope of the FAT, to display redundancy, fail-over and network stability.
- The wireless system withstood all their tests and attempts to show flaws and displayed its resilience and ruggedness.
- The system has been installed and commissioned at the customer site in June 2014



Case Study 2 Meeting Safety Compliance

Tank Farms across India - Brownfield

Challenges	 Secondary level tank gauging to meet safety compliance - M B Lal recommendations 49 locations spread out around the country Require end to end solution within budget 	
Solution	 Honeywell Enraf FlexLine ISA 100 Wireless with OneWireless Network using FDAPs Total 90 FDAPs, 98 WDMs and over 550 Enraf FlexLine ISA100 Wireless radar gauges being deployed across the 49 locations 	
Results	 Compliance within budget and project schedule Consistent deployment across all sites Comprehensive solution to meet requirement 	



OneWireless Terminal Solution Honeywell



Wireless applications beyond tank gauging



Case Studies Summary

Case Study 1: Solar powered gas leak detection. With ISA100 Wireless, Honeywell was able to meet the "near real-time" alarm requirement of 3 sec to comply with government regulations.

Case Study 2: Improve safety with secondary tank gauging. Multiple Brownfield locations, difficult to wire. ISA100 Wireless enables Honeywell Enraf to communicate wirelessly.

With ISA100 Wireless Standard, Honeywell is able to design and integrate a wide range of devices including other wireless manufacturers devices.





Summary

Cost savings from wireless enable scaled adoption of safety applications

ISA100 Wireless is commonly used today for safety related alarms

SIL-2 ratings should accelerate integration with safety systems

Proven in use, following manufacturer best practices





Questions?

GasSecure

- Tank Farm Gas Monitoring
- Gas Detection, Safety System Integration (SIL-2 example)

Yokogawa

- Tsunami Warning System
- *Fire Prevention in Coke Pretreatment*

- Time Critical Perimeter Monitoring
- Tank Farm Safety Compliance



