

GAS

SECURE

First wireless, infrared gas detector

Safe Wireless

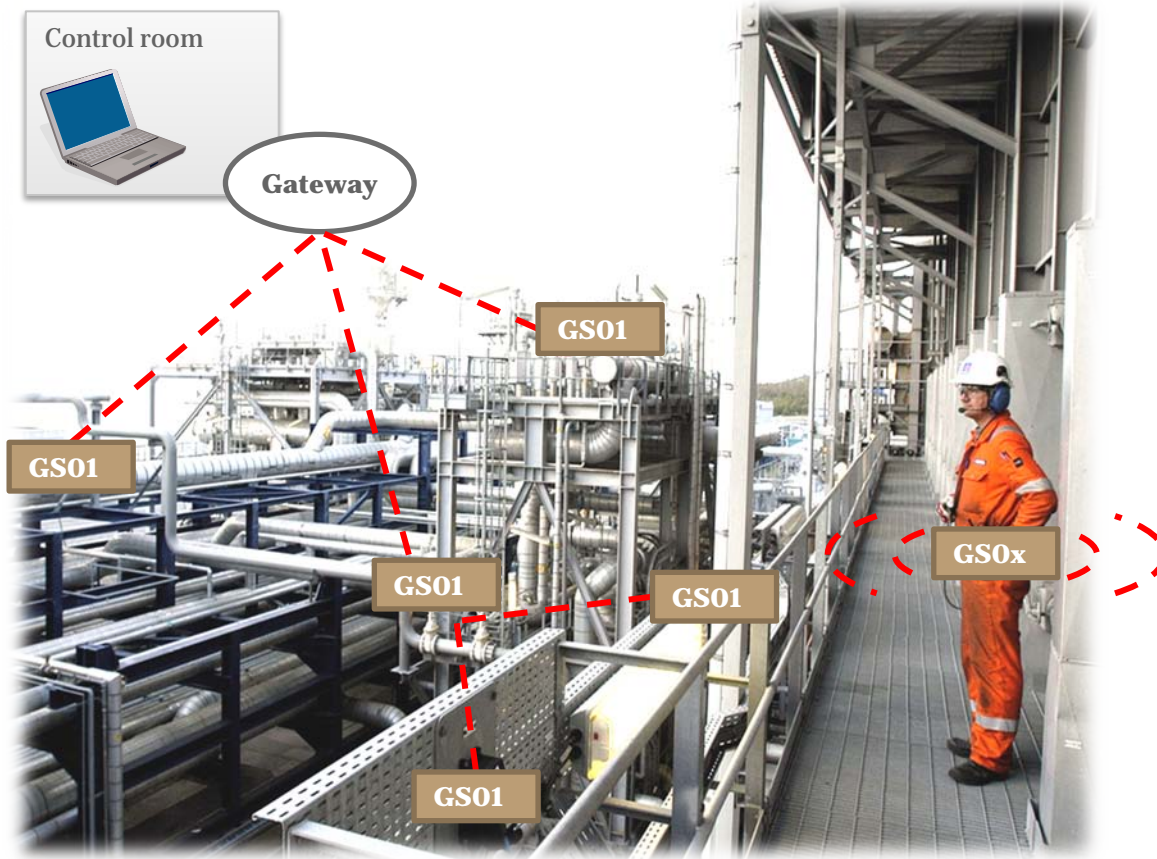
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Agenda

- Introduction
- Principle of detection
- What are the requirements for safe wireless communication?
- Why ISA100?
- What are the issues and how have we solved them
- Installations present and future

GasSecure develops the first wireless, infrared hydrocarbon gas detector



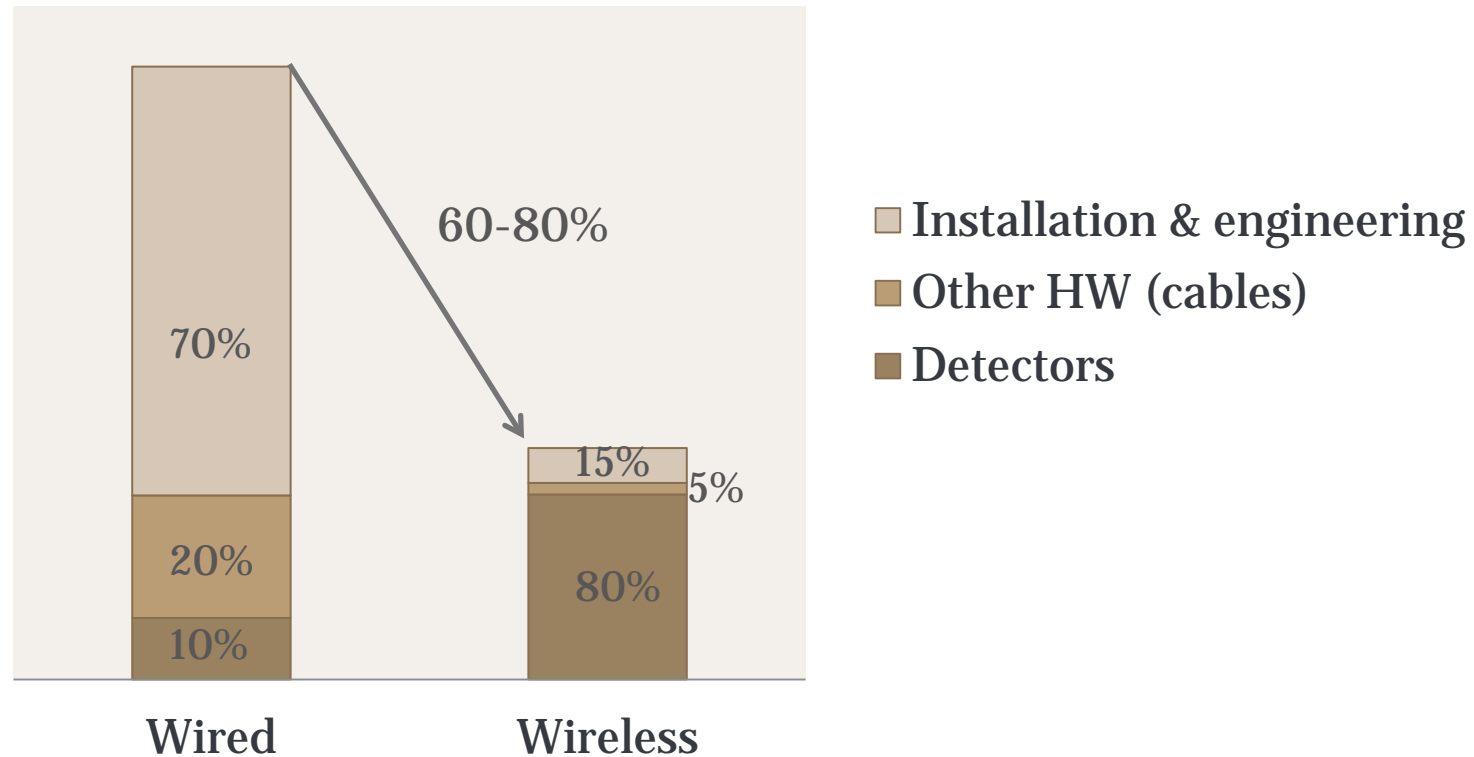
Features:

- High reliability – SIL2 incl. SafeWireless™ communication
- Continuous monitoring with two years battery life
- Fast response (5 s)
- No recalibration

Wireless gas detectors will increase safety by higher coverage and installation flexibility, and...



... reduce system costs with 60% to 80%

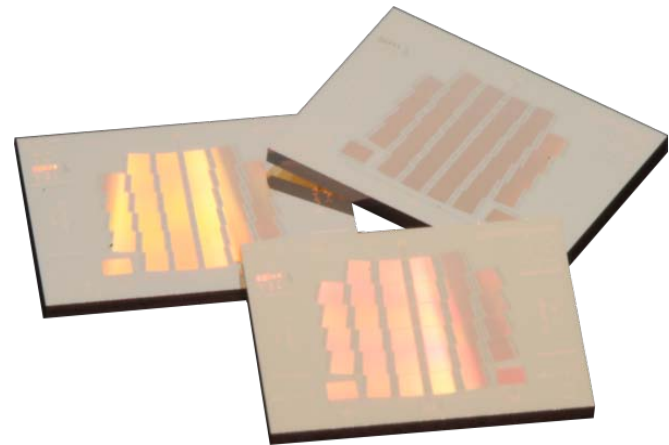


Challenge

From 5 W to 0,005 W
power consumption

- A new detection method
- Optical sensor completely redesigned
- Smart use of wireless standard

MEMS optical filters



Communication will be SIL2 with a safety layer on top of standard wireless protocols

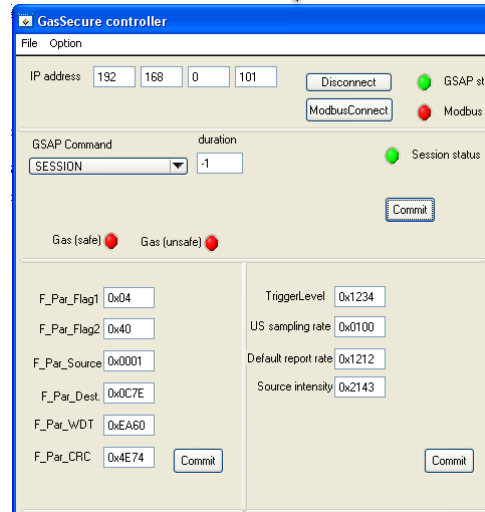


Wired ProfiNET Ethernet/Modbus

Wired ProfiNET



Wireless ProfiSAFE on ISA100.11a



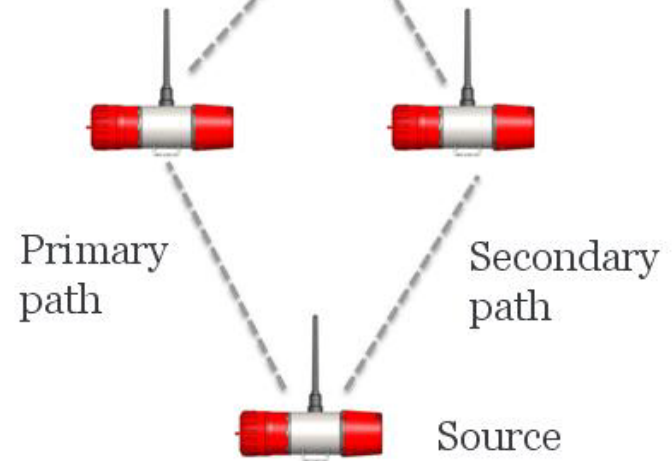
GasSecure tool for safety and operating parameters

Communication requirements from end-users



Backbone network

Gateway



- ✓ SIL2
- ✓ Multihop support
- ✓ Max 2 second latency from node to controller
- ✓ Based on a standard
- ✓ 2.4GHz

Choice of standard: WiHART vs ISA100

Layer	WirelessHART	ISA100.11a
Application	HART command	Object oriented
Data Link	TDMA, Mesh	TDMA/CSMA, Mesh
Physical	802.15.4, 2.4GHz	802.15.4, 2.4GHz

Other major differences:

- In ISA 100, the end devices can request contracts with the gateway in order to obtain a certain Quality of Service.
- ISA has defined five hopping sequences, HART only one.
- ISA supports fragmented packets, in HART this needs to be done by application

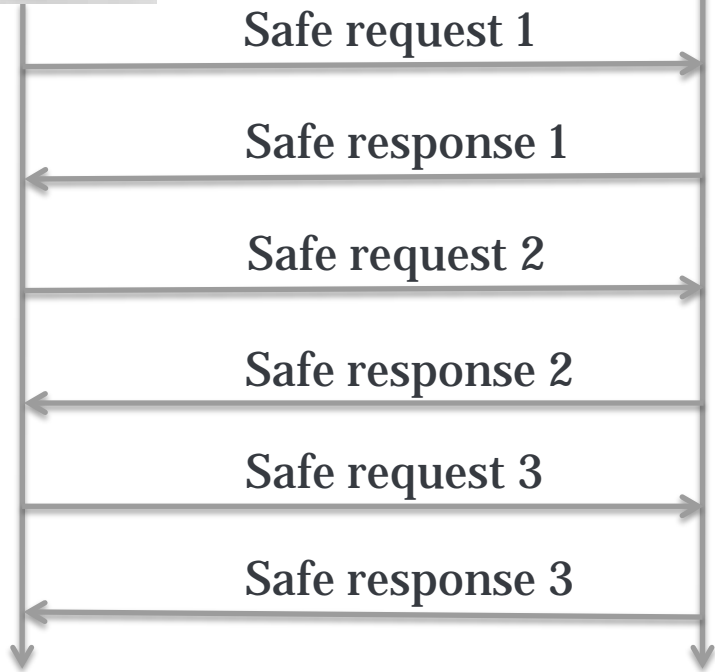
WiHART to be supported by GasSecure if sufficient demand

Safe message characteristics

Remedy: Failure type:	Sequence Number	Time Out with Receipt	Codename for Sender and Receiver	Data Consistency Check
Repetition	X			
Deletion	X	X		
Insertion	X	X	X	
Resequencing	X			
Data Corruption				X
Delay		X		
Masquerade (standard message mimics failsafe)		X	X	X
FIFO failure within Router		X		

- IEC61508 dictates four mechanisms for safe communication
- ProfiSAFE supports all

SafeWireless™: SIL2-rate safe wireless communication



- Initiated from controller
- Max 2 seconds latency from gas detection to packet at controller
- Max two hops
- Safe communication over grey channel
- Message:
 - Gas concentration
 - Temperature
 - Battery status
 - Diagnostic

Challenge and solution

- Combine contradictory requirements:

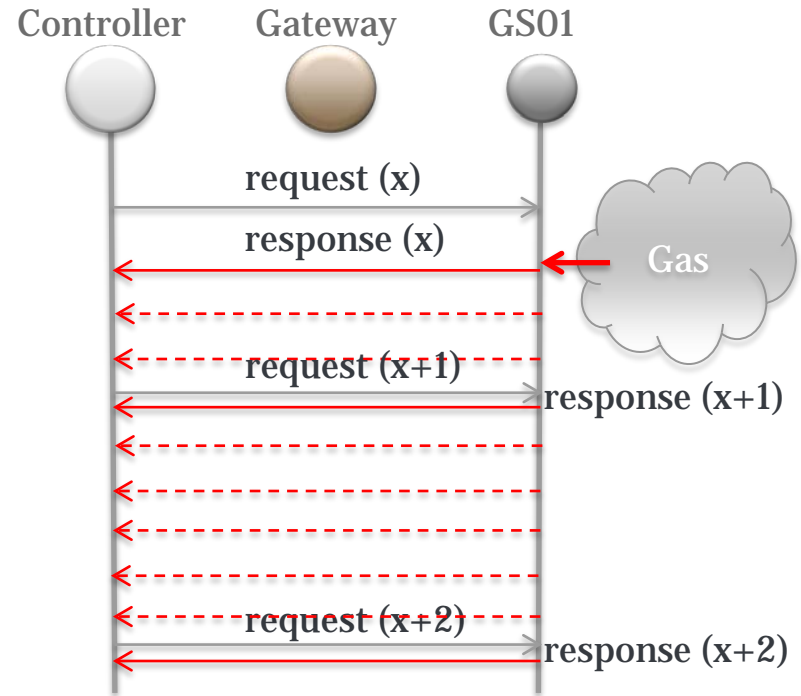
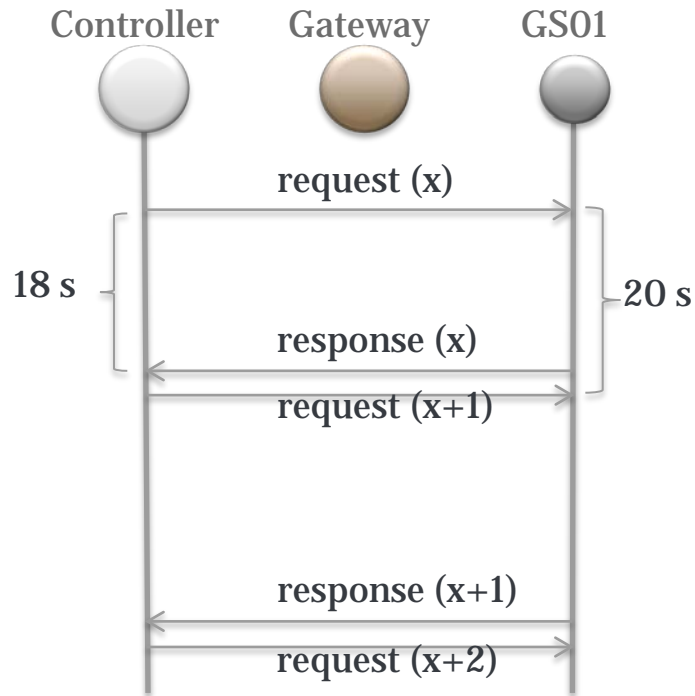
Low energy consumption \leftrightarrow rapid response

- Solution:

Asymmetrical bandwidth allocation

We reserve more bandwidth uplink, but only use it whenever it's required.

Modes of operation



← PROFIsafe message
← ISA100 message

Process safety time

- 60 seconds, defined by IEC60079-29-1
- With safe message every 20 seconds → three attempts
- If no safe message within process safety time:
 - Detector set to safe state
 - Marked as unavailable to control system
 - Operator intervention required to resume



Summary

Detector

- Dual detection principle (US and IR) gives fast response and low power consumption

Wireless communication

- SafeWireless™ with asymmetric bandwidth allocation
- ProfiSAFE

Wired communication

- ProfiNET
- Integration done with ABB

Close cooperation with:

- Statoil, Conoco-Phillips, NIVIS, ABB, Yokogawa, and others

An offshore oil rig at night, illuminated by its own lights against a dark, cloudy sky. The rig features a complex network of steel structures, pipes, and platforms. A prominent crane with a bright light at its tip extends high into the air. The foreground shows a dark body of water and the lower part of the rig's support structure.

WIRELESS GAS DETECTION