ISA100 WCI Webinar

Webinar date: June 14th, 2023.
The presentation will begin at 11:00 New York Time (UTC-4)

UNISAFE – A Novel ISA100 Wireless Solution for Developing, Integrating and Deploying Safety Instrumentation

Presenters: **Robert Assimiti**
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Runar Maeland
runar.maeland@mimestech.no

Agenda

1. About the speakers
2. ISA100 Wireless Mechanisms for Safety Use Cases
3. Connectivity and Networking Considerations for Safety Applications
4. Developing an ISA100 Wireless Safety Instrument
5. Novel Safety Use Cases with ISA100 Wireless
6. Integration using SIL2 Certified Universal Field I/O Instrument
7. Q&A

About the Speaker

Robert Assimiti

WCI Governing Board Member
Member of the WCI Technical Steering and Committee

Co-Founder and CEO
Centero

Robert Assimiti has over 20 years of technical leadership in the wireless arena. He has architected and developed several highly-scalable, mesh based wireless product lines for both commercial and industrial wireless applications. He manages a team of technologists focused on the creation of new technologies, standardization and generation of novel intellectual property. He has also authored and co-authored several patents. Robert defines Centero's current and future technical strategic market position. He also oversees strategic partnerships, the integration of new business models, the incubation of new technologies and the cultivation of world-class talent. Robert is also an active member of the WCI Governing Board and the Technical Steering committee. He holds a Bachelor Degree in Computer Engineering from the Georgia Institute of Technology.

About the Speaker

Runar Maeland

Fire and Gas Systems Expert

Experienced Business Developer

Founder and CEO

Mimes

Runar Maeland has 18 years international oil & gas and marine experience within technical, sales & marketing. Built up a global distribution channel network in several companies. He has architected and developed SIL2 wireless universal IO solution using ISA100. He manages a team of technologists focused on functional safety, new technologies using open standard protocols targeting the “high end” energy and marine market. He has broad experience with technical safety and fire & gas systems in the energy industry and HSSE including incident and investigations experience. Runar is working on developing Mimes strategic partnerships, changing end user guidelines for to accommodate new technology and looking at new innovating product lines.
He has a Bachelor degree in Electrical Engineering from the University of Stavanger and Master degree in Safety, Risk and Reliability Engineering from Heriot Watt University in Edinburgh, Scotland.

ISA100 Wireless Fast Facts

- International standard IEC 62734 since 2014
- Complies with ETSI EN 300 320 v1.8.1 (LBT)
- End-User Driven Standard - meeting all current and future industrial needs
- Sensor routing or field routers for best performance – Freedom of choice
- Broad Multi-Vendor Portfolio of ISA100 Wireless Devices
- ISA100 Wireless enables SIL-2 Certification
- Ensured Interoperability - best-in-class solutions from best-in-class suppliers
- Readily available ISA100 Wireless Modules and Stacks
- Enable fast-track development and go to market

Benefits of ISA100 Wireless Instrumentation

Cost Savings	• Up to 90% of installed cost of conventional measurement technology can be for cable conduit and related construction • Typically: 1/2 the costs, 1/5 of the time • New and scaled applications are now economically feasible
Improved Reliability	• Wireless can add redundancy to a wired solution
Improved Visibility	• Condition monitoring of secondary and remote equipment • Process monitoring, fast additional data for trouble shooting
Improved Control	• Add wireless to existing processes for more optimal control
Improved Safety	Safety related alarms - end to end SIL2 certifiable Simple Automate action Compliance logging

Online Resources

www.isa100wci.org

- Learning Center with White Papers
- Articles, End-user stories, Forum
- Receiving over 20,000 web views per month
- Full list of certified/registered ISA100 Wireless devices
- And more useful content for you and your business

ISA100 Wireless Interest Group

- Latest news, end-user and expert discussions, insights
- 1200 members and growing; please join and invite your peers to join as well !
- Receiving over 5,000 web views per month
- Limited Time Offer: Join the group and you will be entered in a prize draw to win a new iPad

ISA100 Wireless LinkedIn Interest Group

Limited Time Promotion

SCAN ME

Scan the QR code and join the ISA100 Wireless Linkedin group. **If you join during our limited time offer**, you will be entered in a prize draw to win a new iPad!

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3. Connectivity and Networking Considerations for Safety Applications
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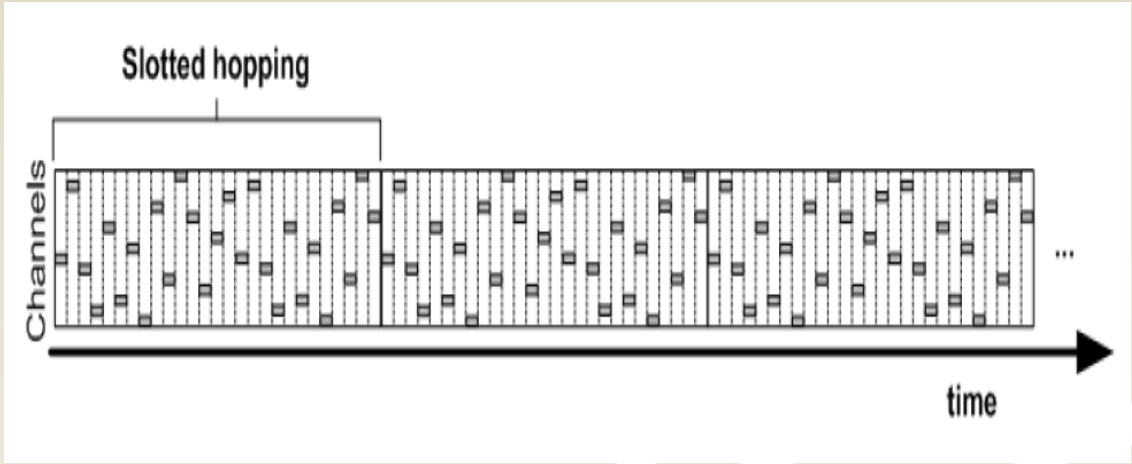
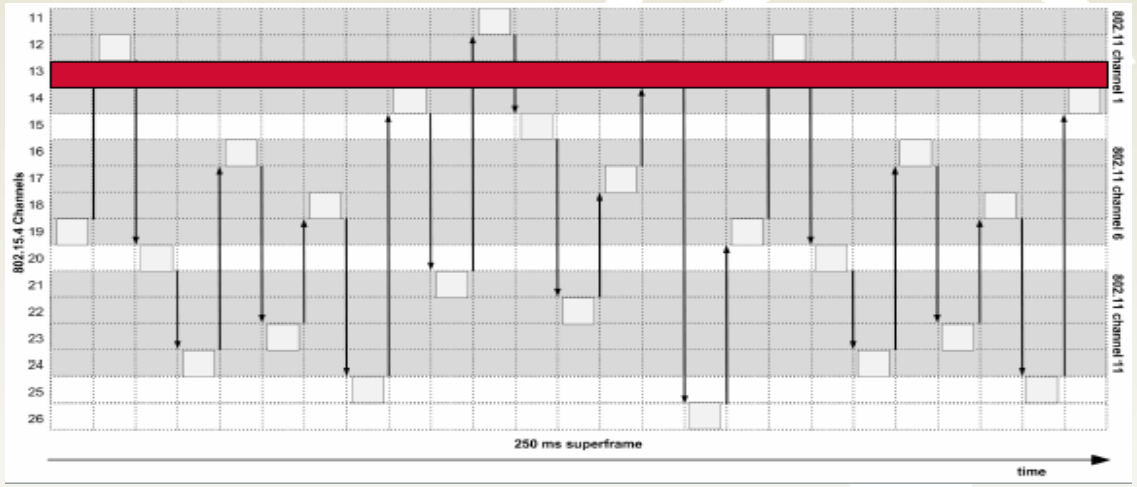
6. Integration using SIL2 certified Universal Field I/O
7. Summary
8. Q&A

ISA100 Wireless – Architected for Safety

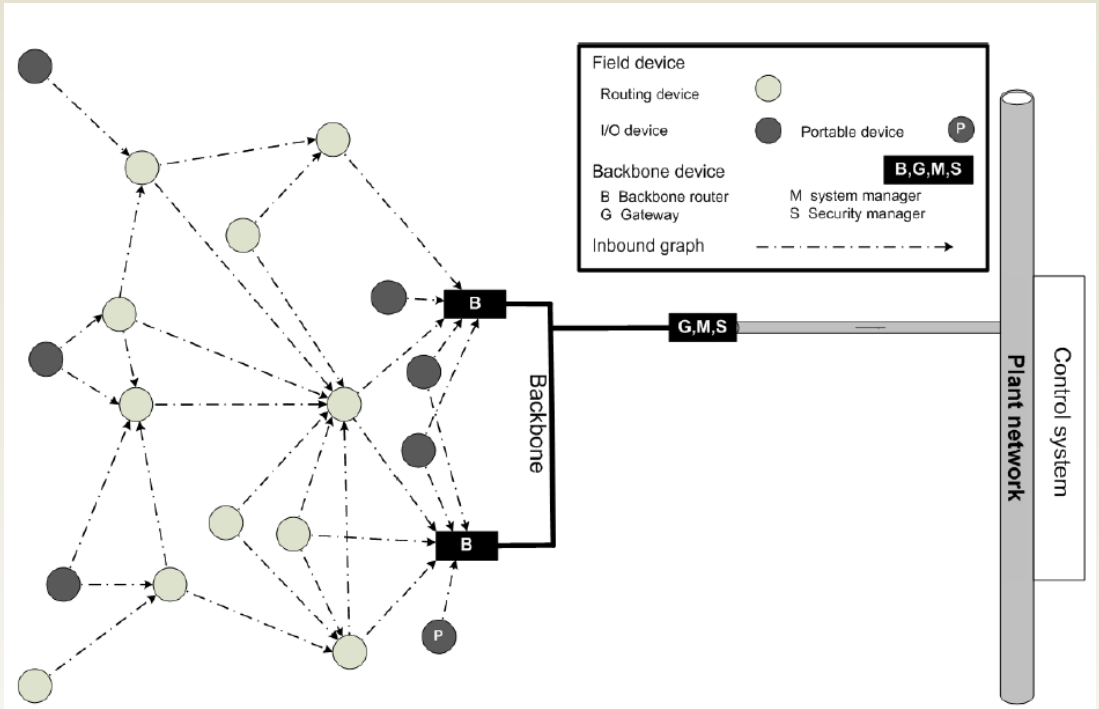
- Data communication reliability is ensured through various mechanisms co-existence mechanisms
  - Time diversity and determinism
  - Collision avoidance
  - Frequency diversity – hopping
  - Automatic Repeat – Request (ARQ)
  - Spectrum management – channel exclusion



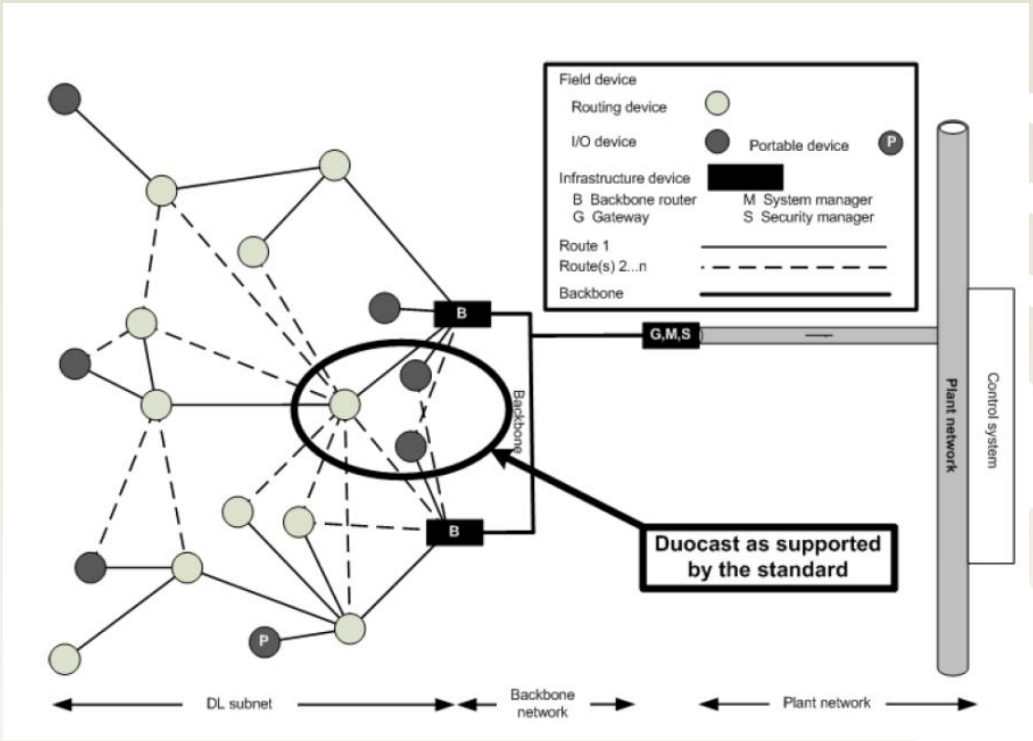


ISA100 Wireless – Architected for Safety

Path Diversity – Mesh Topologies



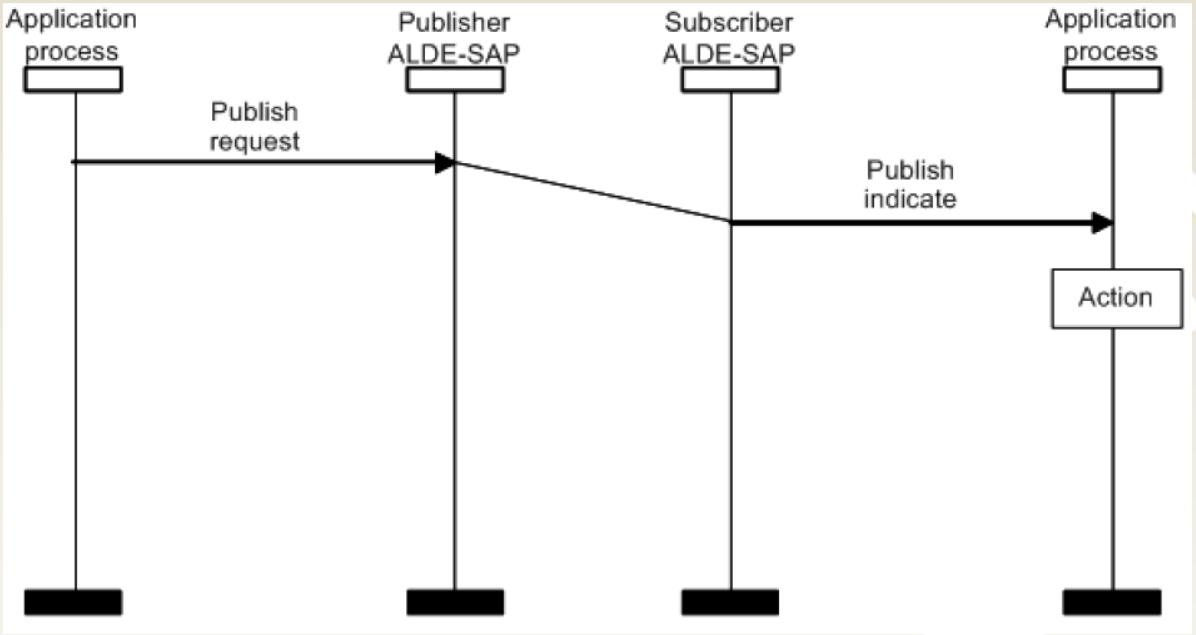
Duo-cast Communication Redundancy



ISA100 Wireless – Architected for Safety

- Publish-subscribe data model includes
  - Latency guarantees
  - Data freshness – freshness sequence number

Publish – Subscribe Data Model



ISA100 Wireless – Architected for Safety

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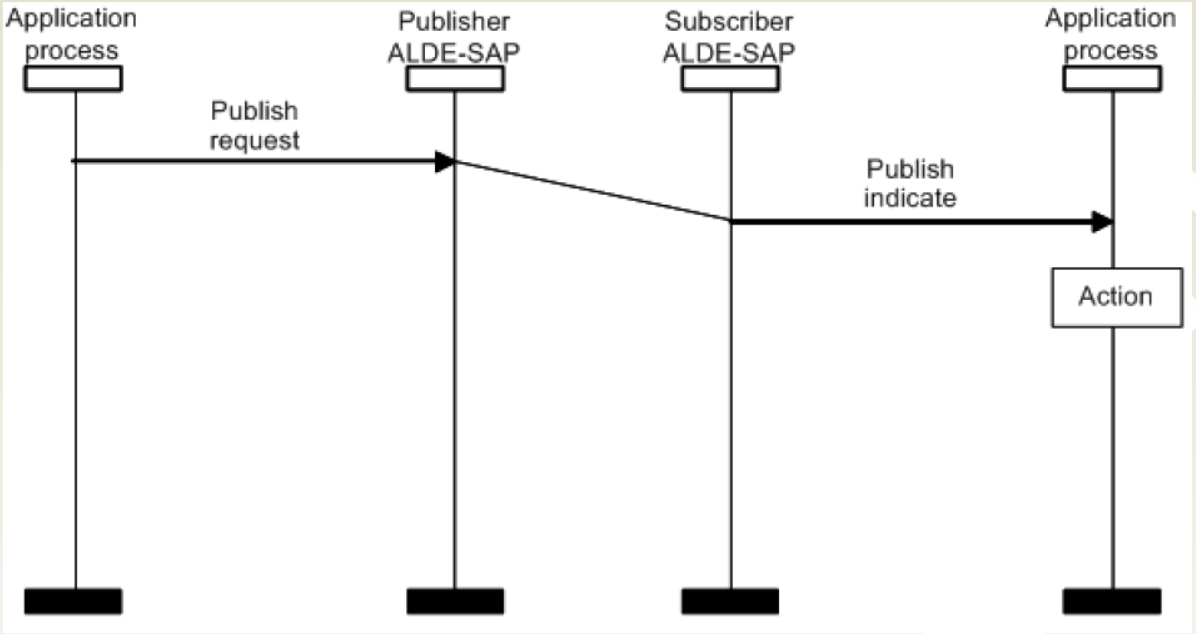
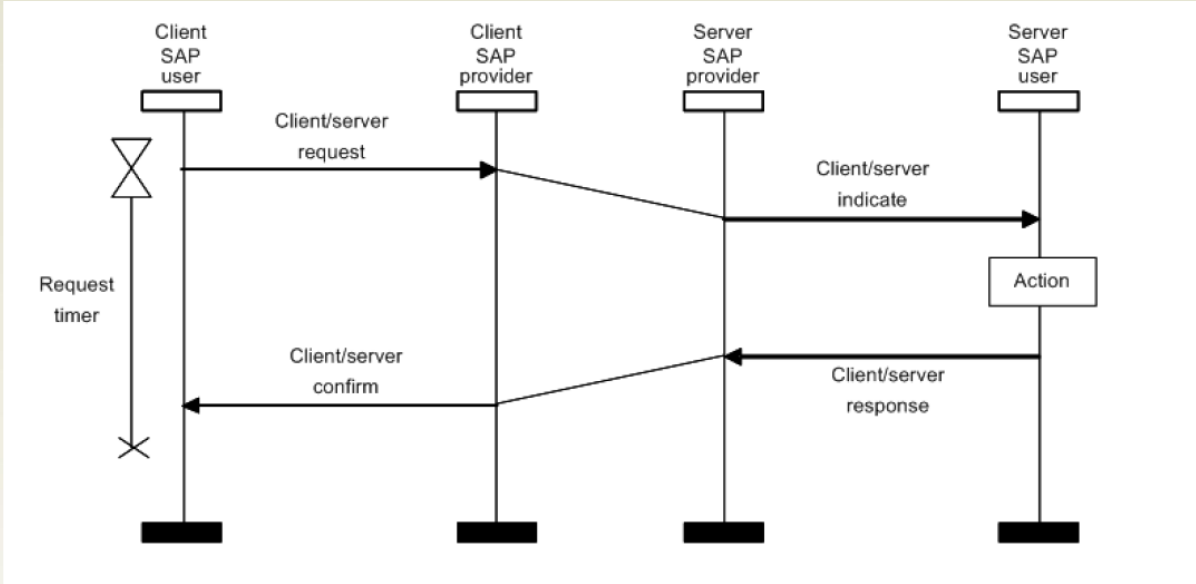
Publish – Subscribe Data Model



ISA100 Wireless – Architected for Safety

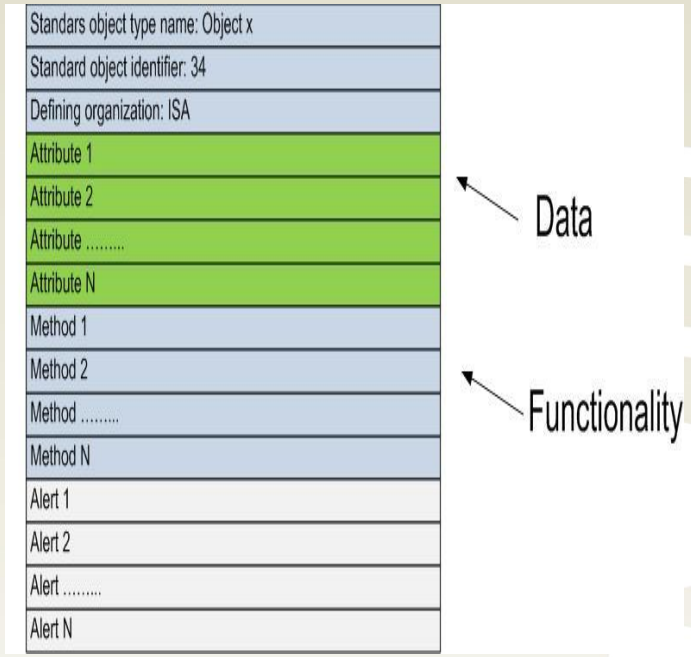
- Client – service model
  - Data availability
  - End-to-end acknowledgment
  - End-to-end transmission time
  - Service feedback code

Client – Service Data Model



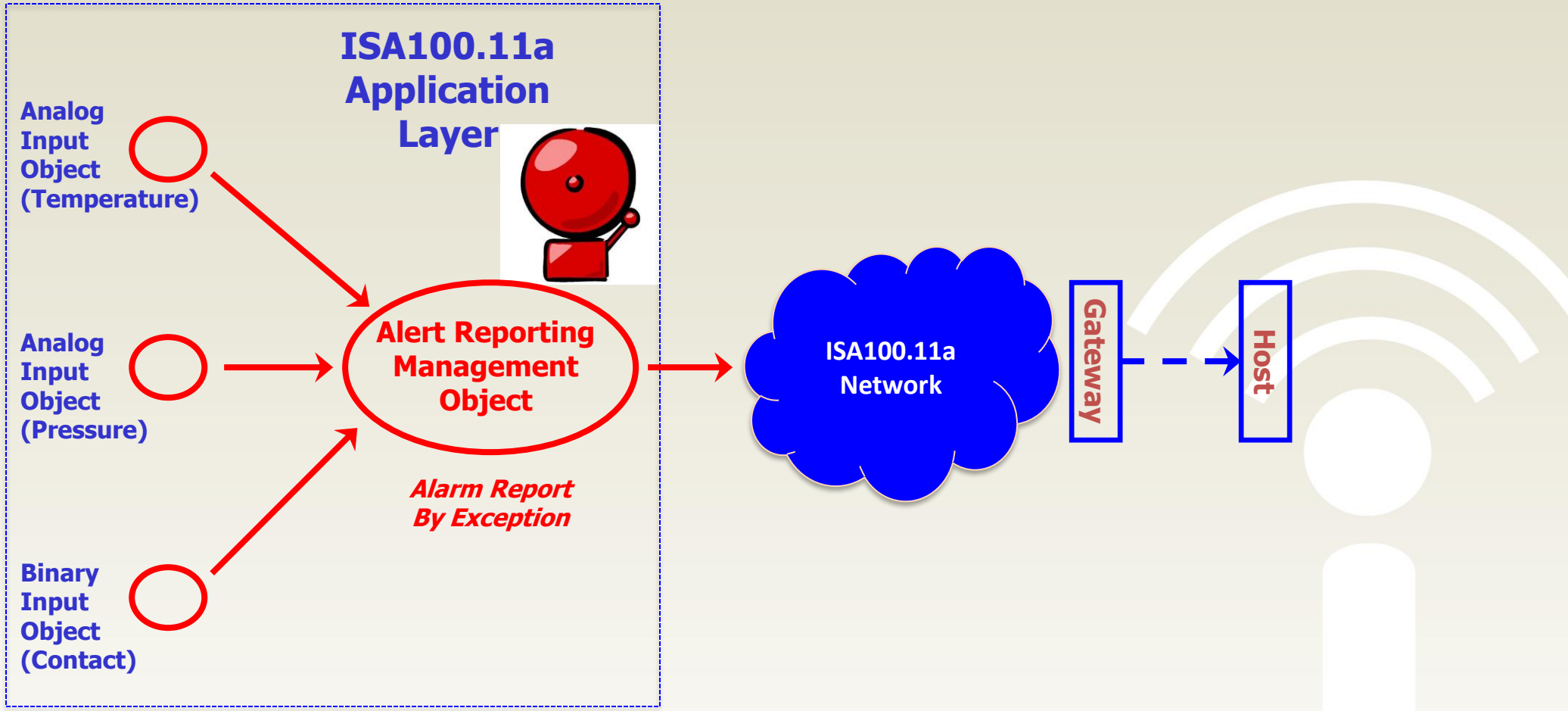
The Object Model – Alerts and Alarms

- An object is a collection of
  - Attributes (state)
  - Methods (action)
  - Alerts (event and alarm alarm)
  - Objects communicate with other objects
- Typical interactions between objects include
  - Read the value of an attribute of a remote object;
  - Write the value of an attribute of a remote object;
  - Report an alert related to a remote object;
  - Acknowledge an alert reported by a remote object;
  - Publish data to a remote object by using scheduled communication bandwidth;
- Each object includes alerting capabilities
  - Events – alerts sent; no other action needed
  - Alarms – alerts that require explicit clearing

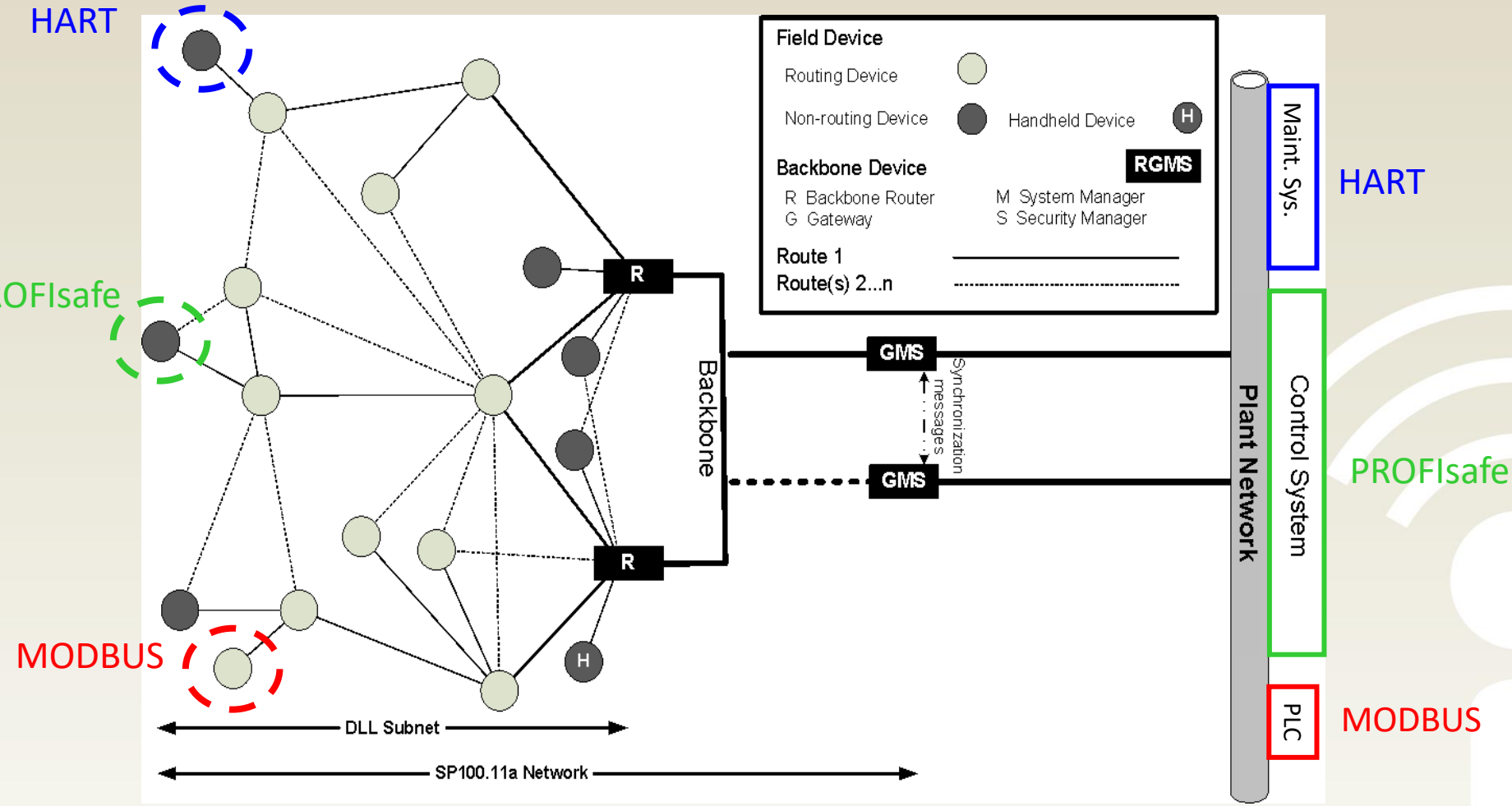


ISA100 Wireless Alert Reporting Mechanism

- Each device includes an ARMO – Alert Reporting Management Object



Tunneling over ISA100 Wireless Networks

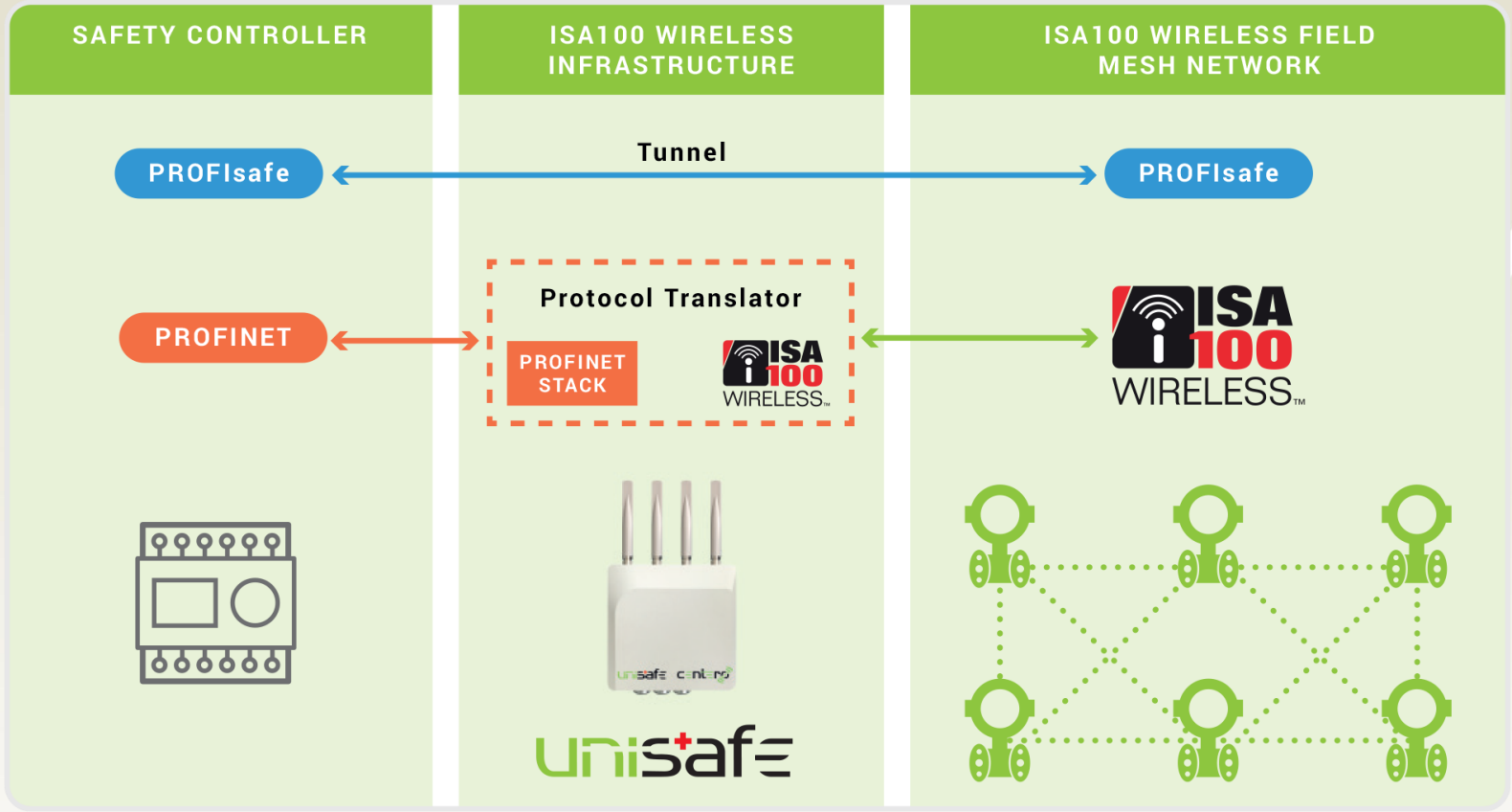


UNISAFE ISA100 Wireless Field Gateway

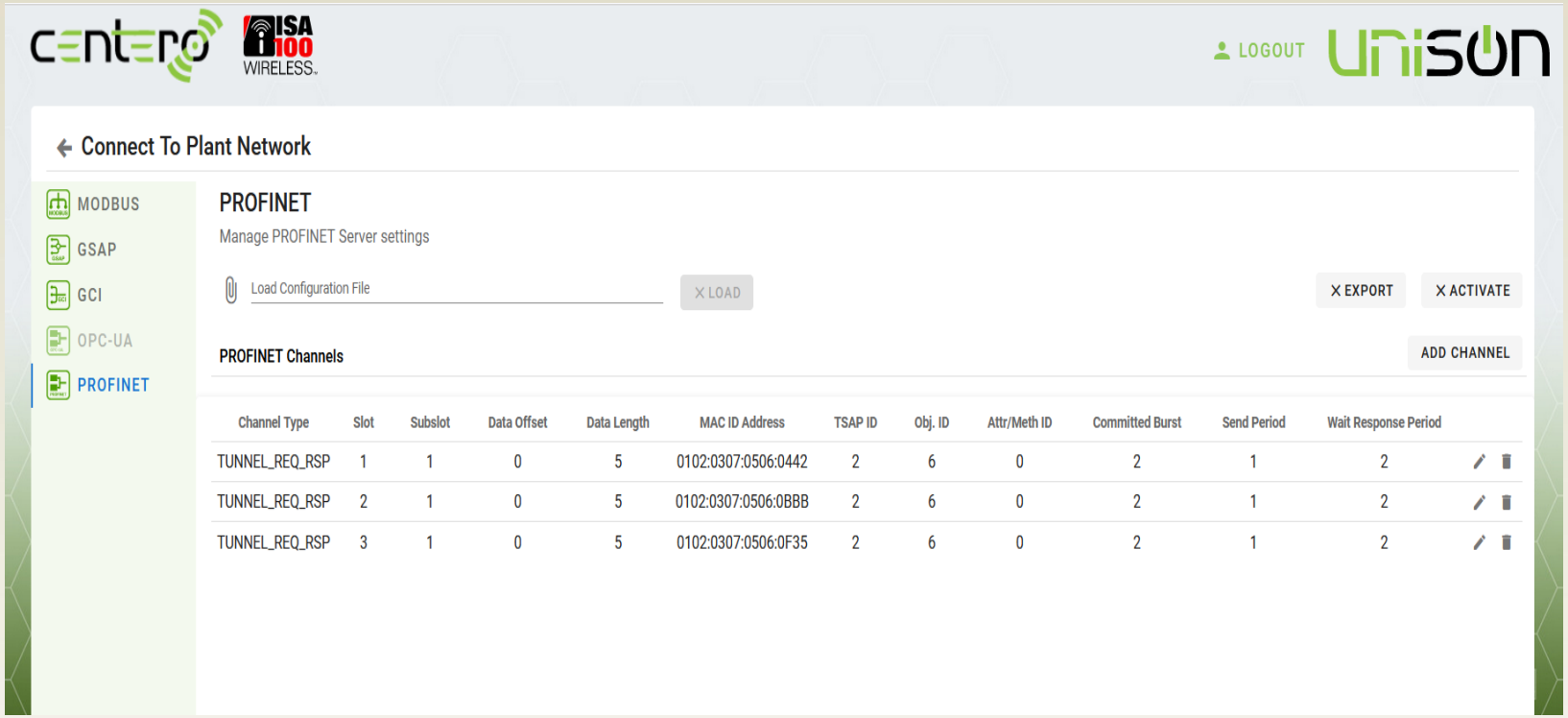
- ISA100 Wireless compliant gateway developed specifically for safety applications
- Inherits all features of Centero's field proven UNISON ISA100 Wireless Field Gateway
- Includes PROFINET stack, interface and protocol translator for connectivity to PROFINET safety controllers
- Supports PROFIsafe tunnelling over ISA100 Wireless from the controller to the field instrument
- Deploy SIL2 field instruments and systems – safety features compliant to the IEC61508
- Bandwidth allocation tailored to field instruments engaged in safety use cases
- Concurrent support for both PROFIsafe as well as traditional ISA100 Wireless instruments

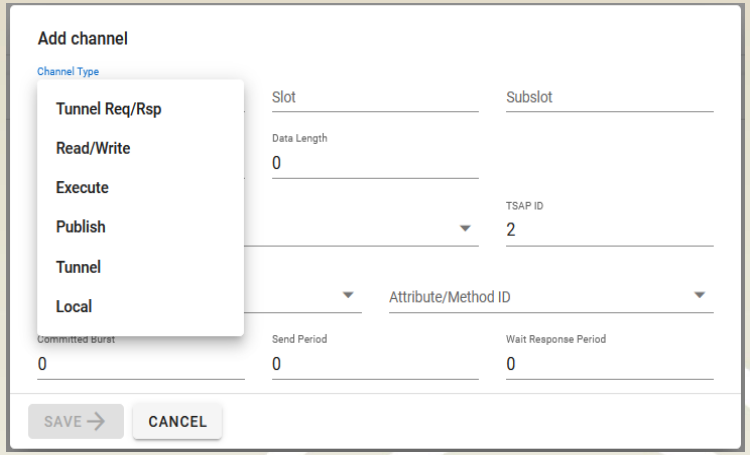
PROFIsafe Tunneling over ISA100 Wireless

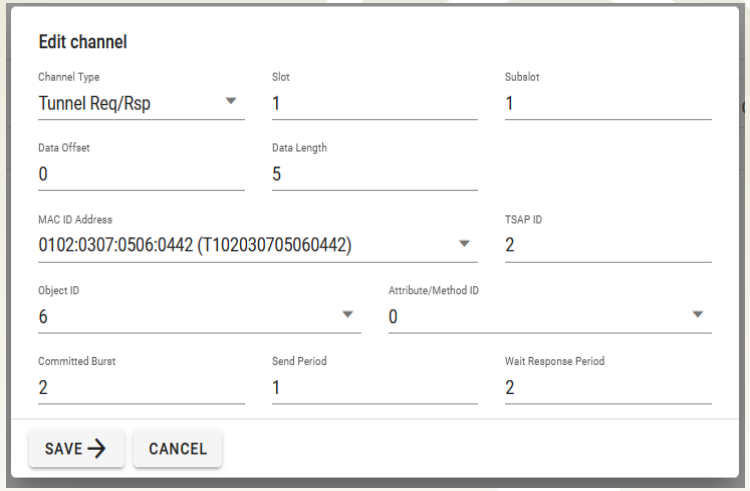
- PROFIsafe is an application profile and end-to-end communication protocol that provides functional safety over PROFINET networks
- Ensures the integrity of failsafe signals transmitted between safety devices and a safety controller



UNISAFE Configuration Console





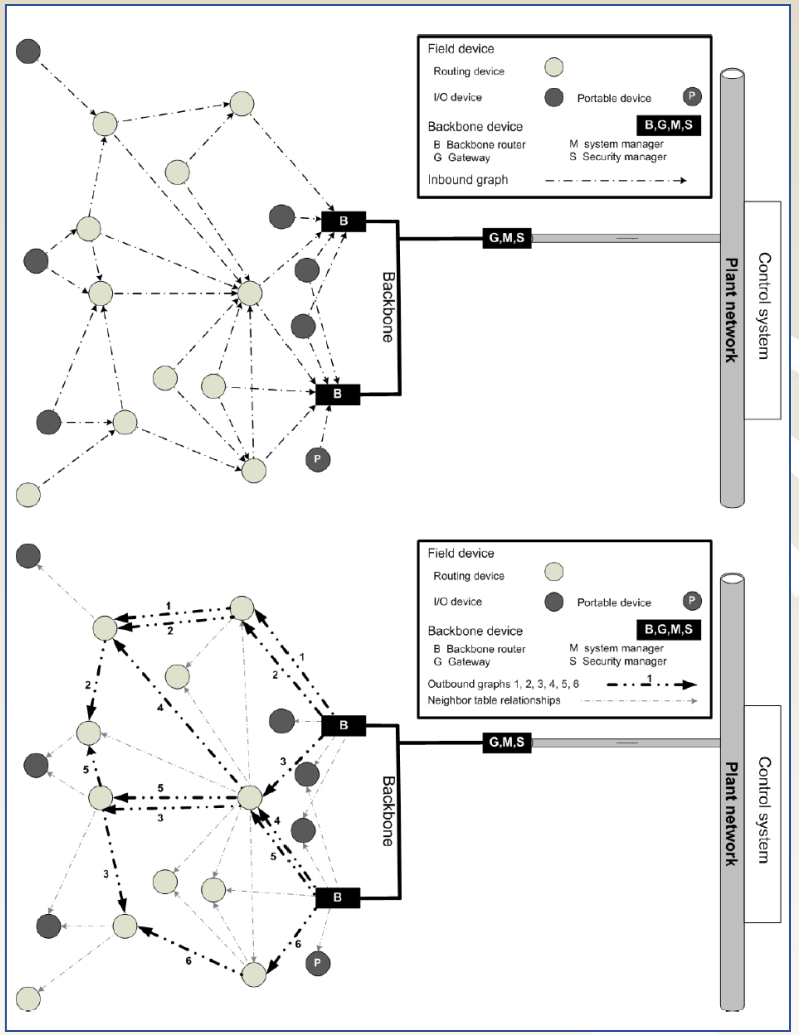


UNISAFE Configuration Console

User Friendly and Versatile	→	Configure functionality for connectivity to PROFINET controller Mapping to ISA100 Wireless constructs
Connected to PROFINET Controller as PROFINET IO-Device	→	Configure UNISAFE to match GDSML file and setting in safety controller
Configure PROFINET to ISA100 Wireless Translator	→	Assign and associate channels and slots to ISA100 instruments and application constructs (Objects IDs, attributes, methods)

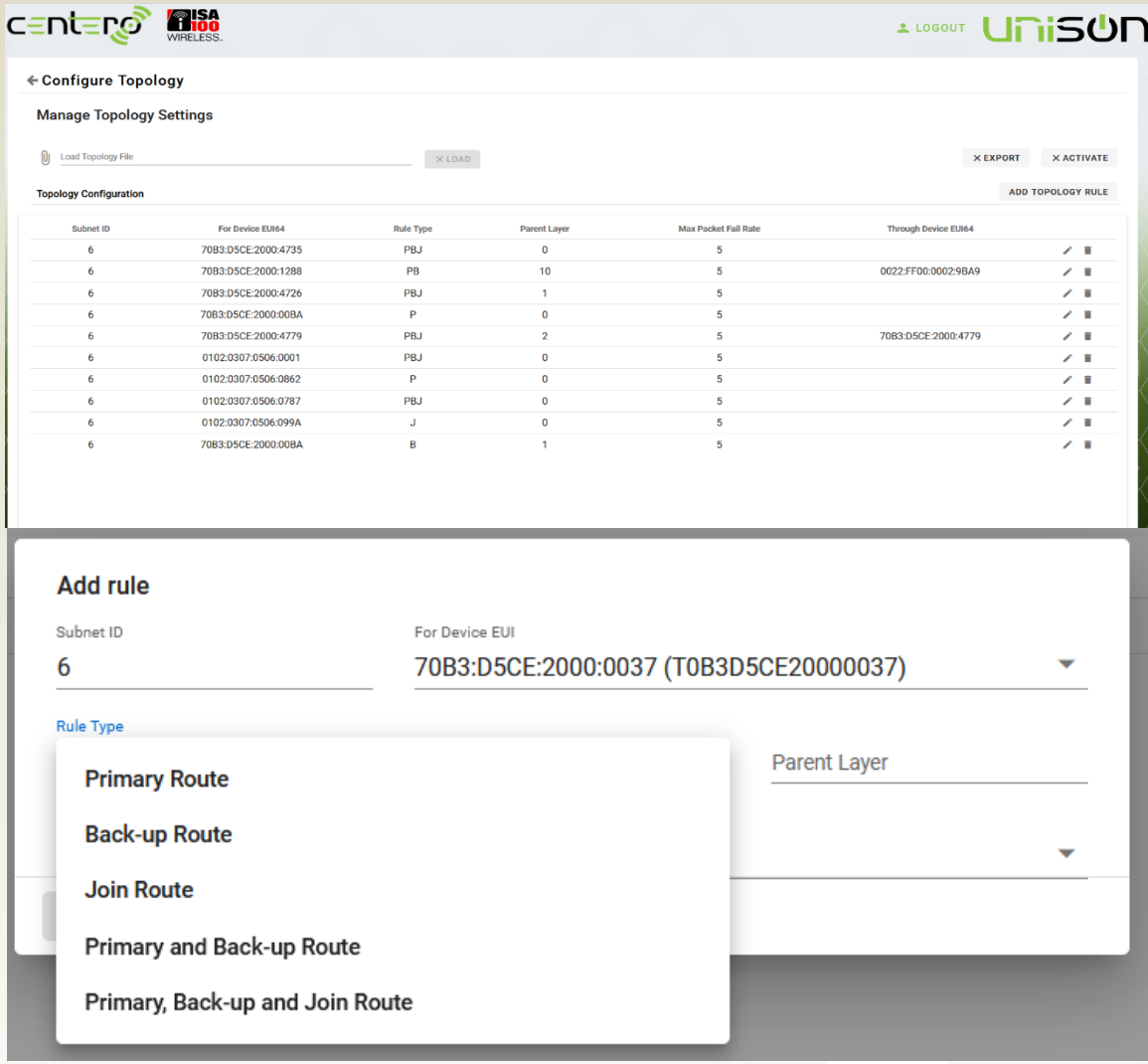
Connectivity and Networking Considerations

- ISA Wireless networks are multi-hop, self-forming and self-healing field mesh networks
- Routing decisions are continuously optimized by the System Manager to minimize hop-count, maximize reliability and battery life
- Safety applications have strict requirements for data availability, timeliness, reliability and latency which can only be met by restricting dynamic nature of mesh topologies



Connectivity and Networking Considerations

- UNISAFE Gateway includes a Mesh Topology Configuration console
- Allows users to enforce specific mesh routes where latency and reliability are predictable (source routing)
- Configure mesh depth (hop count)
- Enforce routing rules that ensure specific performance parameters are met
- Multiple rules can be enforced in parallels depending on the safety use case



UNISAFE ISA100 Wireless Development Kit

- Develop ISA100 Wireless (IEC 62734) compliant and certifiable safety field instruments
- Application processor source code provided – includes safety specific features and mechanisms
- WISA wireless modules included run ISA100 Wireless communication stack
- Include UNISAFE ISA100 Wireless Field Gateway
- User friendly SPiN development board includes OLED display and a large variety of sensors

UNISAFE ISA100 Wireless Development Kit - Benefits

Developed Specifically for Safety Instruments	→	Develop ISA100 Wireless SIL2 Compliant/Certified Safety Instruments
Includes all Components Needed to Develop an ISA100 Wireless Safety Instrument	→	Simplified, user friendly field instrument development – minimal ISA100 knowledge needed
Includes Application Processor Source Code	→	Significantly reduce time-to-market, just add sensor/actuator specific functionality. Application processor source code is license free.

UNISAFE ISA100 Wireless Development Kit - Components

UNISAFE ISA100 Wireless Gateway (Quantity: 1)

UNISAFE Application Processor Enterprise Source Code Package (Quantity: 1)

SPiN Field Development Board with WISA Wireless Modules (Quantity: 2)

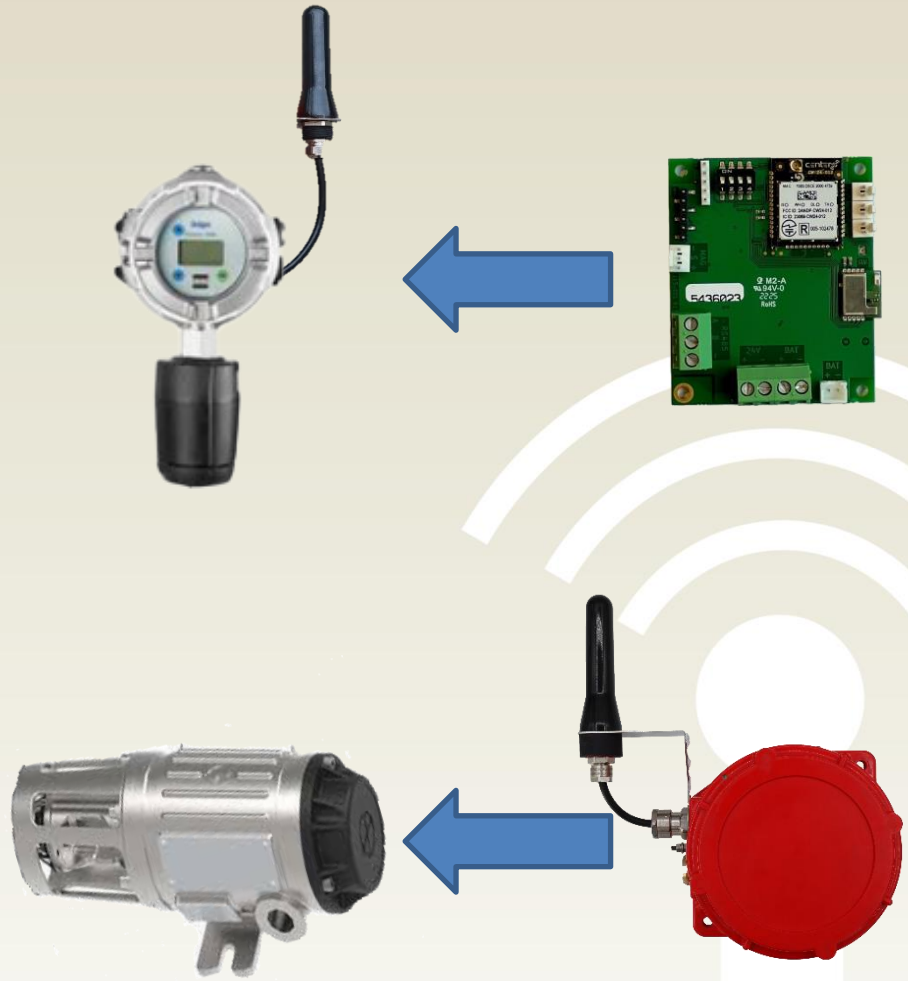
Documentation Package (Quantity: 1)

Novel Safety Use Cases - Gas Detection

RadioHub IO with gas detector:

- 3 wire 4-20mA
- Transmitting safety data over ISA100/PROFIsafe
- Exe antenna for Zone 1 applications
- Hybrid solution runs on 24vdc line or battery

Can be configured as ISA100 Wireless router (mesh topology) or end point (star topology)

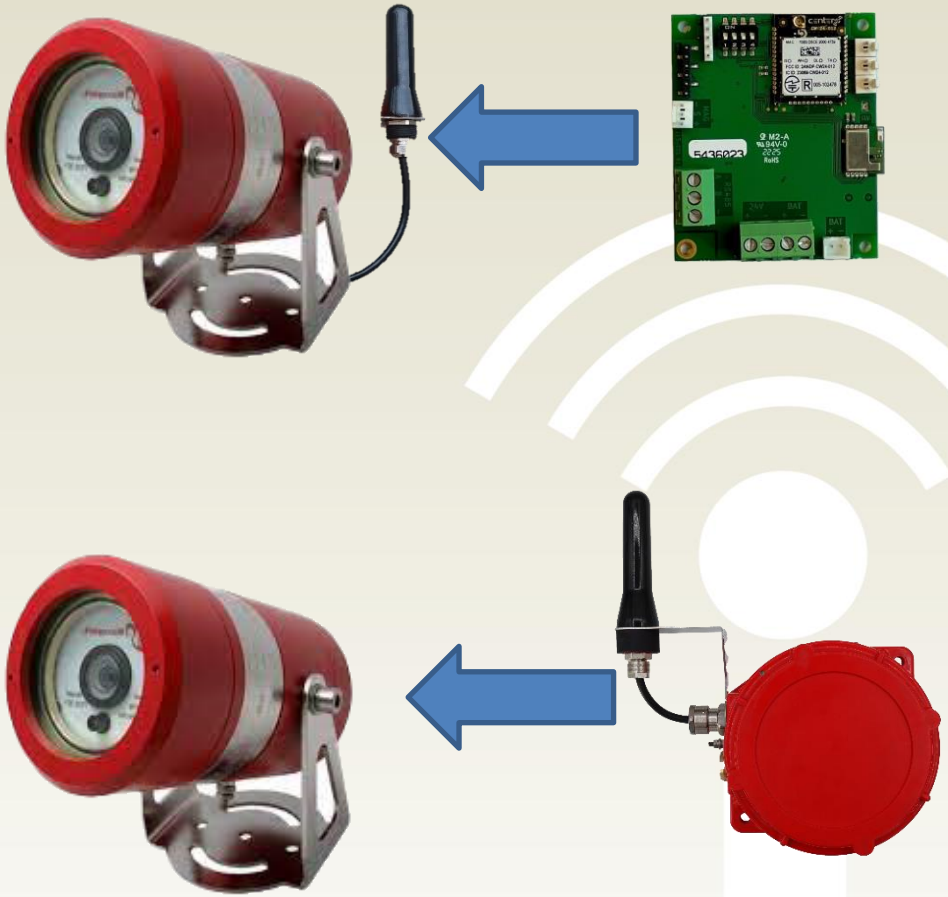


Novel Safety Use Cases - Flame and Fire detection

RadioHub IO with flame detector:

- 3 wire 4-20mA
- Transmitting safety data over ISA100/PROFIsafe
- Exe antenna for Zone 1 applications
- Hybrid solution runs on 24vdc line or battery

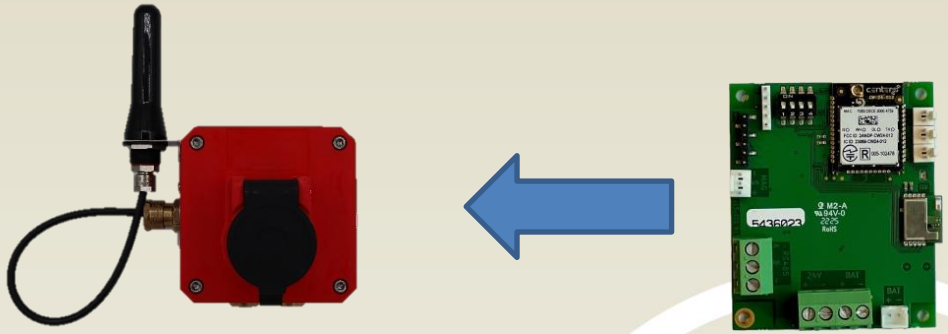
Can be configured as ISA100 Wireless router (mesh topology) or end point (star topology)



Novel Safety Use Cases – Call Stations

RadioHub IO with MCP/ PB:

- DI/AI
- Transmitting safety data over ISA100/PROFIsafe
- IS IO for Zone 1 or 2
- Exe antenna for Zone 1 applications
- 7,2vdc battery or 24vdc line



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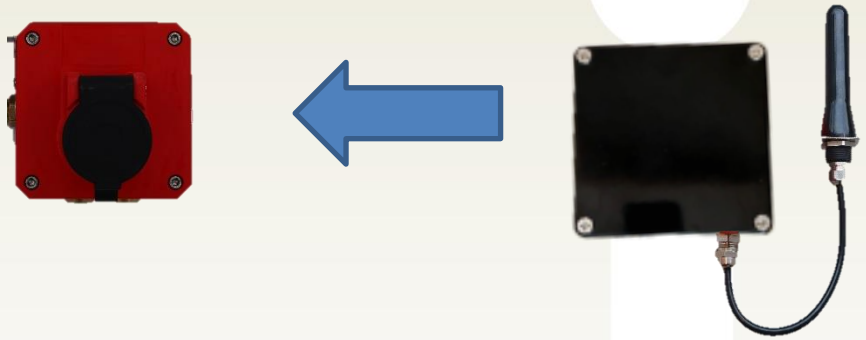
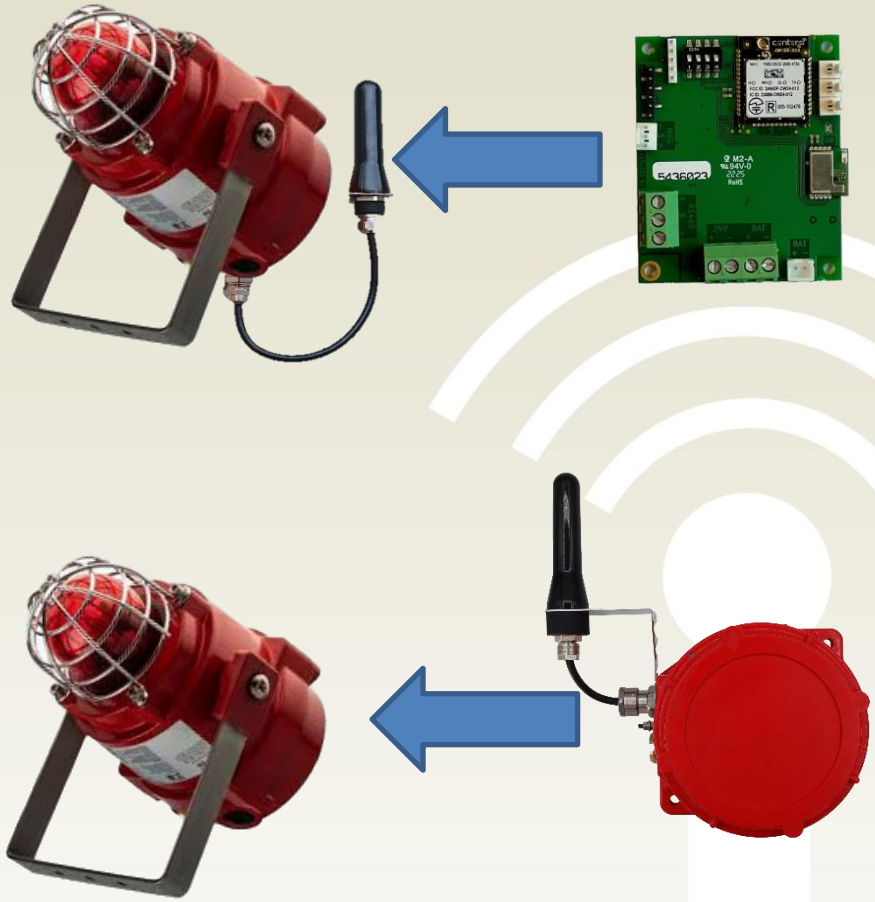


Novel Safety Use Cases - Emergency Alerting

RadioHub IO with AVS equipment:

- Relay output for control
- Transmitting safety data over ISA100/PROFIsafe
- Exe antenna for Zone 1 applications
- Hybrid solution runs on 24vdc line or battery power (low power battery mode)

Can be configured as ISA100 Wireless router (mesh topology) or end point (star topology)



Integration Using SIL2 RadioHub

- Versatile, multiple input/output ISA100 Wireless field IO
- Connect to various wired field instruments and
  - Extract monitoring process values - periodically published or on-demand
  - Send control values to the field instrument – periodically published or on-demand
  - Create monitoring – control loops with predictable latency
- Can be configured as ISA100 Wireless router (mesh topology) or end point (star topology)
- Touch-free, over-the-air provisioning, configuration and firmware upgrades
- Line or battery powered

RadioHub IO ISA100 Wireless Field IO

- Inputs:
  - One (1) - 4-20 mA input, Analog In – VDC
  - 3 wire and 4 wire configurations (sink and source)
- Outputs:
  - One(1) on-board relay – 30 VDC, 2A
  - Two (2) open collector for external relay control - 80 mA
- Suitable for deployments in explosive and hazardous locations
  - ATEX: ATEX II 2G, Ex db IIC Gb T6, Ex tb IIIC Db T80
  - EMC: ETSI EN 301 489-1 / 301 489-17
  - Wireless compliance: ETSI EN 300 328
- Operating temperature range: -40° to +70° (antenna -20° to +65°)
- Ingress protection: IP66/IP76

Integration of RadioHub IO in Beacon

RadioHub Serial ISA100 Wireless Field IO

- Inputs:
  - Modbus RS485 Master
  - Modbus RS485 Slave
- Outputs:
  - LED
- Suitable for deployments in explosive and hazardous locations
  - ATEX: ATEX II 2G, Ex ib IIC Gb T6
  - EMC: ETSI EN 301 489-1 / 301 489-17
  - Wireless compliance: ETSI EN 300 328
- Operating temperature range: -20° to +70° (antenna -20° to +65°)
- Ingress protection: IP66/IP76

RadioHub Dual Input ISA100 Wireless Field IO

- Inputs:
  - 2xAI/DI
- Outputs:
  - LED
- Suitable for deployments in explosive and hazardous locations
  - ATEX: ATEX II 2G, Ex ib IIC Gb T6
  - EMC: ETSI EN 301 489-1 / 301 489-17
  - Wireless compliance: ETSI EN 300 328
- Operating temperature range: -20° to +70° (antenna -20° to +65°)
- Ingress protection: IP66/IP76

Universal Field I/O Starter Kit - Components

UNISAFE ISA100 Wireless Field Gateway

Quantity included: 1

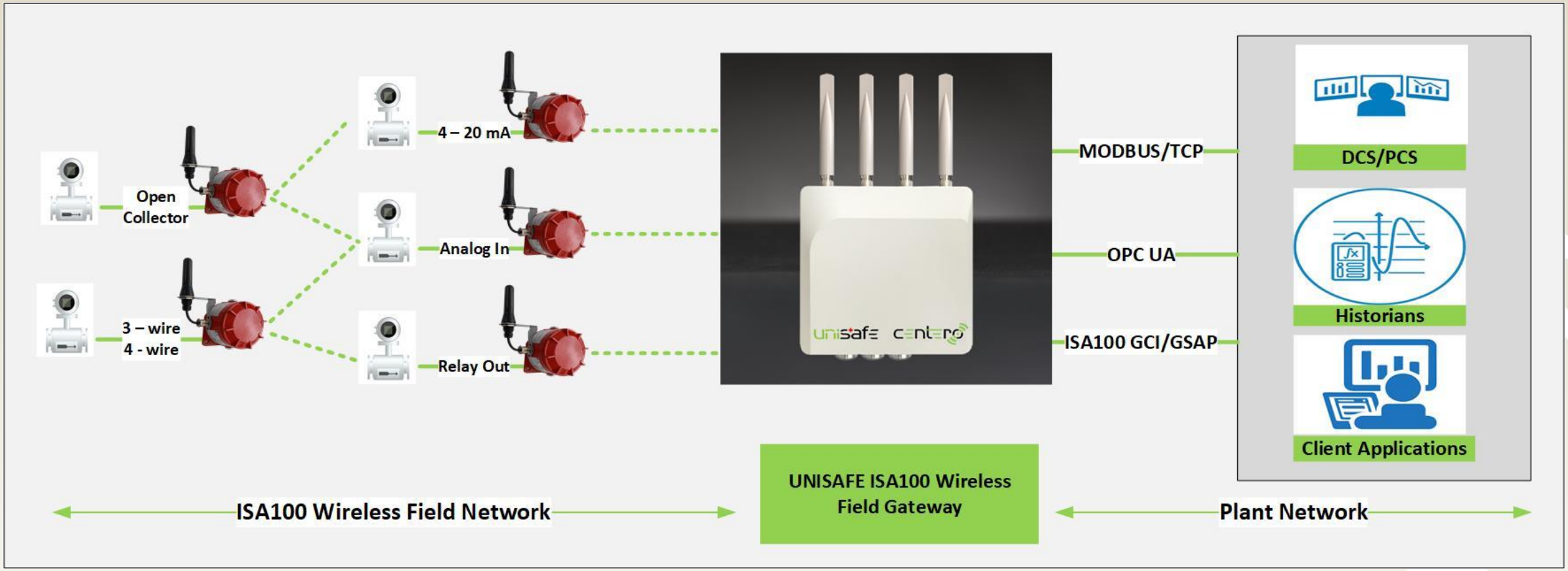
RadioHub SIL2 ISA100 Universal Field I/O Instrument

Quantity included: 2 (can order more)

Documentation Package

Quantity: 1

UNIVERSAL Field I/O Starter Kit Topology



UNIVERSAL Field I/O Starter Kit - Benefits

Wireless connectivity – swift ROI	→	No need for expensive cabling Minimize deployment costs
ISA100 Wireless Adapter	→	Fast integration of wired instruments with control rooms
Multiple I/Os	→	Enable a wide variety and types of wired field instruments

UNIVERSAL Field I/O Starter Kit - Benefits

Touch-free maintenance	→	Over-the-air provisioning, instrument configuration and upgrades
Wirelessly enable both monitoring and control wired instruments	→	Inputs: 4-20 mA, Analog In Outputs: on-board relay, 2 open collector outputs
Various power options	→	ISA100 Wireless adapter can be line or battery powered

For additional information or for purchasing please visit:

https://centerotech.com/product/unisafe-isa100-wireless-field-gateway/

https://www.mimestech.no/

https://centerotech.com/

For Your Attention!

Questions?

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ISA100 Wireless Interest Group

1200+ members and growing; please join and invite your peers to join as well !