



ISA100 WCI Webinar

Webinar date: August 30th, 2023.

The presentation will begin at 11:00 New York Time (UTC-4)

New ISA100 Wireless Programs Bluetooth Low Energy OPC-UA and PA-DIM

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Agenda

1. About the speakers
2. Context: ISA100 Wireless Basics
3. Bluetooth Low Energy
4. OPC-UA and PA-DIM
5. Implementation
6. 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



Jay Werb

Technical Director
ISA100 Wireless Compliance Institute

Jay Werb is the Technical Director of the ISA100 Wireless Compliance Institute, where he manages the organization's compliance and other technical programs. He is also editor of the IEC62734 standard that underlies ISA100 Wireless, and author of the mesh networking protocol specification. Jay has extensive experience in the computer field, with the last 25 years focused on wireless. He has been the technical founder of multiple technology companies and the inventor of over a dozen patented designs. Jay has a Bachelor's degree in Biology and a Master's degree in Management, both from the Massachusetts Institute of Technology.

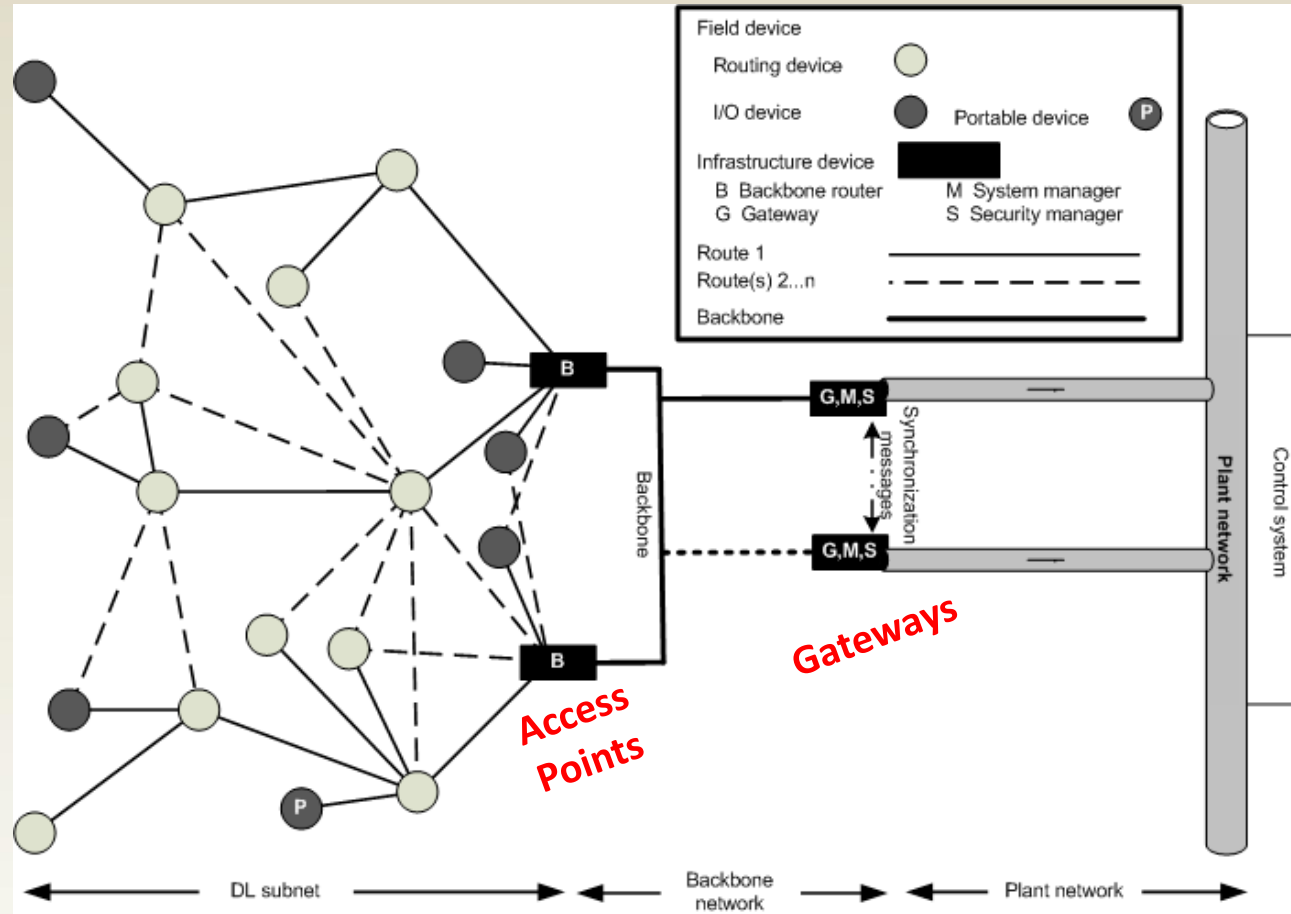
ISA100 Wireless Fast Facts

- 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Wireless can add redundancy to a wired solution
Improved Visibility	<ul style="list-style-type: none">• Condition monitoring of secondary and remote equipment• Process monitoring, fast additional data for trouble shooting
Improved Control	<ul style="list-style-type: none">• Add wireless to existing processes for more optimal control
Improved Safety	Safety related alarms - end to end SIL2 certifiable Simple Automate action Compliance logging

ISA100 Wireless Field Network Architecture



Wireless Mesh

IP Backbone

Plant Network



Bluetooth Low Energy



ISA100 Wireless “Mini-network”

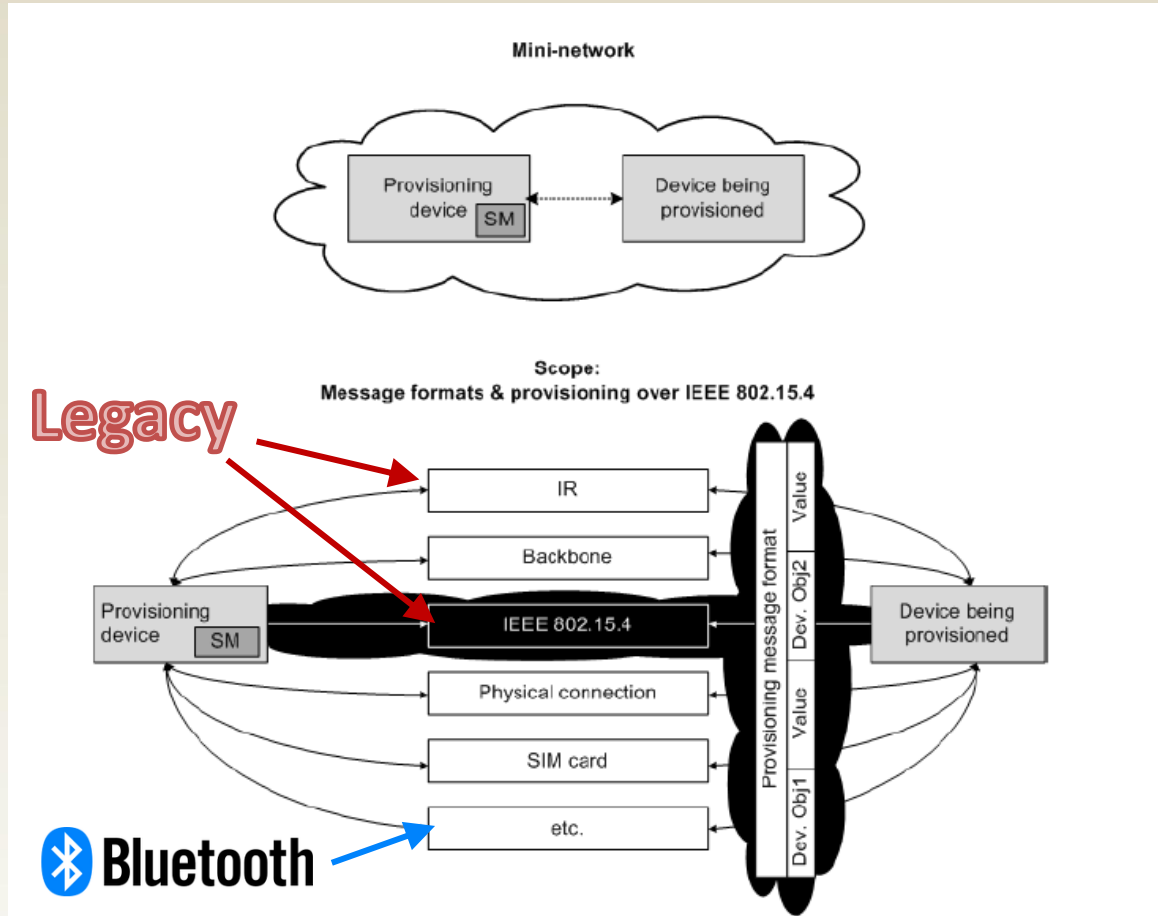


Diagram from ISA100.11a standard

Mini-network use cases

Provisioning

- Starts in factory state
- Configure communication stack for field network
- Security keys
- Network information

Commissioning

- Starts in provisioned state
- Configure application
- Calibrate sensors, etc.





The global standard for simple, secure device communication and positioning

Bluetooth® Classic

Solution Areas



AUDIO STREAMING



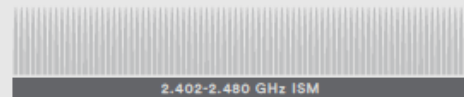
DATA TRANSFER

Device Communication



POINT-TO-POINT

Basic Rate/ Enhanced Data Rate Radio



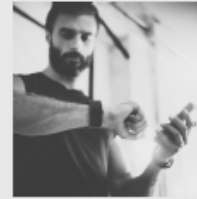
2.402-2.480 GHz ISM

Bluetooth® Low Energy

Solution Areas



AUDIO STREAMING
(COMING)



DATA TRANSFER



LOCATION SERVICES



DEVICE NETWORKS

Device Communication



POINT-TO-POINT



BROADCAST



MESH

Device Positioning



PRESENCE



PROXIMITY

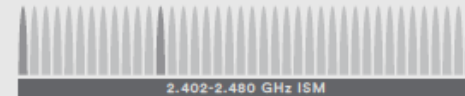


DIRECTION



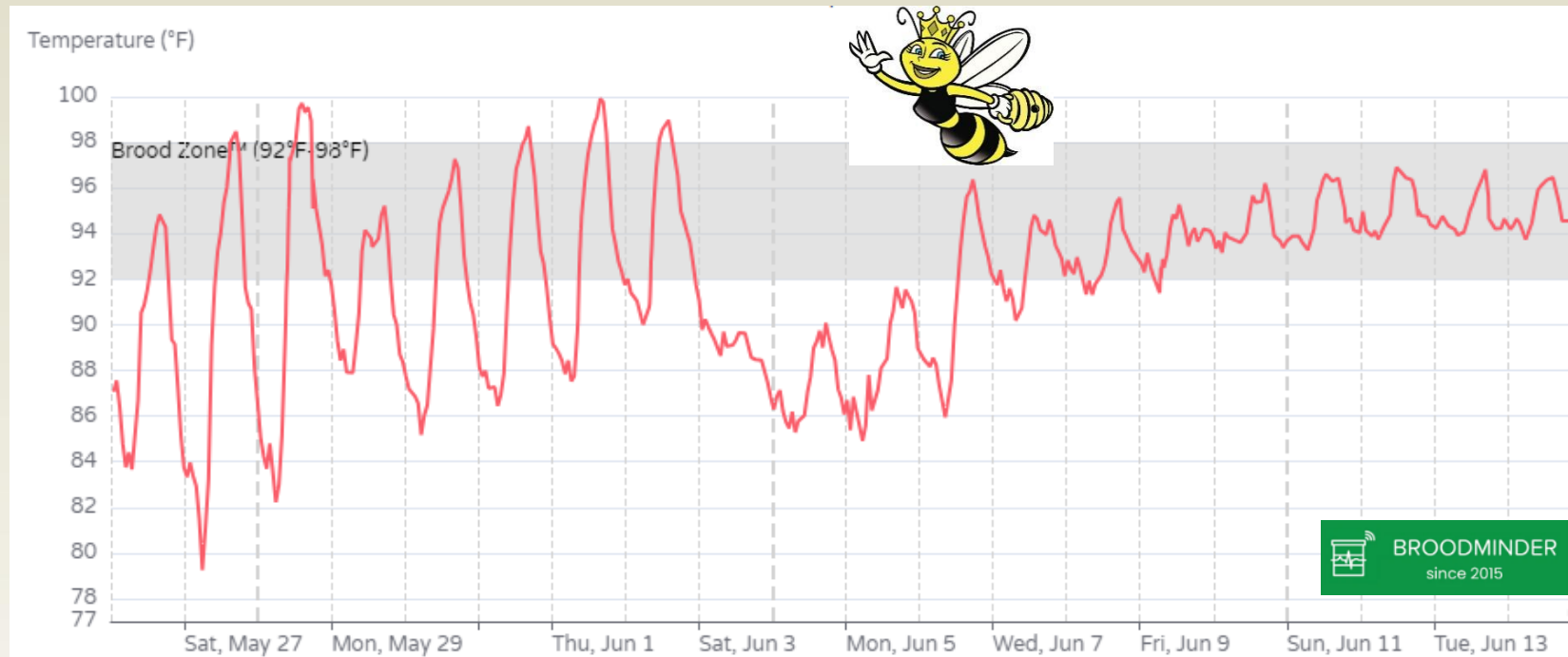
DISTANCE
(COMING)

Low Energy Radio



2.402-2.480 GHz ISM

Bluetooth LE is Everywhere



AirTag

Why Bluetooth Low Energy, and Why Now?

Because Bluetooth LE is supported by cellphones!

Provisioning and commissioning using an app on the user's phone

Bluetooth LE security is well vetted and understood

Enable creative and interoperable ISA100 Wireless solutions

Standardize ISA100-BLE integration before stakeholders lock into proprietary implementations

Project History and Status

2010: Bluetooth LE and ISA100 Wireless were launched around the same time

2018: WCI started project to standardize Bluetooth LE for provisioning and commissioning

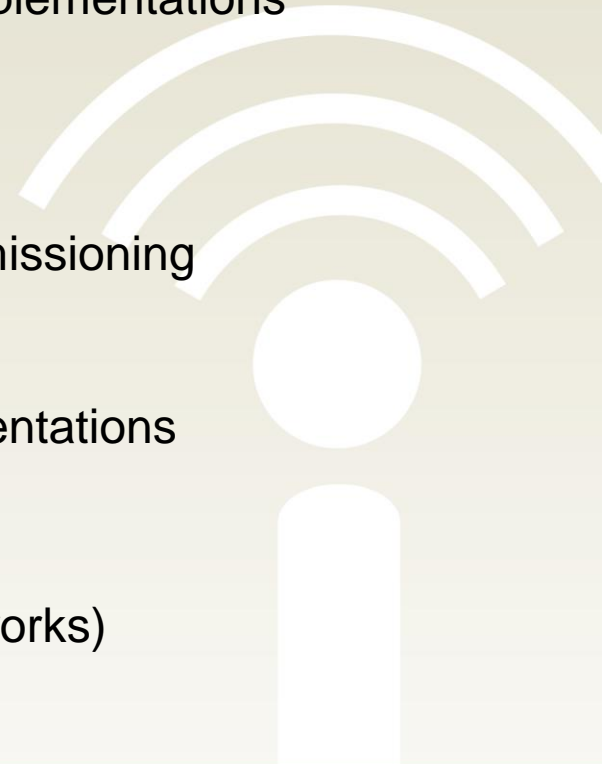
2021: Draft specification completed

2022: WCI provides reference implementation for remote testing

2023: Design validated at Interoperability Workshop with 3 independent implementations

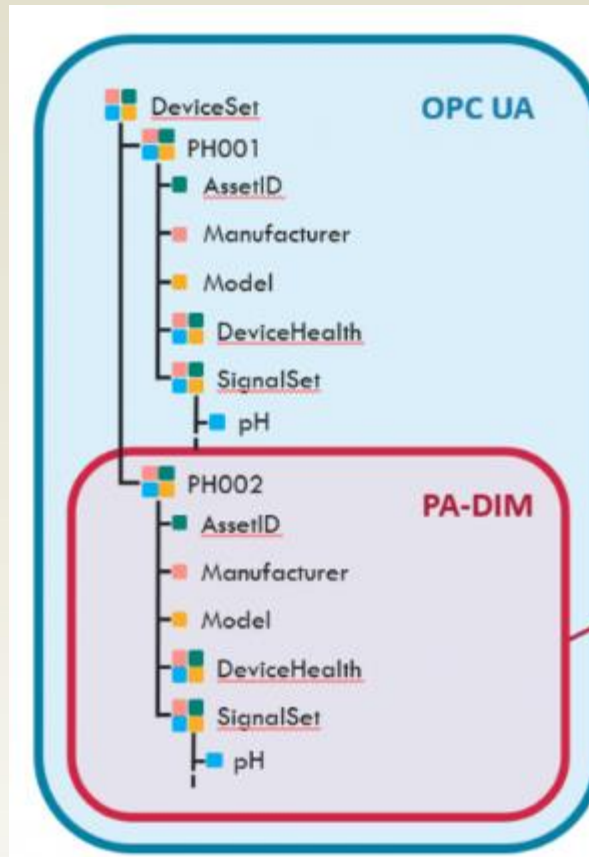
Limited Scope

Supported interoperable use cases: Provisioning and Commissioning (mini-networks)



OPC-UA Data Model

PA-DIM



About PA-DIM

PROCESS AUTOMATION DEVICE INFORMATION MODEL

The Process Automation Device Information Model Standard (PA-DIM) is a specification that defines protocol agnostic communication of common process automation instrument parameters using OPC UA information modeling techniques. Eliminating protocol dependencies simplifies the integration of IT and OT systems while enabling a semantic device information approach for unambiguous machine-to-machine (M2M) communication. Seamless communication is achieved through data-mapping of field device parameters using the address space defined in the PA-DIM specification.

End users will benefit from a protocol agnostic data integration approach leveraging PA-DIM to move process data seamlessly from the field to the cloud to realize improved data standardization across networks.

The PA-DIM owners encompass standards development and end user organizations that share a common interest in collaboratively developing specifications and technology to accelerate the digital transformation of the process automation industry. Each participating organization is a shared owner of the PA-DIM specification, which is managed by the working group hosted by the FieldComm Group. Current PA-DIM owners are FieldComm Group, ISA 100 WCI, FDT Group, NAMUR, ODVA, OPC Foundation, PROFIBUS and PROFINET International, VDMA, and ZVEI.

Text above is adapted from PA-DIM description on FDT website

PA-DIM Adoption by ISA100 Wireless Compliance Institute

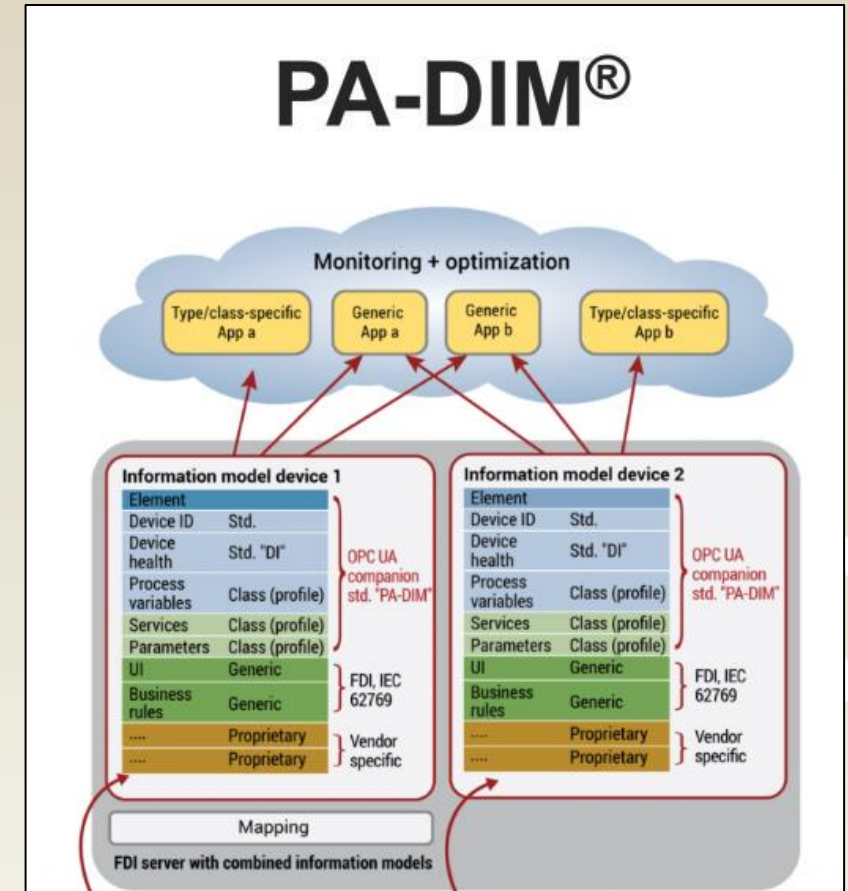
PA-DIM is a new data model for OPC-UA. The PA-DIM architecture is consistent with object models in ISA100 Wireless field devices.

WCI is a co-owner of the PA-DIM, along with FieldComm Group, OPC Foundation, NAMUR, PROFIBUS/PROFINET, ODVA, NAMUR, VDMA, ZVEI, FDT

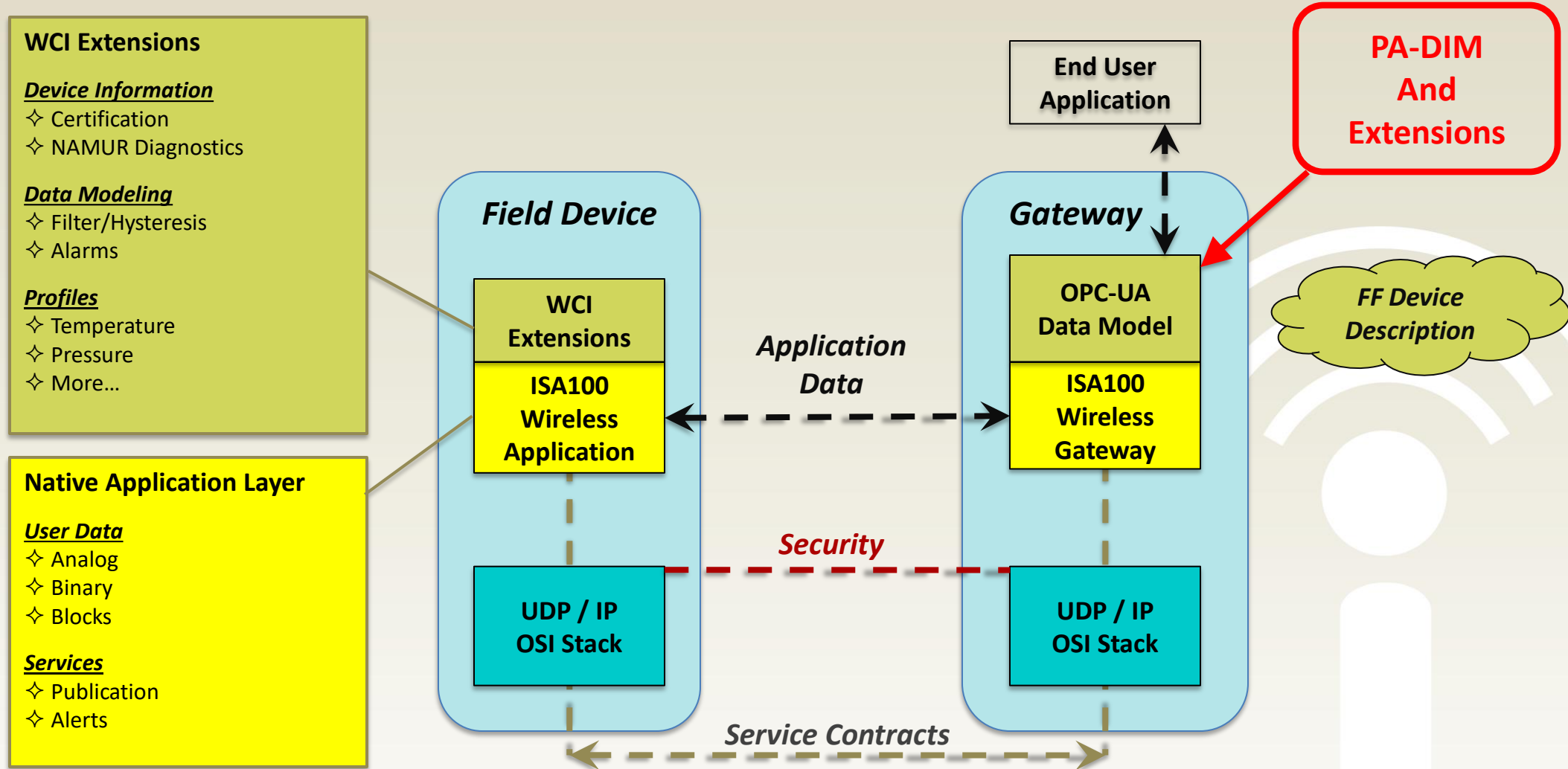
In a joint working group with OPC Foundation, WCI extended the PA-DIM data model for the ISA100 Wireless community. The main extensions are related to wireless aspects not covered by PA-DIM, such as network topology and signal quality metrics.

WCI provided its members with a common test platform, including Python test scripts (client/subscriber) and PC-based field devices for remote testing.

WCI gateway providers are committed to PA-DIM as a common interface for ISA100 Wireless systems.



ISA100 Wireless Application Framework



Why PA-DIM, and why now?

Because the planets aligned

Long-standing user request to standardize OPC-UA interface to ISA100 Wireless and other platforms
ISA100 Wireless stakeholders are committed to PA-DIM in general, and WCI's program in particular

Project History and Status

2019: WCI launched joint working group with OPC Foundation

2021: Workgroup completes draft, building on PA-DIM and other OPCF specifications.

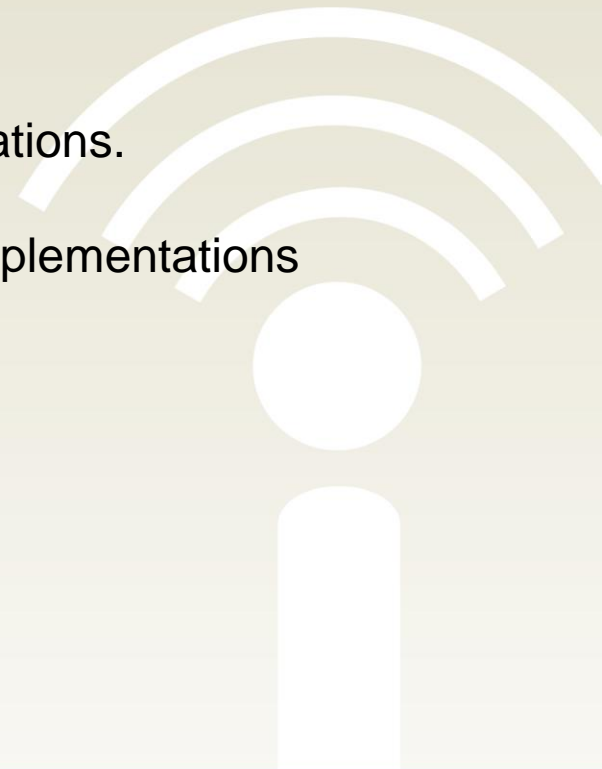
2022: WCI provides test platform for remote testing

2023: Specification validated at Interoperability Workshop with 2 independent implementations

What Next?

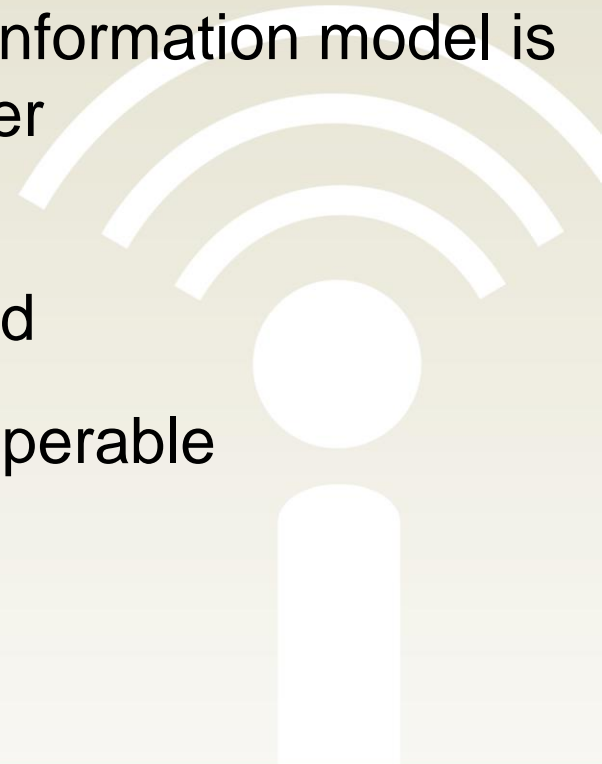
Data model is already in use.

Continue to develop and improve WCI's test platform.



OPC UA WCI Standardization Effort

- Based on WCI standard document that defines an OPC UA Information Model to represent and access ISA100 Wireless devices
- Standardization was a cooperative effort between the WCI and the OPC Foundation
- The goal and purpose of the standardized ISA100 OPC UA information model is to allow access to ISA100 devices in an interoperable manner
- Current status
 - 2020: ISA100 Wireless OPC UA - specification first drafted
 - 2023: Interoperability workshop in June 2023 – two interoperable implementations
 - 2023: Specification finalized

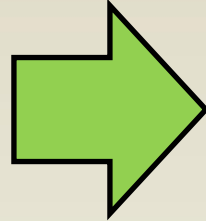


OPC UA ISA100 Wireless Data Model

- An OPC UA system is based on a client server communication model and consists of two main entities
 - OPC Server – centralizes device data and responds to UA Client requests
 - OPC Client – expected to be able to discover and use vendor-defined information
- OPC UA unifies data access, alarms and events, historical data, health and device management data
- OPC UA data model is independent of the wireless protocol
- Wireless aspects are well encapsulated, providing flexibility to support other wireless protocols in the future.
- Includes the following OPC UA models
 - ISA100 Field Devices – extension of PA-DIM model (OPC 30081)
 - ISA100 Access Point
 - ISA100 Network information model

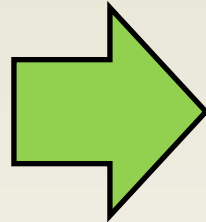
OPC UA ISA100 Wireless Data Model Benefits

Ensured Interoperability



OPC UA common plant network interface
No need for software aggregators
Reduction in CAPEX and OPEX
Streamlined plant operation

Connect to plant network



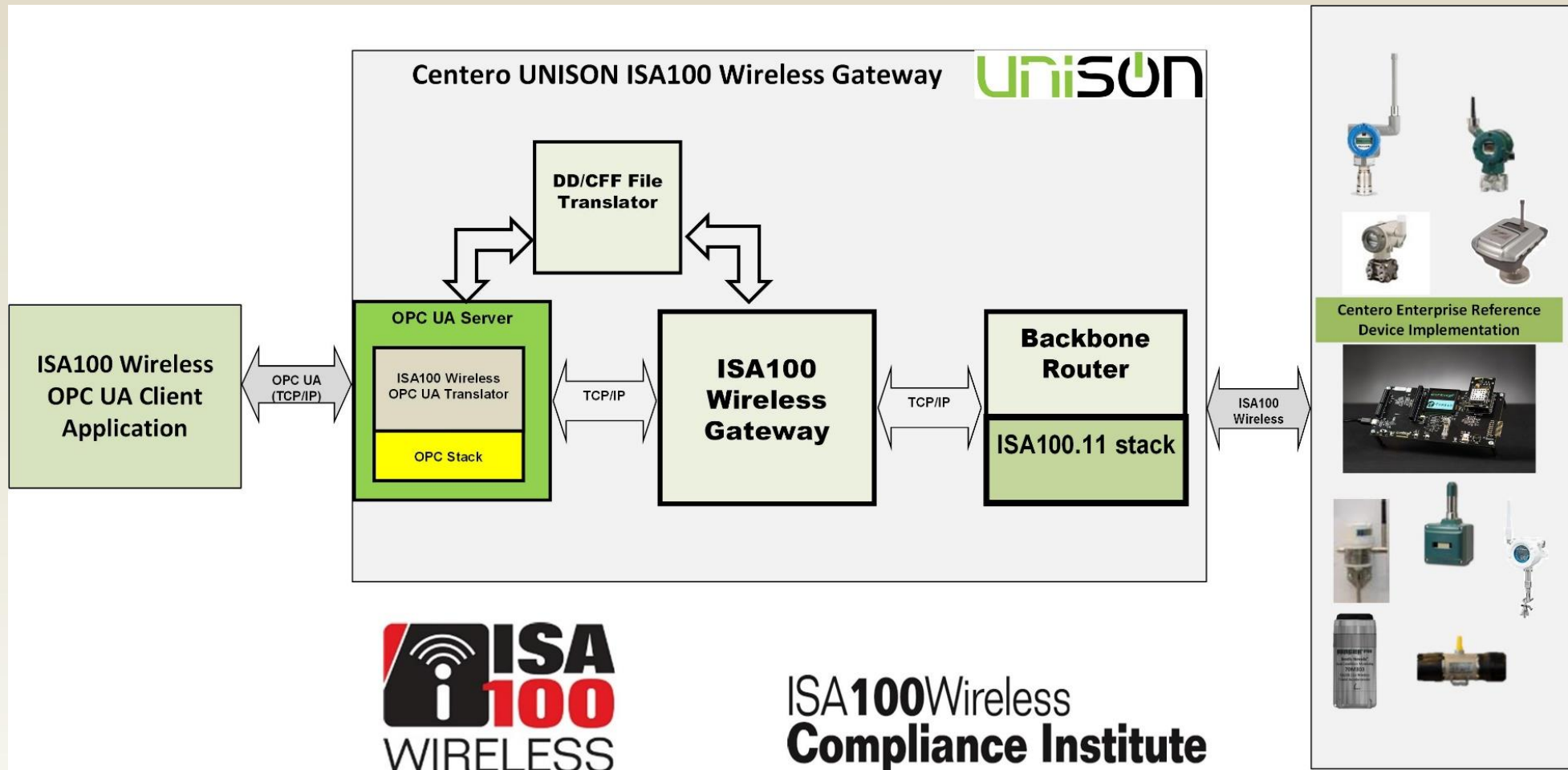
Connect to wide array of client applications:
data historians, analysis software etc

Comprehensive data sets
compared to legacy
protocols



Unifies data access, alarms and events,
historical data, health and device
management data

WCI ISA100 Wireless OPC UA Reference Implementation



Centero UNISON ISA100 Wireless Gateway

- ISA100 Wireless and WiFi Mesh+ high throughput backbone connectivity
- Supports highly scalable deployments in multiple topologies
- Monitoring and advanced control features
- Over-the-air provisioning with advanced security features
- Advanced diagnostics – NAMUR, wireless health and battery life
- Native support for DD/CF files
- Long-range ISA100 Wireless connectivity - 1.2 miles (2 km) LoS
- Plant network interfaces: MODBUS, GCCI, OPC UA (ISA100 Data Model) and PROFINET/PROFIsafe
- All software and firmware is remotely upgradable via secure AES-256 encrypted and authenticated process
- Power redundancy (DC and PoE)



Centero UNISON ISA100 Wireless Gateway

- UNISON Gateway includes translator that supports dynamic mapping of parameters exposed in DD/CF file via OPC UA interface
- Number of OPC UA clients supported – 5 concurrent connections
- Centero also offers royalty free source code for OPC UA client implementation



Summary

ISA100 Wireless platform upgrades

Bluetooth Low Energy

Provision and commission field devices from a cellphone app
Interoperability validated at Interoperability Workshop
Compliant products are under development

OPC-UA Data Model

One data model for many standards
PA-DIM with extensions
Interoperability validated at Interoperability Workshop
Compliant products are available today



Questions?



www.isa100wci.org



[ISA100 Wireless Interest Group](#) 

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

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