

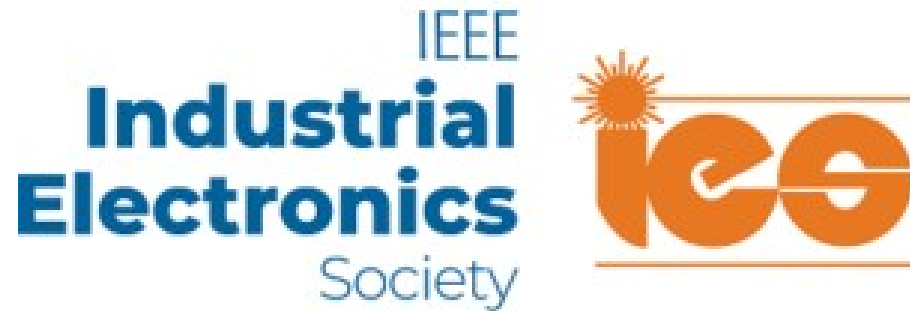
Webinar #2:

# PATH TO SENSORS INTEROPERABILITY

FEATURING SENSORS MANUFACTURER AND GATEWAY VENDOR

September 22, 2021

## THANKS TO OUR TECHNICAL SPONSORS



# ABOUT THE IEEE SENSORS COUNCIL

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**Formed in 1999 to address multi-disciplinary and general problems facing sensors**

- Not focused on specific technology (such as photonics or semiconductor circuitry)
- 26 IEEE member societies (each deals with a specific technology or topic)
- Chapters in all geographical regions

## **Main activities**

- Publications
- Industry events
- Education
- Awards

**Ideally suited to discuss and tackle IoT-enabled sensors**



# Path to Sensors Interoperability

# Presenters

## Artur Rdzanek

General Product Manager for ABB, focused on sensor products for Dodge® mechanical power transmission division. He has more than 20 years of product management and manufacturing experience. Artur holds a B.S. and M.S in Automatics and Robotic Engineering from Lodz University, and an Executive MBA from Warsaw-Illinois University.



# ABB

**Artur Rdzanek**  
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2021

# Path to Sensors Interoperability

ABB Ability™ Smart Sensors – Dodge® Power Transmission + Cassia's Bluetooth Gateway



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## Agenda

- Smart Sensors Power Transmission
- Certification as a key element of interoperability
- What is interoperability from a sensor/gateway perspective?
- What are the common interoperability challenges facing IIoT enterprises?
- What are the solutions to each challenge?
- What are the common challenges facing end-users?
- Summary

# Smart Sensors Power Transmission

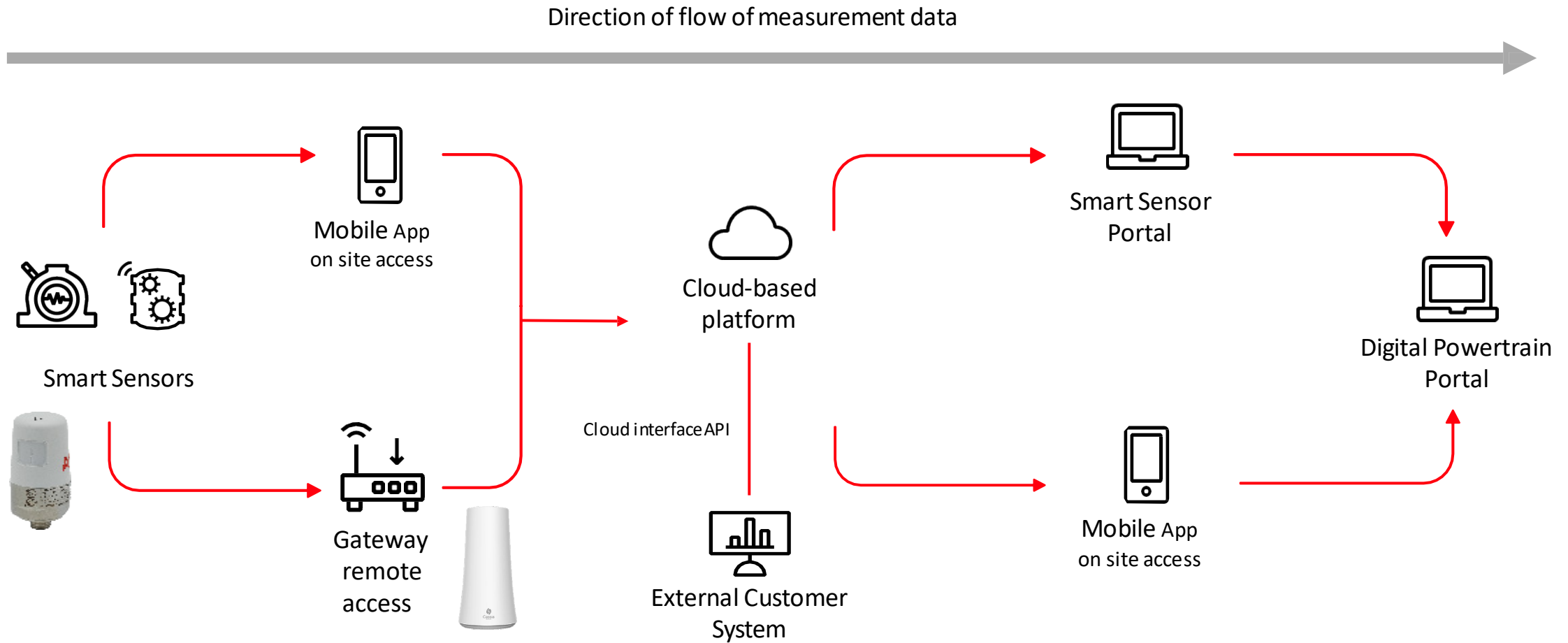
Solutions and platform

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# Smart Sensors Power Transmission

How does this work? Solutions and platform



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# Presenters

## Sheryl Bihler, P.E.

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Certification Engineer for ABB, specializing on Dodge® mechanical power transmission products.

She has more than 10 years of hazardous location equipment design experience and more than 15 years product safety assessment experience. Sheryl has participated in the US National Standards committee for more than 15 years. She holds a B.A. in Mathematics and an M.S. in Statistics from the University of Northern Colorado, B.S. in Electrical Engineering from Colorado State University and is a licensed Professional Engineer (Electrical) in Nevada and Texas.



**ABB**

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**Sheryl Bihler, P.E.**  
Certification Engineer  
ABB Dodge® Power Transmission

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# Certification as a key element of interoperability

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# Certification

## ABB Ability™ Smart Sensors – Dodge® Power Transmission



### Communications

Bluetooth	FCC (USA)
	IC (Canada)
	RED (EU)
	NYCE (Mexico)

### Ex Markings

Ex ia	Intrinsic Safety
	Gases, Vapors, Dusts

### Standards Considered

Communication	IEEE 802.15.1 (Bluetooth protocol)
Performance	None Performance specifications defined during development
Safety	IEC 61010-1 (test and measurement) IEC 60079-0 (general haz loc) IEC 60079-11 (intrinsic safety)

### Hazardous Location Markings

Certifications	ATEX/IECEX Zone 0,1,2 Gas/Zone 20,21,22 Dust NEC & CEC 500 Class I,II,III, Division 1 (Gas, Dust, Fibers and Flyings)	
Certification Marking	II 1 GD I M1 Ex ia I Ma Ex ia IIC T3(150°C) Ga Ex ia IIIC T146°C Da	CI I, Zn 0, AEx ia IIC T150°C Ga CI I, Div.1, Grps ABCD CI II, Zn 20, AEx ia IIIC T150°C Da CI II, Div 1, Grps EFG CI III, Div 1

# Presenters

## Van Krueger

Van Krueger serves as the VP of U.S. Operations at Cassia Networks and has over 25 years of executive and leadership experience. Van oversees the development and implementation of Cassia Networks' operations strategy and focuses on establishing successful global enterprise IoT partnerships.



**Van Krueger**  
VP of U.S. Operations  
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# What is interoperability from a sensor/gateway perspective?

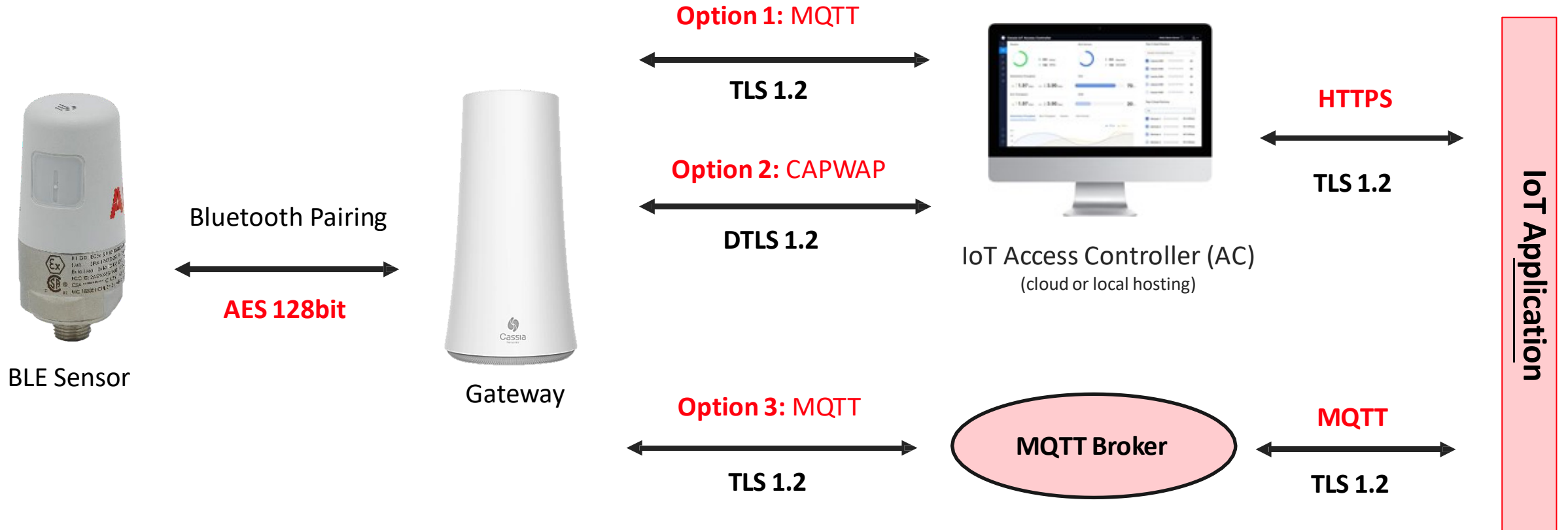
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## What is interoperability from a sensor/gateway perspective?

From a sensor/gateway perspective, interoperability can be described as the ability to provide **cost-effective, seamless, timely, and secure connectivity** for uploading data to a **customer facing application**.



# End-to-End Encryption





# What are the common interoperability challenges facing IIoT enterprises?

## Common **interoperability challenges** facing today's IIoT enterprises



How to go from “**wired**” to  
“**wireless**”?

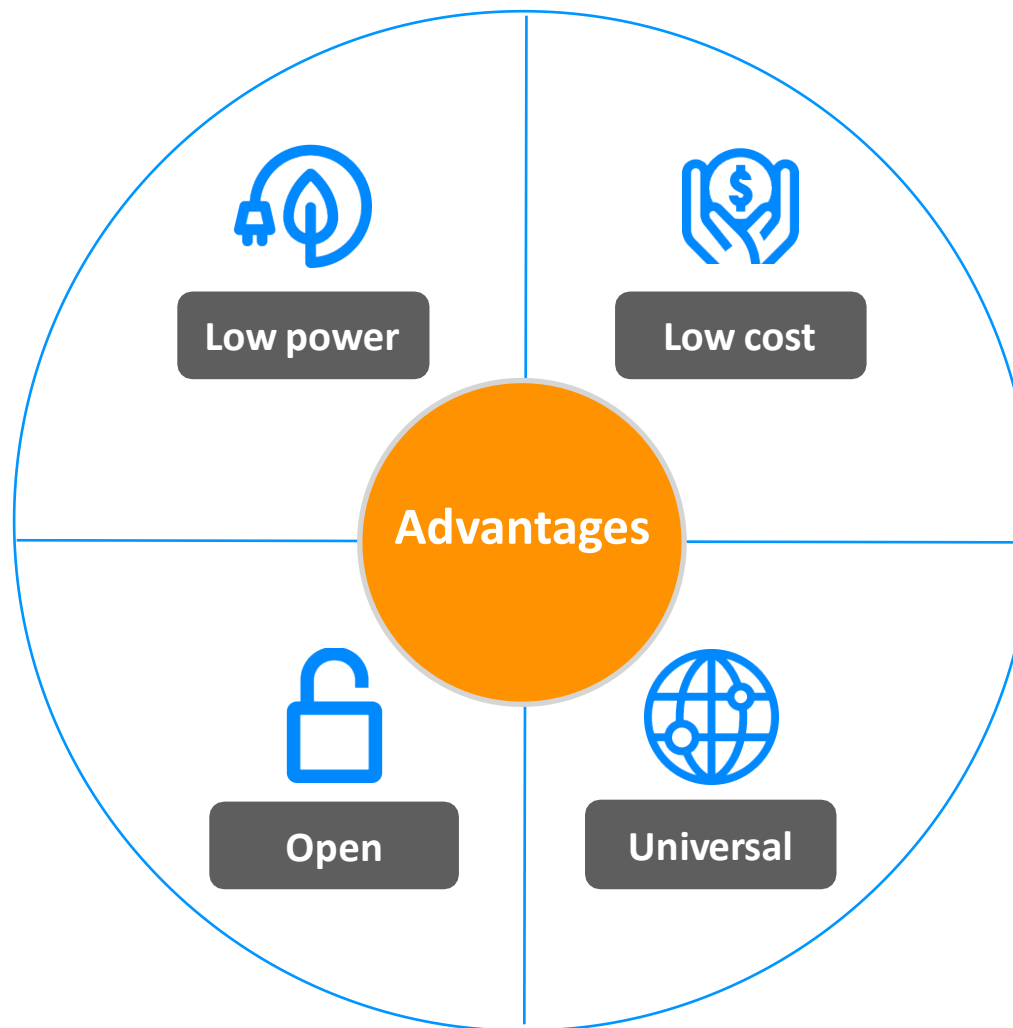


What wireless  
**communication protocol** to  
use?

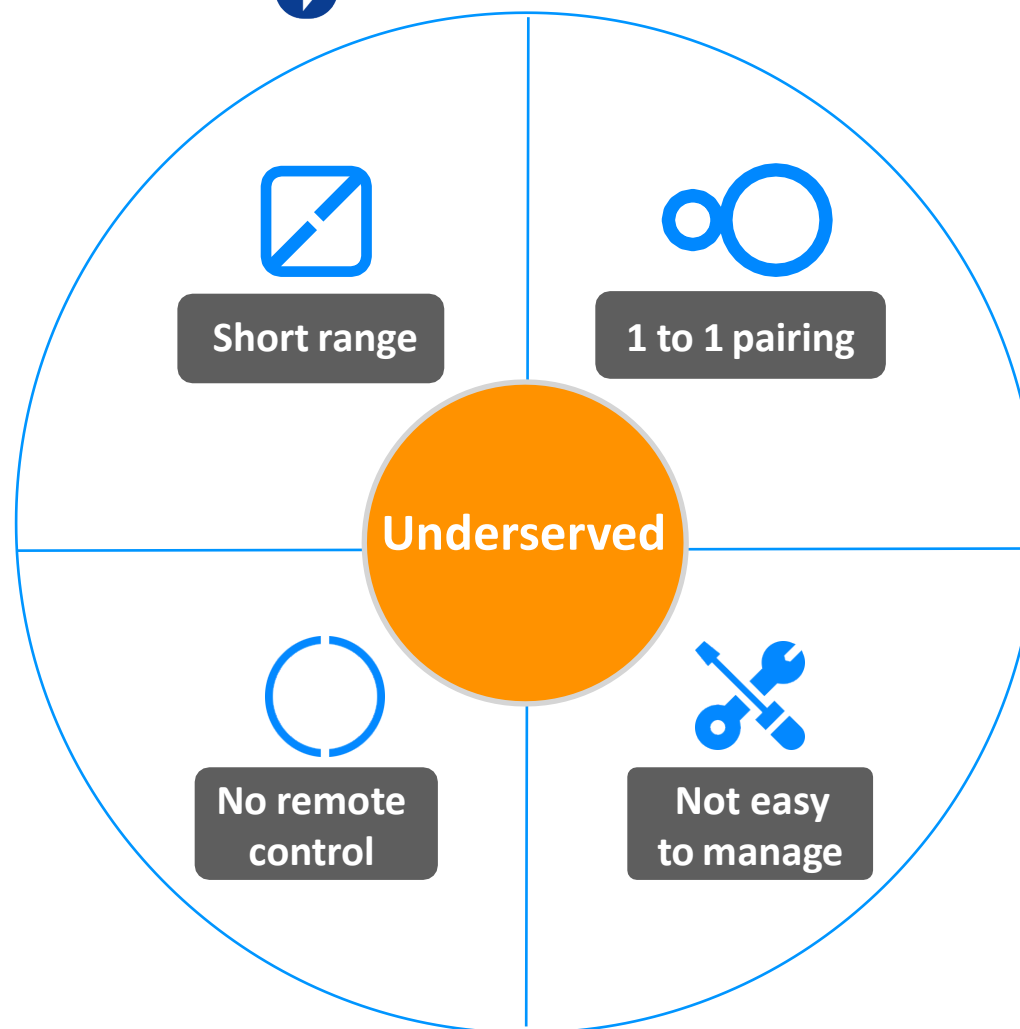


How to ensure enterprise  
level network  
**reliability, security & scalability**?

## Why Bluetooth for Industrial IoT?



## Limitations of traditional Bluetooth



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# What are the solutions to each challenge?

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## Addressing the limitations with **Bluetooth Gateways** and **IoT Access Controller**



Indoor/outdoor  
Bluetooth Gateway



Indoor/outdoor  
Bluetooth Gateway



Indoor/outdoor  
Bluetooth Gateway  
(OPC-UA server)



Hazardous Area  
Bluetooth Gateway

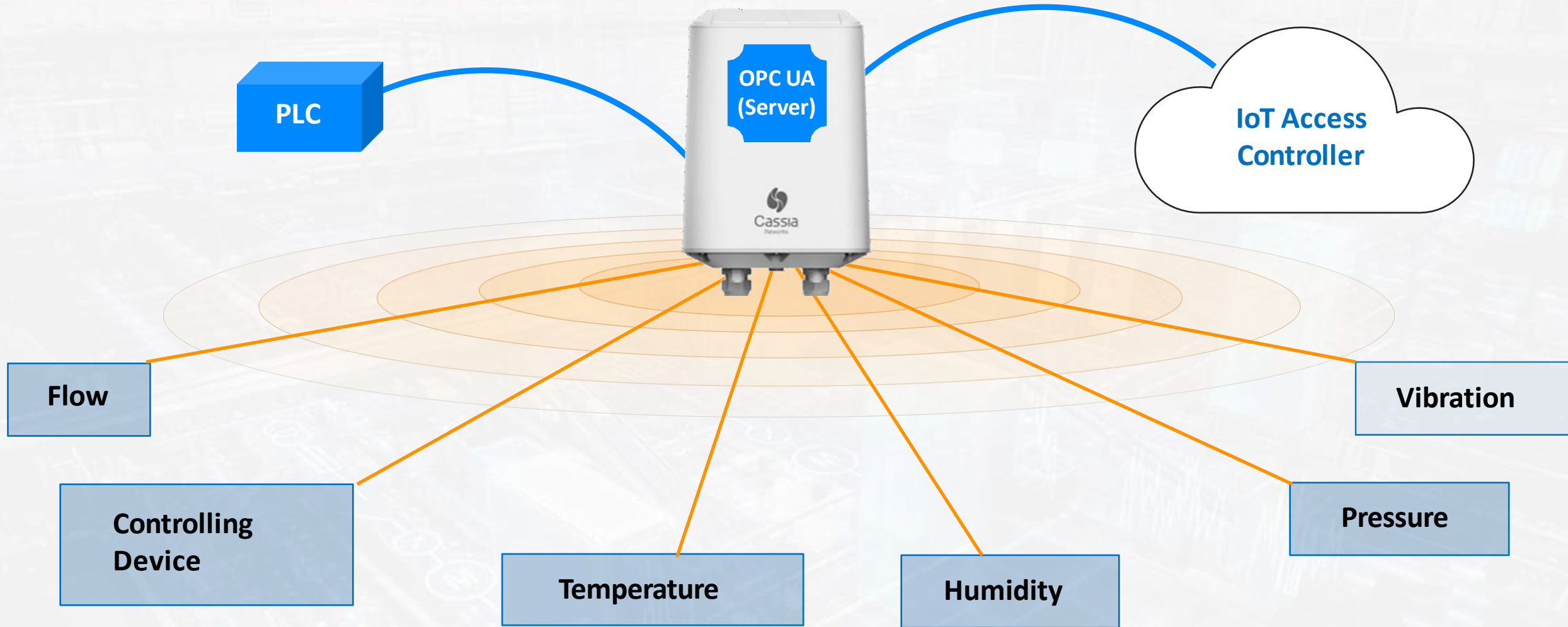


IoT Access Controller (AC)  
(cloud or local hosting)

- 1 Long range - up to 400 m with Bluetooth 4, up to 1 km with Bluetooth 5.0\*
- 2 One to many connections, up to 40
- 3 Flexible backhaul - Ethernet, Wi-Fi and USB Cellular modem (optional)
- 4 Edge computing support

- 1 Easy and centralized management
- 2 End-to-end security
- 3 Easy integration and highly scalable
- 4 Supports Bluetooth roaming and positioning

## Bluetooth IoT and Industry 4.0



Ideal for condition monitoring, predictive maintenance, environmental monitoring as well as personnel & asset tracking

# What are the common challenges facing end-users?



## Common challenges facing end-users

### Challenges

- 1 Total cost of ownership
- 2 Cybersecurity, data loss
- 3 Solution scalability
- 4 Device integration
- 5 Ongoing cost of data
- 6 Product data sheet accuracy
- 7 Sensor performance parameters

### Solutions

- 1 Fewer gateways required, ease of management
- 2 Encryption; end-to-end security
- 3 IoT AC supports 1000's of devices
- 4 RESTFul API's, MQTT Protocol support
- 5 Flexible backhaul options
- 6 Independent certification service
- 7 Compliance to standards

# Summary

# Summary

- Required certification for interoperability must be considered upfront
- Ability for the end-to-end solution to be used in a wide variety of applications, use cases and physical locations
- By selecting the right wireless communication protocol, today's IIoT enterprises can overcome the most common interoperability challenges
- Bluetooth/wireless gateways and sensors help to address the common IoT interoperability challenges to offer the end-user a flexible, scalable and secure solution

**Thank You!**



# CALL TO ACTION

**PROPOSED BY IEEE SENSORS COUNCIL IN COLLABORATION WITH IEEE SA**

Brent Lunceford | IEEE Sensors Council

IEEE SA Sensors Webinar

September 22 , 2021

## WHAT HAVE WE LEARNED TODAY?

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### **Many industries depend on sensors and sensors permeate our daily lives**

- Smartcities, mobility, industrial automation, consumer electronics, medical devices, smart watches, etc.

### **New technologies facilitate rapid growth of IoT enabled smart sensors market**

- 5/6G internet, microprocessors, communication protocols, better performance
- Big Data, Cloud, innovative applications, better performance

**...But at a cost for interoperability**

# WHAT ARE THE MAIN CHALLENGES?

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## Interoperability

- Possible in closed-loop systems (integration by sensor-gateway manufacturers)
- New technologies (ex. 5G, 6G) will compound interoperability problems

**Unless industry takes action**

## Product data misrepresentations

- Many product data sheets are not accurate or factual

**IEEE Sensors Registry (<https://sensorsregistry.ieee.org/>) lists sensor devices verified by IEEE**

## Cybersecurity

- Often implemented by individual components but not by the entire ecosystem
- No recommended cybersecurity protocols to help with IoT implementations

**IEEE webinar #3 in November, 2021 will be dedicated to this important topic**

## WHAT ARE THE MAIN CHALLENGES? (cont'd)

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### Non-compliance to standards

- Some industries (such as consumer electronics) use Google's APIs that serve as de-facto standards to access sensors

**They obfuscate the sensors lack of compliance but mitigate the interoperability problems.**

### New technologies

- (ex. 5G, 6G, Cloud, Big Data) and communication protocols will compound compliance and interoperability problems

**The results are additional testing costs for integrators and implementers.**



# STANDARDS & CERTIFICATION

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## IEEE portfolio of sensor standards include:

- IEEE 1451.x range of sensor standards

A set of network-independent communication interfaces for connecting transducers to servers and specification of [Transducer electronic data sheets](#) (TEDS).

- IEEE 2700

A minimum set of performance parameters defined with required units, conditions, and distributions for each MEMS sensor.

- IEEE 2888

A framework for MEMS sensor performance specification terminology, units, conditions, and limits.

## Need to develop standard(s) that:

- Have industry support
- Address fundamental framework issues for system level integration
- Work with current and emerging technologies
- Will serve as a base for conformity assessment programs

# HOW CAN IEEE ADDRESS THE CHALLENGES?

## What?

A **roundtable meeting** to discuss industry needs for the IoT enabled sensor devices

*Areas of interests: interoperability, cybersecurity, restoring trust in product specifications (data sheets)*

## Why?

The market is experiencing rapid growth and it is important for industry to assess issues and recommend a plan to mitigate them

## Who Should Participate?

- Industry executives (i.e. CEOs, CTOs, product architects & managers)
- Participants from: manufacturers, solution providers, SDOs, academia, test laboratories

## When & Where?

- IEEE NYC office
- Date: Q1, 2022    Email: [sensors-rt@ieee.org](mailto:sensors-rt@ieee.org) to indicate interest



## Q & A

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# THANK YOU

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