

WEBINAR

MQTT Sparkplug:

A Game Changer for
Adopting IIoT and Digital
Transformation

Hosted By  **HIVEMQ**



Speakers



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Ravi is a product management leader with extensive experience delivering high-quality products and services that have generated revenues and cost savings of over \$10B for companies such as Motorola, GE, Bosch, and Weir. His expertise spans industries such as Mining, O&G, Industrial Automation, Automotive, Mobile Devices, Enterprise communications, Automotive and Fleet Management. He also has technical expertise in Data Analytics, Artificial Intelligence (AI), Big Data, Data Security, Product Marketing, Product Engineering, Cloud Platforms, SaaS/PaaS, and Agile Methodologies.



Speakers



Ryan Bateman

Senior Product Manager, HiveMQ

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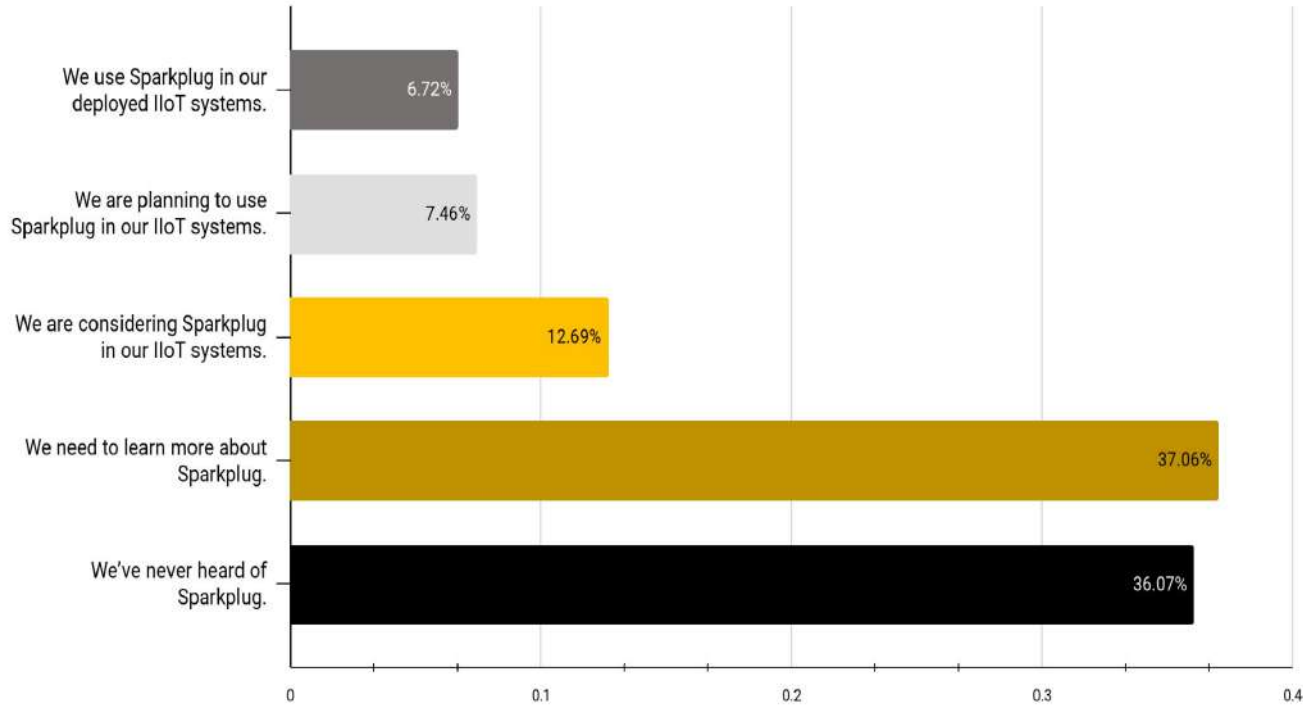
[in linkedin.com/in/rbateman/](https://www.linkedin.com/in/rbateman/)

Ryan is a full-stack generalist, leader, manager, and technologist with 17 years of experience in software product, the majority of which is in mobile technology. He's currently working as a product manager at HiveMQ defining next generation experiences for customers especially in Manufacturing.



What best reflects your **experience with Sparkplug**?

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Future of Manufacturing



Automation



Cybersecurity



Advanced Analytics



Industry 4.0



Smart Sensors



Cloud Computing



AI/ML



Business Drivers



- Automate regulatory compliance reporting
- Enable traceability to support audit management and product recalls
- Achieve higher Overall Equipment Efficiency(OEE)
- Enable remote monitoring
- Reduce carbon footprint
- Enable product innovations

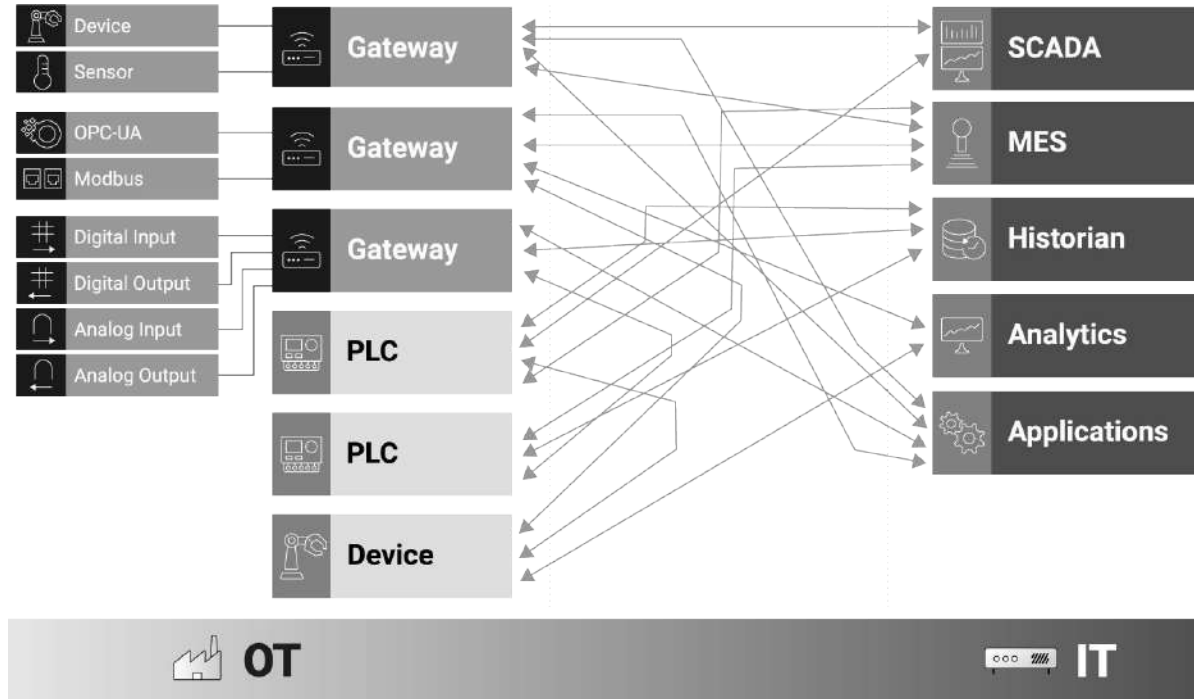


Lots of Data Silos





Siloed OT Systems - No Interoperability



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Challenges



- Dealing with multiple rules and regulations to remain compliant with various agencies
- Need for information for Hazard analysis spread across multiple locations
- Lack of inventory visibility
- Quality control challenges
- Scrapping/reworking a batch



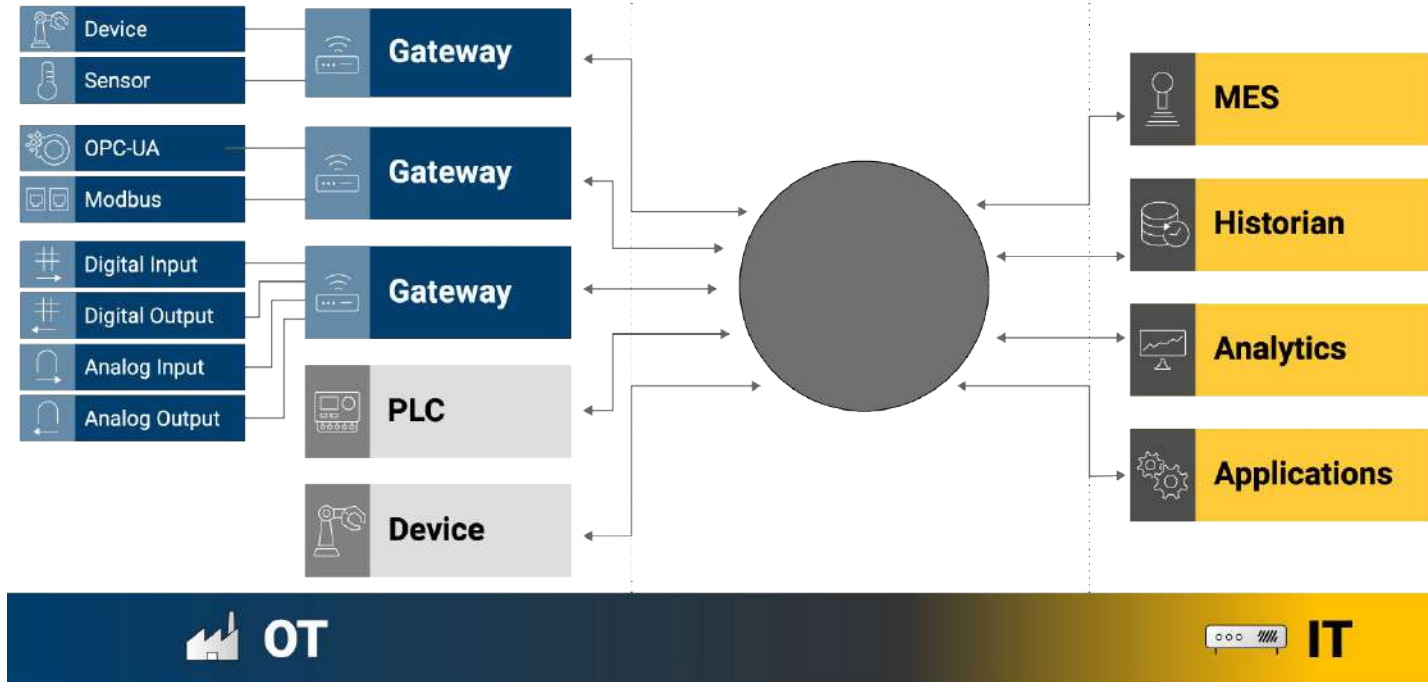
Goals for Modernization



- Accessing real-time data
- Digitizing equipment health inspections
- Allowing modular automation in a manufacturing plant
- Optimizing manufacturing process
- Identifying bottlenecks
- Enabling digital traceability



Decoupled Architecture

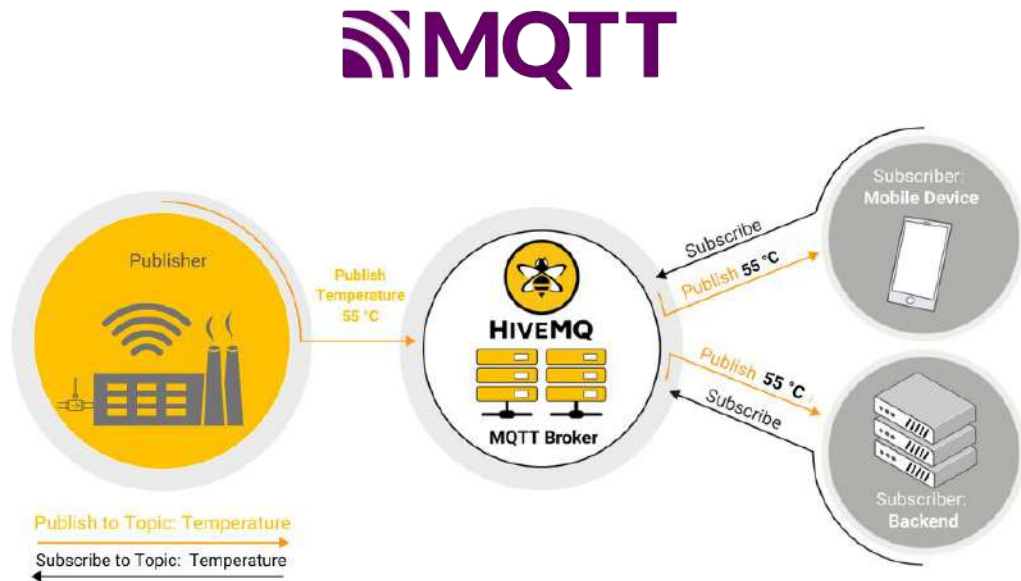


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What is MQTT?

- A standard binary publish-subscribe messaging protocol designed for fast and reliable data transport between devices especially under very constrained conditions
- Constraints include unreliable network connectivity, limited bandwidth, limited battery power, and so on
- Built on top of TCP/IP
- Ideal for the Industrial Internet of Things



But There Are Still Issues



- Devices and endpoints have different topics, payloads and data structures
- Applications assuming specific formats and structure
- Data agnostic - payload must be interpreted but no context



Eclipse Sparkplug



[Sparkplug](#)



Sparkplug

- Open Source Software Specification for increasing MQTT interoperability, developed especially in the field of IIoT and Industry 4.0
- Provides MQTT Clients Framework to seamlessly integrate data from their applications, sensors devices and gateways within the MQTT Infrastructure in a bi-directional and interoperable way.



What does Sparkplug offer for IIoT applications?

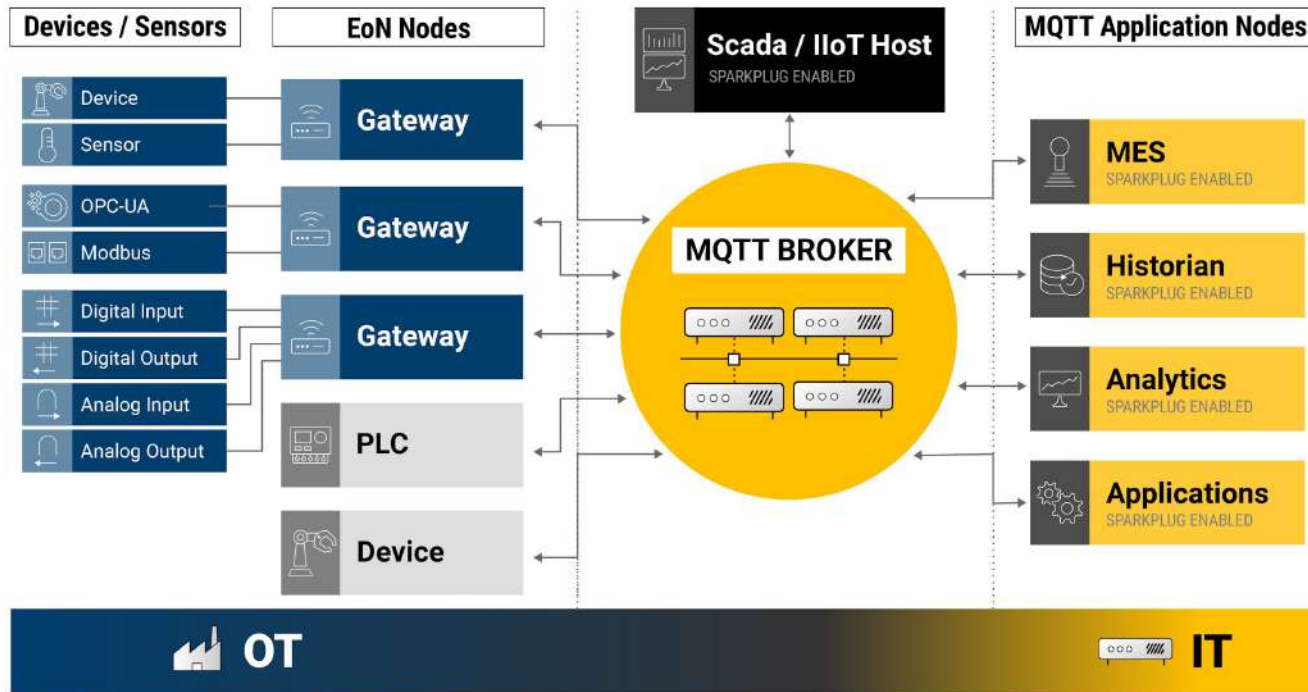


[GitHub - eclipse-sparkplug/sparkplug](https://github.com/eclipse-sparkplug/sparkplug)

Sparkplug defines:

- Topic namespace
- Data Model and Structure
- Extensible process variable payload
- Defines MQTT state management

MQTT Sparkplug Architecture



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Factory Components | SCADA/IIoT Host

SCADA / IIoT Host



- Application responsible for monitoring and control MQTT EoN node
- Maintain continuous session state awareness of all participants (machines, devices, PLCs, sensors, gateways and applications)
- Not responsible for establishing or maintaining connections directly to the device
- In Sparkplug, devices, EoN and SCADA/IIoT Host connect to central MQTT broker to publish and subscribe to data; allowing report by exception

Factory Components | EoN Nodes

EDGE OF NETWORK (EoN) NODES



- EoN provide physical and logical gateway function for devices that don't implement Sparkplug
- EoN manage the state and session of itself and the connected sensors
- EoN allows devices that implement protocols like OPC-UA, Modbus, and proprietary PLC to connect to a Sparkplug architecture



Factory Components | Devices

Devices



- Devices and sensors are the key endpoints in any industrial automation system
- Devices and sensors connect with EoN that bridge the data from these devices into the Sparkplug protocol

Factory Components | MQTT Application Nodes

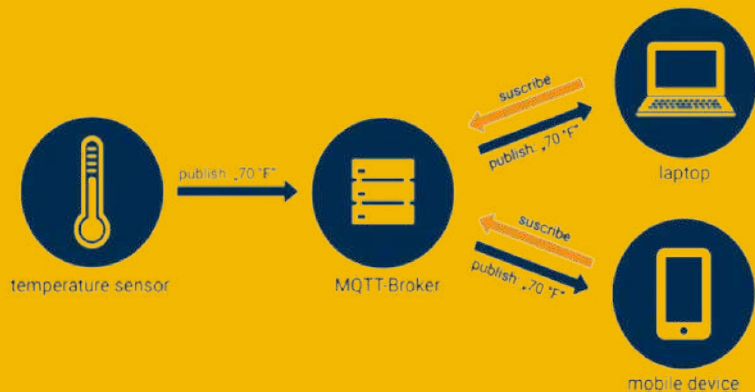
MQTT APPLICATION NODES



- MQTT Application Nodes can produce and consume Sparkplug messages but don't act as a SCADA / IIoT Host.
- Typically Application Nodes are MES, Historians, Analytics systems

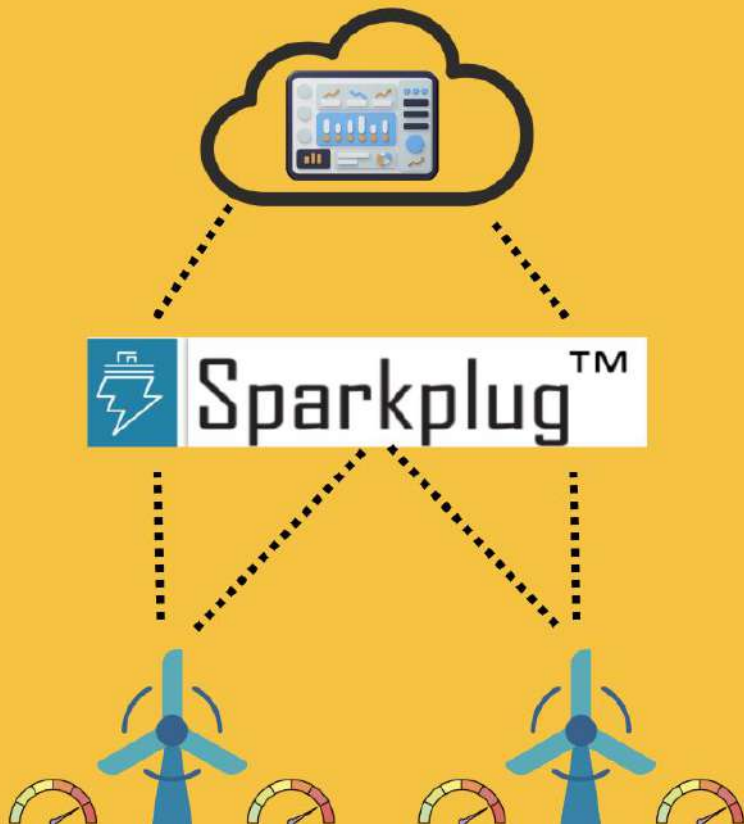
The MQTT Broker

MQTT BROKER



- MQTT broker is the central data distribution point in a Sparkplug architecture
- MQTT broker requirements:
 - 100% compliant to MQTT 3.1.1
 - Requires features like Retained Messages, Last Will and Testament and QoS
 - Not all MQTT brokers support these features: MS Azure IoT Hub and AWS IoT can't be used with Sparkplug

Sparkplug 3.0 Specification



- While no features are introduced, the new spec is more detailed, clearer and provides more information
- Biggest addition is the Technology Compatibility Kit (TCK)
- The purpose of the TCK is to check the implementation of the vendors in a Sparkplug setup, such as edge nodes, host and broker, for compliance with the Sparkplug specification
- Allows vendors to be listed as Sparkplug Compatible

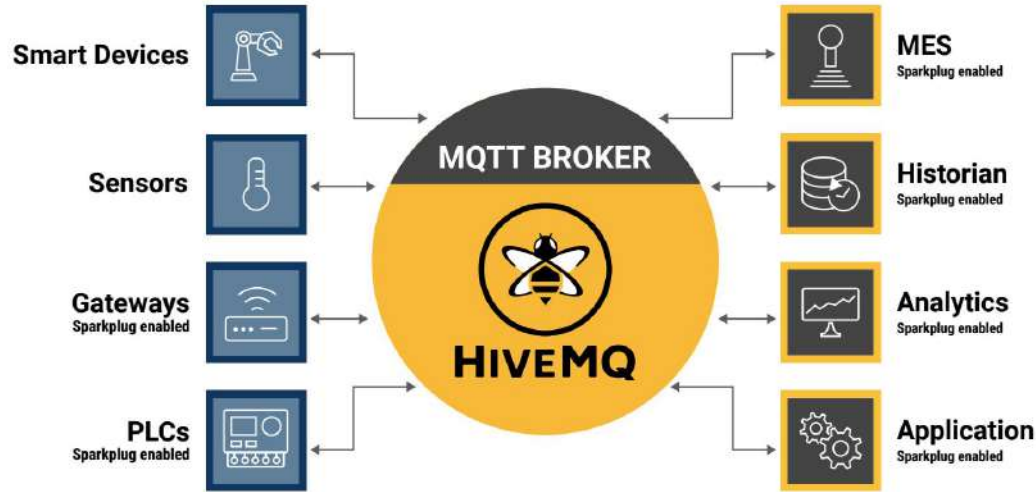
Sparkplug Compatibility



- The goal of Eclipse Sparkplug is to make MQTT-based infrastructure interoperable
- A label saying products are 100% compatible with Sparkplug would be a way to achieve this
- Sparkplug 3.0 has launched "Sparkplug Compatible" label which is issued to 100% compatible products and allows them to list their products as that
- Companies can certify products as Sparkplug compatible to show their Sparkplug implementation in terms of the Required and Optional Criteria
- Certification process can be started from Eclipse page and first step is to setup and run the TCK - [Sparkplug compatibility site](#)



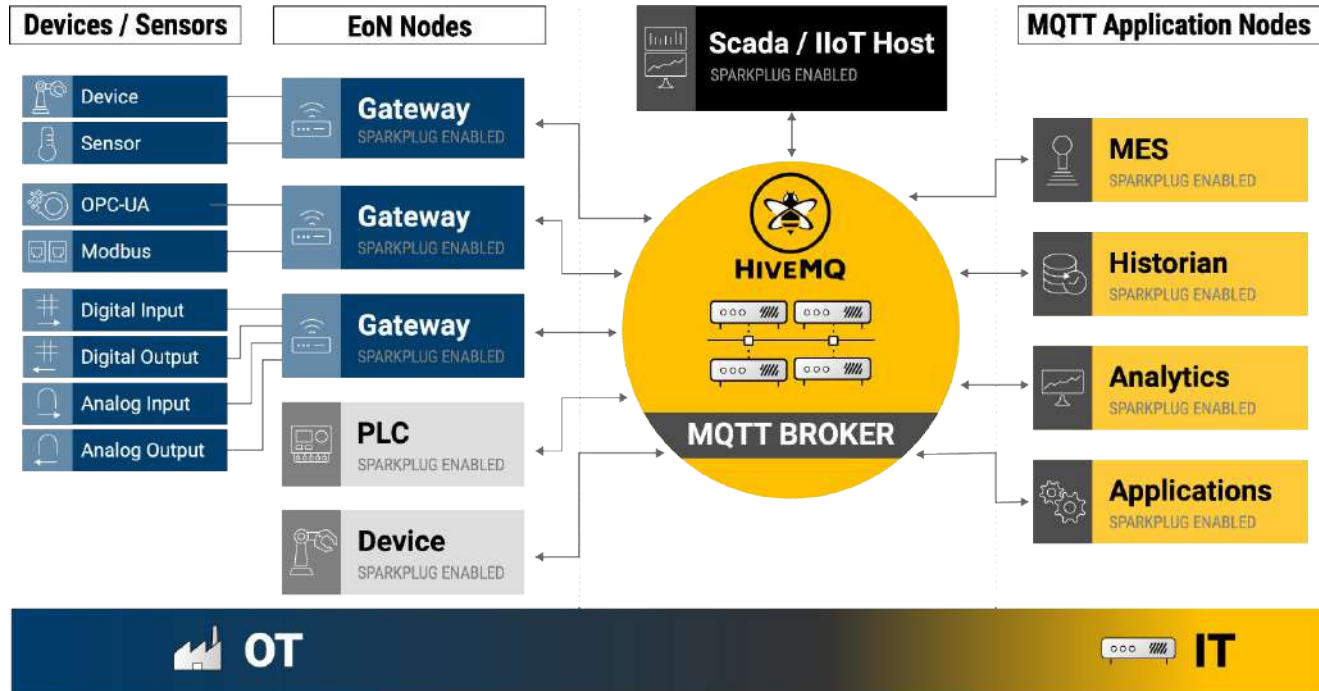
HiveMQ MQTT Platform is Sparkplug Compatible



- High availability
- 100% MQTT and Sparkplug compliant
- Highly Scalable
- Highly Observable
- Enterprise Security
- Extensions Framework
- Integration with OT/IT Systems



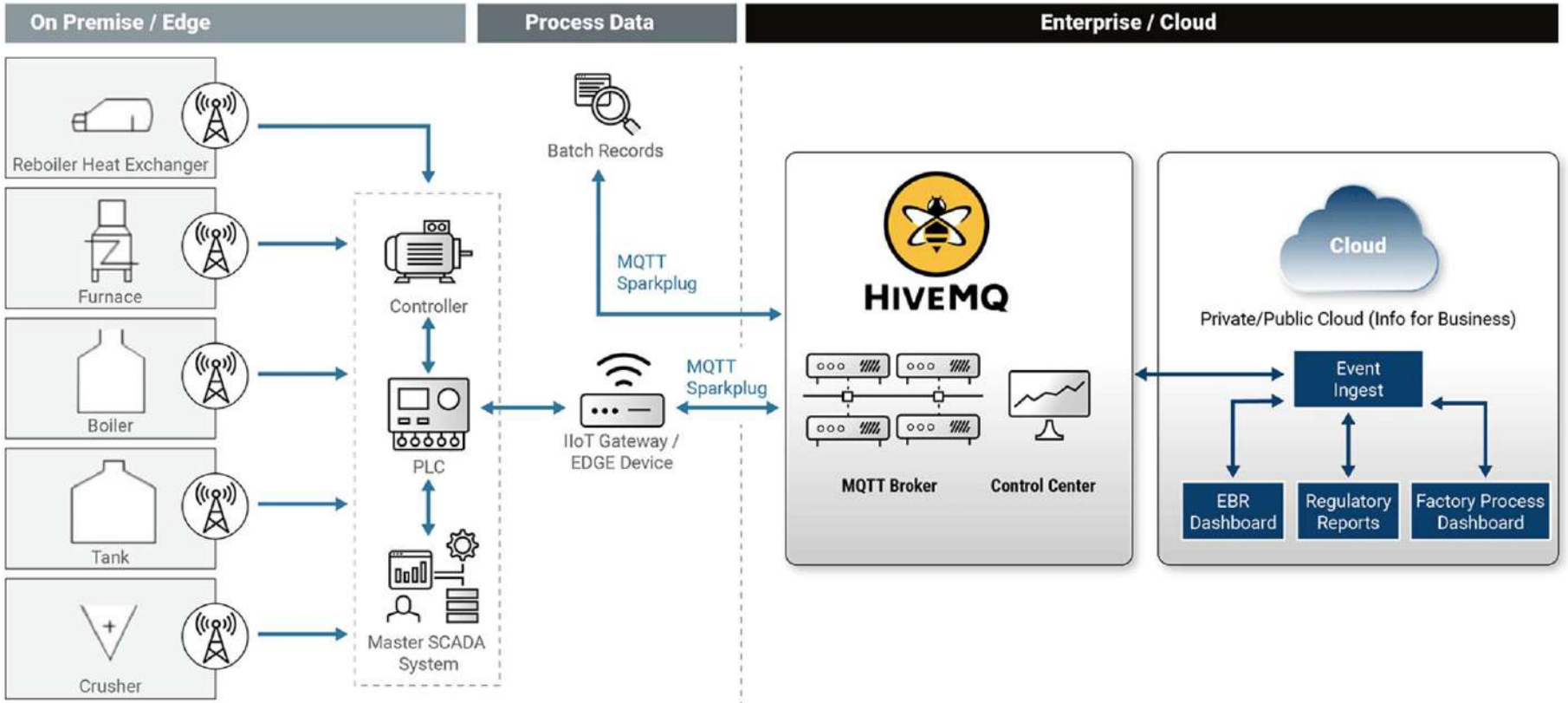
MQTT with Sparkplug Architecture



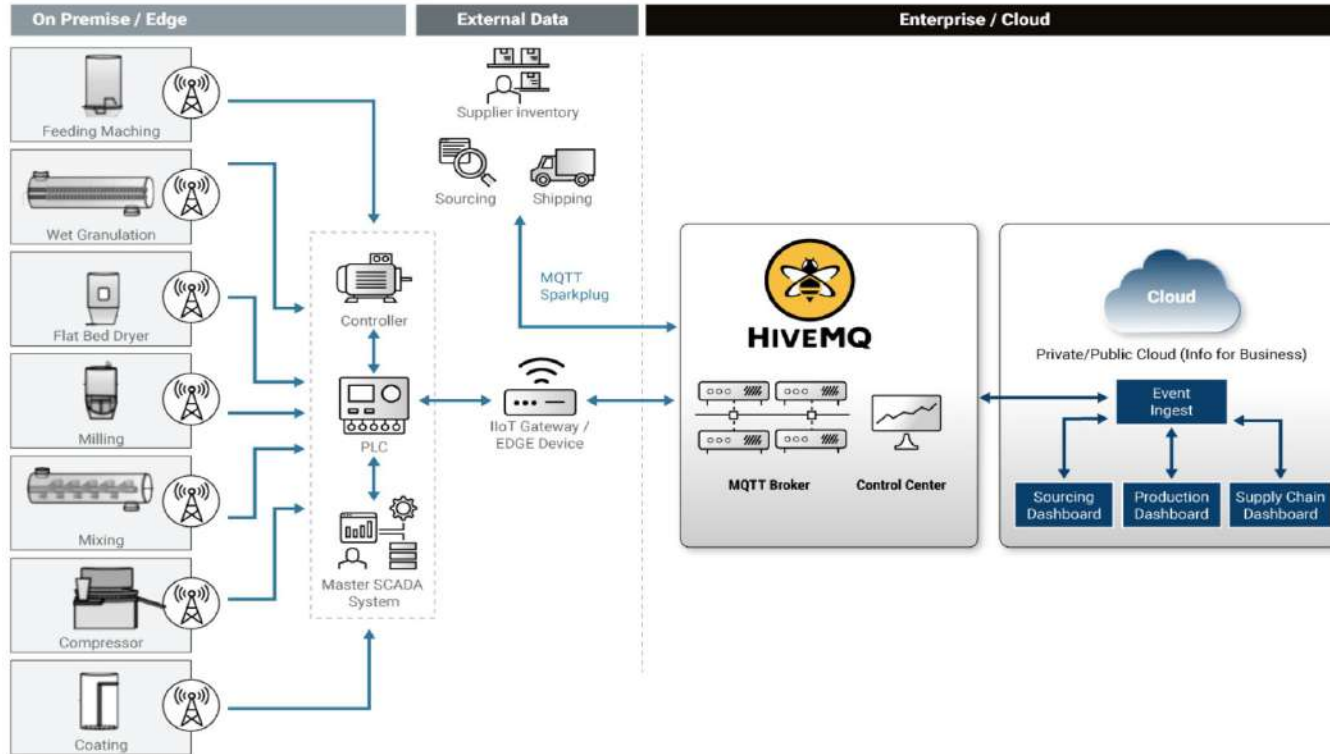
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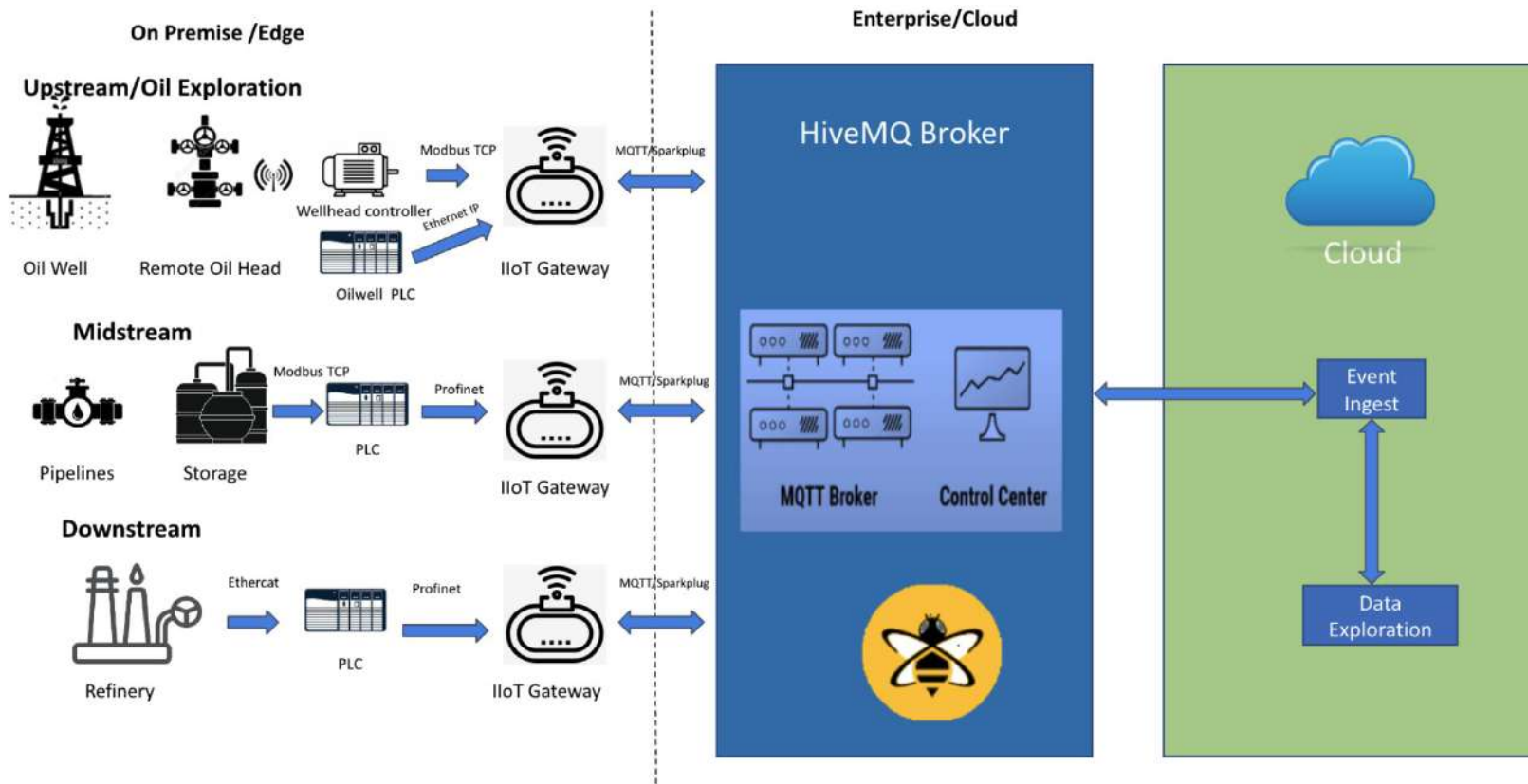
Regulatory Reporting Use Case for Chemical



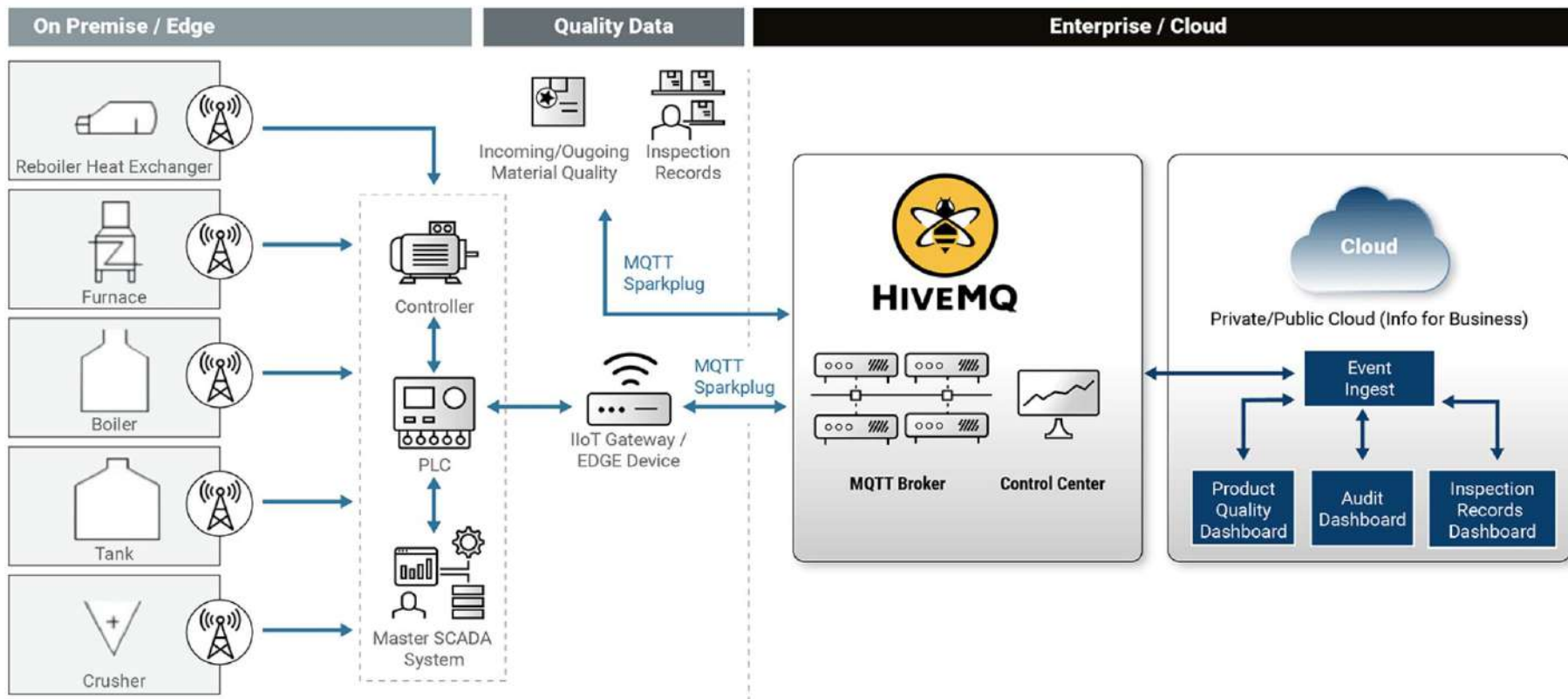
Pharma Supply Chain Optimization



Upstream O&G Use case architecture

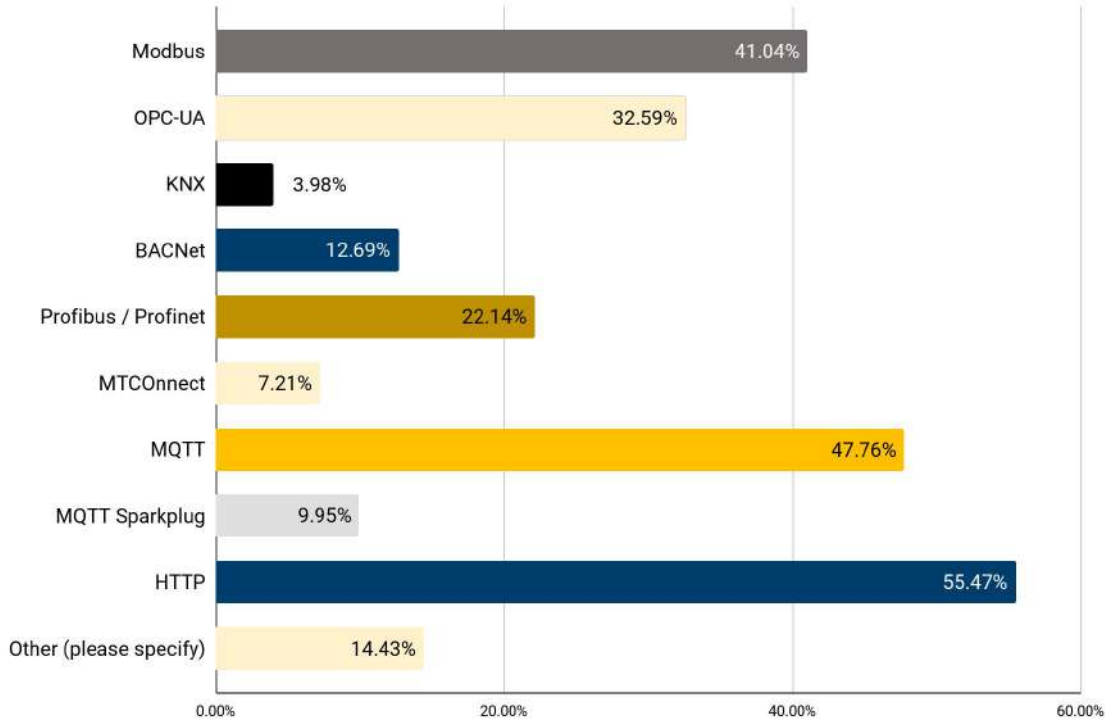


Chemical Product Traceability Use Case Architecture



Which of the following protocols do you use today to connect your equipment?

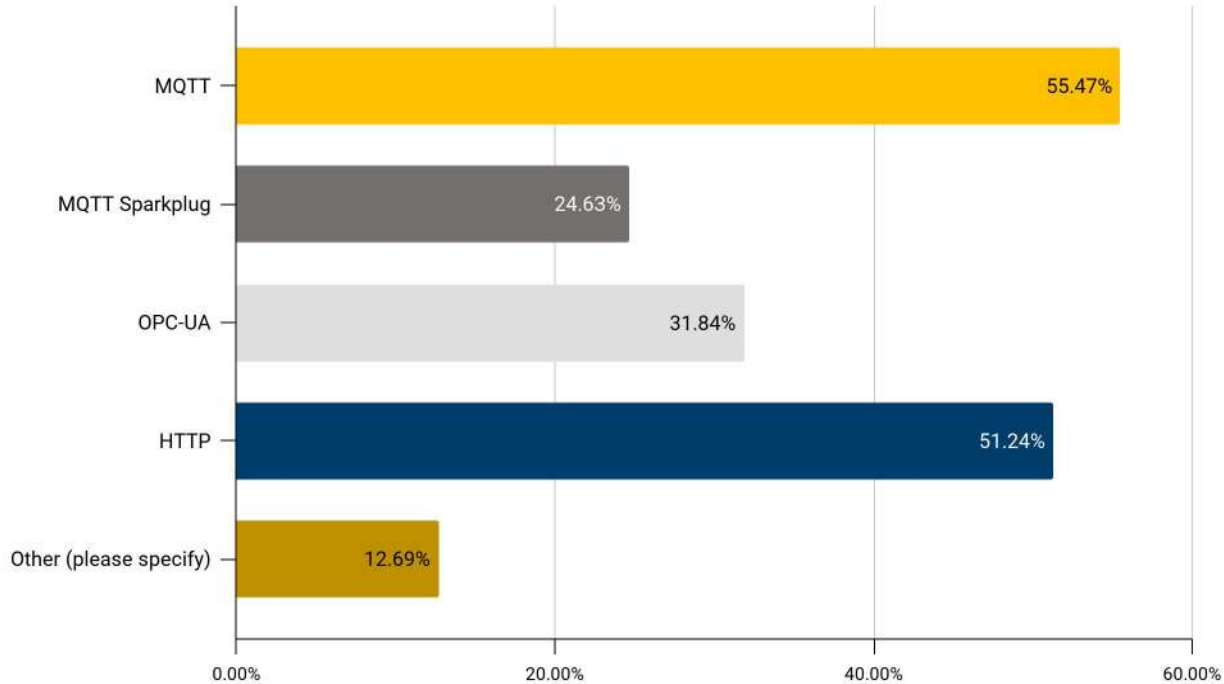
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Which of the following protocols do you consider strategic to fulfill your IIoT strategy?

Select all that apply

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Sparkplug Ecosystem



Sparkplug Community



<https://www.hivemq.com/solutions/technology/mqtt-sparkplug/>



Next Steps



New to MQTT? [Get the MQTT Essentials eBook](#)



New to MQTT Sparkplug? [Get the MQTT Sparkplug Essentials eBook](#)



Check out [HiveMQ MQTT Sparkplug Solution](#)



Next Steps



Try out Sparkplug-Compliant HiveMQ MQTT Broker today: <https://www.hivemq.com/downloads/>



**ANY
QUESTIONS?**



THANK YOU

Contact

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