Futureproofing IIoT Systems with Modern Communication Standards

Speaker: Dominik Obermaier, CTO and Co-founder of HiveMQ

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Introduction to HiveMQ

- A global company **founded in 2012**, headquartered in **Germany**
- HiveMQ helps move data to and from connected devices in a efficient, fast and reliable manner
- **130+ global customers** with production IoT applications

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Future of Manufacturing

Automation

Cybersecurity

Advanced Analytics

INDUSTRY 4.0

Smart Sensors

Cloud Computing

AI / ML

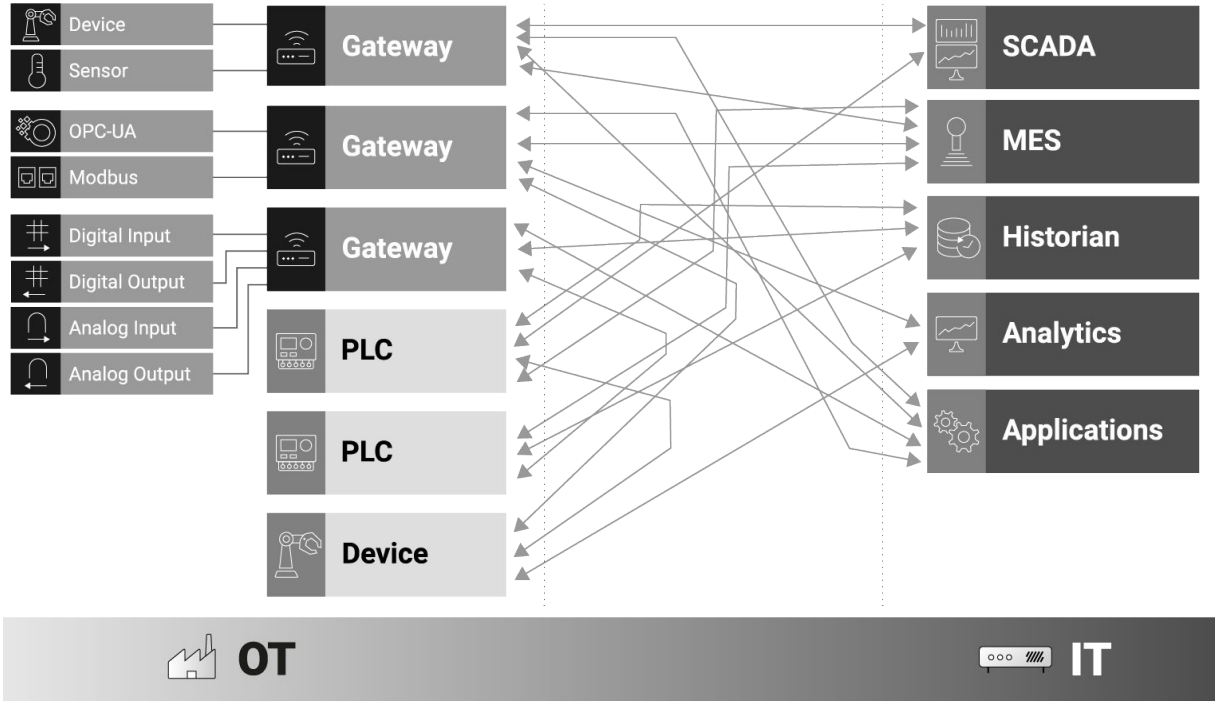
Business Drivers

- Improve factory efficiency
- Optimize intra plant logistics
- More flexible manufacturing
- Measure and Increase OEE [1]:
  - Increase availability of our equipment by avoiding non-planned standstill
  - Analyze and increase quality
  - Tune the performance of our machines and processes

[1] overall equipment effectiveness

Lots of Data Silos

Siloed OT Systems - No Interoperability



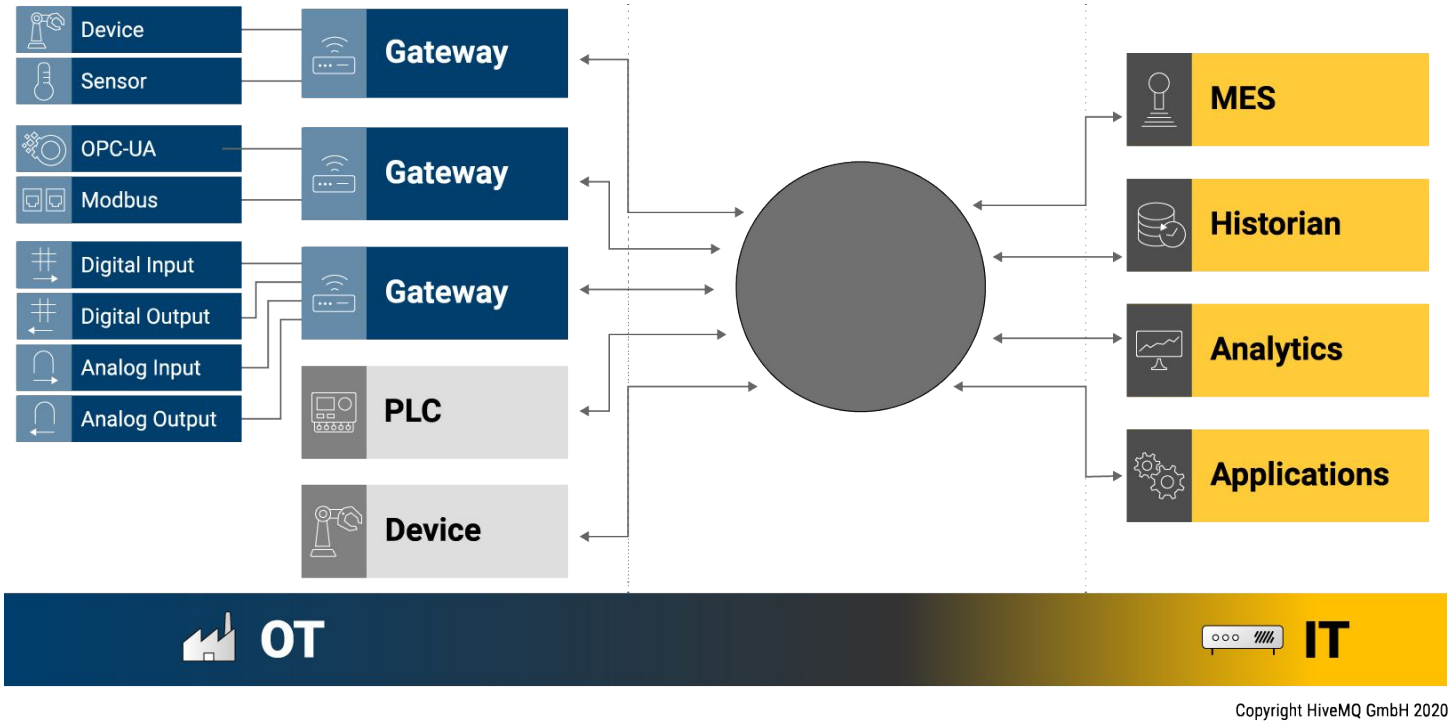
Challenges

- Difficult to change workflows and processes
- Difficult to setup a new system/facility
- Difficult to analyze data across the entire system

Goals for Modernization

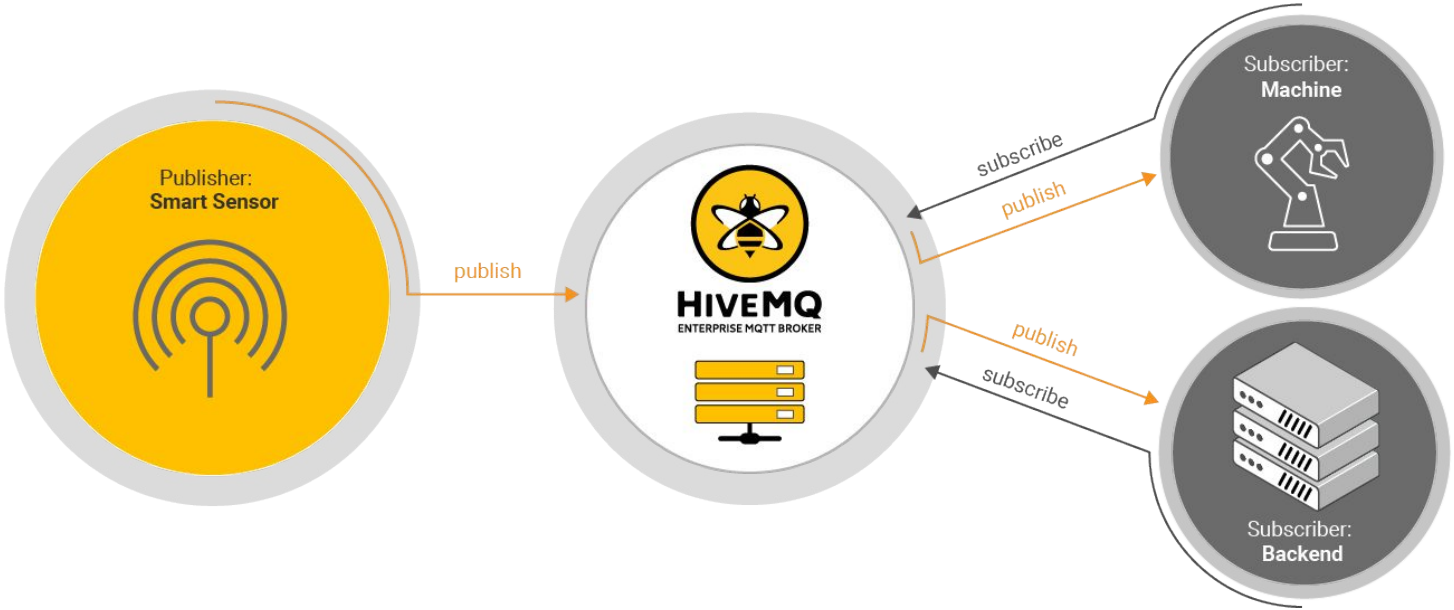
- More agile software delivery into factories
- Faster mean time to recover
- Enable centralized command and control
  - Enable visualization of overall manufacturing process
- Consistent and flexible software architecture

Decoupled Architecture



- Decoupled clients and broker
- Publish/Subscribe protocol
- Extensible
- Reliable

Pub/Sub Pattern



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

INTRODUCING

Sparkplug

A simple, open specification, that will enable plug and play interoperability between IIoT devices and IIoT applications.

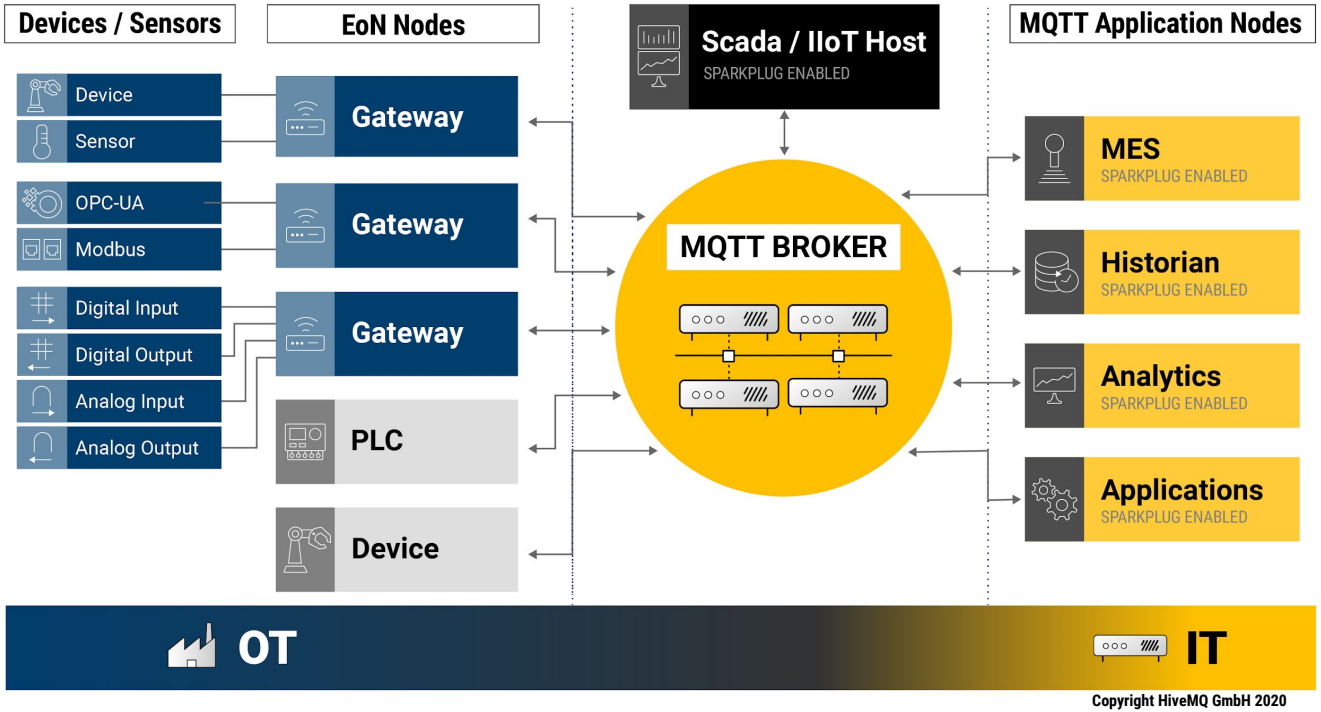
Sparkplug Defines:

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

KEY CONCEPTS

- Continuous Session Awareness
- Report by Exception
- Interoperability by consistent data format
- Auto Discovery

MQTT Sparkplug Architecture



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

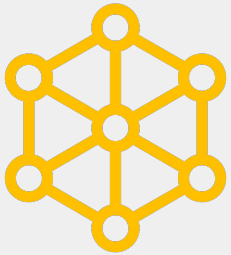
EDGE OF NETWORK (EoN) NODES

- 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

DEVICES/ SENSORS

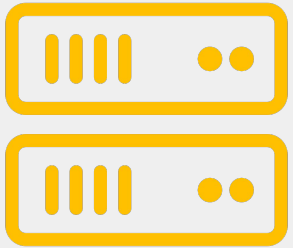
- Devices and sensors are the key endpoints in any industrial automation system
- Devices and sensors connect with EoN that bridge the data from these devices into the Sparkplug protocol

MQTT APPLICATION NODES



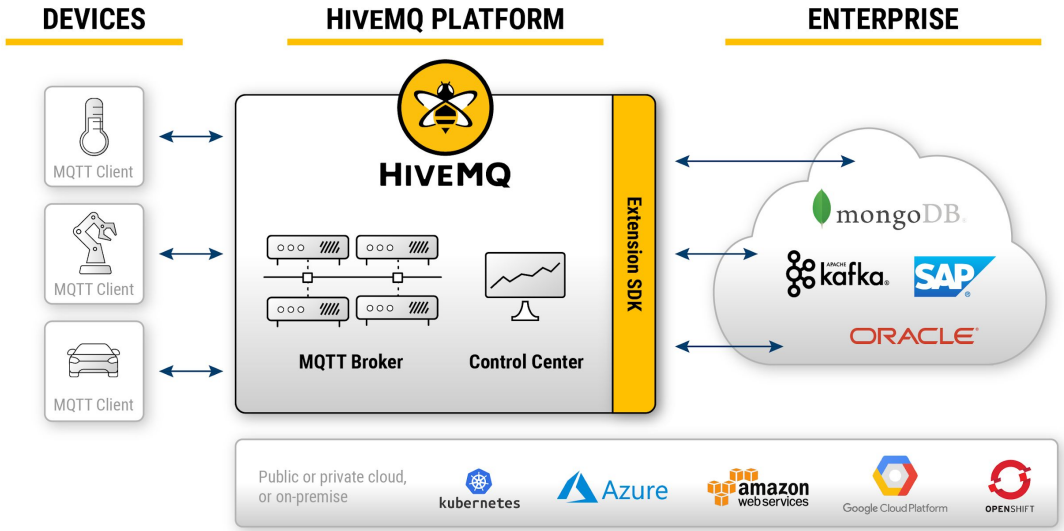
- MQTT Application Nodes can produce and consume Sparkplug messages but don’t act as a SCADA / IIoT Host.
- Typically Application Nodes are MES, Historians, Analytics systems

MQTT BROKER



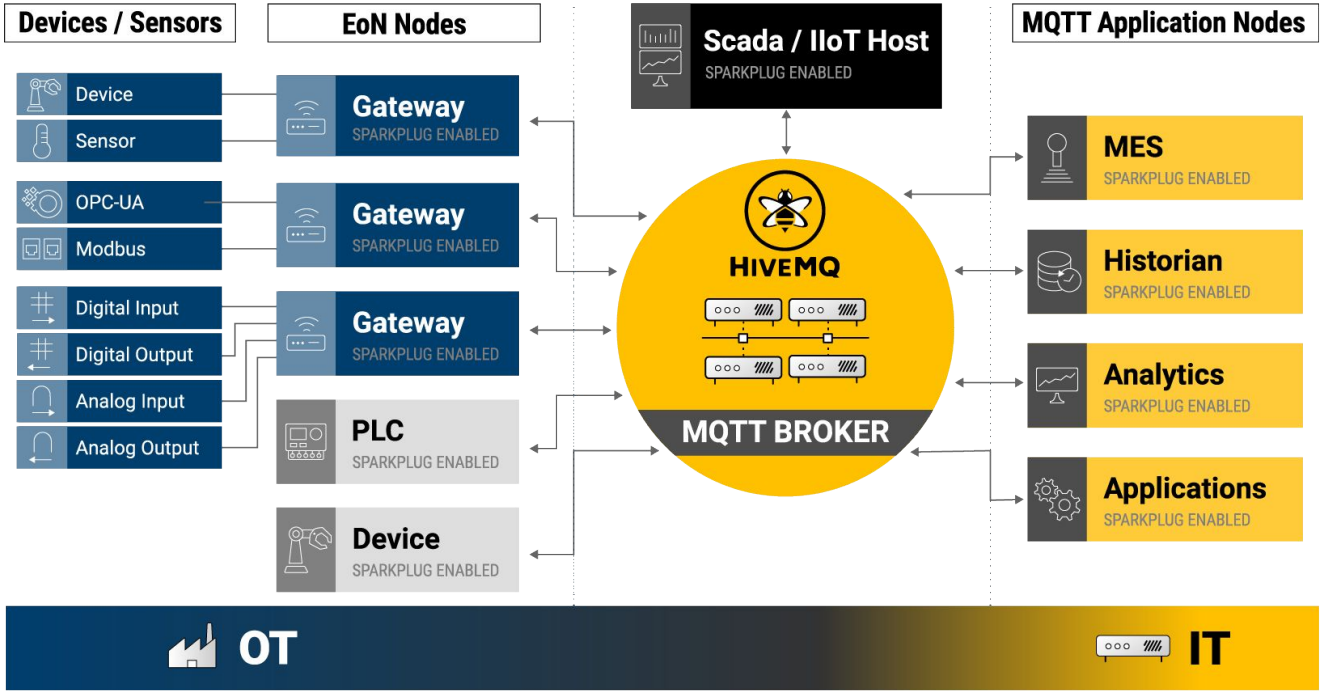
- MQTT broker is the central data distribution point in a Sparkplug architecture
- MQTT broker requirements:
  - 100% compliant to MQTT 3.1.1
  - Requires features like Retained Messages, Last Will and Testament and QoS
  - Not all MQTT brokers support these features: MS Azure IoT Hub and AWS IoT can’t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

HiveMQ MQTT Platform

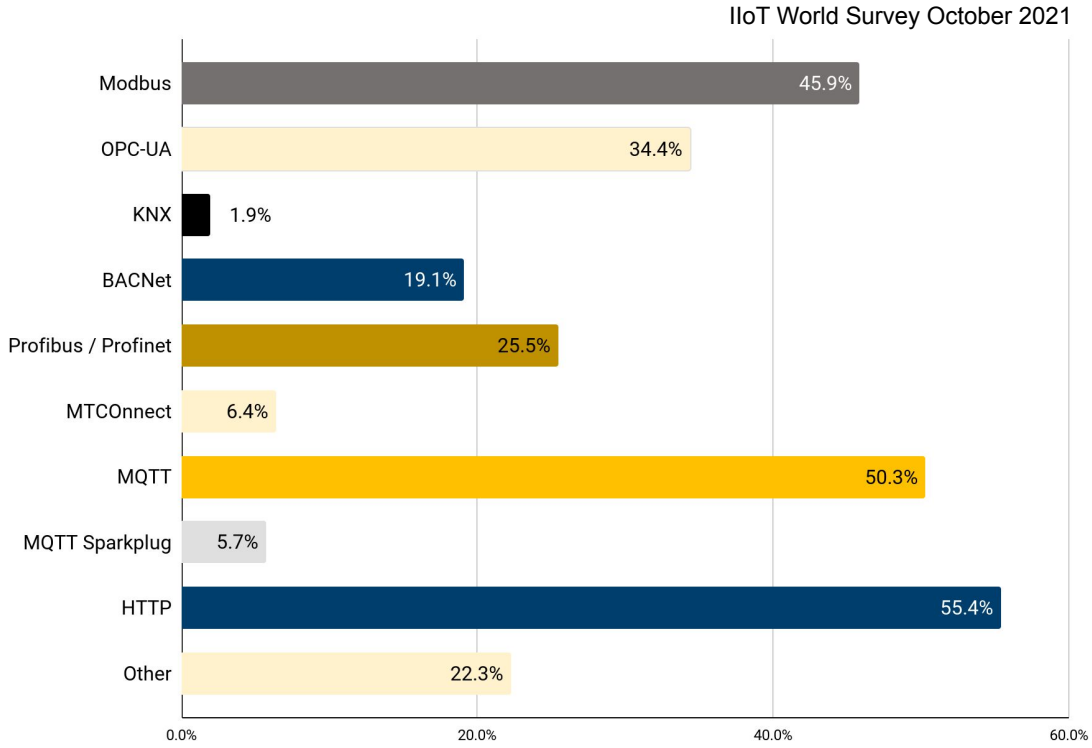


- High availability
- 100% MQTT compliant
- Scalability
- Observability
- Enterprise Security
- Integration with OT/IT Systems

MQTT with Sparkplug Architecture

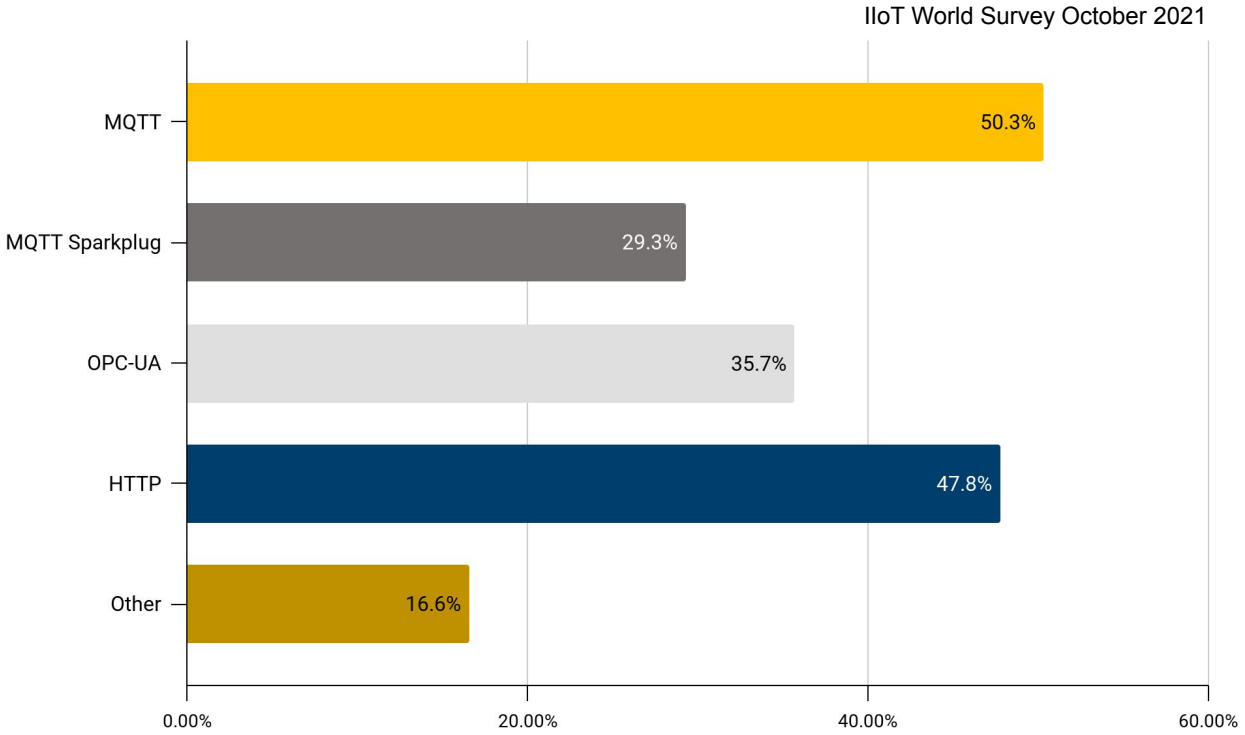


Which of the following protocols do you use today to connect your equipment?



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

Select all that apply



Sparkplug Ecosystem

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

Next Steps

[Get a copy of Sparkplug Essentials e-Book]

[Book a demo to see how HiveMQ supports the Sparkplug specification]

Resources

Get started with HiveMQ today: https://www.hivemq.com/downloads/

Or new to MQTT? Get the MQTT Essentials E-Book: https://www.hivemq.com/download-mqtt-ebook/

ANY QUESTIONS?

THANK YOU

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