

Accelerating Adoption of IoT Protocols in Industry 4.0



HIVEMQ

AGENDA

- **Smart Manufacturing**
- **Data Maturity Model**
- **Challenges in data collection in Manufacturing**
- **Industrial Data Flow**
- **Industry 4.0 Reference Architecture**
- **Introduction to HiveMQ**
- **Success Stories**
- **Next Steps**



Smart Manufacturing?

Global Trends & Challenges in Manufacturing



- **Material shortage** leads to reduced output and difficult planning
- **Carbon Footprint & Energy Cost** has increasing impact on profit margins
- **Security Vulnerabilities** become major business risk
- **Global Supply Chains** are more fragile than imagined
- **Demographic & Society Changes** lead to skills shortage & lack of young talent
- **Regulations & Bureaucracy** becomes an increasing burden

Components of Smart Manufacturing



Automation



Cybersecurity



Advanced Analytics



Industry 4.0



Smart Sensors



Cloud Computing



AI/ML

Power of Smart Manufacturing through I4.0, IIoT & AI



McKinsey Report: Capturing the true value of Industry 4.0

- 30-50% reductions in machine downtime
- 10-30% increases in throughput
- 15-30% improvements in labor productivity
- 85% more accurate forecasting

IIoT enables AI to learn from your production process by connecting it to your physical assets & to automatically adjust & optimize it

Short & Long Term Impact on Business

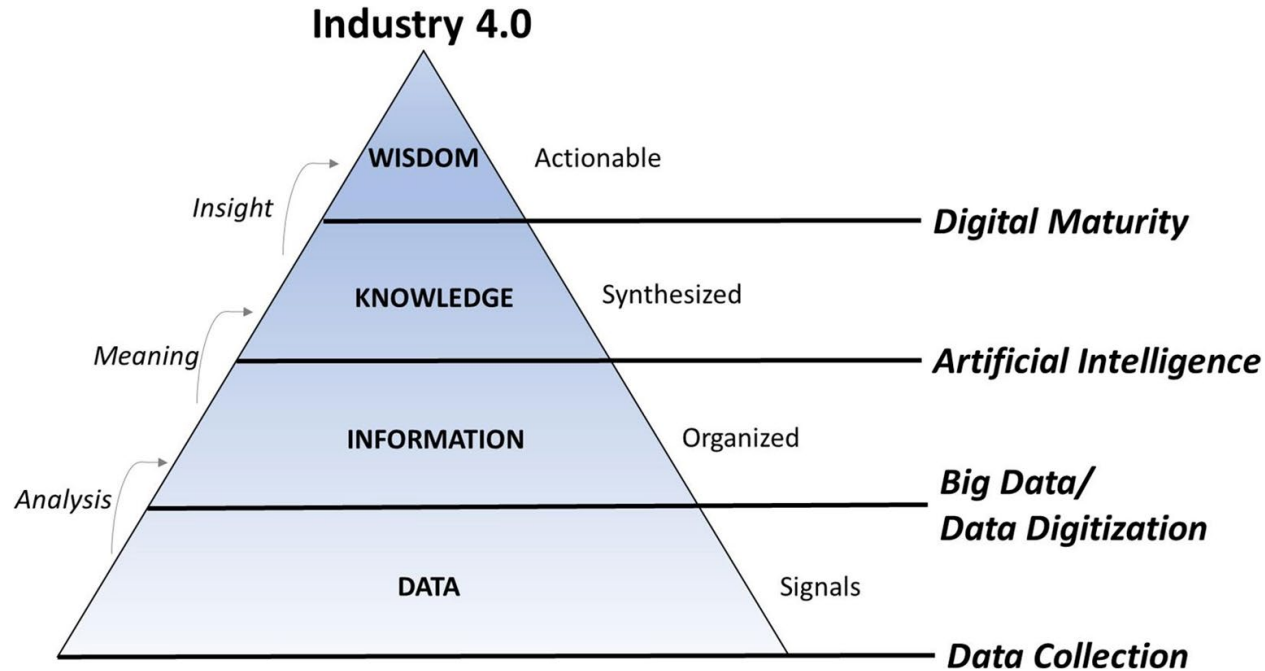


- **Automation** → reduce workforce, eliminate repetitive / unhealthy work & be the most attractive employer
- **Operational efficiency** → increased productivity with higher margins
- **Shorter and more optimized supply chains** → strategic flexibility to mitigate globalization risks
- **Secure communication between plants, data center & cloud** → eliminate business interruption risk
- Enable **new product innovation** through further adoption

Data Maturity Model



Data Maturity Model for Industry 4.0



Challenges in data collection in Manufacturing



- Working to solve complex issues like **heterogeneous devices, protocols, vendor solutions** on the shop floor
- **Data silos** with the various machines, processes and applications on the shop floor and between different sites
- **Unreliable connectivity** on the factory networks
- **Legacy architectures** that lack bi-directional data connectivity
- **Limited bandwidth** for communication

Data Collection Value Creation Loop

Gather

Gather data and signals from the field

Gather

Analyze

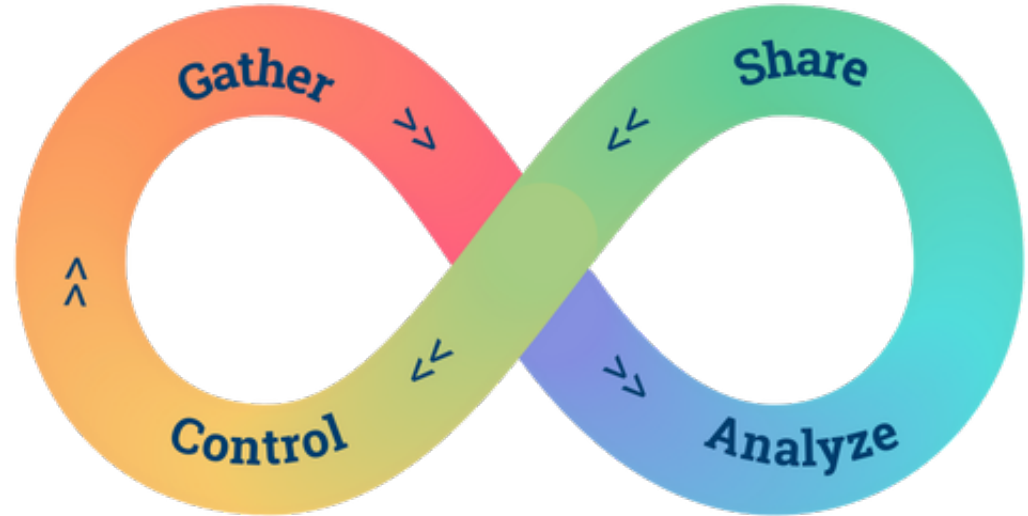
Analyze on Edge or Cloud

Share

Share with enterprise systems

Control

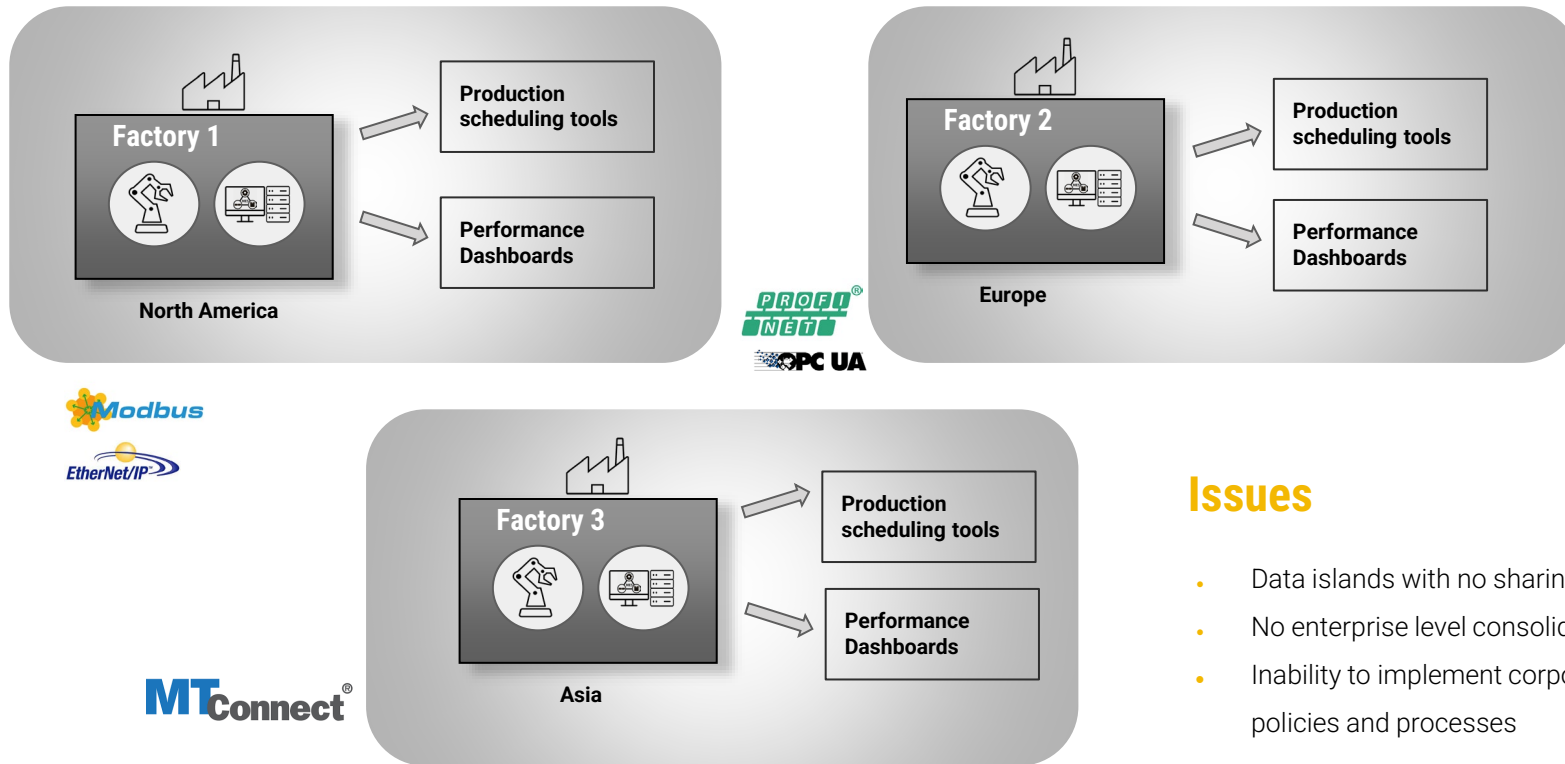
Control and manage the endpoints in the field



Manufacturing Data Flow



Data Flow prior to Enterprise data set up



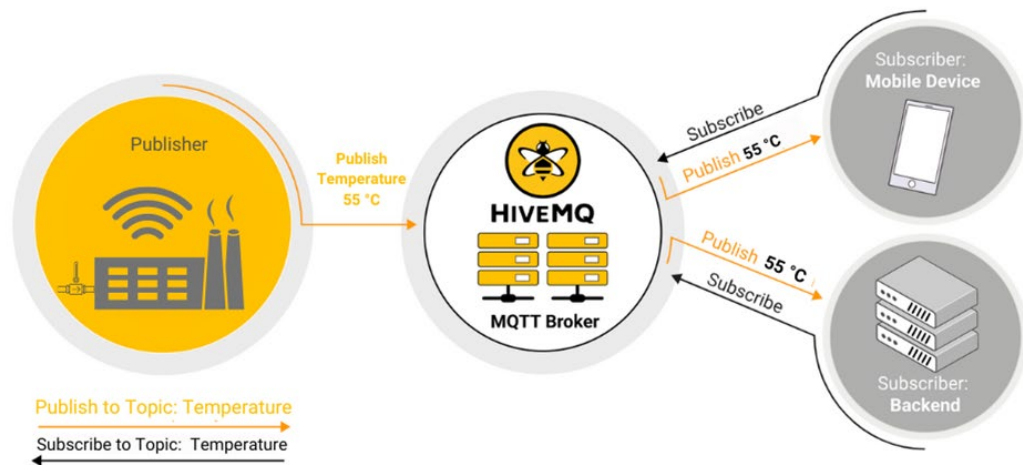
Issues

- Data islands with no sharing of best practices
- No enterprise level consolidation of data
- Inability to implement corporate level data policies and processes

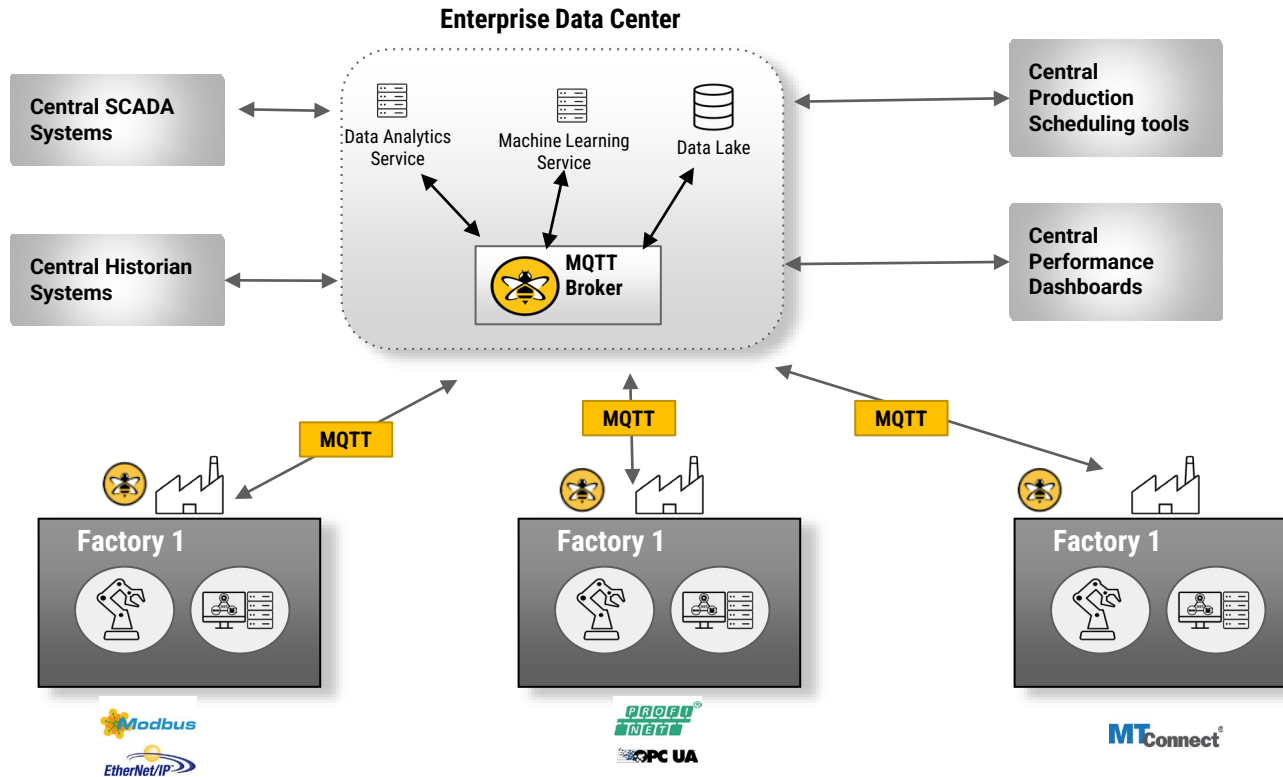
What is MQTT?

- 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

MQTT



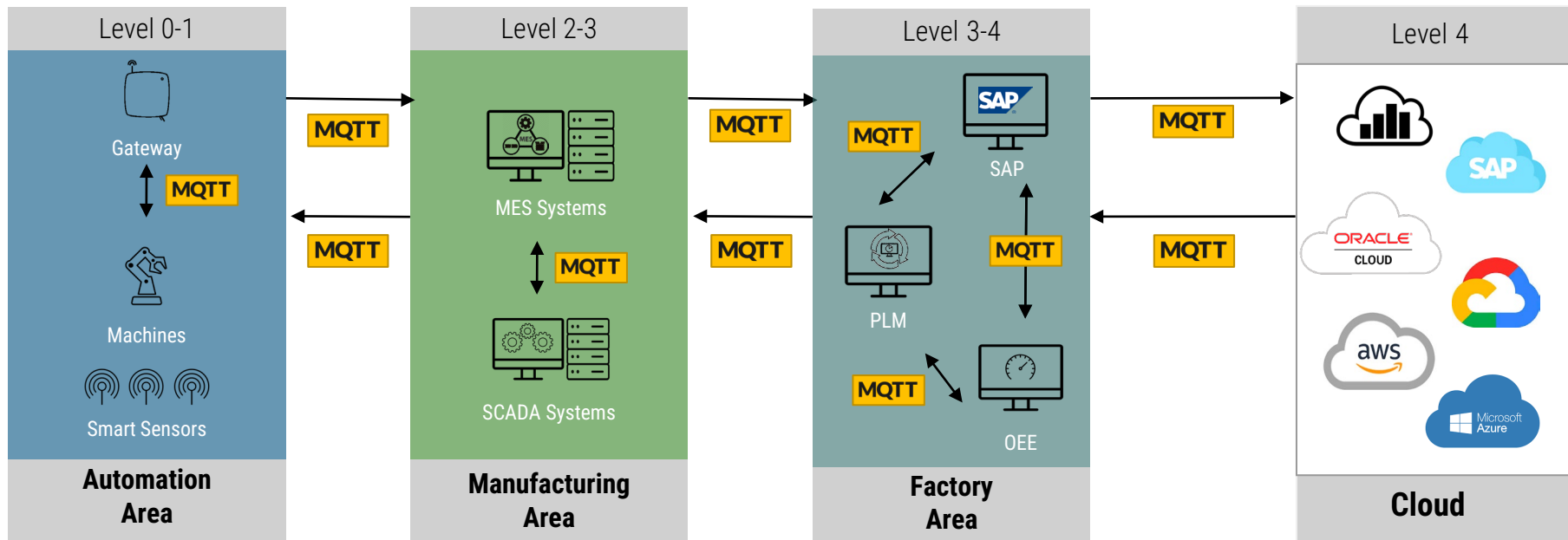
Data Flow After Enterprise Data Set up with MQTT



Benefits

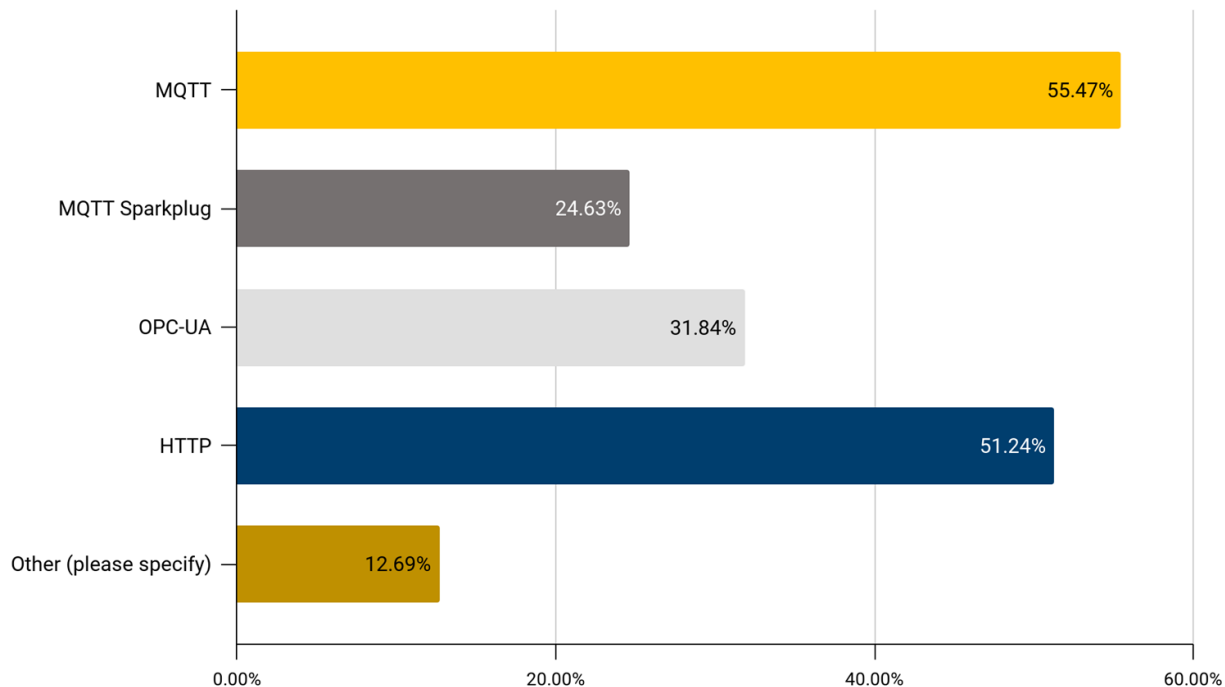
- Secure open standard based communication over public Internet
- Scalability & Hyperconnectivity on enterprise or cloud
- No data silos
- Enterprise level insights & optimization

Connecting Factory systems using MQTT



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

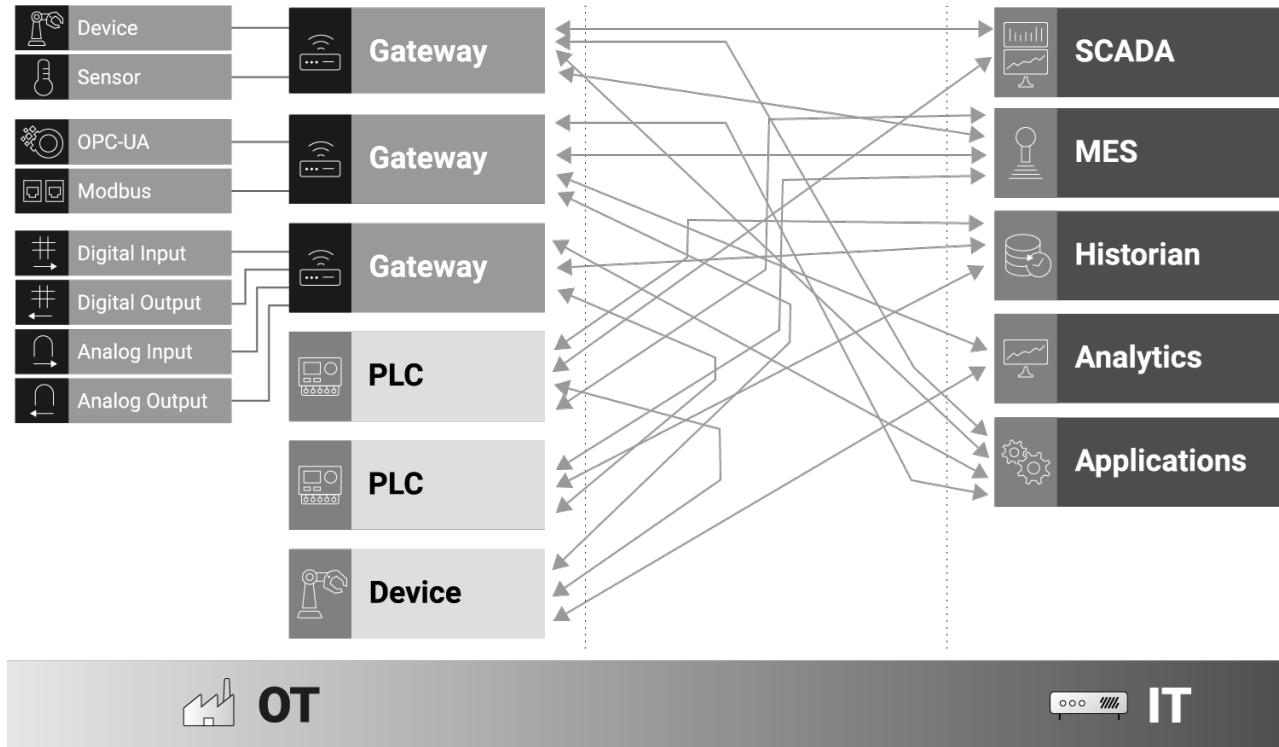
[IIoT World Survey October 2022](#)



Industry 4.0 Reference Architecture with Unified Namespace

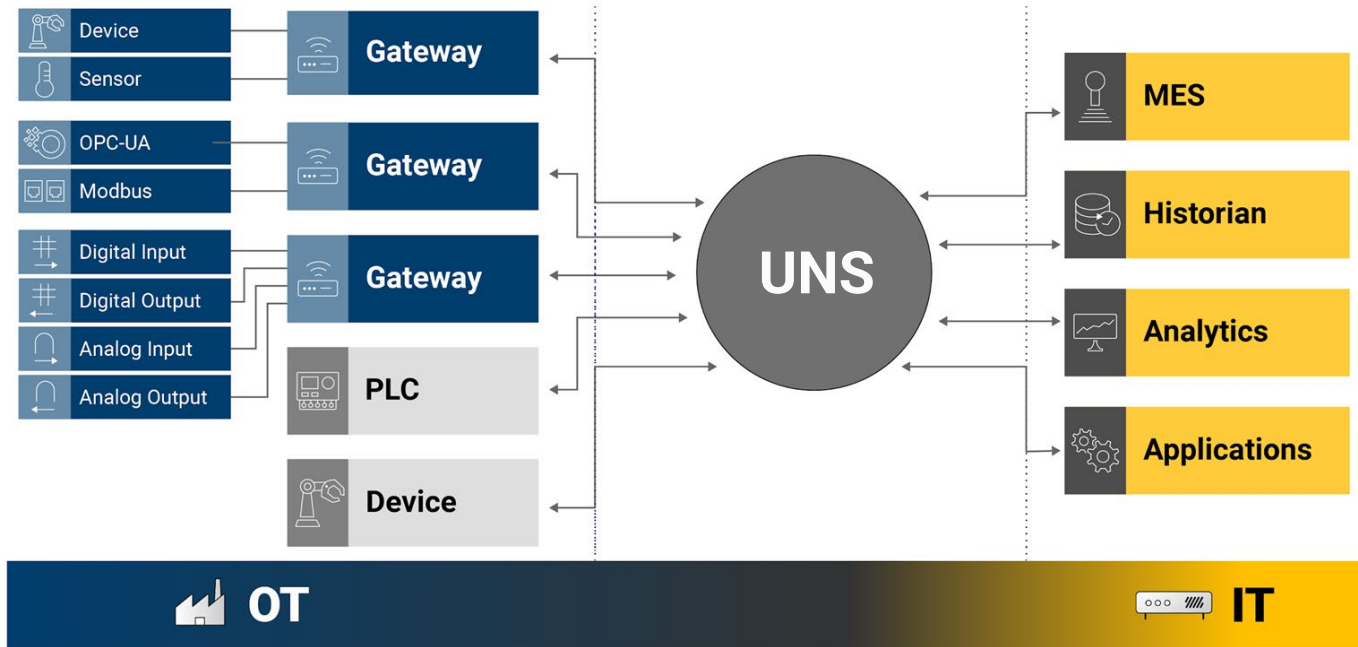


Traditional architecture : Siloed, No Interoperability

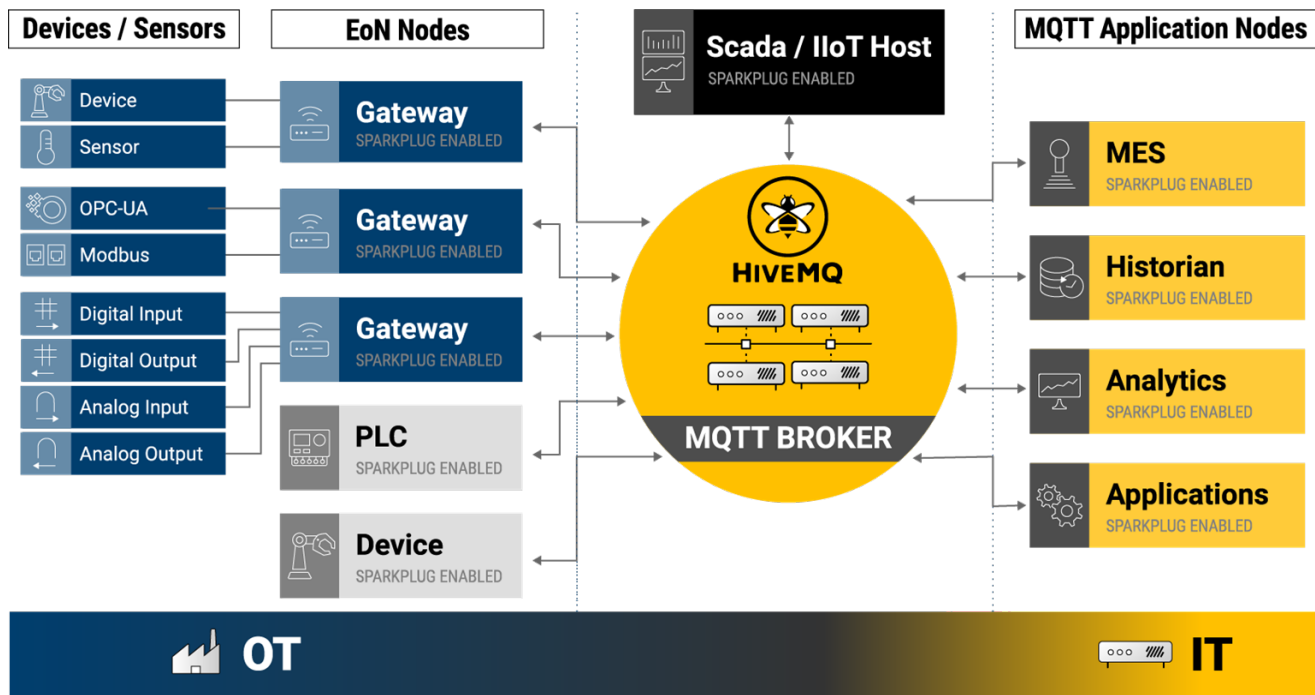


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Next Generation: Consolidated interoperable Architecture



Reference architecture with MQTT Sparkplug



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Introducing HiveMQ



Introduction to HiveMQ

- **Founded in 2012**, based outside of Munich
- HiveMQ helps **move data to and from connected devices** in an **efficient, fast and reliable** manner
- 160+ employees
- **180+ customers** with production IoT applications



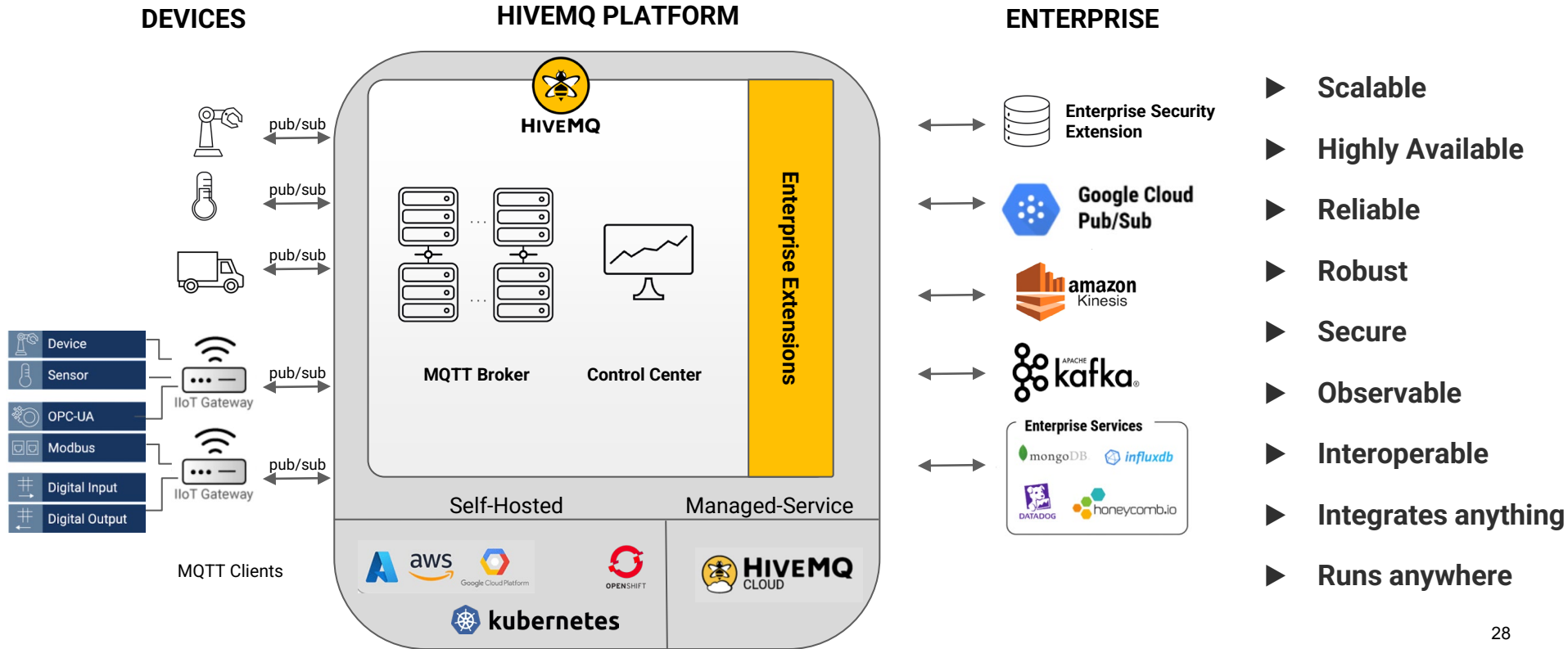
OASIS MQTT TC
Helped standardize IoT
Standard



Eclipse IoT working group
Member



Enterprise MQTT Platform



HiveMQ Extension Overview



Seamlessly integrates MQTT messages into the Kafka messaging flow



Enable crucial security features for safe and secure enterprise IT and OT deployments



A Scalable & Secure solution that bridges a HiveMQ cluster with any other MQTT broker



Seamlessly integrates the HiveMQ platform with Google Cloud, enabling MQTT data transmission at hyper-scale



Trace MQTT data end-to-end, using OpenTelemetry and monitor 1,500+ metrics via your APM solution



Quickly move your MQTT data from the broker directly into AWS via Amazon Kinesis Data Streams

Our Enterprise Customers



Automotive Manufacturing



Benz Vehicle Diagnostics System (VDS)

- VDS is critical part of manufacturing process and can not go down
- If VDS goes down for >10 min, assembly line may stop
- Requires reliable messaging platform for factory to cloud connectivity



HiveMQ Solution

- Each instance of VDS includes multiple test devices on factory floor, connected with a HiveMQ broker located in factory
- Ensures a test device continues to behave properly if network connection is dropped and reconnected
- Fast, efficient and easy way to share information between factory floor and enterprise IT systems

Result

- Rolled out to 24 factories around the world
- 10,000 testing devices connected
- Generating 470 million messages/month

Media Streaming



Customer can control set-up box with phone in the same way as with the remote

- Handle more than 5 million simultaneous connected devices
- Instant switching between screens (main screen, mobile, etc.)
- Consistent response time as customers move between devices



LIBERTY GLOBAL

HiveMQ solution

- HiveMQ is reliable, always-on and can scale easily
- Lightweight nature of MQTT allow low network latency
- HiveMQ delivers millisecond latency
- HiveMQ monitoring provides observability for operations team

Result

- Customer satisfaction scores very high
- 1.5 million connected in 2019
- global rollout to 2.5 million devices is planned

Pharma Manufacturing



Company's global manufacturing business drivers

- Make data driven business decisions across the enterprise
- Automate regulatory reports and flag any quality issues as early as possible
- **Drive efficiency and productivity by 30%**

Corporate Goal and measure of success:

- **\$ 1.5 billion productivity goal by 2024** in their 15 factories globally (100 Million per site)

HiveMQ Solution

- Installed in 6 factories with a goal to be expanded to 15
- Connected all strategic assets on factory floor to a HiveMQ broker located in factory
- Fast, efficient and easy way to share information between brokers in different factory locations to a centralized enterprise HiveMQ broker that provides a single pane of glass
- Enable bi-direction movement of data to and from cloud platform for reporting, dashboarding and analytics

Connected Cars



Mobile app using SMS/HTTP took up to 30 secs to unlock door

HiveMQ solution

- Always-on connectivity for all devices
- HiveMQ runs on expandable Kubernetes cluster
- MQTT is designed for network low latency and Push communication
- HiveMQ implements all quality of service levels to guarantee delivery
- MQTT saves
 - 34% network bandwidth per message
 - Up to 80% if more than 100 messages

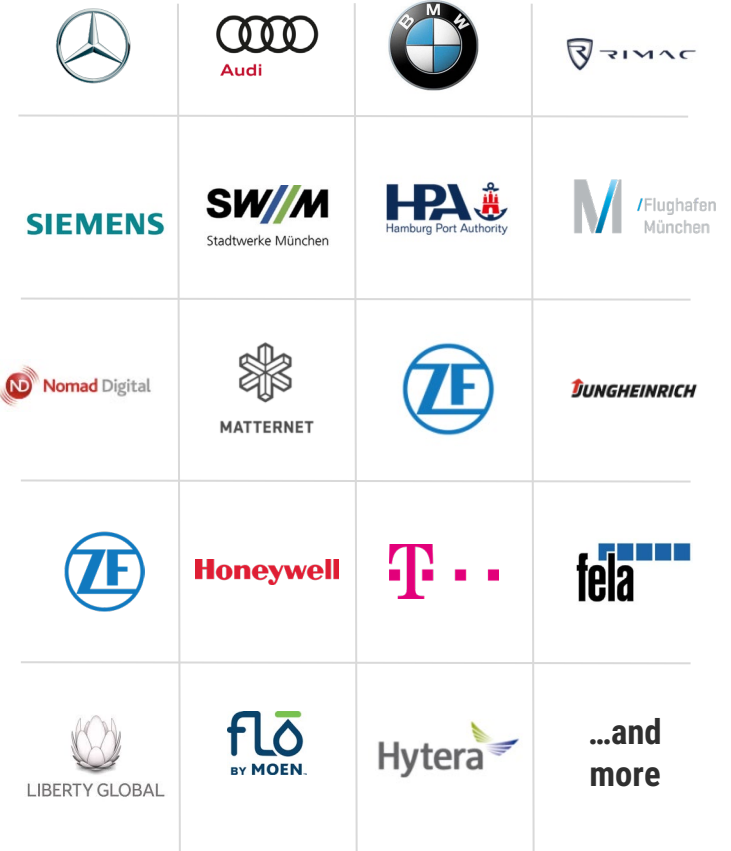


Result

- Sub-second response time for key capabilities like unlock car
- Core communication infrastructure of the most popular car sharing app of Germany

HiveMQ: Trusted by more than 180 Brands

- Building new digital products
- Improving customer experience
- Creating more efficient operations



THANK YOU



Key HiveMQ Assets



Blog on MQTT Sparkplug Enables Smart Manufacturing [Blog](#)



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



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



Manufacturing White Paper: [Modernizing the Smart Manufacturing Industry with MQTT](#)

