# Architect Scalable IoT Systems with **MQTT and Kafka**

HiveMQ and Kafka are better together. Kafka is designed for fault-tolerant, high throughput data pipelines, and HiveMQ is designed for reliable, scalable real-time communication with constrained IoT devices. They can work together to enable end-to-end data streaming and real-time data processing scenarios in IoT deployments. HiveMQ and Kafka can help you build connected products, improve efficiencies, and reduce operating costs.

HiveMQ and Kafka Architecture

HiveMQ and Kafka work great together for all IoT use cases by seamlessly integrating MQTT messages into the Kafka messaging flow. Conversely, the MQTT client interface can distribute Kafka messages to the IoT device.

HiveMQ Customers

BMW · Mercedes-Benz · Deutsche Telekom · RIMAC · ZF
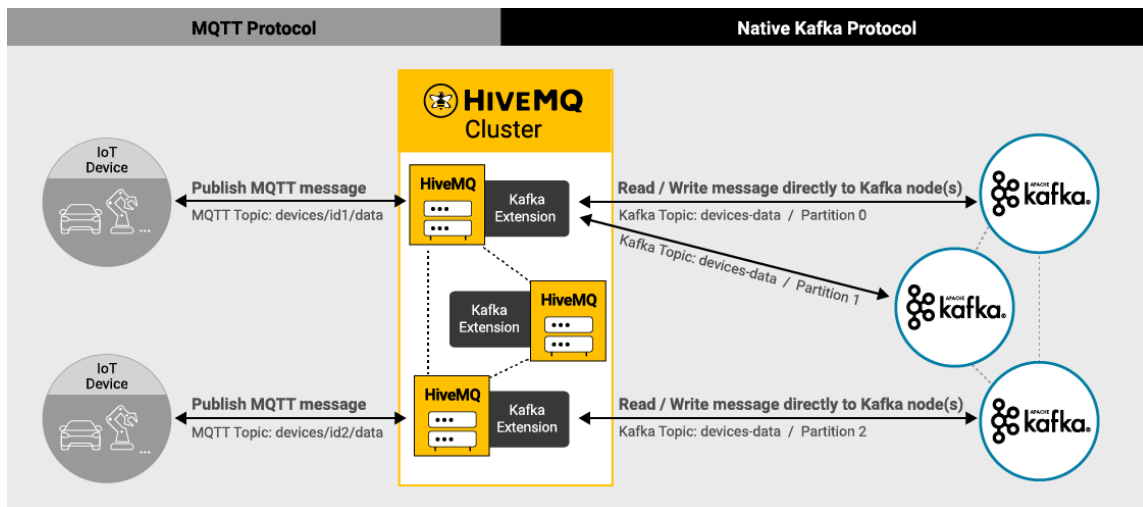
Kafka Needs HiveMQ for IoT

Kafka is well-suited for sharing data between enterprise systems and applications in a data center or the cloud. However, there are several reasons Kafka is not ideal on its own for IoT use cases:

→ Kafka brokers need to be addressed directly by the client, which isn't the case for IoT devices that connect through load balancers.

→ Kafka clients require a stable IP connection, which isn't always true for IoT devices connecting over unreliable cellular networks.

→ Kafka does not support many topics, so large IoT deployments with large topic spaces typically don't fit well into Kafka.

→ Kafka clients are complex and resource intensive, so smaller constrained IoT devices often can't run a Kafka client.

Key Features of the HiveMQ Solution for Kafka

Native integration
- Seamless bi-directional MQTT-to-Kafka communication
- Supports full MQTT 3 and MQTT 5 features, including QoS levels 0, 1, and 2
- Messages are buffered at the broker level for high availability and fault tolerance

Topic Mapping
- Share Kafka messages with various MQTT clients via Kafka-to-MQTT topic mapping
- Allows multiple MQTT topic filters per Kafka topic with full MQTT wildcard support
- The Programmatic Customization API enables flexible MQTT-to-Kafka topic mapping and custom message transformation

Data Validation
- Validates Kafka messages using the schema registry for data integrity
- Enhanced tracing support for customizations in MQTT-to-Kafka transformers
- Can export extension information into a diagnostic archive for enhanced support and troubleshooting
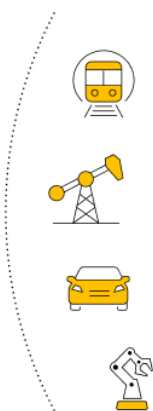
HiveMQ Cloud and Confluent Cloud

HiveMQ Cloud´s integration with Confluent Cloud enables bi-directional data transmission between IoT devices and Kafka clusters to integrate MQTT data with Confluent Cloud seamlessly.

For more information or to download the HiveMQ MQTT Platform,
visit hivemq.com