

**WEBINAR**

# **MQTT: The Key to Scalable Reliable Connected Car Platforms**



# WELCOME



**Christian Götz**

CEO and Co-founder of  
**HiveMQ**

- **HiveMQ – Founded in 2012**, based outside of Munich
- **130+ customers** with production IoT applications
- Awarded with **Deloitte Fast 50**, **10 most innovative IoT companies to watch** in 2018, **Focus Growth Champions 2020** and others



# Our customers are...

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

 LIBERTY GLOBAL		
DAIMLER		
 Audi	SIEMENS	Honeywell
		...and more

# Automotive Customers

- Connected car platforms
- Car sharing services
- Connected car services



DAIMLER



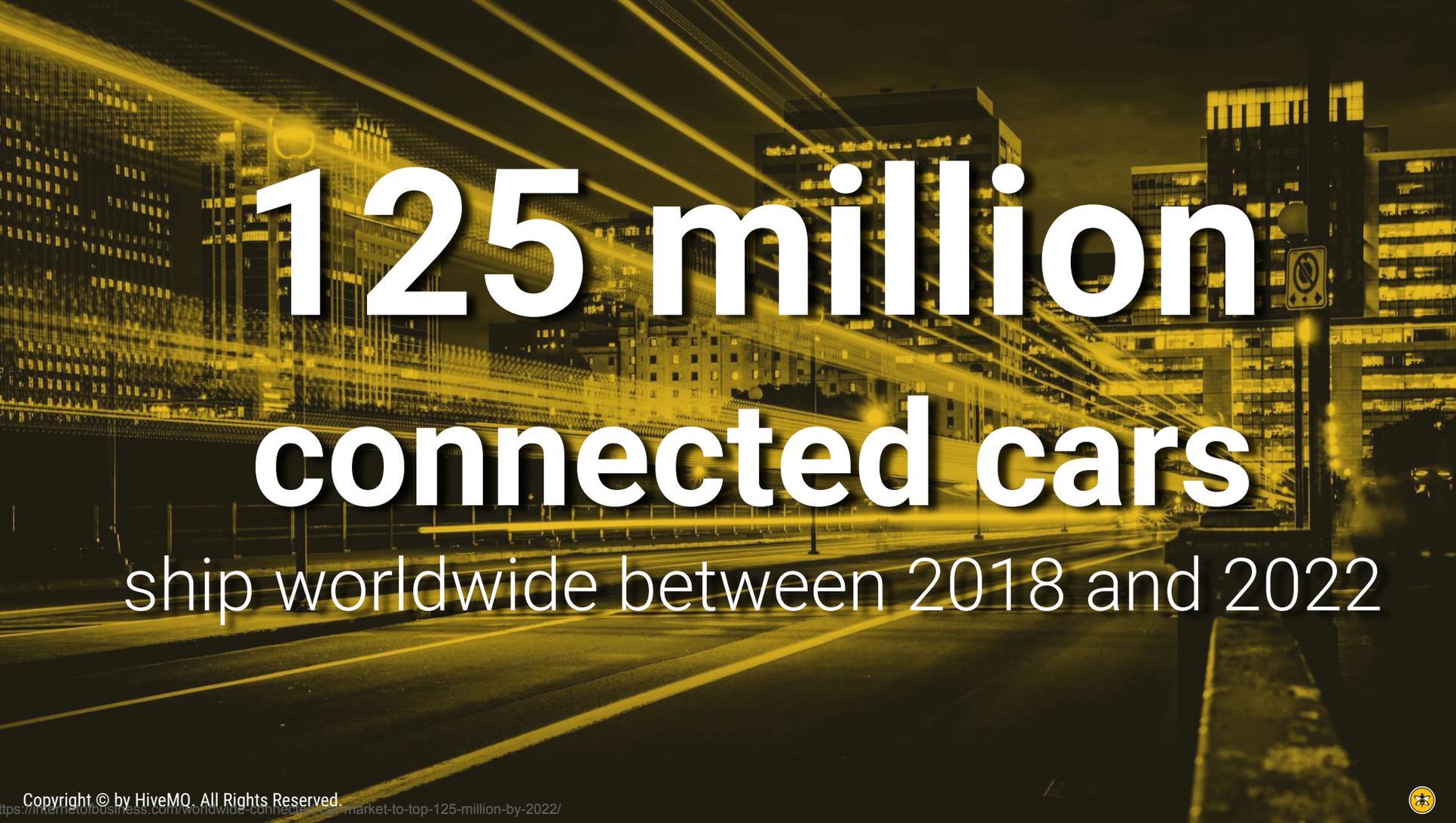
ECARX  
亿咖通科技



*Kapsch* >>>



# How to Build a Reliable Connected Car Platform with MQTT



# 125 million connected cars

ship worldwide between 2018 and 2022





Telekom.de LTE 13:46 79%



57 L  
FUEL LEVEL

722 km  
TOTAL RANGE

Last Updated: 21.06.17 14:03

Locked

Remove Status Info

To activate, press and hold for 2 seconds.

Lock

Unlock

Horn

Lights

Climate Control

Heats or ventilates your BMW depending on the current temperature. This process will last for up to 30 minutes.

To activate, press and hold for 2 seconds.

Vehicle

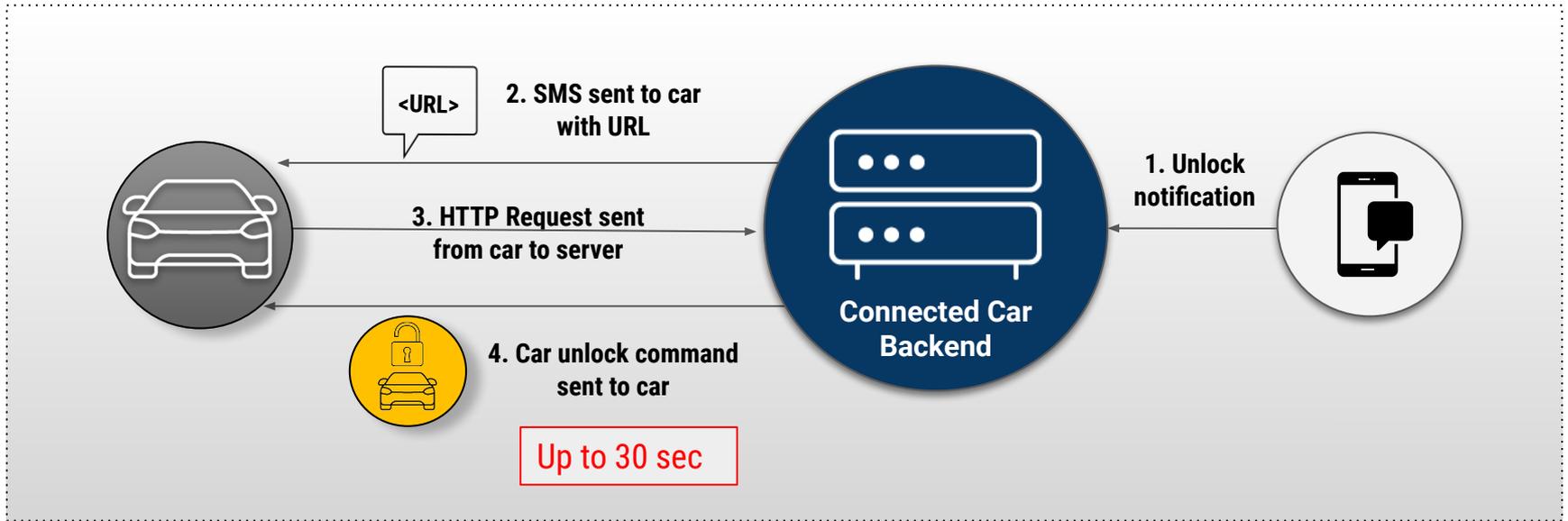
Destinations

Activity

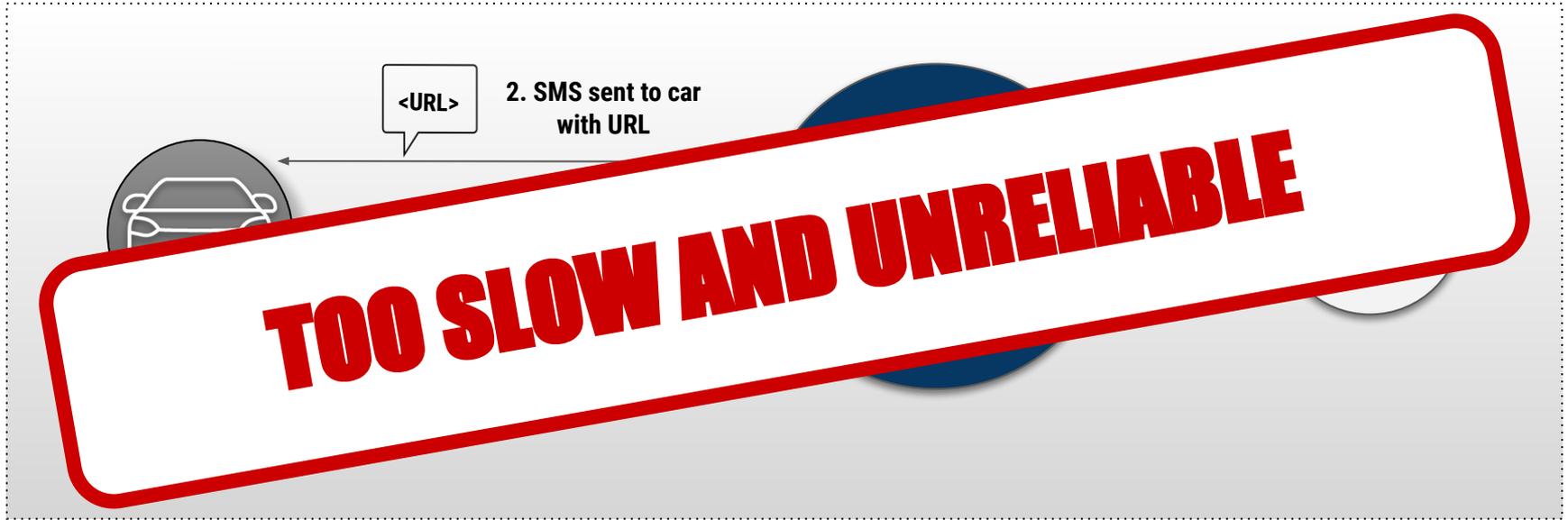
Hub

More

# Current Challenges



# Current Challenges



# Challenge #1 Unreliable Networks and Network Latency



## Challenge #2 Broadcast messages to large fleets of vehicles



## Challenge #3 Scaling up to meet demand



## Challenge #4 Integration with Enterprise Systems



# Challenge #5 Monitor and Troubleshoot Deployments



# New Technologies are needed

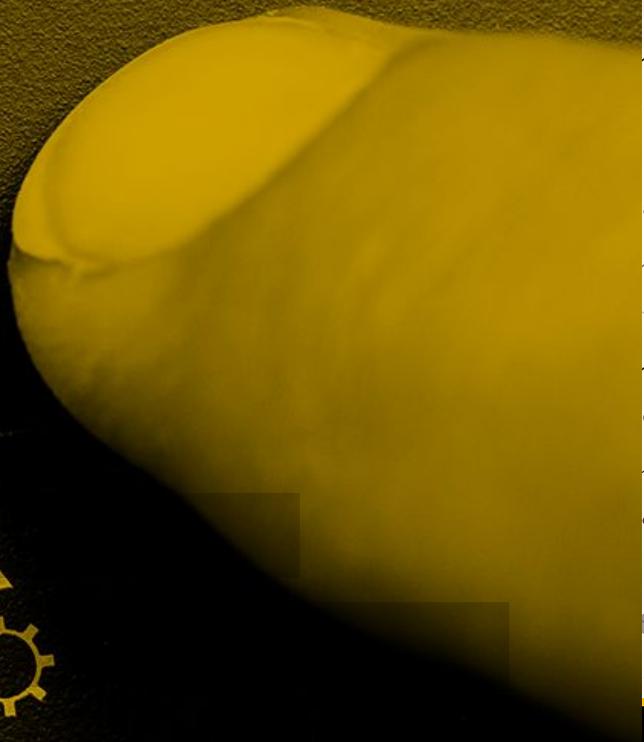
**Internet of Humans**

**http://**

**Internet of Things**



Paradigm shift



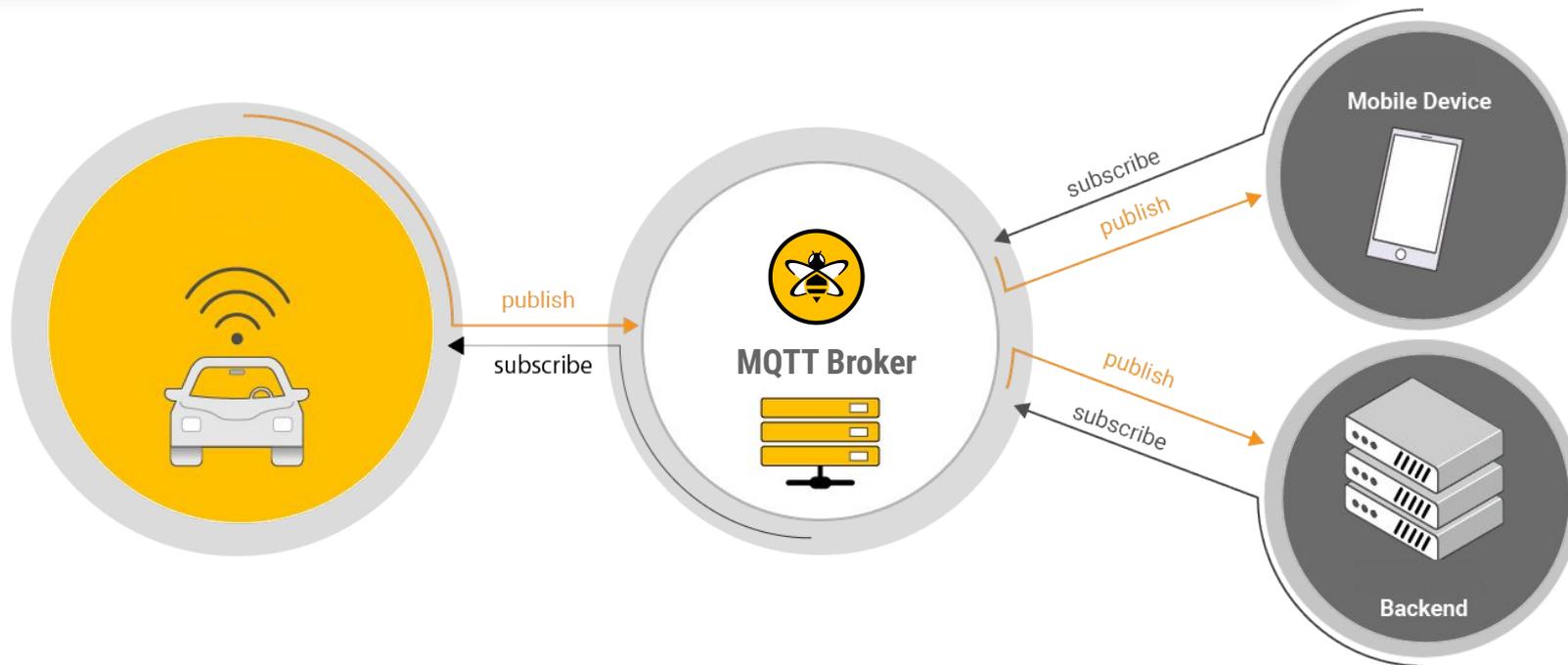
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# A New Architecture



# Connected Car Protocol: MQTT



- Lightweight, simple client
- Pub/Sub protocol
- Persistent Connections
- Quality of service levels

`http://`

- Request/Response handshake for each connection
- No ability for bidirectional
  - SMS is used but is unreliable
- No quality of service
- No queuing of messages for lost connection

# New Technologies found

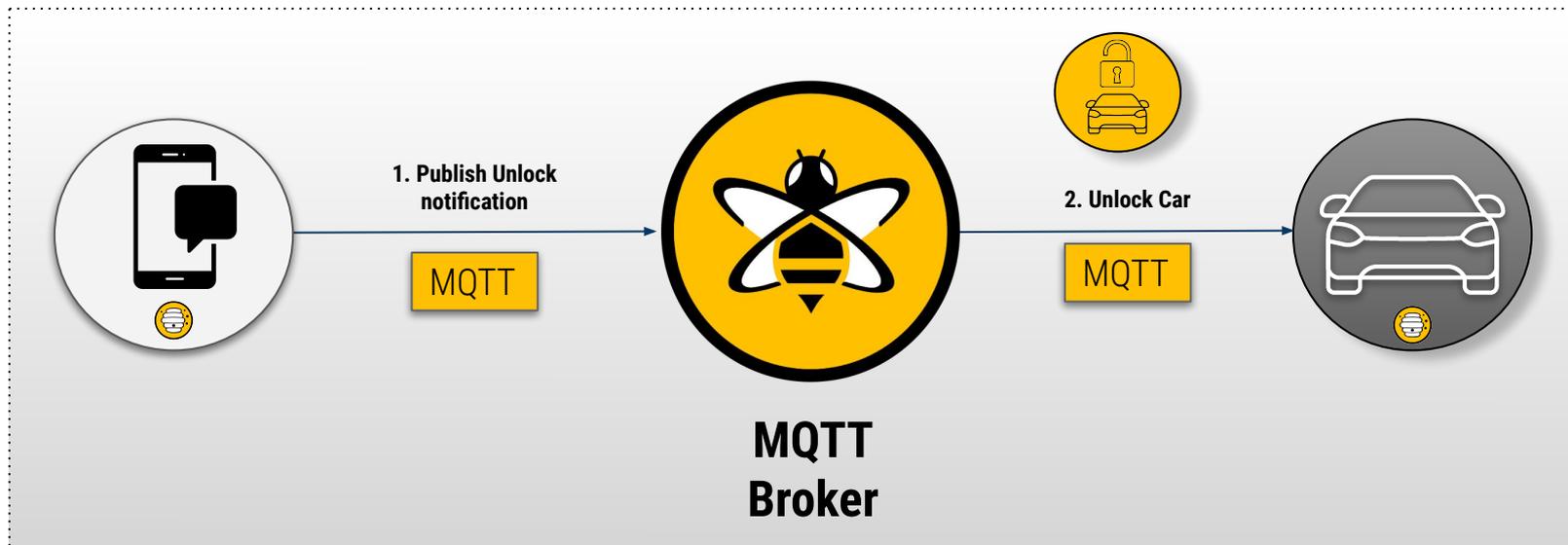
Internet of Humans

<http://>

Internet of Things



# Remote Door Unlock with MQTT

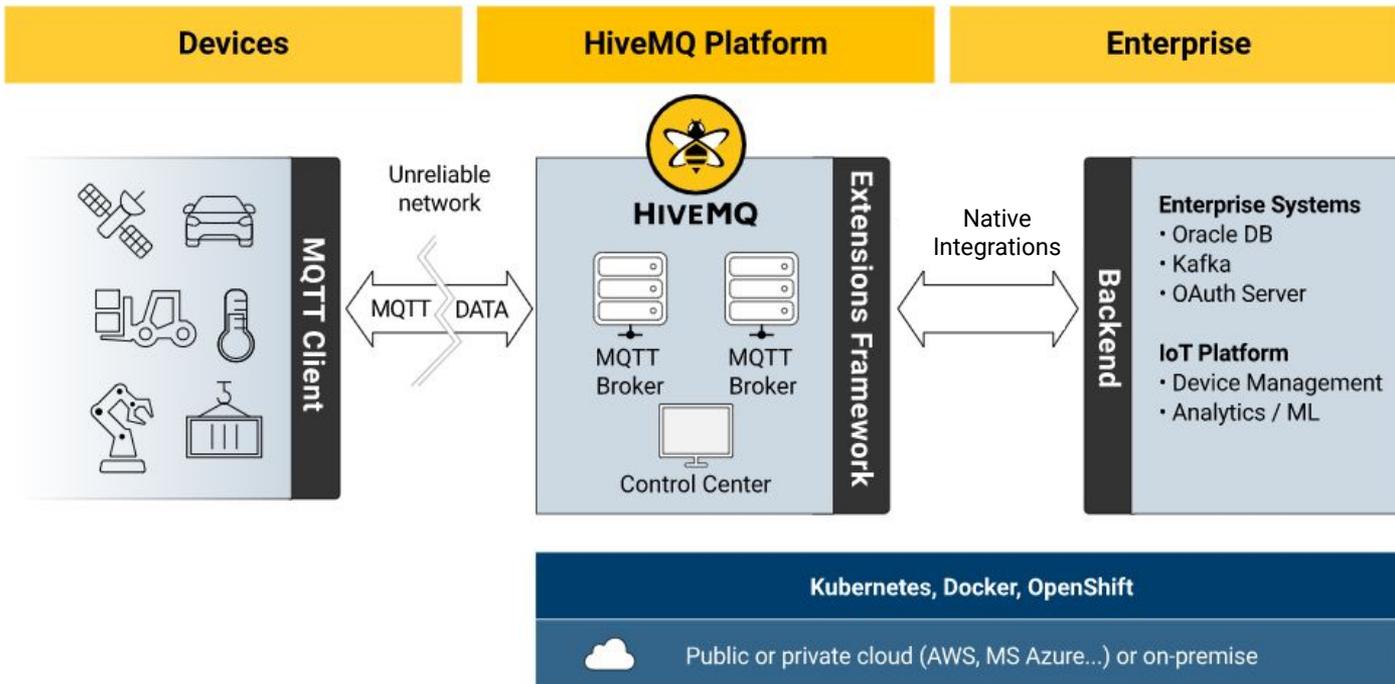




**MQTT is just a protocol, right?**

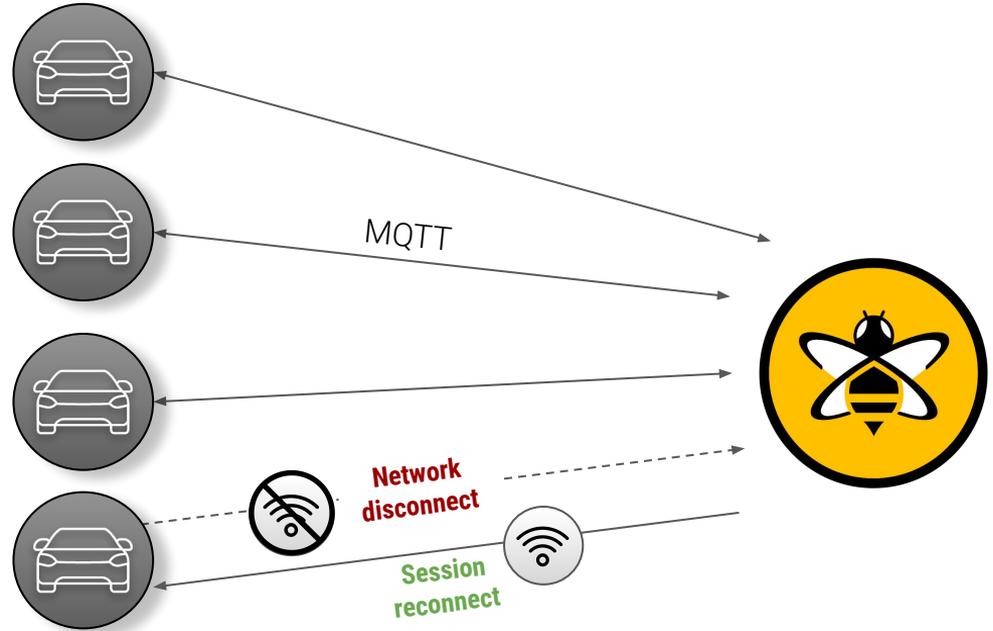


# Enterprise MQTT Platform



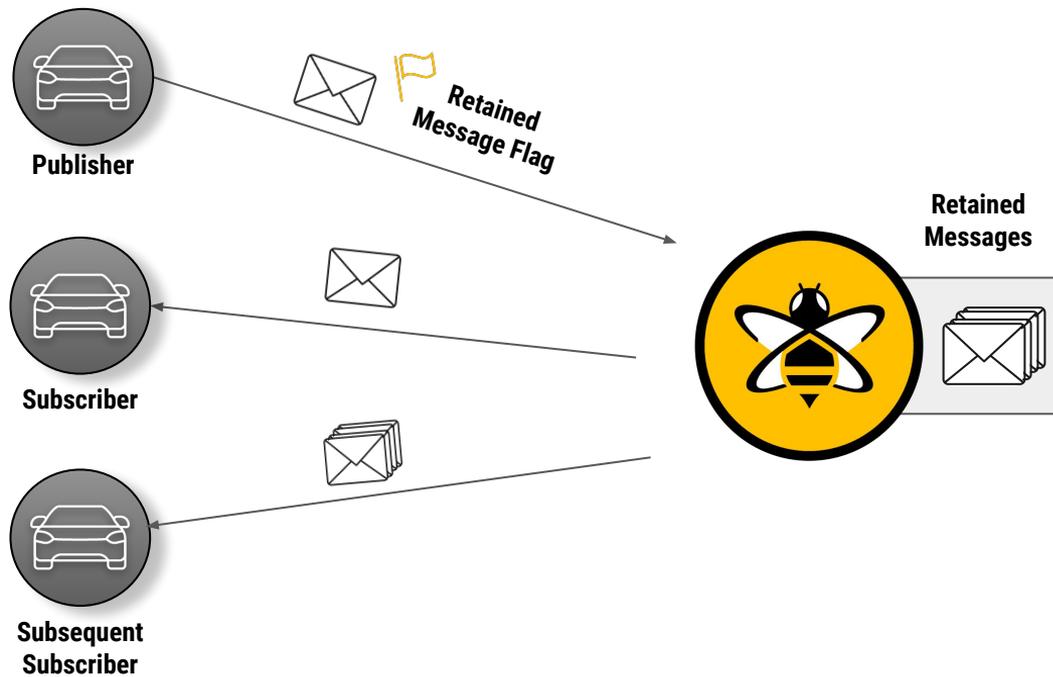
# 10mio+ Persistent Always-on Connections

- Persistent sessions
- Reconnect after network disconnect
- Bi-directional communication
- Massive scalability



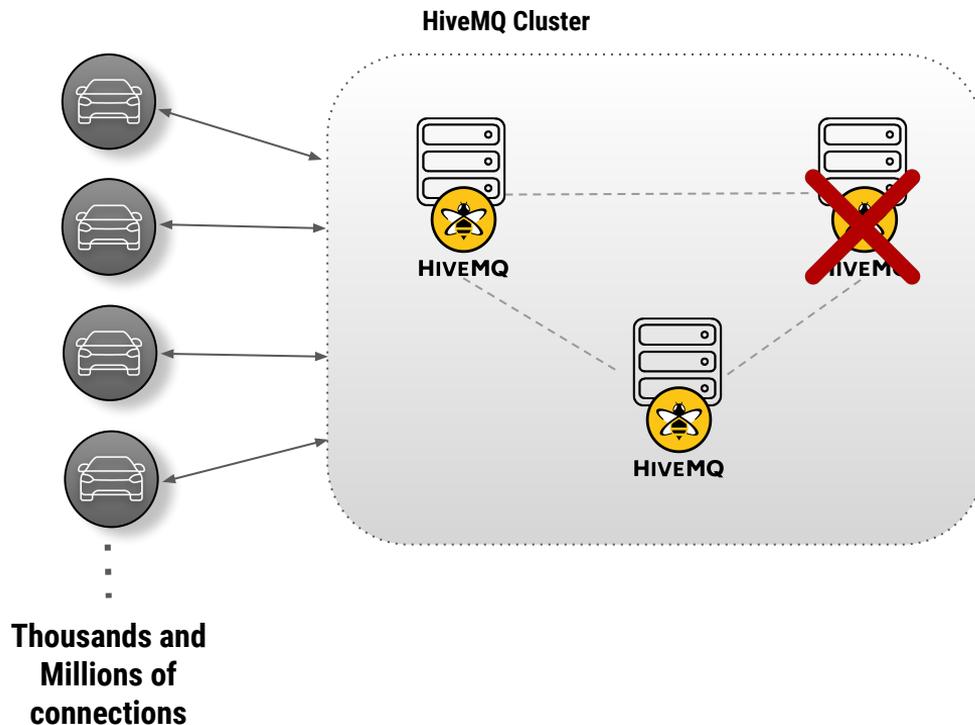
# Guaranteed and Reliable Data Delivery

- Quality of Service messaging
  - At most once (0)
  - At least once (1)
  - Exactly once (2)
- Retained Messages
- Offline queued messages

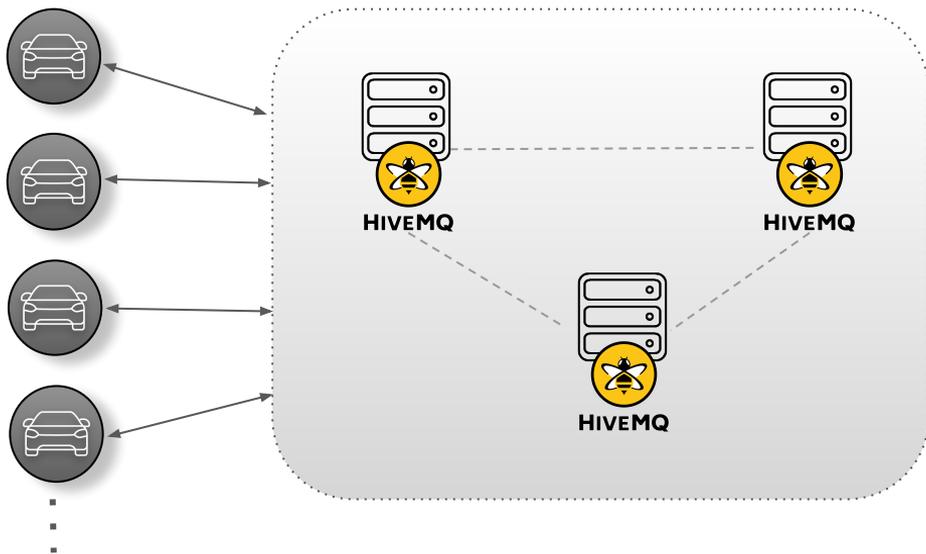


# Elastic Scalability and Auto Heal

- Automatically scale up and down
- Connections distributed across clustered nodes
- Masterless cluster architecture so end user doesn't experience latency if cluster node is down



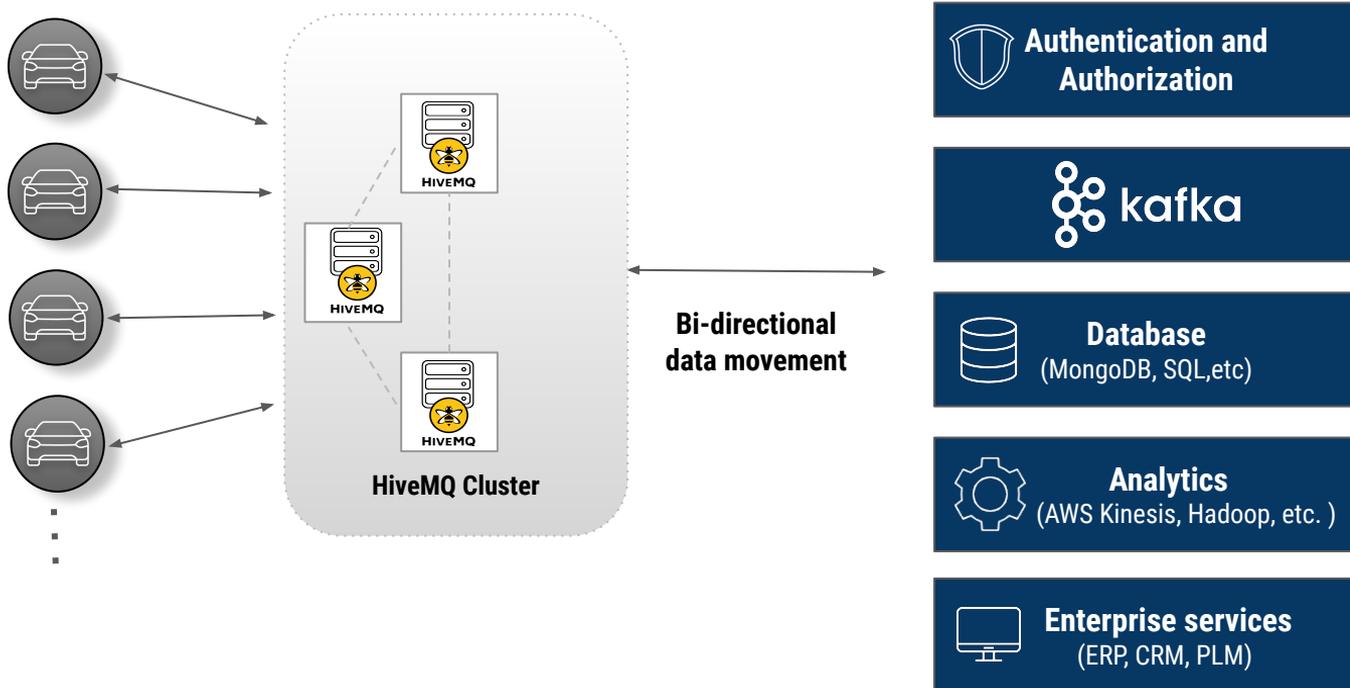
# Cloud Neutral Deployment



- Cloud   
- Container  **kubernetes**  **OPENSIFT** 
- Managed service  **HIVEMQ**  
CLOUD
- VM
- Bare metal

etc.

# Open API and Extension Framework



# Observability and Insights from Operations

The image displays the HiveMQ web interface, showing a dashboard with various metrics and a detailed view of a client connection.

### Dashboard Overview

**Key Metrics:**

- Connections: 250,000
- Inbound Publish Rate: 4.974 / s
- Outbound Publish Rate: 4.976 / s
- Subscriptions: 200,000
- Retained Messages: 0
- Queued Messages: 0
- Cluster Nodes: 3

**Connections per Cluster Node (stacked):** A line chart showing the number of connections per node over time. The nodes are vNLXP (blue), huAKh (green), and Qylyq (red). The total number of connections peaks at approximately 250,000 around 10:05.

**Active License Information:**

- Cores Used: 24 / 24
- License Type: Valid, Commercial License
- CPU: 25% (8 cores)
- Total Inbound Publish Messages: 526,402
- Total Inbound Volume: 541.54 MB

### Client Detail: subscriber-client-000000000

**Session Information:**

- Client ID: subscriber-client-000000... (show more)
- Connected Since: 2020-04-21 10:03:01
- Session Expiry Interval: 0 Seconds
- Message Queue Size: 0 Messages

**Connection:**

- Client IP: 35.174.153.227
- Clean Start: False
- Username: hivemq
- Password: \*\*\*\*\* (show password)
- MQTT Version: MQTT5
- Keep-Alive: 60 Seconds
- Listener: TCP Listener at 0.0.0.0:1884
- Name: tcp-listener-1884
- Connected Node: Qylyq

**Restrictions:**

- No TLS Information Available
- Maximum Bytes per Second Inbound: Unlimited
- Maximum Bytes per Second Outbound: Unlimited
- Maximum Message Size: 256.00 MB
- Maximum Message Queue Size: 1,000 Messages
- Drop Strategy for Queued Messages: Discard
- Proxy Protocol: Not Present

**Client List Table:**

Client ID	Connection Status	Username	IP Address
subscriber-client-000000000	✓	hivemq	35.174.153.227
subscriber-client-000000001	✓	hivemq	35.174.153.227
subscriber-client-000000002	✓	hivemq	35.174.153.227
subscriber-client-000000003	✓	hivemq	35.174.153.227
subscriber-client-000000004	✓	hivemq	35.174.153.227
subscriber-client-000000005	✓	hivemq	35.174.153.227
subscriber-client-000000006	✓	hivemq	35.174.153.227
subscriber-client-000000007	✓	hivemq	35.174.153.227
subscriber-client-000000008	✓	hivemq	35.174.153.227
subscriber-client-000000009	✓	hivemq	35.174.153.227
subscriber-client-000000010	✓	hivemq	35.174.153.227
subscriber-client-000000011	✓	hivemq	35.174.153.227
subscriber-client-000000012	✓	hivemq	35.174.153.227
subscriber-client-000000013	✓	hivemq	35.174.153.227
subscriber-client-000000014	✓	hivemq	35.174.153.227
subscriber-client-000000015	✓	hivemq	35.174.153.227
subscriber-client-000000016	✓	hivemq	35.174.153.227
subscriber-client-000000017	✓	hivemq	35.174.153.227
subscriber-client-000000018	✓	hivemq	35.174.153.227
subscriber-client-000000019	✓	hivemq	35.174.153.227
subscriber-client-000000020	✓	hivemq	35.174.153.227
subscriber-client-000000021	✓	hivemq	35.174.153.227
subscriber-client-000000022	✓	hivemq	35.174.153.227
subscriber-client-000000023	✓	hivemq	35.174.153.227
subscriber-client-000000024	✓	hivemq	35.174.153.227

# HiveMQ for Connected Cars



- 10 mio+ Persistent Always-on Client Connections
- Guaranteed and Reliable Data Delivery
- Elastic Scalability and Auto Heal
- Cloud Neutral Deployment
- Open API enables Custom Integration for Enterprise requirement
- Observability and Insights for Operations

# ECARX Case Study



**ECARX**  
亿咖通科技

Independently operated by Geely Holding Group

- **Key Challenge:**
  - Manage connectivity between car and cloud
- **What HiveMQ provided:**
  - Latest MQTT standard, especially MQTT 5
  - MQTT 5 has improved the reliability of overall system
  - Extension framework for easy message flow of MQTT connection

## Result

- 2 million Geely cars connected
- Average of 350,000 simultaneous connections
- 30% cost reduction

# HiveMQ: The Standard for Connected Car

OEM



DAIMLER

Third Party  
Platforms



Suppliers



Expect to have more than 50%  
of automotive OEMs using  
HiveMQ by 2022

# Additional Resources

HiveMQ Automotive Solutions and Case Studies

<https://www.hivemq.com/solutions/automotive/>

Enabling the Connected Car White Paper

<https://www.hivemq.com/solutions/iot/enabling-the-connected-car/>

Try HiveMQ Cloud - 7 days for free!

<https://www.hivemq.com/cloud/>

Try HiveMQ!

<https://www.hivemq.com/downloads/>

# THANK YOU

Contact

**Christian Götz**



*christian@hivemq.com*



*linkedin.com/in/christian-götz-0b515873*



*@goetzchr*