WEBINAR

IoT in Production

HIVEMQ

Introduction

Florian Raschbichler

@fraschbi

- HiveMQ Head of Support
- 5 years of experience with MQTT
- IoT operations consulting
- 120+ customers guided to production

Agenda

- What is MQTT?
- An IoT Use Case
- Organisational Hurdles
- Testing IoT Deployments
- Debugging
- IT Security
- Networking
- Conclusion
- Q & A

de-facto standard for IoT

Eclipse Foundation IoT survey

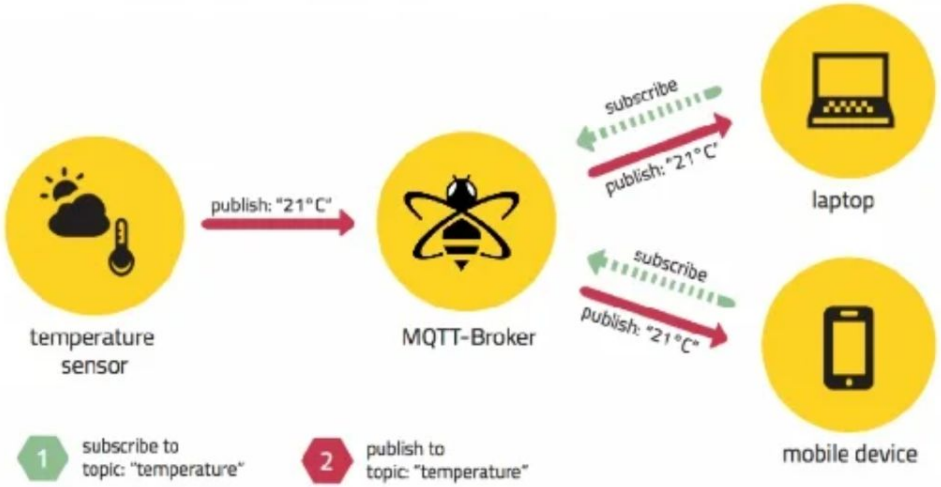
Protocol Usage

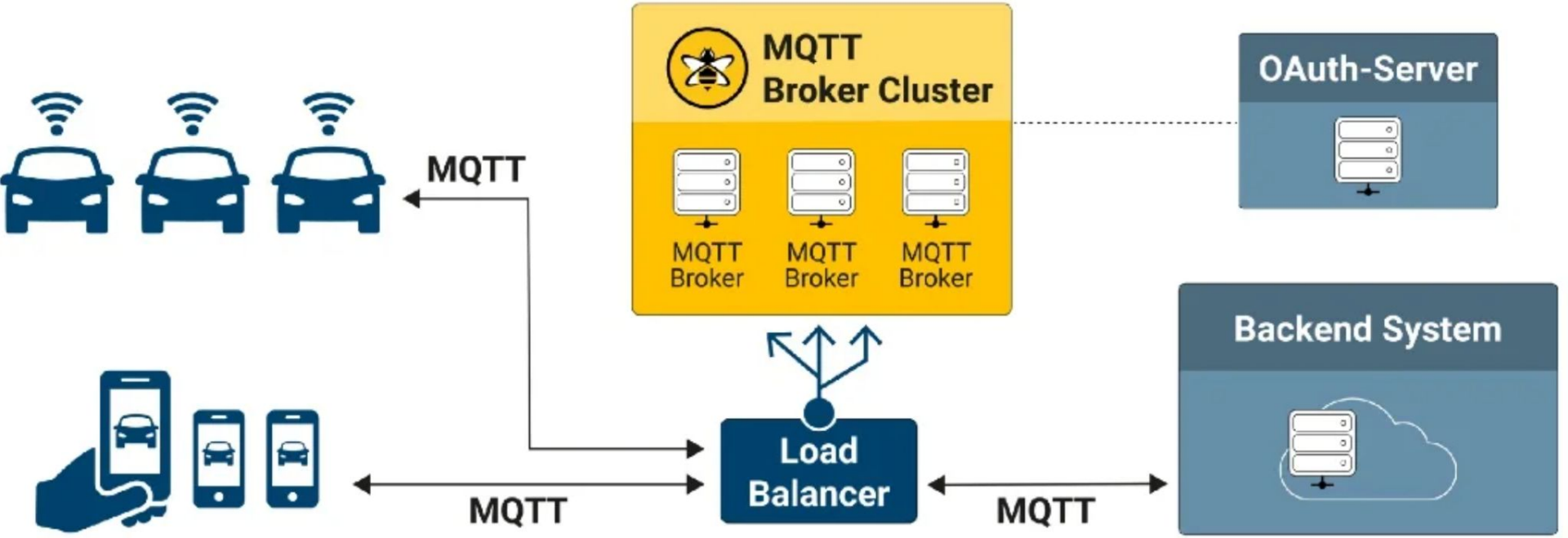
- 2018
  - MQTT 62%
  - HTTP 54%

https://trends.google.com/trends/explore?date=2012-01-01%202019-02-28&q=mqtt,amqp,xmpp,coap

Pub/Sub

- lightweight protocol on top of TCP/IP
- Pub/Sub pattern
- de-coupling of sender and receiver
- central component: the broker





Connected Cars

- “Hello World” IoT Use Case
  - Bi-directional communication
  - Unreliable networks
  - Decent computing power
- Connectivity and Digitalisation #2 importance
- Car OEMs technological inventors
- UX improved with IoT technologies

* https://automotive-institute.kpmg.de/2018/brain.html#automotive-key-trends

Multiple Teams / Vendors

Challenge

- ☐ Communication
- ☐ Accountability
- ☐ Synchronisation

Pitfall

- ☐ Friction loss
- ☐ Blame game
- ☐ Resource blockage

Solution

- ☑ Operational points of contacts
- ☑ Single overall ownership
- ☑ Coordinate capacities early

Adaption to IoT

Challenge	Pitfall	Solution
☐ New technologies ☐ Long term projects ☐ Unknown territory	☐ No knowledge transfer ☐ Lack of foresight ☐ Technical one way streets	☑ Hire experts ☑ Architectural investments ☑ Chose supported software

End-to-end considerations

Challenge	Pitfall	Solution
☐ Scalability Testing ☐ Resiliency Testing ☐ Performance Testing	☐ Individual components	☑ Always test entire system

Project Staging

Challenge

- ☐ Complex use cases
- ☐ Devices and software
- ☐ Networking

Pitfall

- ☐ Lab testing software
- ☐ Static sprint cycles

Solution

- ☑ Use actual devices
- ☑ Live networking systems
- ☑ Consider hardware dev cycles

Black Boxes

Challenge

- Huge amounts of messages
- Data protection laws
- Distributed Systems
- Unknown technologies

Pitfall

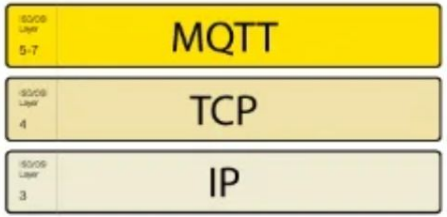
- ‘Mute’ Components
- No knowledge transfer
- Hasty conclusions

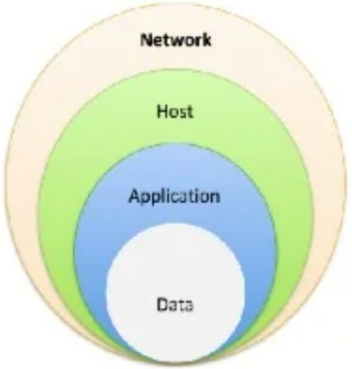
Solution

- Gather metrics
- Meaningful Dashboard
- Centralised Logging
- Always to RCAs
- Verbose early stages
- Get your Ops up to speed

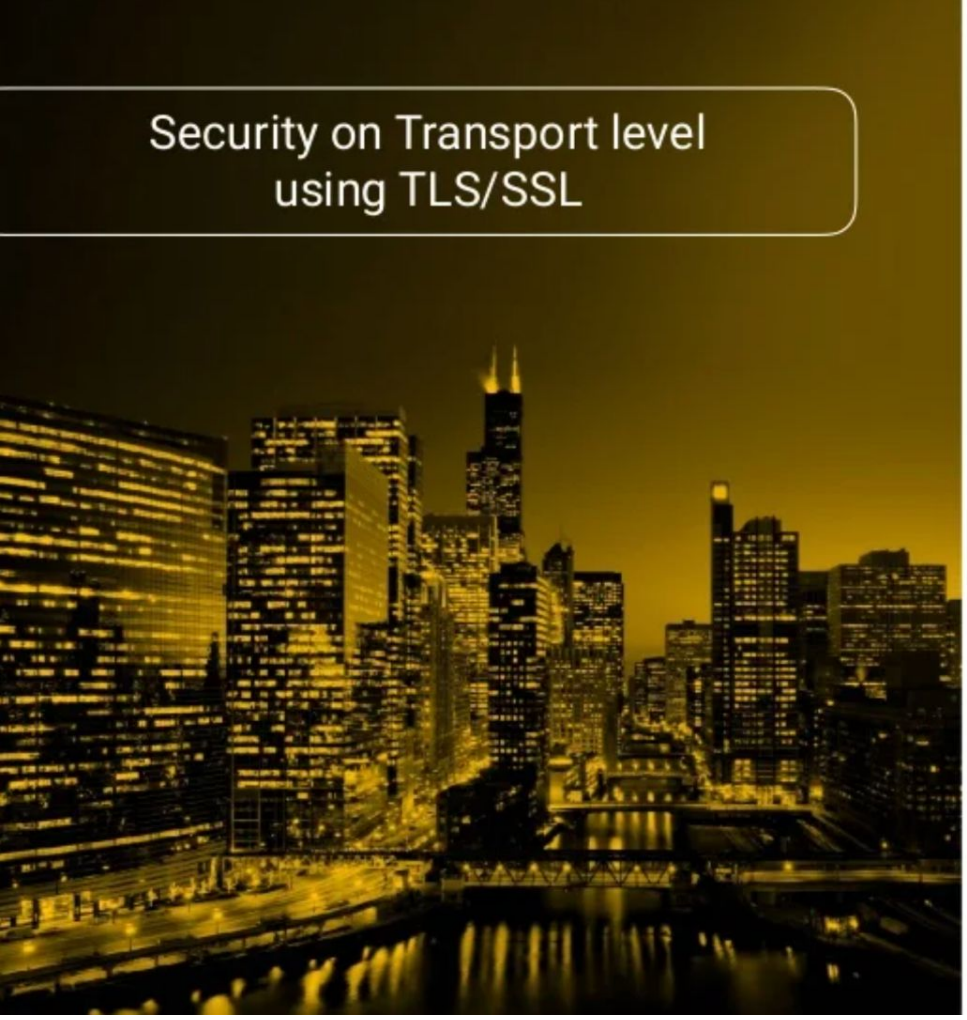
Security Layer

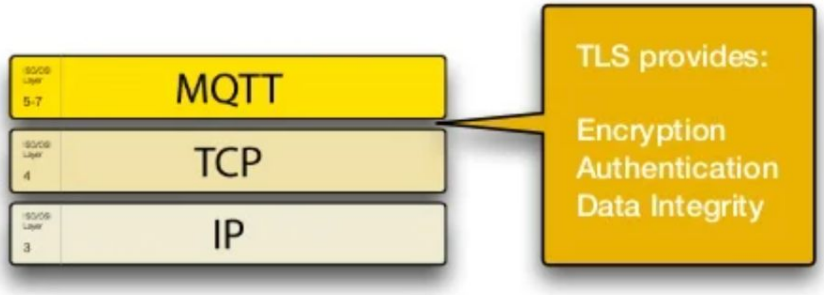
- Secure the application
  - Security on network level - VPN
  - Security on transport level - using TLS/SSL
  - Security on application level
- Secure your deployment





Security on Transport level using TLS/SSL





When TLS is used correctly, a third-party observer can only infer the

- *connection endpoints,*
- *type of encryption, as well as the frequency and*
- *an approximate amount of data sent,*

but cannot read or modify any of the actual data.

Authentication

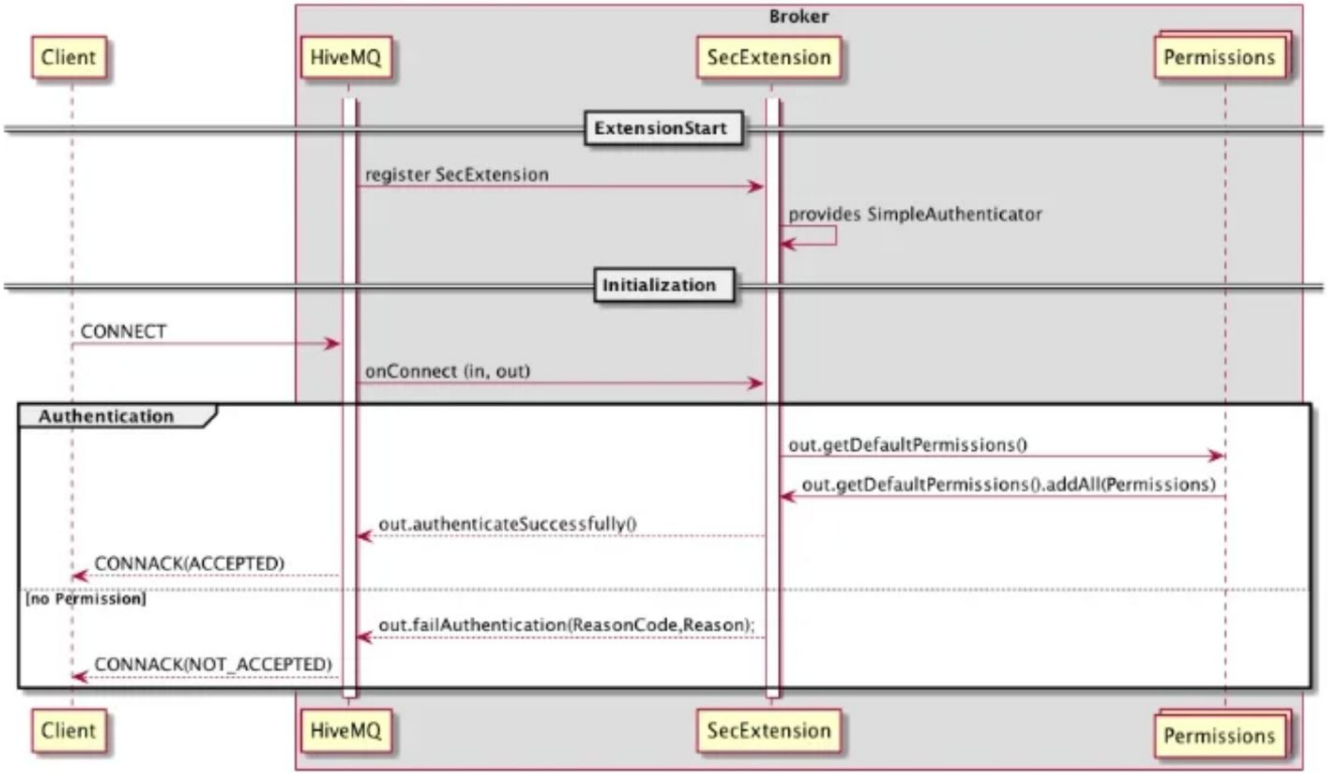
- Proof of identity
- Protocol features may not be sufficient
- x509 Client Certificates
- Existing infrastructure
  - LDAP
  - OAuth 2.0
  - ...

Authorization

- Permissions for clients
- Actions
- QoS Levels
- Topic Filters

Security on Application Level

Advanced Authentication Mechanisms with extension, that provides an Authenticator via a Security Service



Best practises

Infrastructure

- Only expected traffic gets forwarded to downstream systems
- UDP - not used by MQTT - can be blocked
- Allow only traffic to ports, needed for your MQTT system (1883, 8883)

Operating System

- Use SELinux, keep libraries and software updated

MQTT Broker

- Use TLS
- Use Authentication & Authorization, separate topic namespaces
- Throttling your MQTT clients to prevent overload
- Configure message size to maximum of your use case (max 256MB)

TCP Timeouts

Challenge

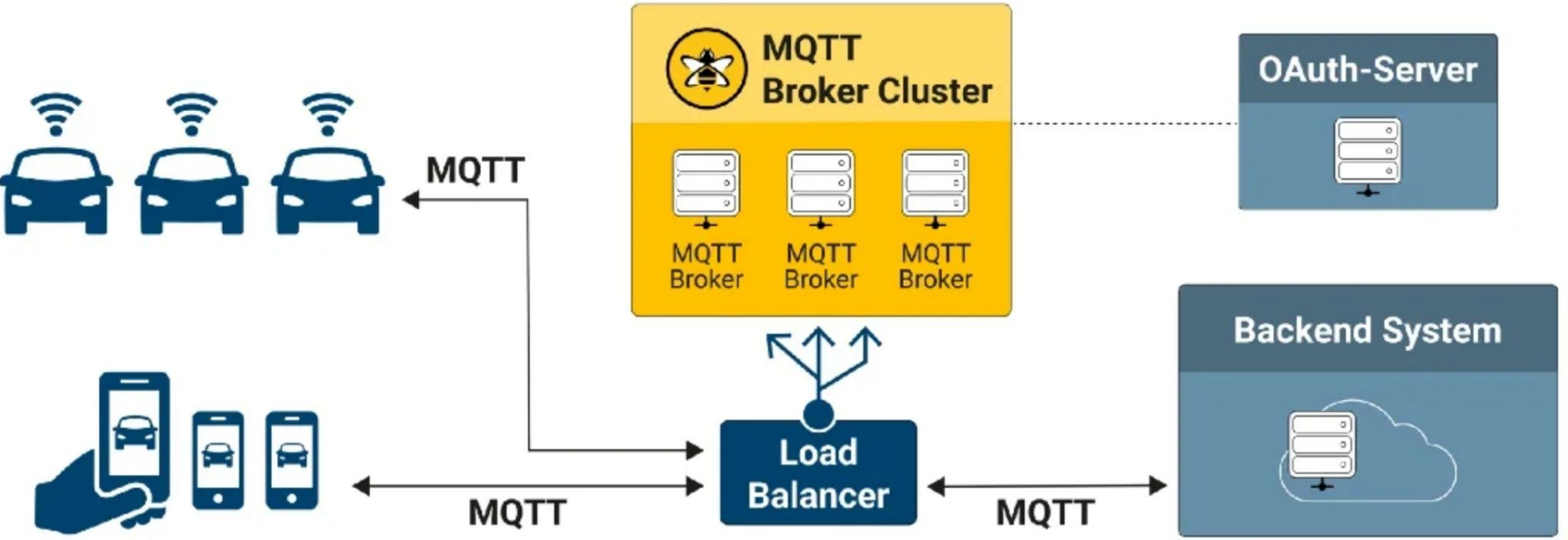
- ☐ Multiple Components
- ☐ Billions of Devices
- ☐ Various Layers

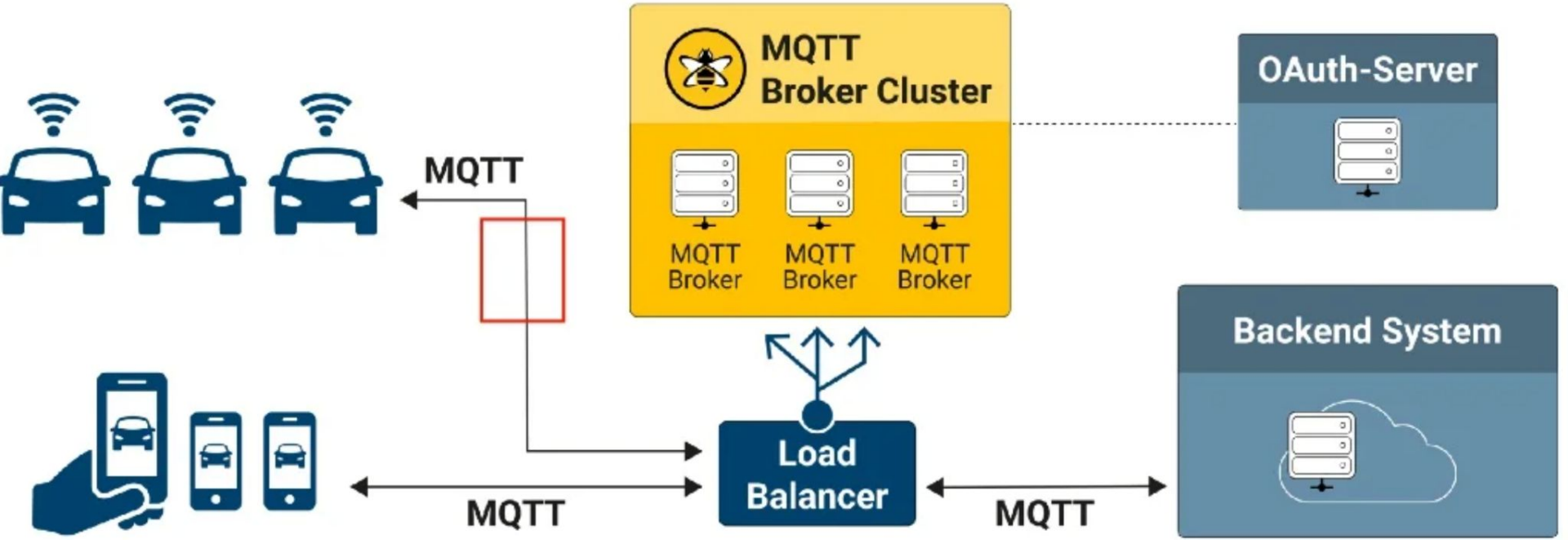
Pitfall

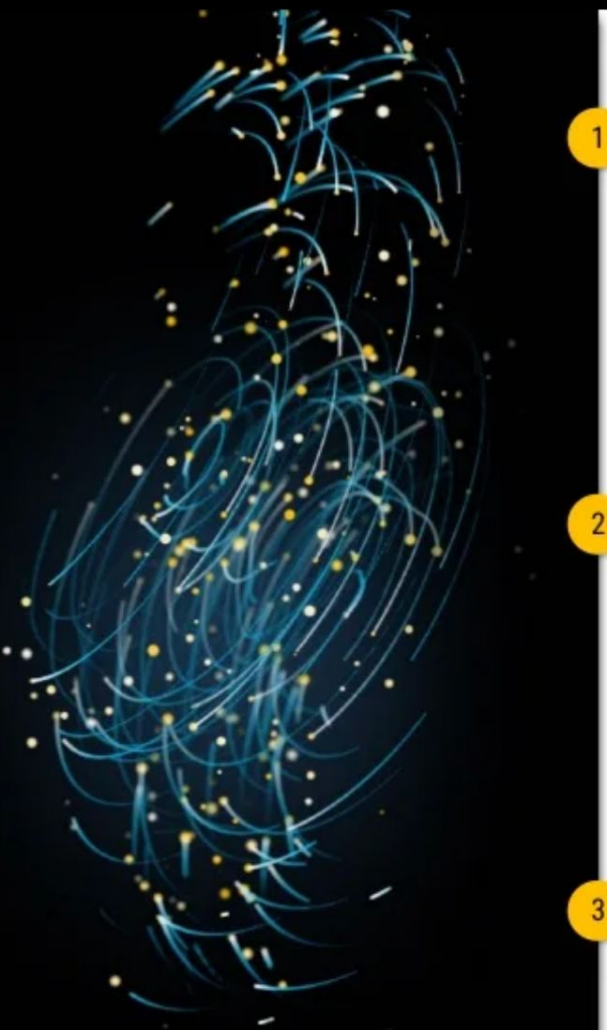
- ☐ Timeouts
- ☐ NATing Firewalls
- ☐ QoS=0
- ☐ Scalability
- ☐ Resilience

Solution

- ☑ Synchronise Heartbeats
- ☑ Live Testing
- ☑ Create detailed overview







1. IoT is ready for production
2. Acquire knowledge and expertise
3. Invest early into an wholesome approach

Resources

[Get Started with MQTT]

[MQTT Essentials Series]

[Get HiveMQ]

ANY QUESTIONS?

Reach out to community.hivemq.com

THANK YOU

Stay updated on upcoming webinars

Subscribe to our Newsletter!