

The logo for AWS re:Invent 2023. It features the text 'AWS re:Invent' in a white, sans-serif font. 'AWS' is in a smaller font size and positioned above 're:'. 're:' is in a smaller font size and positioned to the left of 'Invent'. The background is a dark blue gradient with large, overlapping, curved shapes in shades of purple, pink, and orange on the right side.

# AWS re:Invent

NOV. 27 – DEC. 1, 2023 | LAS VEGAS, NV

I O T 2 0 4

# Innovate and modernize connected vehicle platforms with AWS IoT

## J. Lowry Snow

Principal, WW GTM, Auto  
& Connected Vehicle  
AWS

## Andrea Ketzer

Director, Technology Strategy,  
Connected Mobility, Auto & MFG  
AWS

## Yozo Takehara

Unit Lead  
Digital Services Development Div.  
American Honda Motor Co., Inc.



# Speakers



**J. Lowry Snow**

Principal, WW GTM, Auto &  
Connected Vehicle  
AWS



**Andrea Ketzer**

Director, Technology Strategy,  
Connected Mobility, Auto & MFG  
AWS



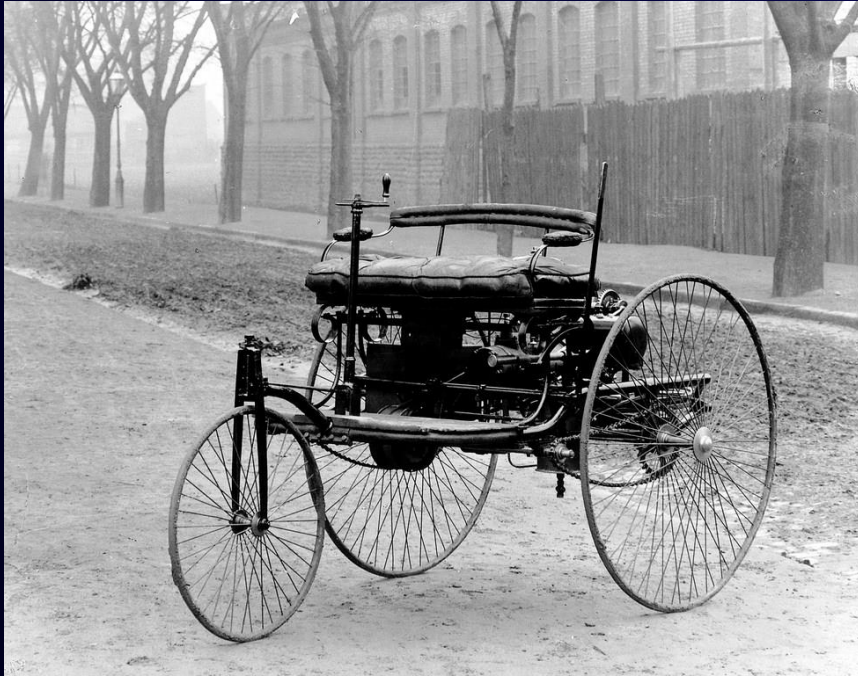
**Yozo Takehara**

Unit Lead  
Digital Services Development Division  
American Honda Motor Co., Inc.

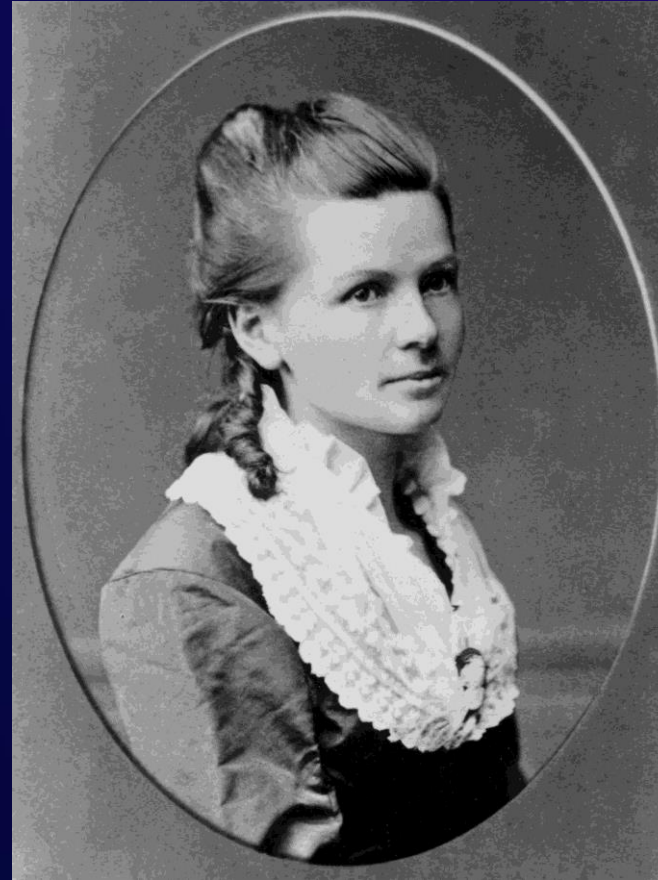
# Agenda

- 01 Intro
- 02 Connected Vehicle platforms with AWS
- 03 Modernizing the vehicle data platform
- 04 Customer journey: American Honda Motor
- 05 Takeaways

# Automotive innovation pioneer



**Benz Patent-Motorwagen (1885)**



**Bertha Benz – Auto Pioneer (1870)**

# Cloud-enabled connected use cases



# Reasons customers choose AWS for Connected Vehicle



**Scalability**



**Multi-Region**



**Reliability &  
security**

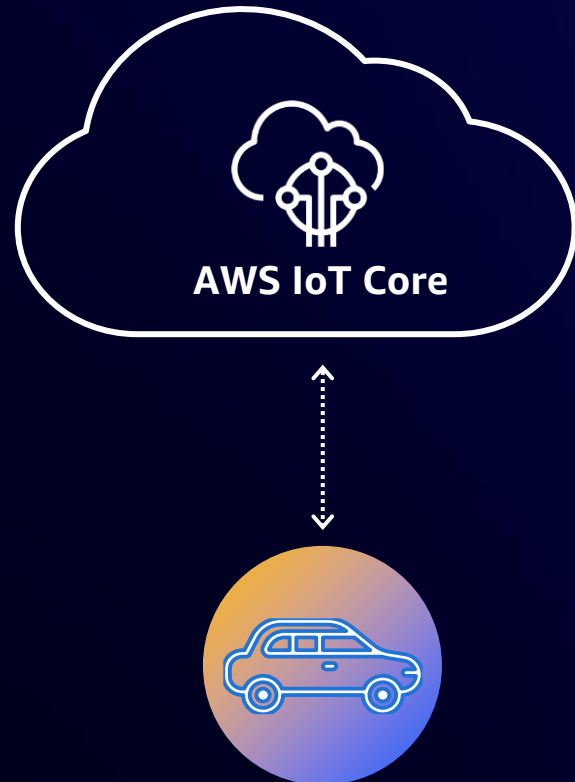


**Cost savings**



**Data efficiency**

# AWS IoT Core for Connected Vehicle platforms



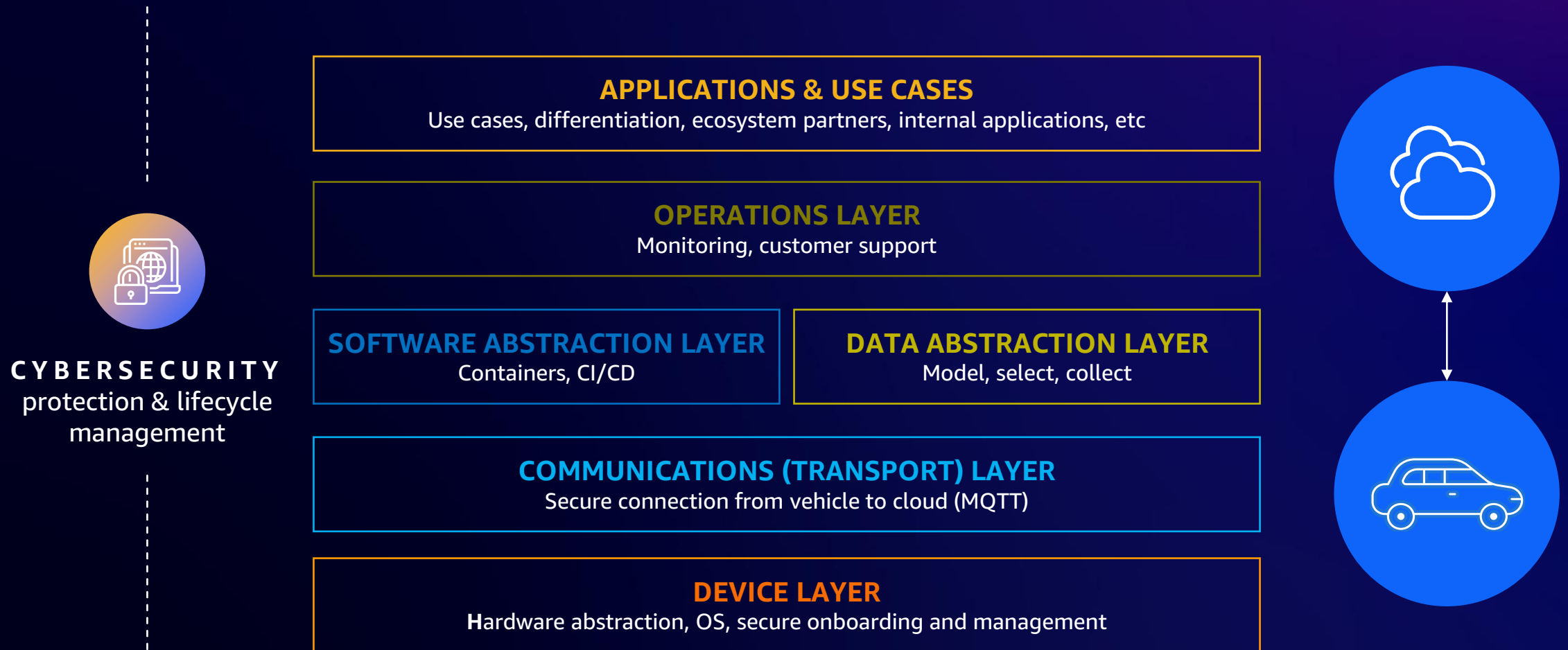
**270M+** connections

Unique devices connecting  
to AWS IoT per day

**Millions of vehicles**

Using AWS IoT services  
for Connected Vehicle platforms

# Connected Vehicle platform architecture

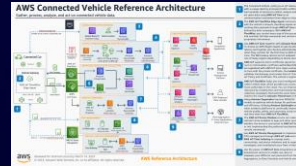


# Connected Vehicle: Build vs. Buy

## Build & Evolve



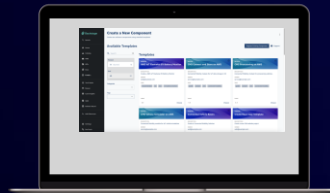
AWS IoT and related services



Connected Vehicle reference architectures (CVRAs)



Partner Community



Connected Mobility Solution (CMS)

## Buy & Integrate (hybrid)

### Complete platforms



OEMs



Fleet operators

### Hybrid integrations

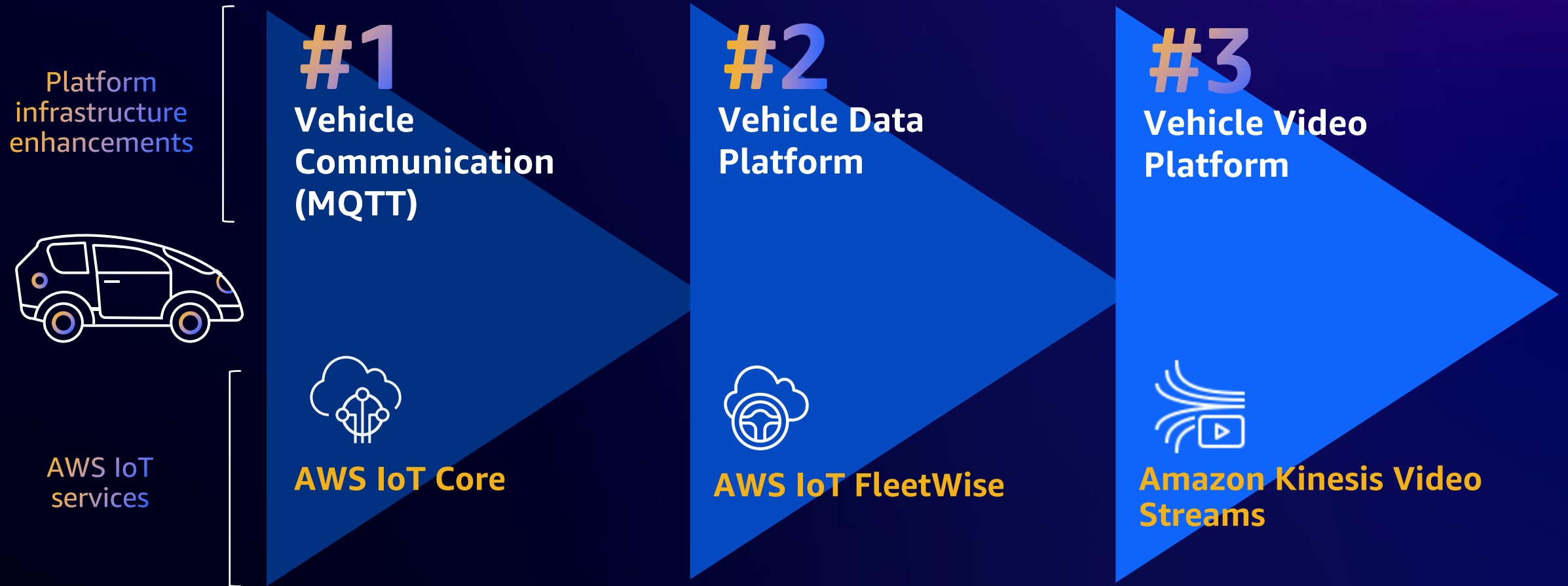


OTA  
App store  
Subscription management  
Camera streaming



CAEdge for SDV  
AV/ADAS

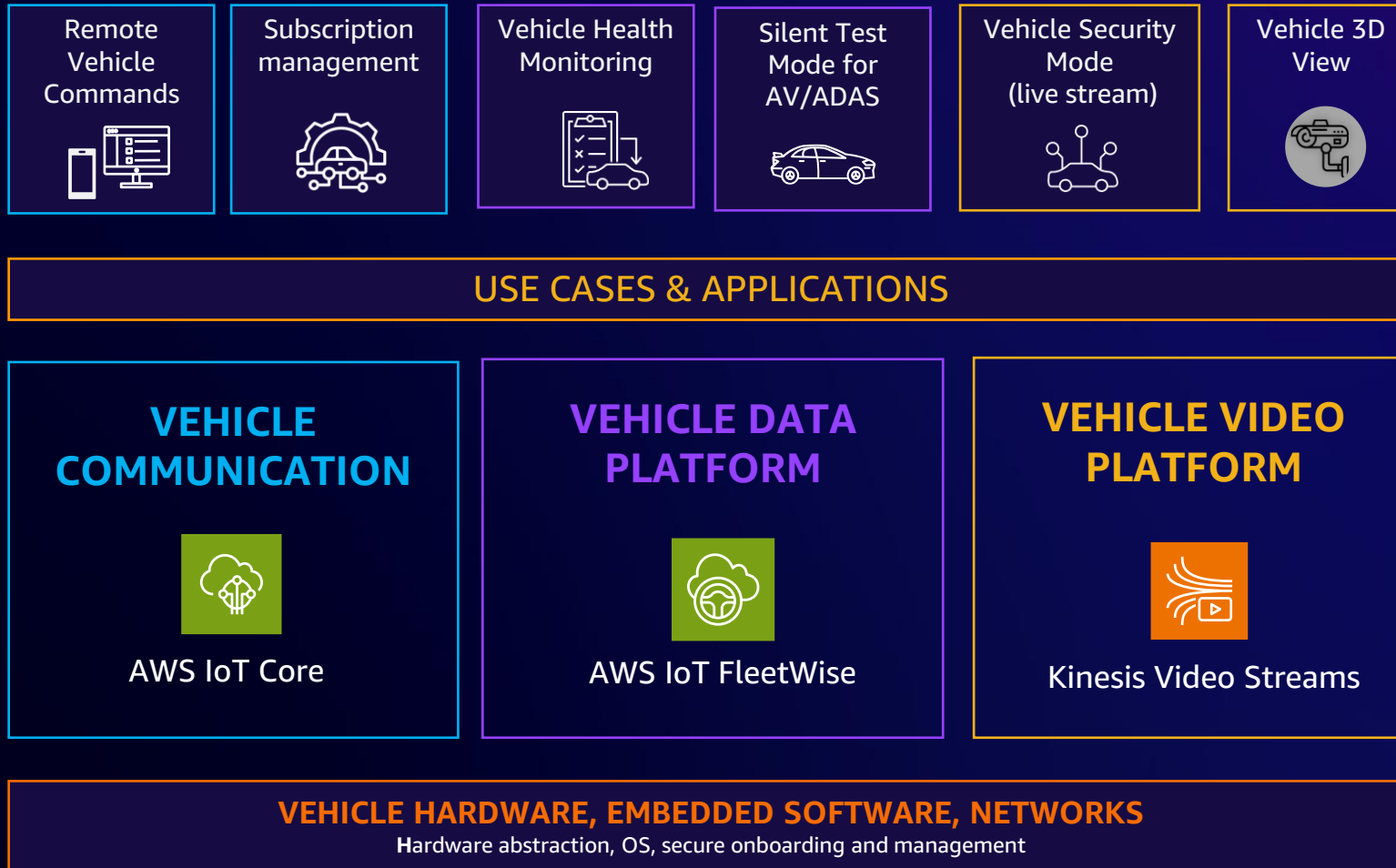
# Innovate and enhance your existing Connected Vehicle platforms with AWS IoT



# Connected Vehicle architecture with AWS IoT



VEHICLE  
PLATFORM  
SECURITY



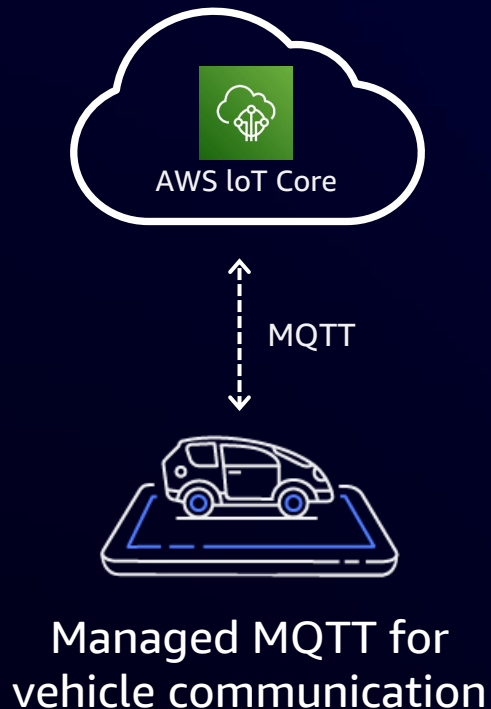
Offboard



Onboard



# Infrastructure enhancement #1: AWS IoT Core for managed MQTT



MQTT is the **de facto** standard protocol for **vehicle-to-cloud** communication

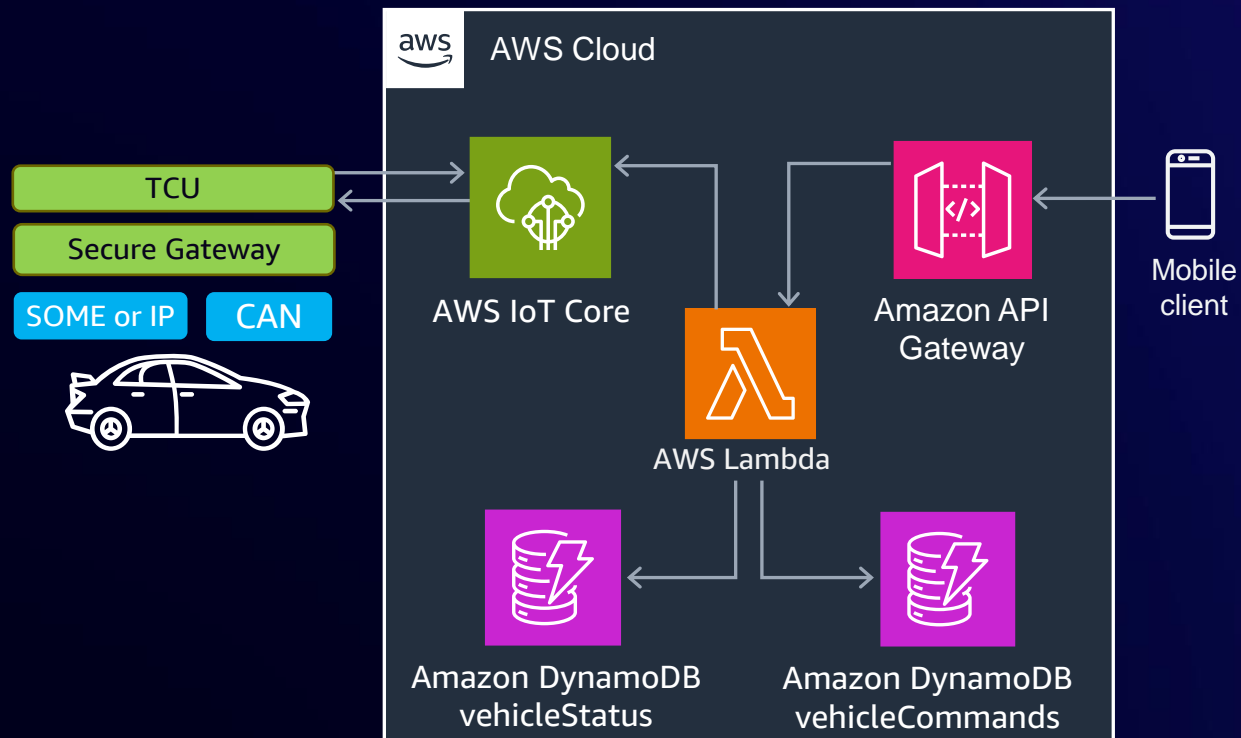


**AWS IoT Core auto scales to support millions of vehicles deployed worldwide**



**Easily build and deploy new use cases**  
(vehicle shadow, subscription management, location services)

# Remote Vehicle Commands with AWS IoT Core

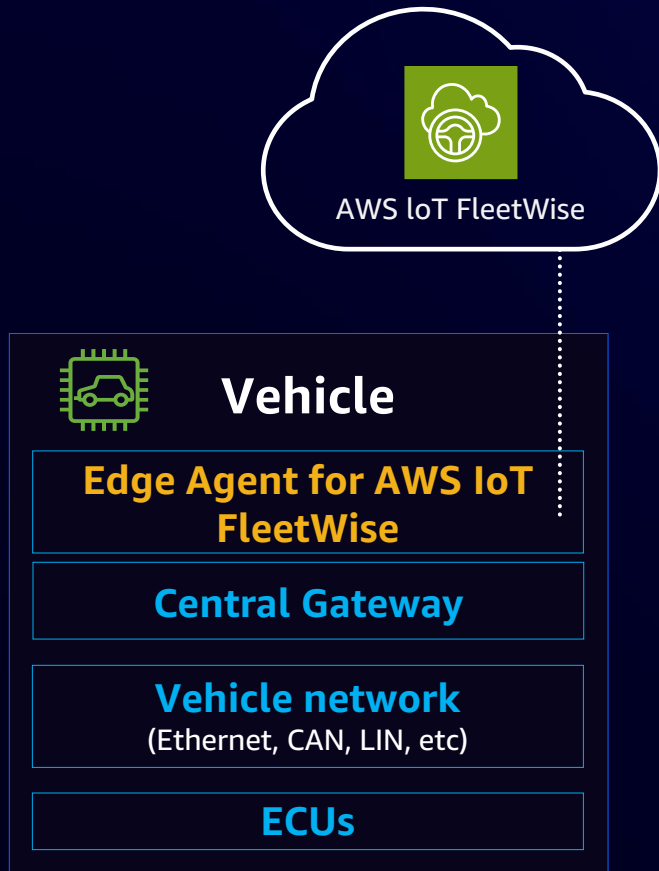


## Use case features

- Remote vehicle start/stop
- Remote lock/unlock
- Cabin preconditioning (AC/Heat)
- Enable/disable anti-theft system
- Many others...

# Infrastructure enhancement #2:

## AWS IoT FleetWise for data collection & management



**Improve data relevance** by sending only the data you need to the cloud

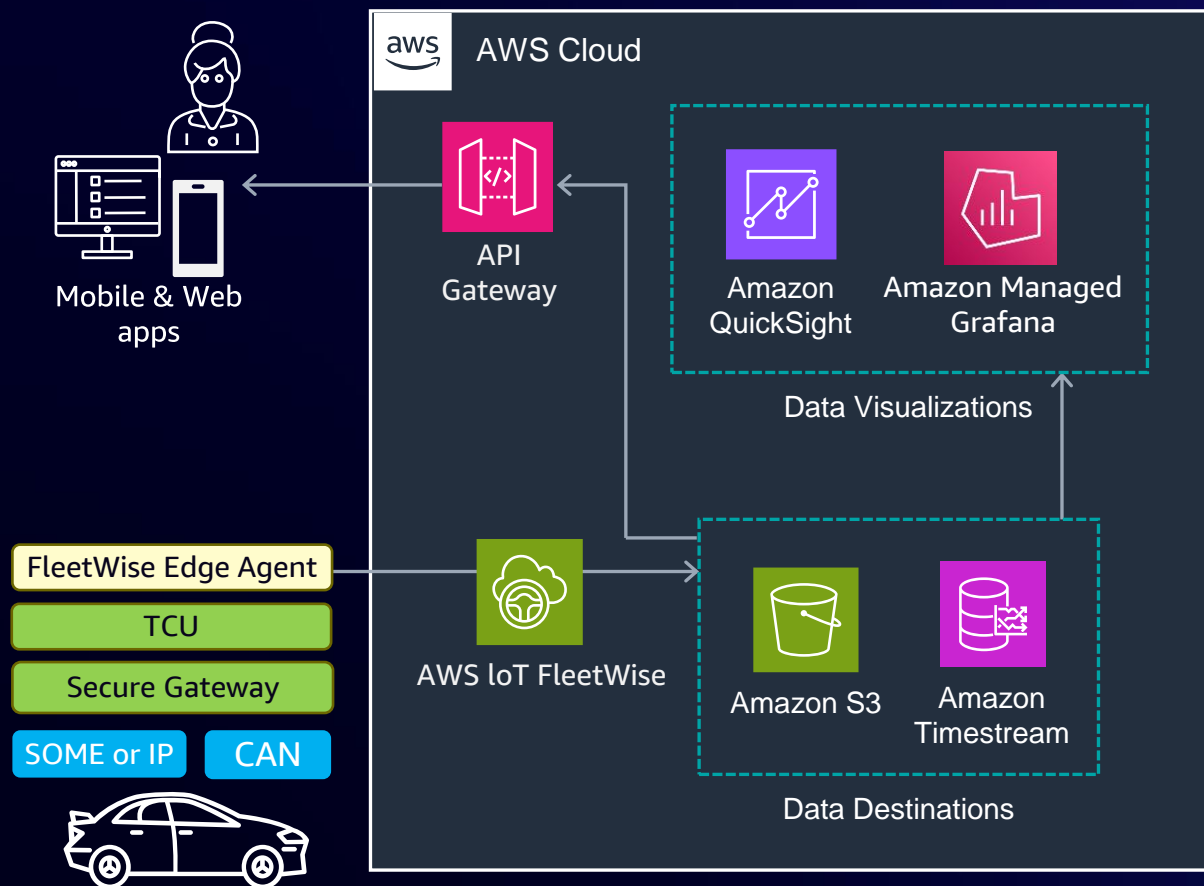


**Standardize data** from a fleet of vehicles by modeling vehicles and sensors



**Build a range of data-driven use cases**  
(vehicle data telemetry for health monitoring, vision system data for ADAS silent testing)

# Vehicle Health Monitoring with AWS IoT FleetWise

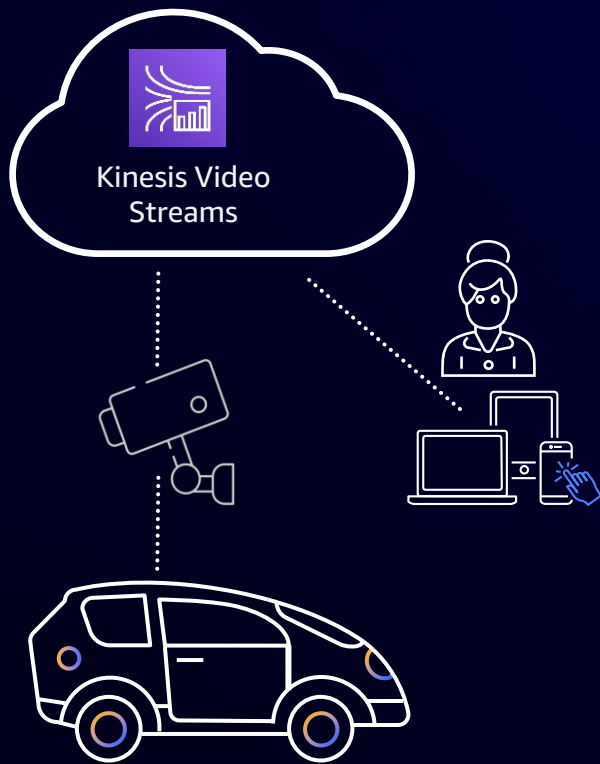


## Use case features

- Vehicle owners have access to vehicle status, maintenance alerts, and many other attributes
- OEMs can inform internal teams of vehicle health, predictive issues, and product usage (e.g., IVI)
- Drive statistics can be easily tracked for trip data use cases and new customer experiences

# Infrastructure enhancement #3:

## Kinesis Video Streams for vehicle camera use cases

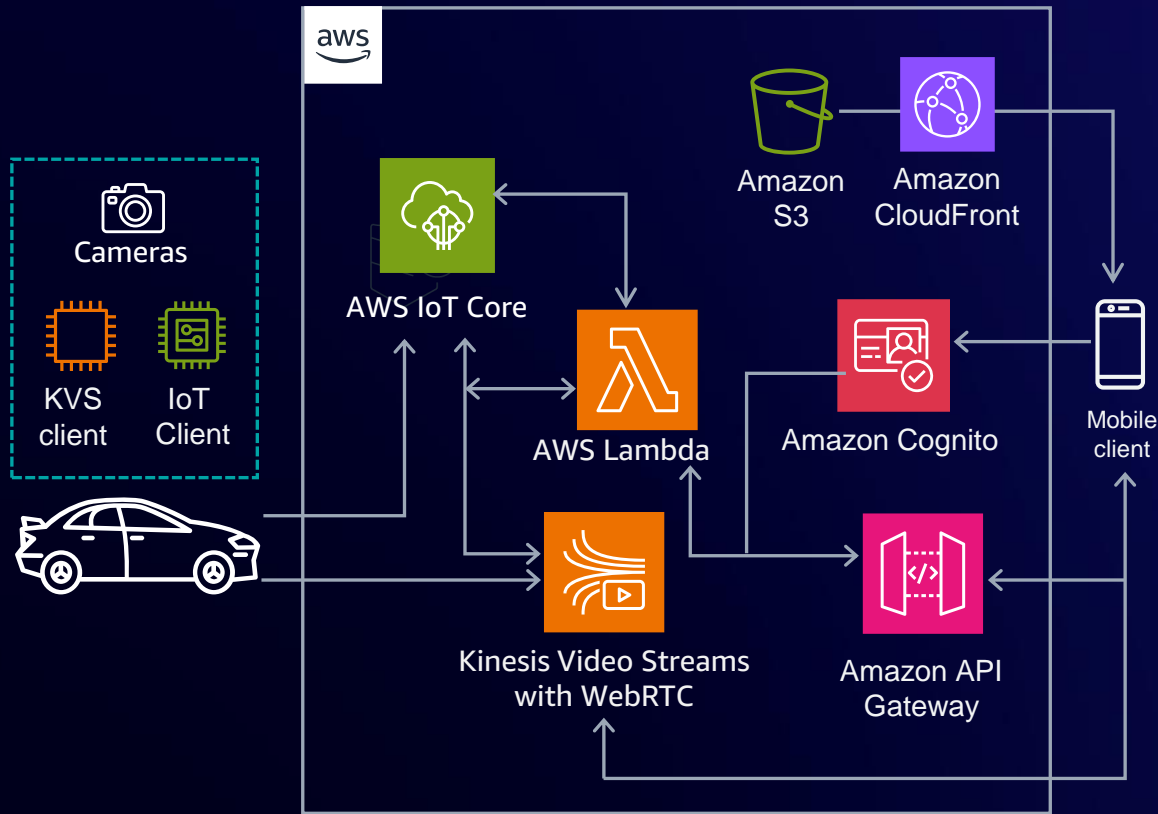


**Video streaming** from vehicle cameras (in-cabin or external) to cloud and devices

Quickly & easily **scale** to millions of vehicles and media streams **globally**

Enables **innovative** new customer **use cases** (vehicle security mode, 3D view, real-time video streaming)

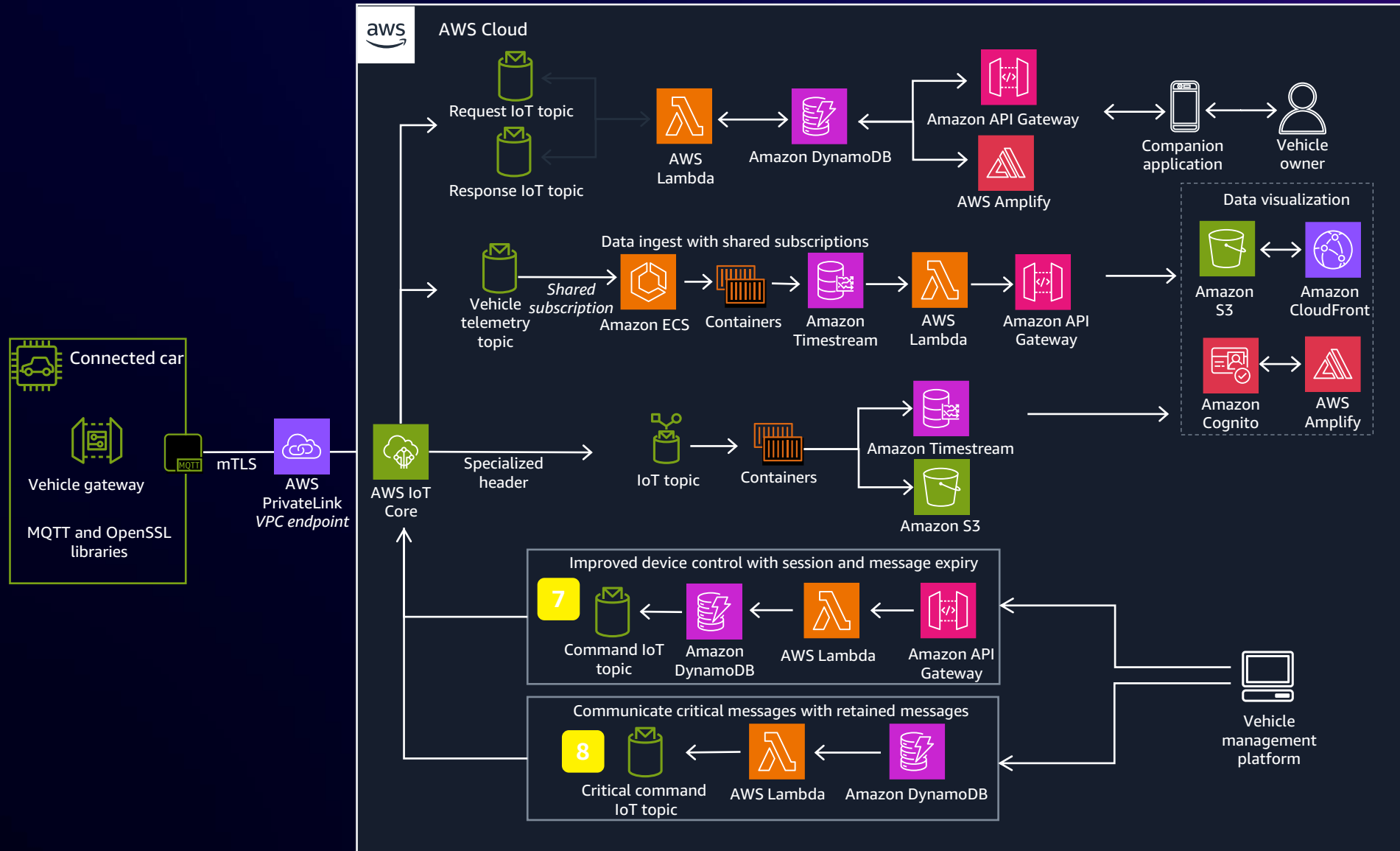
# Vehicle Security Mode with Kinesis Video Streams



## Use case features

- Build an innovative, differentiating feature using Kinesis Video Streams to live-stream video from any vehicle camera
- Customers use a mobile client to select and view a camera stream, while vehicle is in motion or stationary
- Can be used to offer Vehicle Security Mode, for event alerts and video storage or streaming to check and monitor vehicle status

# Reference Architecture: Modernizing Connected Vehicle with AWS



# Customers using AWS IoT for Connected Vehicle



**TOYOTA**

 **HYUNDAI**

**HONDA**



**Visteon**

 **WirelessCar**

**Continental** 



**motive**

**mX** | **TELEMATICS**

 **LG**



# Modernizing the Vehicle Data Platform

# What's missing?



A man with a beard, wearing a blue button-down shirt, is standing in profile, working on a laptop. The laptop is on a small black table. The background is a server room with rows of server racks and blue lighting. The text "Data delays = development delays" is overlaid in white on the left side of the image.

**Data delays = development delays**

# AWS helps accelerate development



**Accelerate software development and time-to-market**



**Release higher quality code, reduce updates and recalls**



**Deliver enhanced user experiences**



**Use vehicle data to make improvements over time**

# Connected Mobility Solution (CMS) on AWS



Managed  
**foundational**  
infrastructure to  
deploy CM  
platform



A  
comprehensive,  
extensible,  
secure, and  
flexible  
**CM architecture**



Ready-to-  
deploy **catalog**  
of use cases  
developed  
in-house or  
sourced from  
partners



A  
comprehensive  
**data strategy**  
that accelerates  
value realization



**200+ partners**  
bring solutions  
that support  
automotive  
workloads

# Accelerate development with fully managed AWS services

- AWS IoT FleetWise
- Purpose-built for the automotive industry to collect vehicle data more efficiently



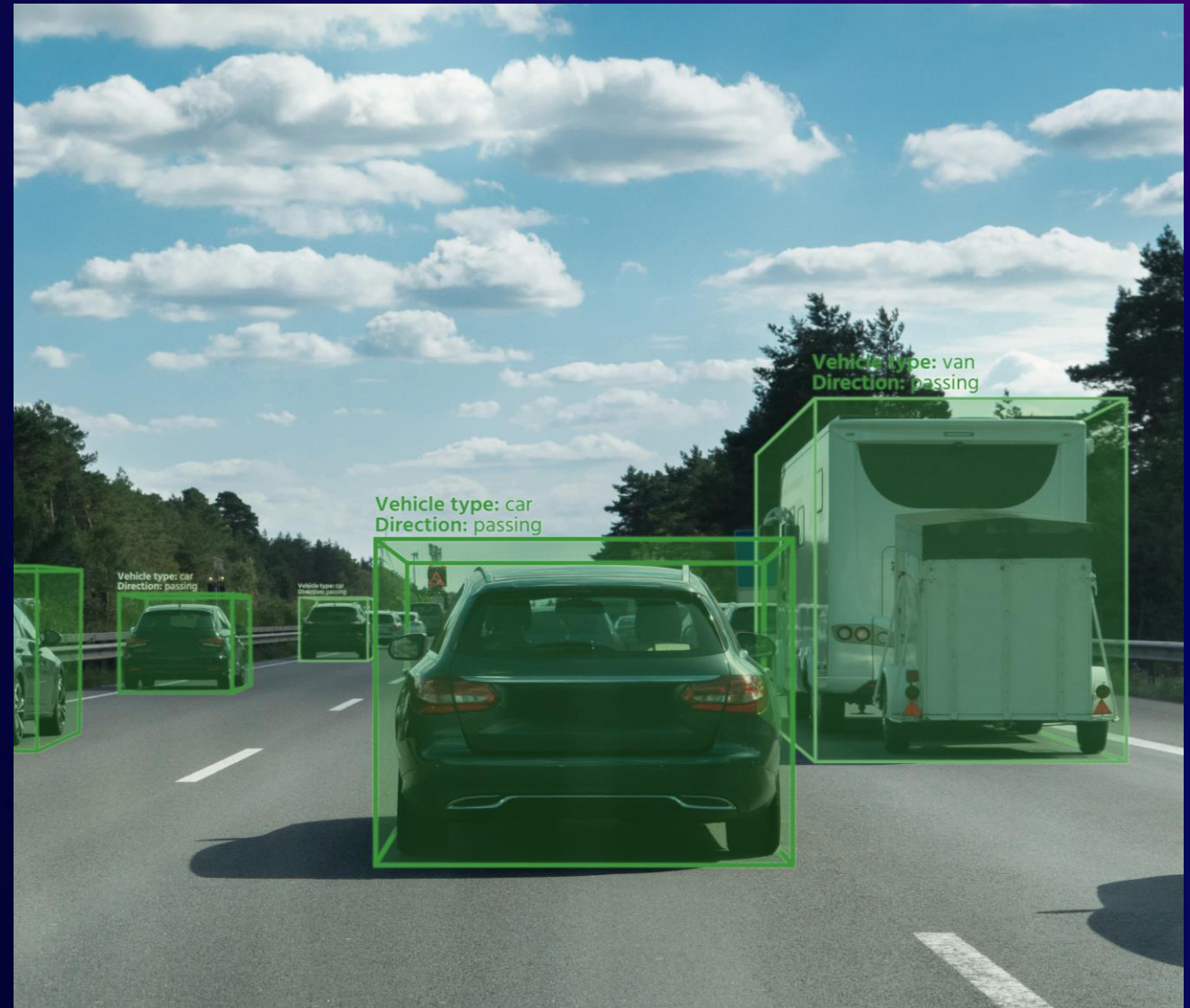
# More cars, more cameras, exponentially more data



# Vision system data from AWS IoT FleetWise

## New Preview

- Collect and organize data from vehicle vision systems that include **cameras, radars, and lidars**
- **Gain a full picture view** of structured and unstructured vision system data, metadata, and telemetry data and keep it **automatically synchronized** in the cloud
- Take advantage of the AWS IoT FleetWise **features and interfaces you already use** to collect telemetry data





“Continental has collaborated closely with AWS on developing technologies that accelerate automotive software development in the cloud. With vision system data from AWS IoT FleetWise, we will be able to easily collect camera and motion-planning data to improve automated parking assistance and enable fleet-wide monitoring and reporting.”

**Yann Baudouin**  
**Head of Data Solutions - Engineering Platform and Ecosystem,**  
**Continental AG**



# Customer Journey: American Honda Motor



Future and modified vehicles and products shown. Honda's role in research projects shown varies. Visit [honda.com](https://honda.com) or [honda.co.jp](https://honda.co.jp) for more information. ©2023 American Honda Motor Co., Inc.

# HondaLink



© 2023, Amazon Web Services, Inc. or its affiliates. All rights reserved.

# Implementing MQTT on real production vehicles

## Agenda

How connected vehicles worked before MQTT

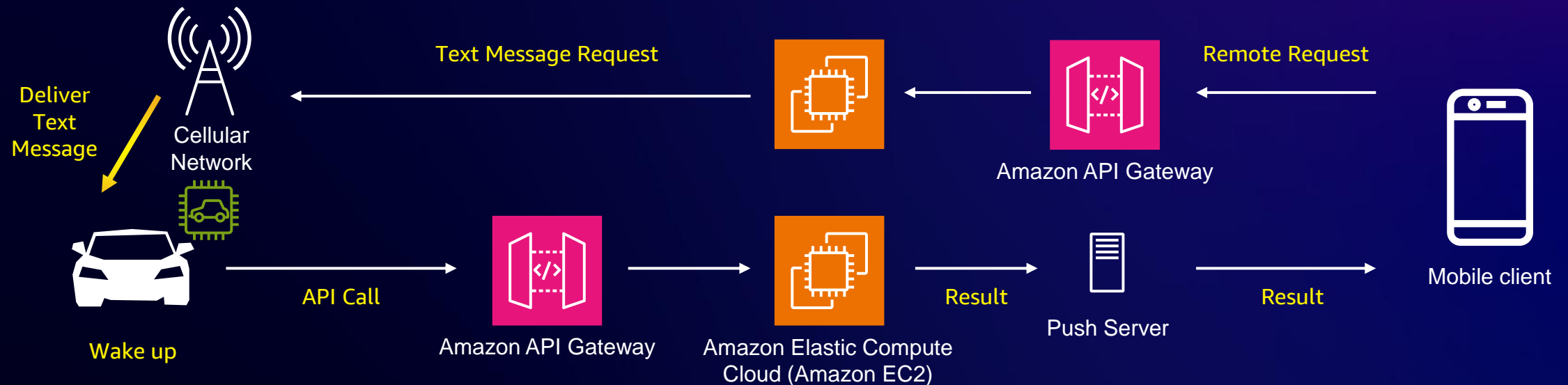
Challenges with the legacy approach

How MQTT helped resolve legacy issues

Overcoming obstacles migrating to AWS IoT

New vehicle features enabled by MQTT

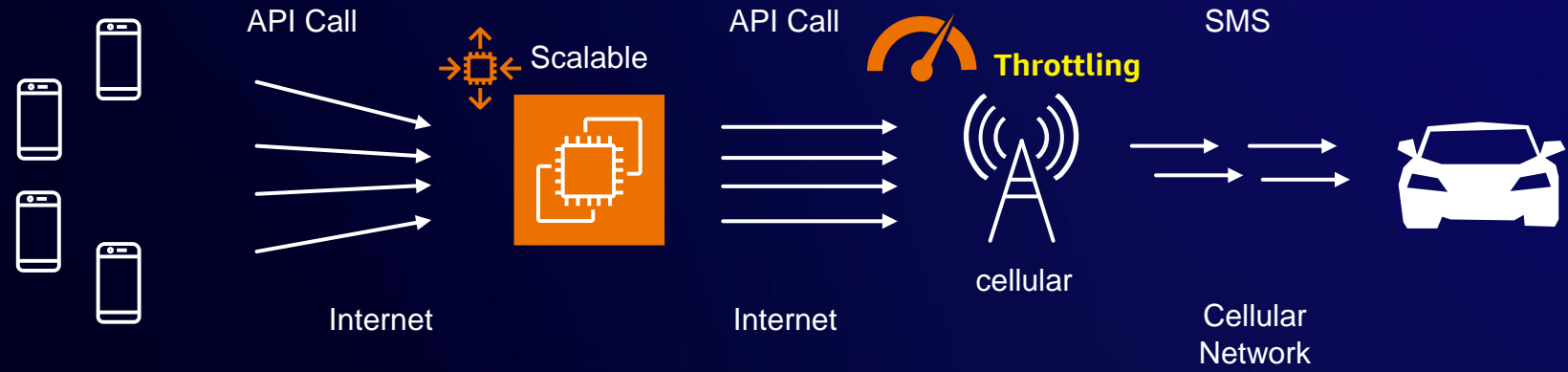
# How connected vehicles worked before MQTT



Used SMS (text messages) to wake up IoT devices  
Legacy connected vehicles also used this method

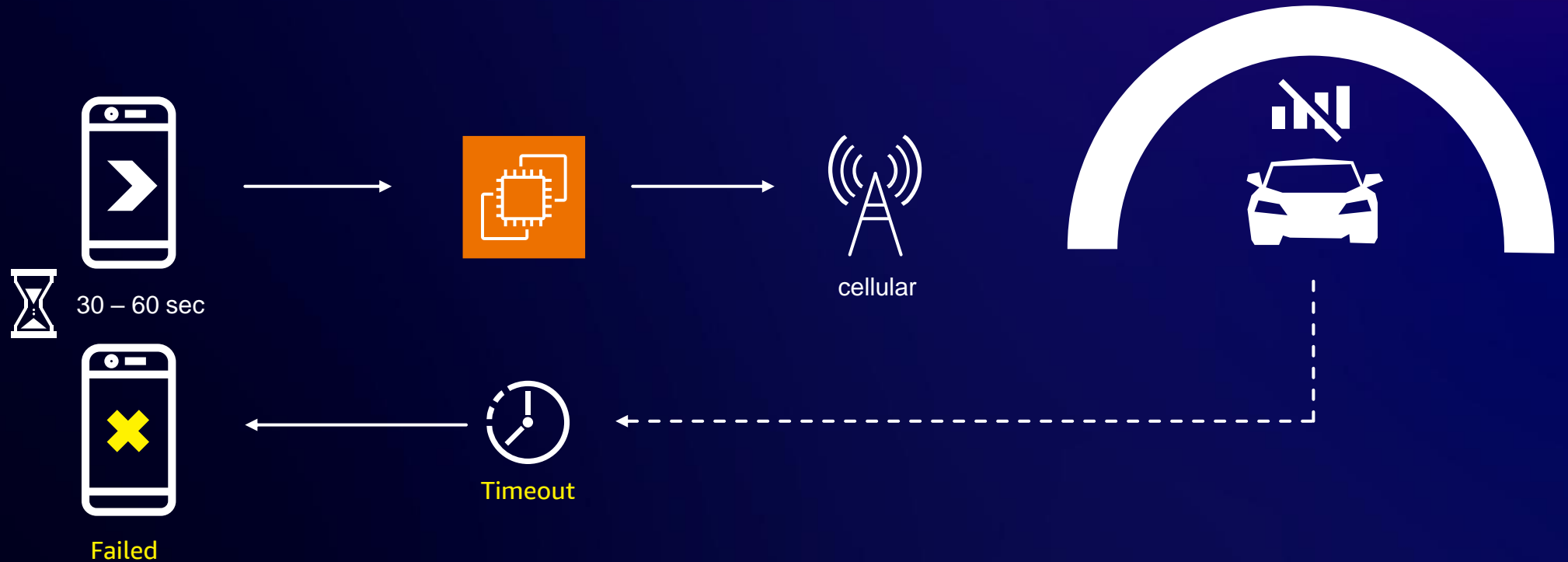
# Challenges with the legacy approach

- High latency / throttling using SMS



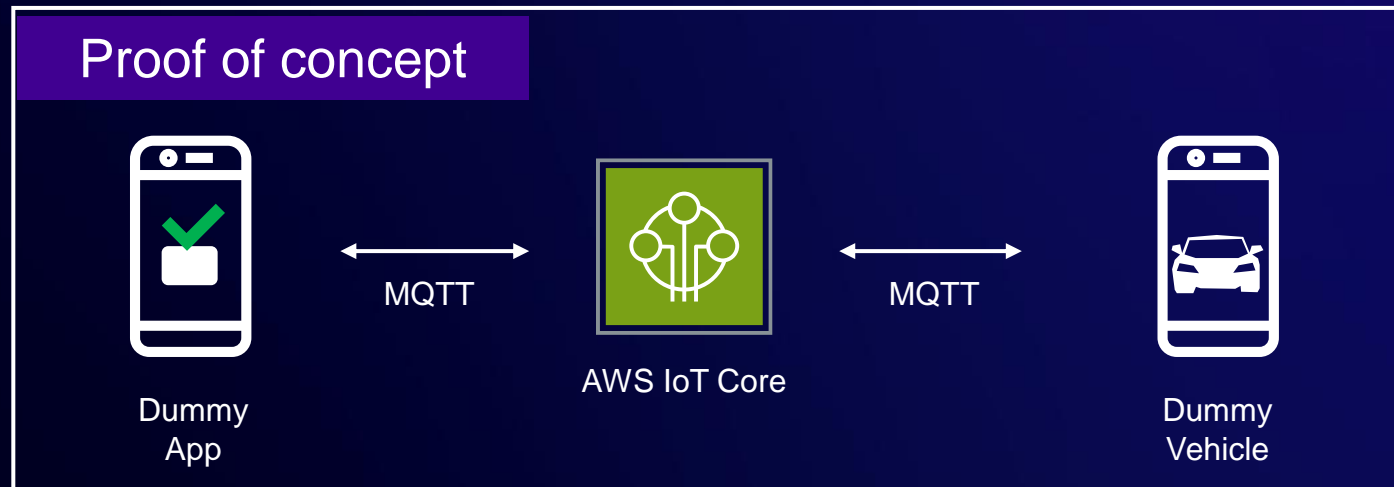
# Challenges with the legacy approach

- Timeout base architecture in low signal area



# AWS IoT launches managed MQTT support

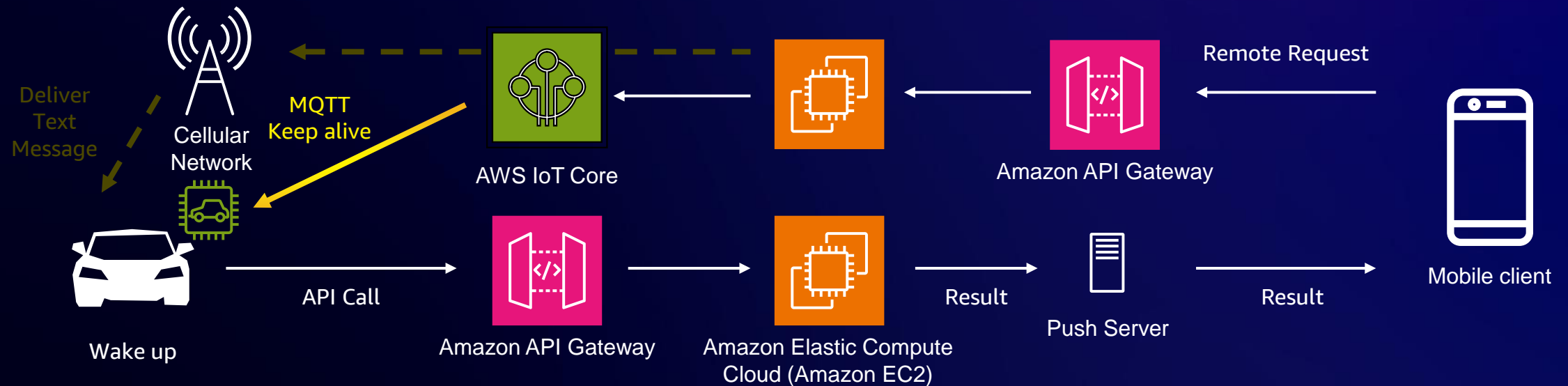
- AWS announced the managed MQTT endpoint in 2015
- Easy to start/test on AWS



Always keep an eye out for new technology

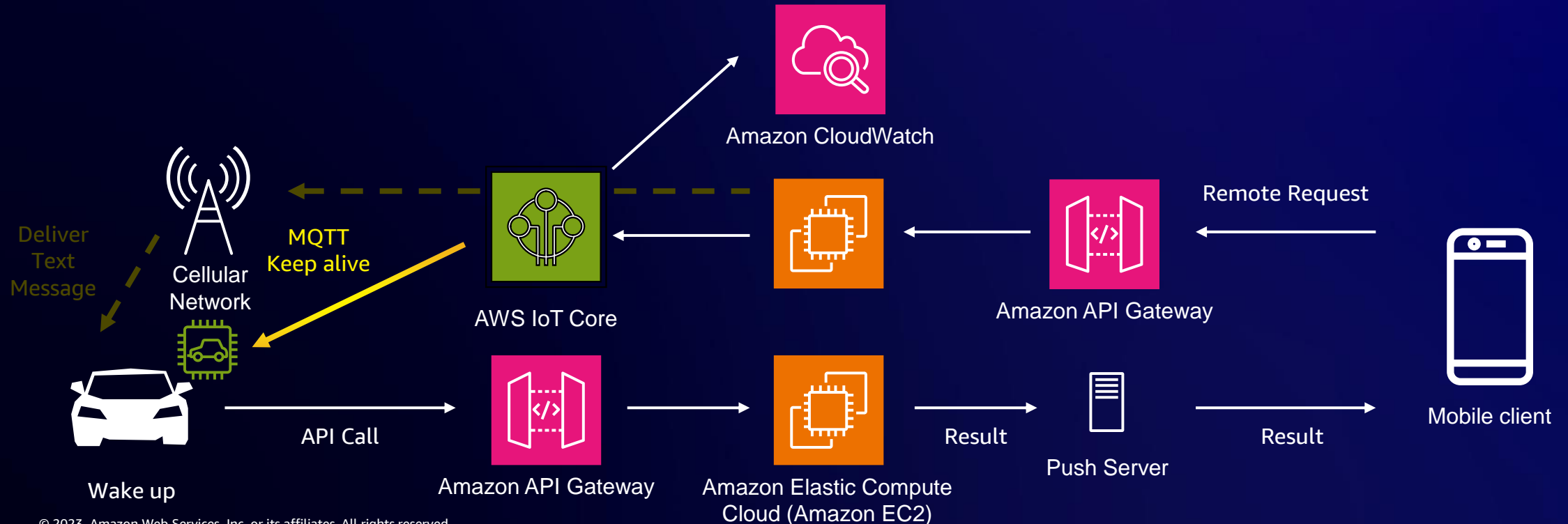
# Modernizing the legacy platform with MQTT

- Maximize legacy assets
- Minimize new technology risk



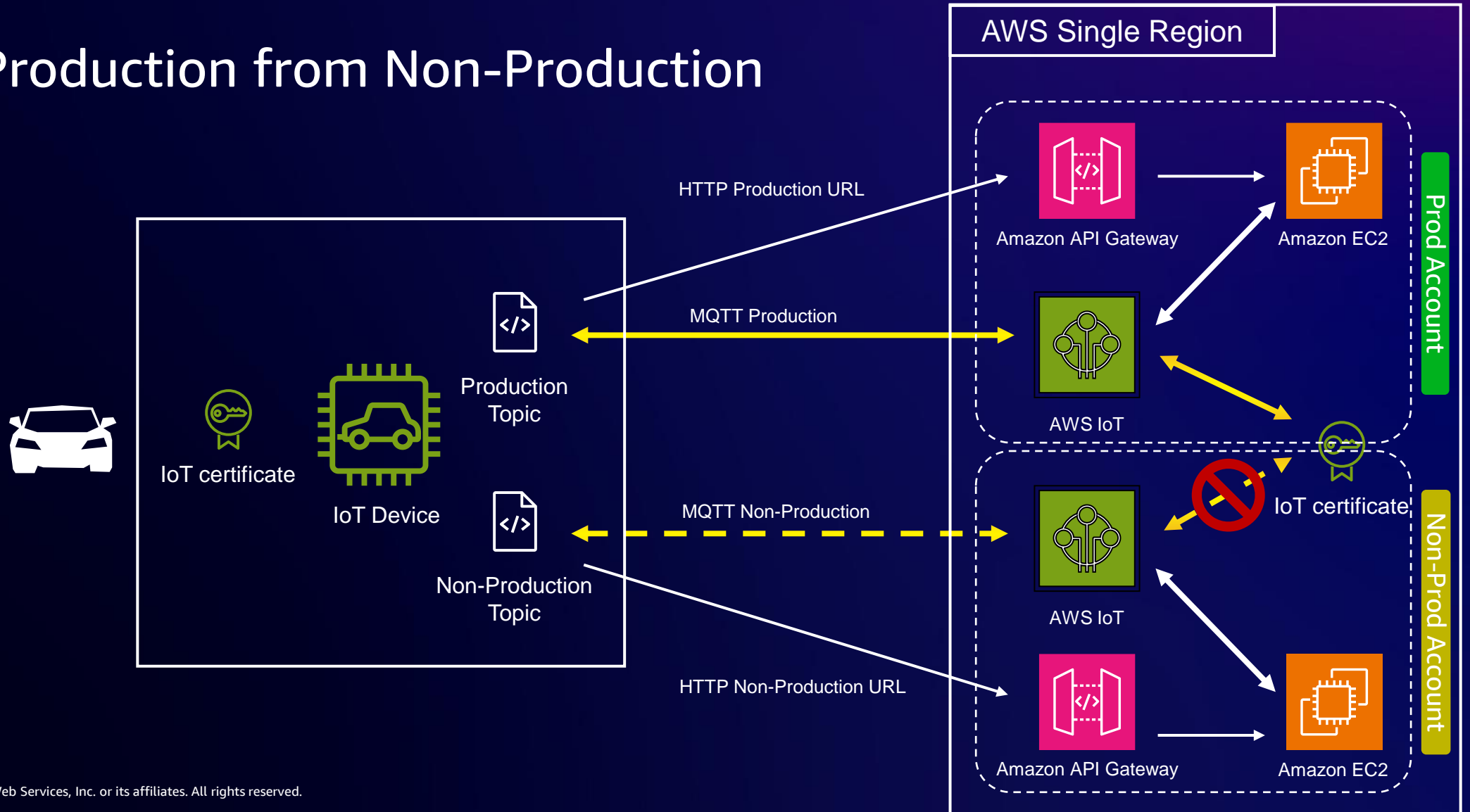
# Modernizing the legacy platform with MQTT

- Low latency for waking up the vehicle
- Be scalable during spikes
- Long-lived connections to a fully managed service
- Can observe offline before posting command



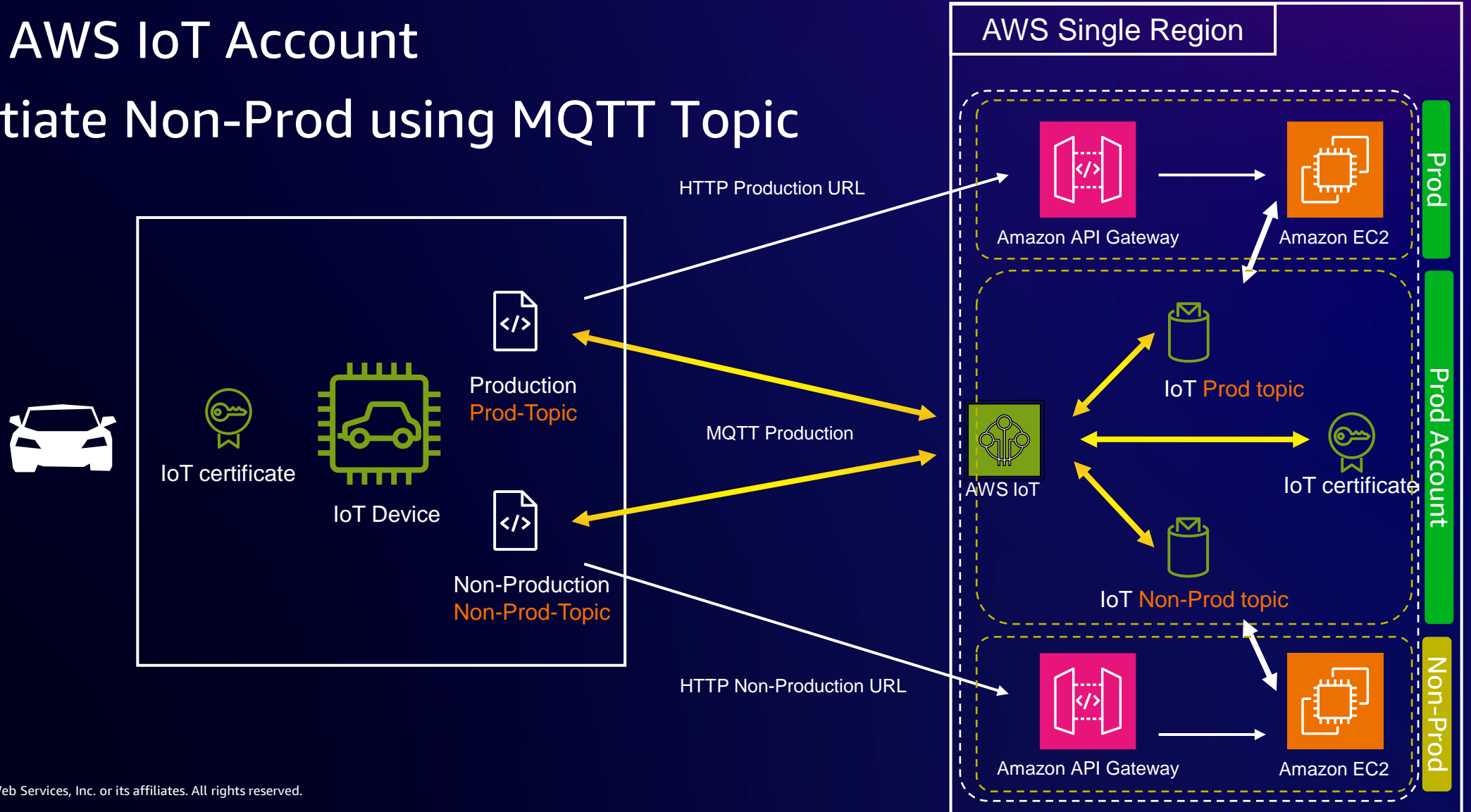
# Overcoming obstacles migrating to AWS IoT

- Isolate Production from Non-Production



# Overcoming obstacles migrating to AWS IoT

- Use one AWS IoT Account
- Differentiate Non-Prod using MQTT Topic



# New features for ACCORD using MQTT

2024  
**ACCORD**  
America's best-selling car over the last five decades.\*



©2023 American Honda Motor Co., Inc

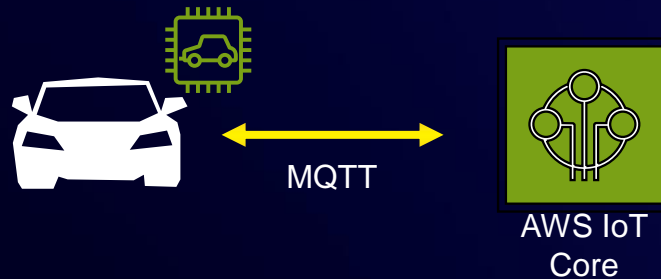


© 2023, Amazon Web Services, Inc. or its affiliates. All rights reserved.

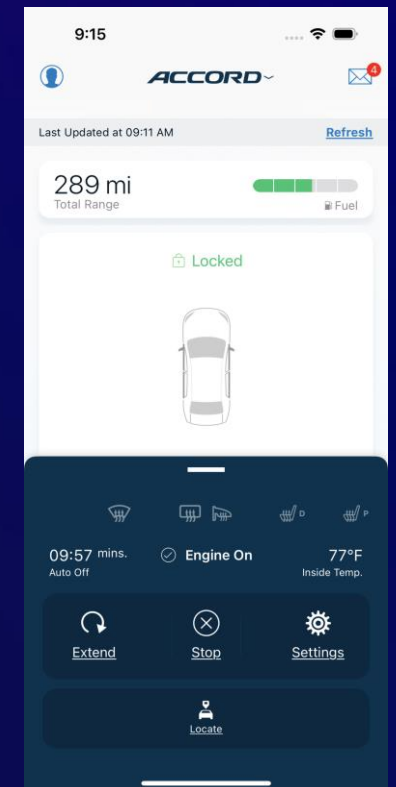
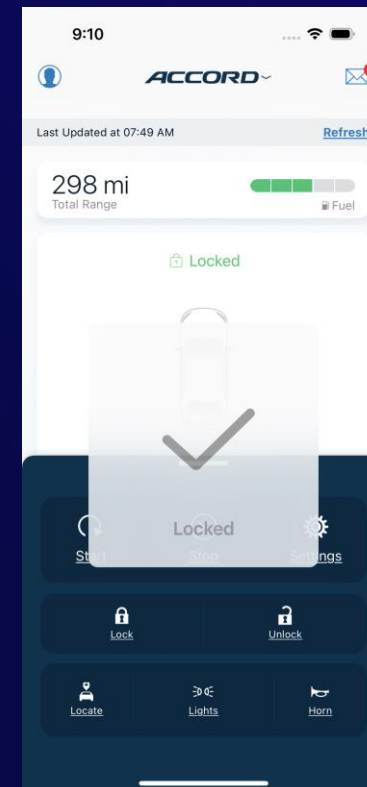
# New features for ACCORD using MQTT



- Remote door lock / unlock (improved response)
- Remote engine start with climate (improved response)



©2023 American Honda Motor Co., Inc



# All new ACCORDs have these features



LX



EX



Sport Hybrid



EX-L Hybrid



Sport-L Hybrid



Touring Hybrid



©2023 American Honda Motor Co., Inc

- Remote door lock / unlock
- Remote Start & Stop
- Geofence Alert
- Speed Alert
- Security Alarm Alert
- Vehicle Locator

# Benefit summary of managed MQTT from AWS IoT

- Best way to provide long-lived connections to a fully managed service
- Can scale automatically
- Available now for production vehicles
- Easy to develop a PoC using AWS IoT tools
- HTTP can be used for large data transactions

Closing Thought: Keep an open mind for new technology

# Takeaways & related IoT sessions

# Takeaways

1. Use AWS IoT services to enrich, modernize, and add innovations to your Connected Vehicle platform
2. Include AWS in your journey – we love to collaborate and help builders build
3. Work with your AWS team to schedule follow-up meetings

## **Related IoT sessions @ re:Invent 2023:**

**IoT 210** | Managing big data workloads from connected vehicles with AWS IoT

**IoT 311** | Build architectural patterns for IoT data ingestion and visualization

**IoT 309** | Innovate your applications using AWS IoT Core with MQTT 5

**IoT 305** | Detecting EV battery anomalies across a fleet using AWS IoT

# Thank you!



Please complete the session survey in the mobile app

**J. Lowry Snow**

LinkedIn:  
[@jlowrysnow](#)

**Andrea Ketzer**

LinkedIn:  
[@andrea-ketzer-b5636112](#)

**Yozo Takehara**

LinkedIn:  
[@yozo-takehara-68688738](#)

