



# Distributing ML at the edge

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# ML at the edge: challenges and benefits

Challenges from use cases, benefits from deployment at the telco network edge

Distributed, low latency machine learning



Reduce in-vehicle bill-of-material by offloading computing resources

Increasing amount of in-vehicle data (40+ TB/h)



Optimise service cost with shared resources

Desire for more mobile-driven services in cars harnessing advanced network functions



Seamlessly upgrade in a cloud-based environment

Needs to be developer friendly



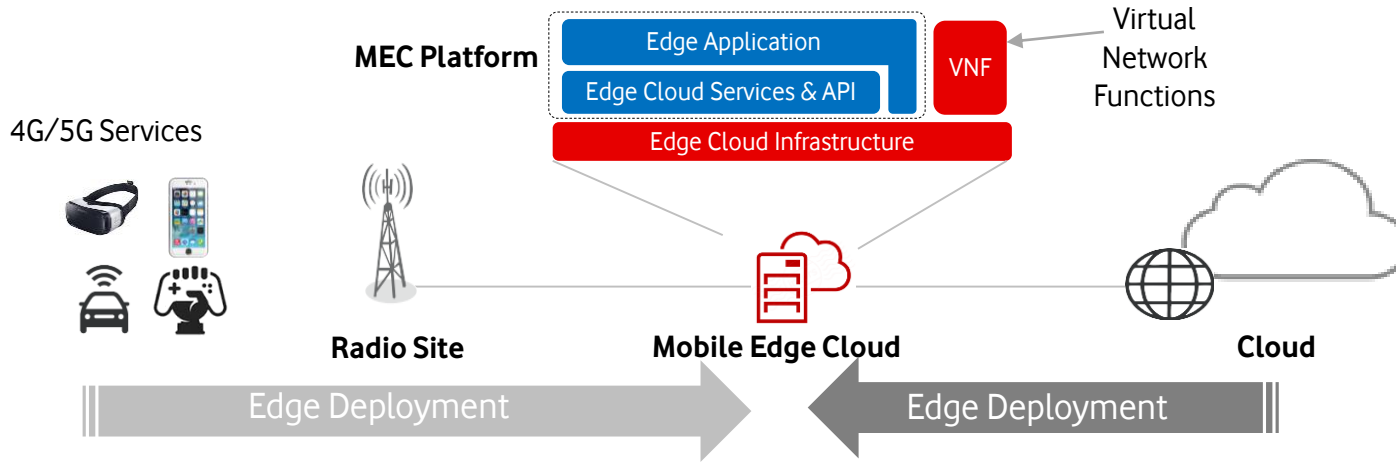
Evolve at the pace of technology leveraging the latest advances



Real-time alerts that enhance safety



# What is Mobile/Multi-access Edge Computing?

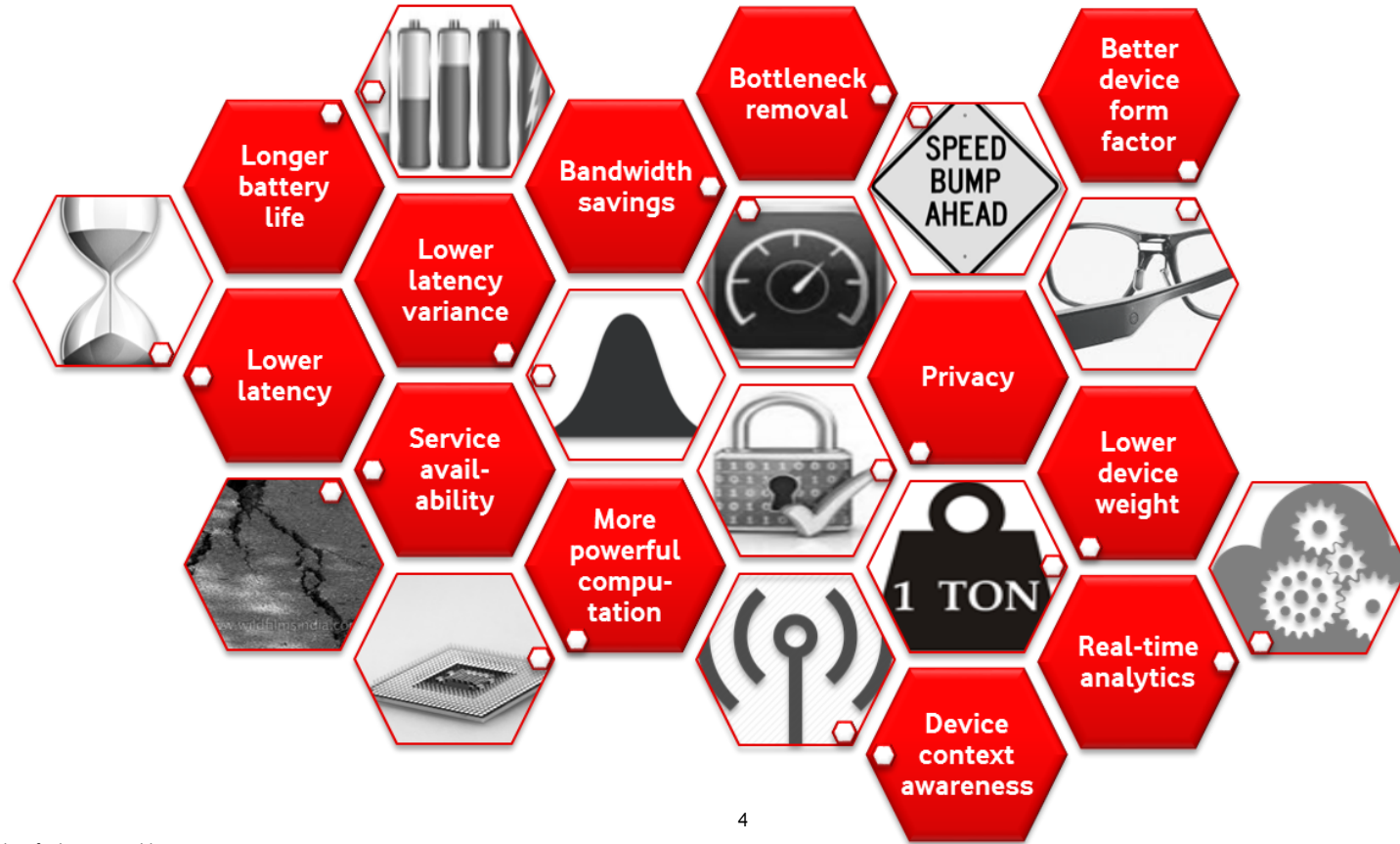


- MEC is a network architectural concept that enables **cloud-computing** capabilities at the **edge of the network**
- MEC offers **applications and content providers** cloud-computing capabilities at the edge of the network
- MEC software (i.e. MEC Platform) runs as a VNF on a cloud-based edge infrastructure
- 3<sup>rd</sup> party applications can be deployed on MEC platforms
- MEC platform can expose network APIs to applications

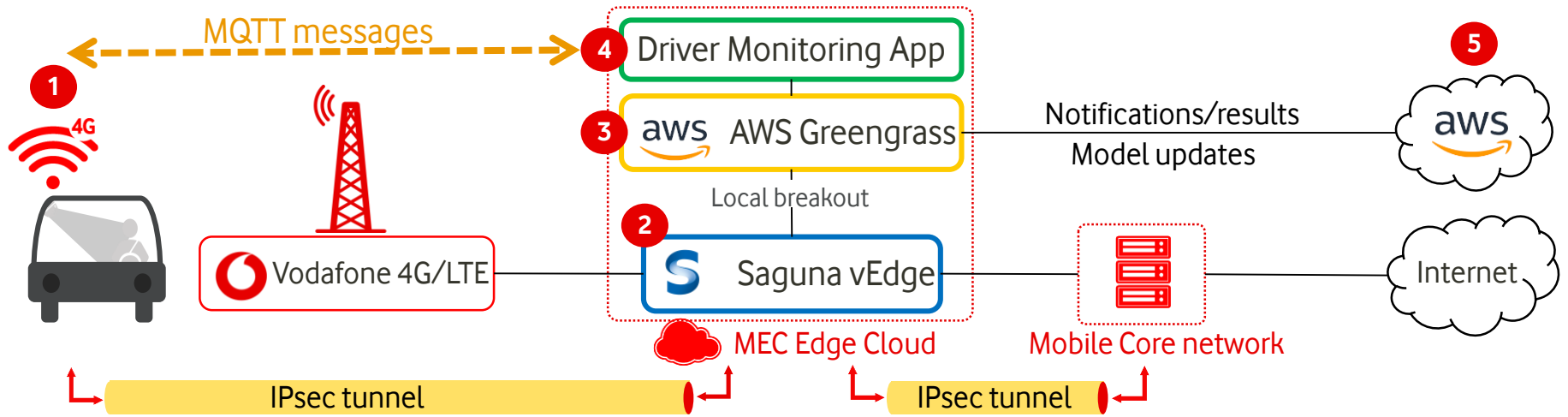


# The rationale for edge computing goes beyond latency

Latency argument is sometimes 'overhyped'



# MEC driver monitoring proof of concept



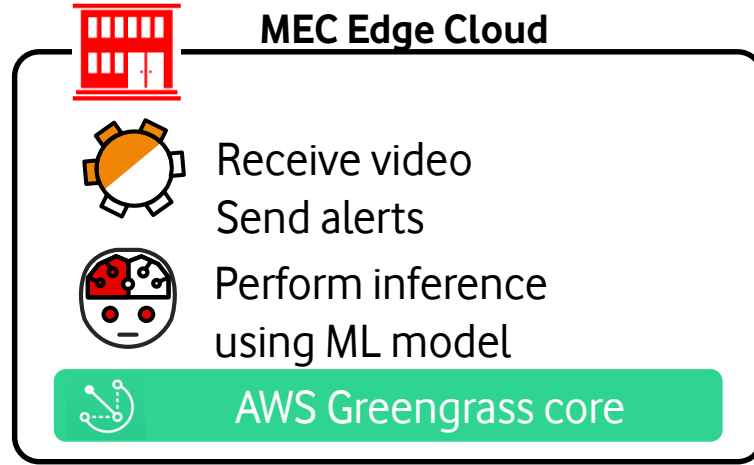
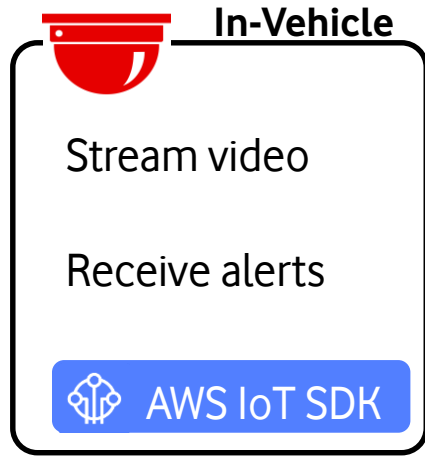
- Camera device (Raspberry Pi)
  - Connected via cellular radio
  - Video streamed to Driver Monitoring App

- Filters traffic based on traffic rules: e.g. pass-through to Internet, mirror, redirect to local application
  - Can 'chain' applications

- Camera device is in Greengrass Group
  - Runs in a VM
  - It's a 'MEC application'
  - Receives traffic from radio access as per configured traffic rules

- Edge app
  - Business logic
  - Includes neural network
- Training

# Driver monitoring application



Developed by  TensorIoT

## Convolutional Neural Network

- Two architectures explored: Inception, MobileNet
- MobileNet chosen for its speed advantage and ability to run on a light platform (as for a PoC)

## Business logic

- Classifies a series of sequential video frames
- Then makes decision on whether “distracted driving” detected
- For PoC, sends message to Raspberry Pi for local web server and displaying via browser on monitor

## Training data

- Source: Kaggle.com
- Dataset: State Farm Distracted Driver Detection



The future is exciting.



**Ready?**