Driving to the **Edge**

How Open APIs and Open RAN will Transform Ordinary Parking Lots into Dynamic Data Centers

Natasha Tamaskar
VP, Global Marketing and Sales Strategy, Radisys
The Next 20 Minutes

- Auto Industry Evolution
- Connected & Autonomous Vehicles
- Increasing Role of Mobile Networks in Realizing the Vision
- Challenges: What it takes
Transportation Industry On the Brink of a Revolution?

$273 Billion
Potential application revenue of connected vehicles by 2026

Drivers
Safety, Efficiency, Comfort, Optimized Maintenance

New Innovation
Sensors, AI, Big Data, Network

New Ecosystem
Device, apps, content provider, auto manufacturer, network operators and vendors

Source: GSMA, Machine Research
Comes With the Tsunami of Mobile Data

4 TB per day

Estimated amount of data that an autonomous car will generate in about an hour and a half of driving

Source: Intel

CAMERAS
~20–40 MB PER SECOND

RADAR
~10–100 KB PER SECOND

SONAR
~10–100 KB PER SECOND

GPS
~50 KB PER SECOND

LIDAR
~10–70 MB PER SECOND

Source: Intel
Unforeseen Requirements of Low Network Latencies

Latency

Low: 10ms

Very-Low: 5 ms

Ultra-Low: 1 ms

Applications

Experience

Time Sensitive

Mission Critical

Vehicle Steering

Traffic Efficiency

Personal Services

Ultra-Low: 1 ms

• Collision Warning
• Platooning
• Self-Parking
• Autonomous Navigation

Very-Low: 5 ms

• Real time traffic re-routing
• Bird’s eye view of roads and parking lots
• E-Tolling
• Fleet Management

Low: 10ms

• Infotainment
• Parking subscription
• LBS
• Traffic updates
• Augmented Maps

Vehicle Steering

Traffic Efficiency

Personal Services

Unforeseen Requirements of Low Network Latencies
Smarter Auto
Requires next level of connectivity and intelligence
Autonomous Driving Needs Smarter Networks

Closed
Vendor lock-ins, slow time to market and high innovation cost

Open
Open white box hardware and software (NFV, SDN) efficiencies

Monolithic
Integrated control and data, proprietary interfaces

Disaggregated
Disaggregated control / data, Open APIs

Static
Pre-programmed control logic and fixed network resources

Programmable
Programmable based on real world network conditions

Fixed
Integrated RRU & BBU with high cost last mile transport

Flexible
Deployment architecture and front haul agnostics

Roadside Comm.
Wired/ Wireless

Telematics
2G/3G/4G

Safety Driving
V2X (802.11P 4.5G)

Comfort Driving
5G (5GNR)
MEC Paving the Path - Open Principles
Distributed Intelligence

- New standards and initiatives driving use case: 3GPP Cellular V2X in Rel 16, LF Edge, ETSI
- Laws of Physics and Economics
  - Need for localized data processing: High Bandwidth Data Analytics at the Edge – AR/VR, HD Maps
  - Local Breakout of Data to Local Service Providers - Telematics
  - Real-time RAN Aware Data Treatment – FOTA, SOTA, Emergency Response
  - Location Aware Service Insertion Based on Crowdsourced Data
Use Case: Transforming Ordinary Parking Lots into Dynamic Data Centers

Self Parking Cars: 62% reduction in space needed if the garage was reserved exclusively for self-parking cars.
Use Case: RAN Aware Over The Air (OTA) Upgrade of Vehicle Firmware

CSPs can save on firmware transport costs

Higher reliability and policy enforcement to prevent upgrade failures
Pulling Together the Solutions
What Does it Take to Pull Together a Mobile Edge Solution?

3 major problems to be solved:

#1: Identifying choices that map to each domain & location

#2: Software and Hardware Integration of those choices

#3: Functional & performance testing, including scaling

Ecosystem has to be interop validated in a multi-vendor “neutral” architecture
Open Building Block Approach

RSYS, OpenSource or 3rd Party Building Blocks

- MEC Apps
- MEC Platform
- Orch & ME Platform Mgmt
- NFVi
  - Data Plane
- RADISYS System Integration
- Ext. Network
- Broadband Network
- 3GPP Network
- Virt. Infra. Mgr (VIM)

Validate Deployment Location Choices

Complete Integrated MEC Solution with Zero Vendor Lock-in

- MEC Apps
- MEC Platform
- Orchestration & ME Platform Management
- NFVi
  - Data Plane
- Virt. Infra. Manager (VIM)
- Broadband Network
- 3GPP Network
- Ext. Network
Summary

• The automobile industry is on the verge of disruption, creating new ecosystems with auto manufactures, software and content providers as well as network operators.

• Market movement is dependent on innovations in the mobile space.

• “Open networks” will not be good to have but a requirement.

• Open RAN will bring in new advancements in innovation, but will require strong understanding of “how” to put these solutions together – hardware, software, open, proprietary, edge, centralized.