5GAA MEC4AUTO:

Edge computing for automotive services

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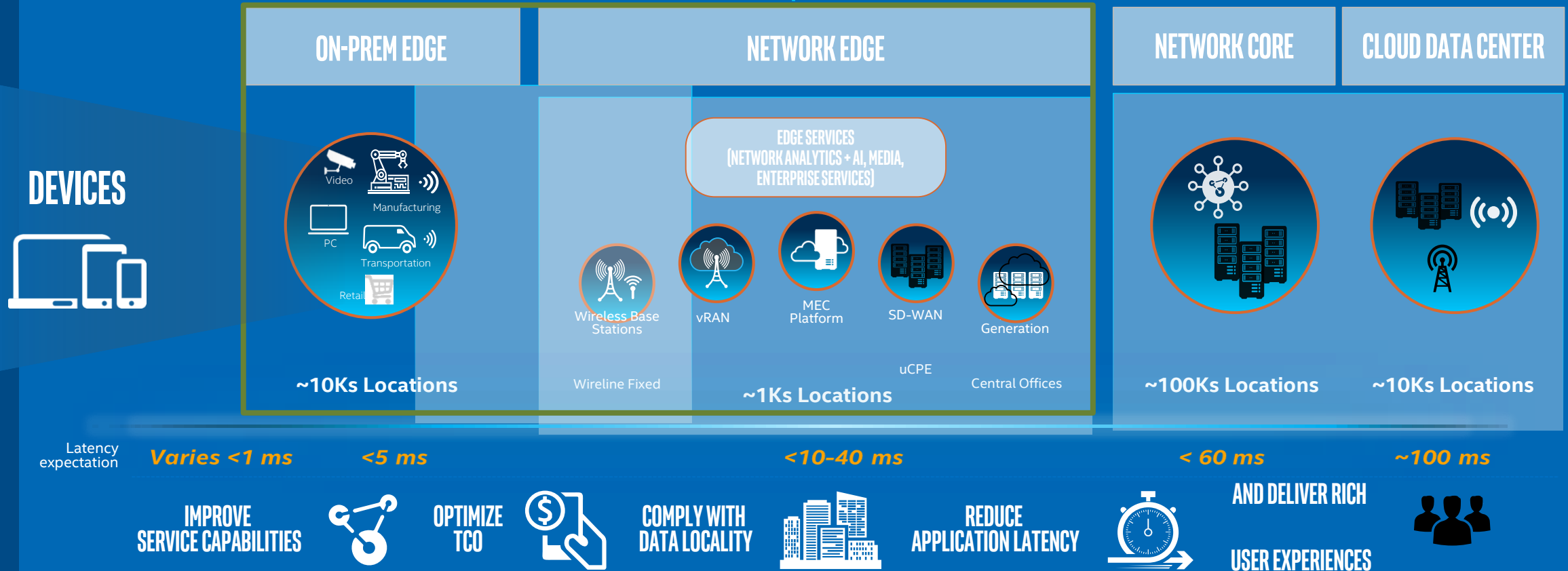Senior Standards and Research Engineer

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Rise of the Intelligent Edge

Edge Computing: Placement Of Data Center-Grade Network, Compute and Storage Closer to the Endpoint Devices

DEVICES

ON-PREM EDGE	NETWORK EDGE	NETWORK CORE	CLOUD DATA CENTER

EDGE SERVICES
(NETWORK ANALYTICS + AI, MEDIA, ENTERPRISE SERVICES)

Video
Manufacturing
PC
Transportation
Retail

Wireless Base Stations

vRAN

MEC Platform

SD-WAN

Generation

~10Ks Locations

Wireline Fixed

uCPE

Central Offices

~1Ks Locations

~100Ks Locations

~10Ks Locations

Latency expectation | *Varies <1 ms* | *<5 ms* | *<10–40 ms* | *< 60 ms* | *~100 ms*

IMPROVE SERVICE CAPABILITIES

OPTIMIZE TCO

COMPLY WITH DATA LOCALITY

REDUCE APPLICATION LATENCY

AND DELIVER RICH

USER EXPERIENCES

Why a dedicated WI for Edge Computing/MEC?

- Edge Computing offers Cloud Computing capabilities at the Edge of the Network.

- 5GAA considers Edge Computing as one of the key supporting technologies for many V2X services for Connected Vehicles and for Automated Driving.

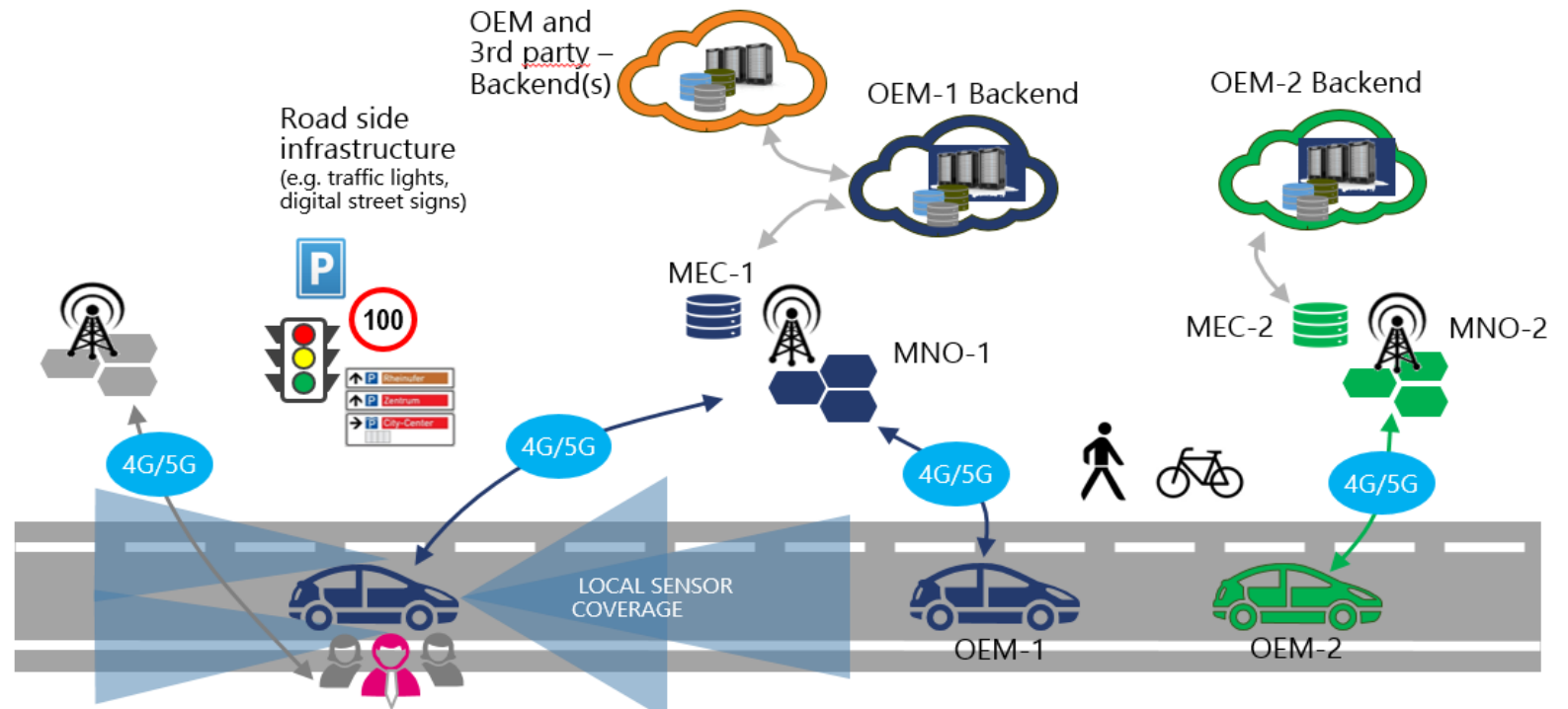- Still some challenges for the successful deployment of Edge Computing for V2X services

5GAA MEC4AUTO scope and high-level objective

" *...demonstrate the use of Multi-access Edge Computing (MEC) technology for automotive services, for example, when two distinct automotive vendors can truly test at least three use cases involving two distinct MNOs employing network infrastructure provided by two distinct infrastructure vendors.*"
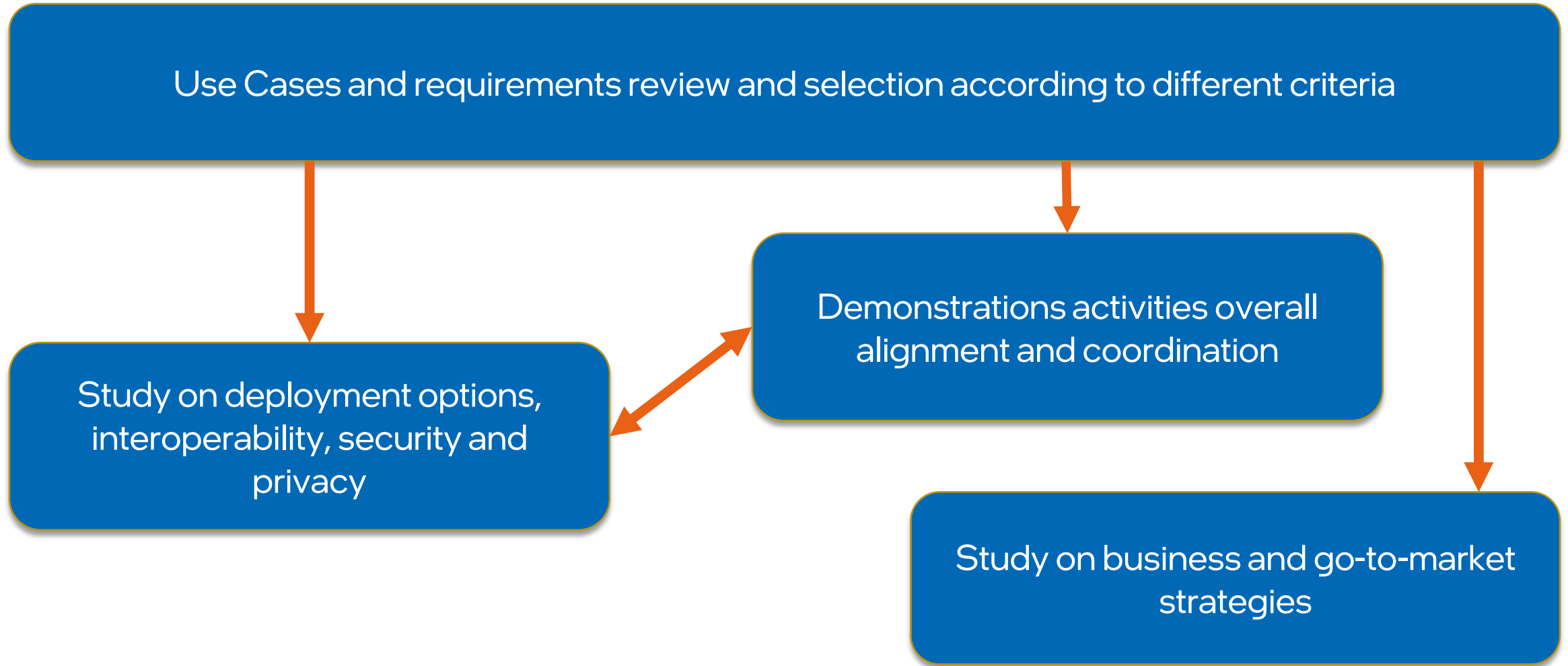
5GAA MEC4AUTO High-level Long-term Objective

Demonstrate the use of Multi-access Edge Computing (MEC) technology for automotive services:

- Multiple automotive vendors – Multi-OEM
- Multiple network infrastructure operators – Multi-MNO
- Multiple network vendors

5GAA MEC4AUTO Work Structure

Use Cases and requirements review and selection according to different criteria

Study on deployment options, interoperability, security and privacy

Demonstrations activities overall alignment and coordination

Study on business and go-to-market strategies

Use Cases and requirements review and selection according to different criteria

5GAA MEC4AUTO

5GAA MEC4AUTO Use Cases and Requirements Review and Selection According to Different Criteria
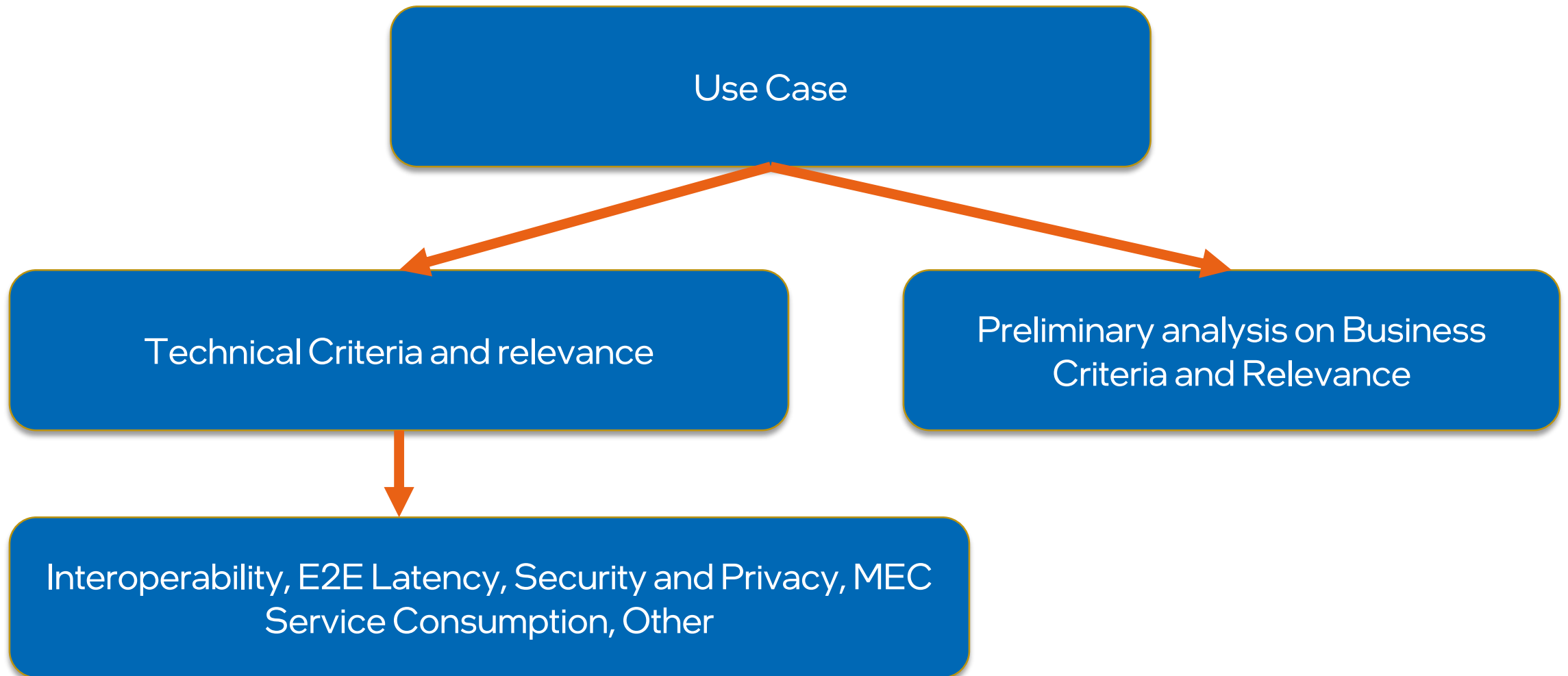
Topics:

- Sources of V2X use cases enabled by MEC

- Criteria for selection of use cases

- Analysis of selected use cases

- MEC APIs and introduction of Conformance Test specifications for V2X interoperability

5GAA MEC4AUTO Criteria for Selection of Use Cases

- Main criteria to MEC relevance

    - Interoperability in Multi-stakeholder environments

    - MEC performance and related KPIs

- Viability of Demonstration

- Analysis of Potential Value Chain and Business Potential

5GAA MEC4AUTO Use Cases Evaluation

Use Case

Technical Criteria and relevance

Preliminary analysis on Business Criteria and Relevance

Interoperability, E2E Latency, Security and Privacy, MEC Service Consumption, Other
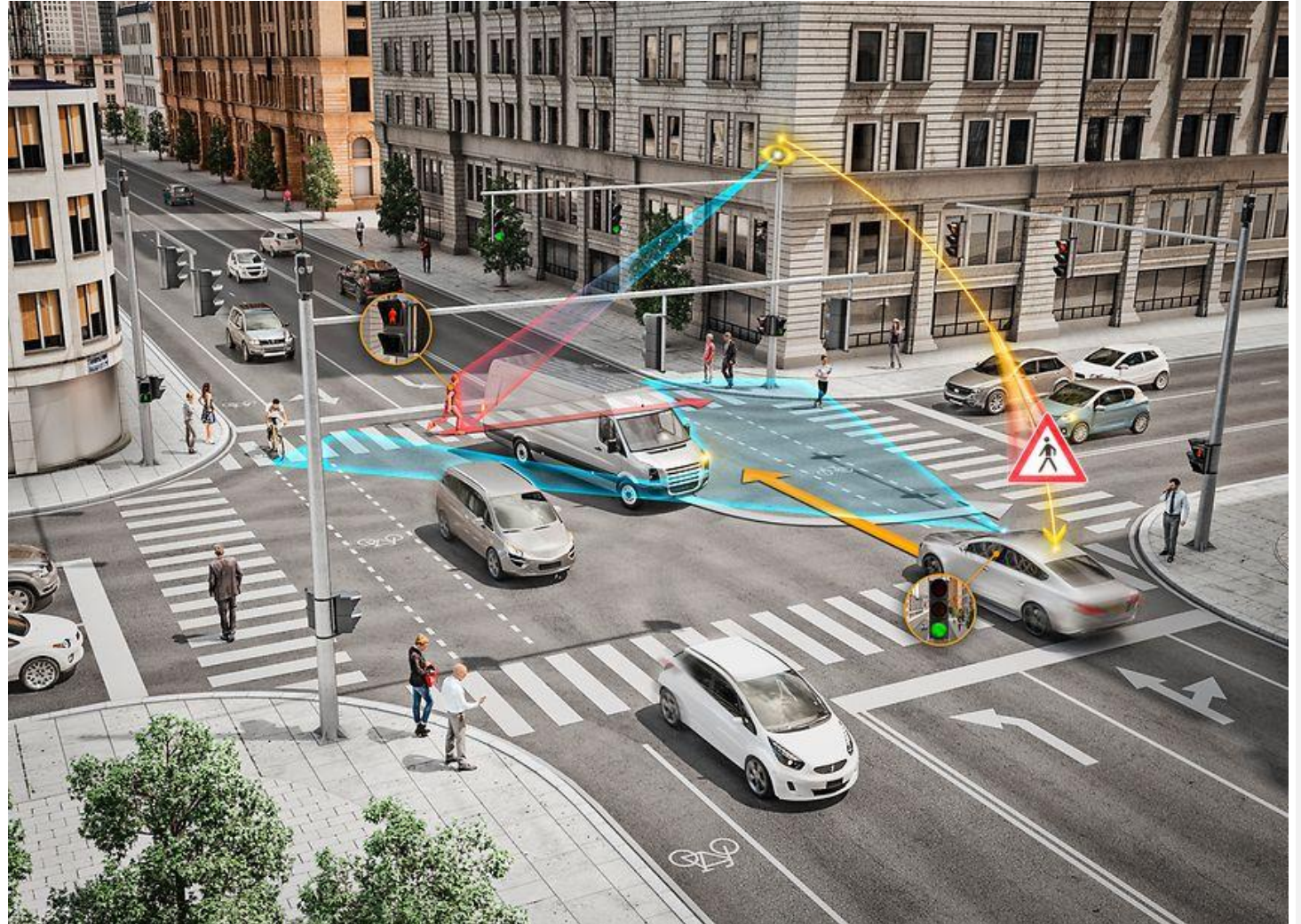
5GAA MEC4AUTO Use Cases

- Use cases analyzed:

  - See-through

  - In-Vehicle Entertainment (IVE)

  - Intersection Movement Assist (IMA)

  - Vulnerable Road User (VRU) protection

  - Vehicle Platooning in "steady state"

MEC4AUTO Use Case

VRU Protection

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MEC4AUTO Use Case

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Intersection Movement Assist

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In-Vehicle Entertainment

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MEC4AUTO Use Case

High bandwidth, up to 10 Gbps

Low latency, almost real-time

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See-Through

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MEC4AUTO Use Case

Platooning

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Study on deployment options, interoperability, security and privacy
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5GAA MEC4AUTO Study on deployment options, interoperability, security and privacy
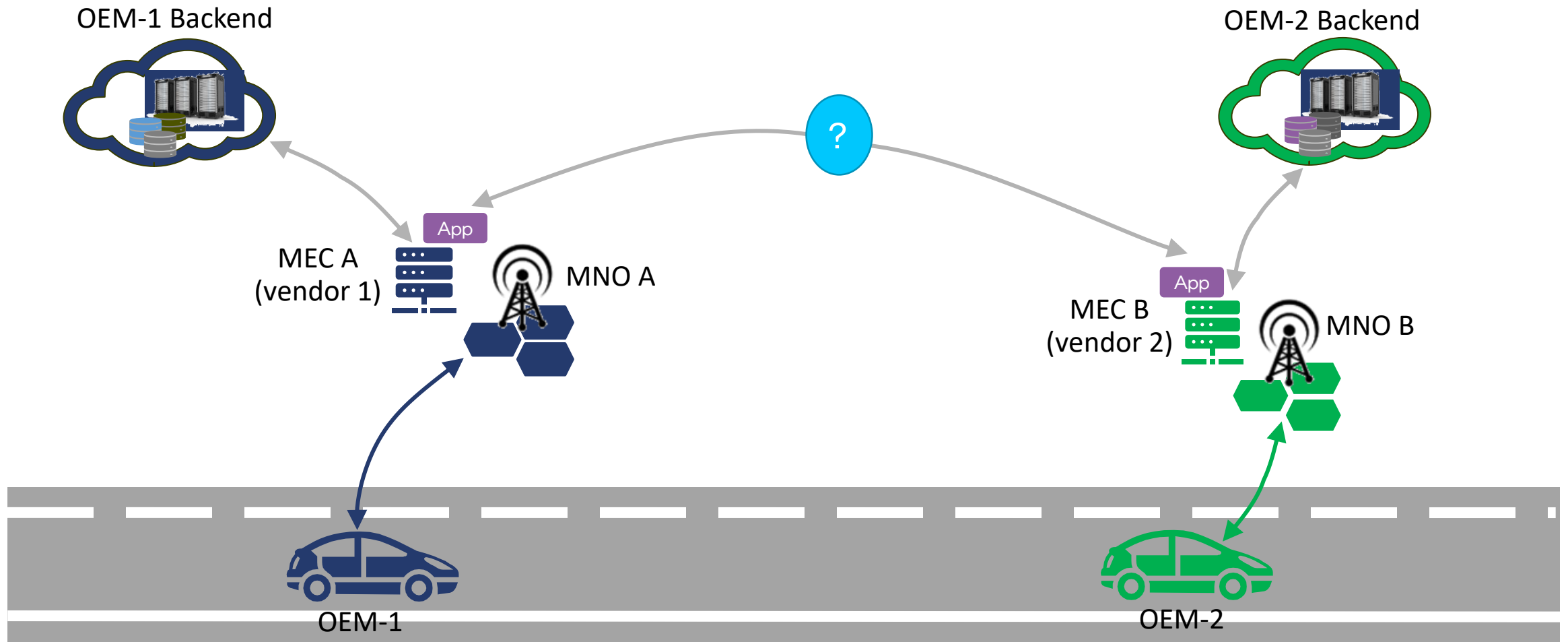
Topics:

- SoA edge computing architecture principles for V2X

- High-level Architectural Considerations on MEC in Multi-MNO Scenarios

- Deployments for use cases

- Interoperability and service continuity for edge computing

- MEC Security Guidance

5GAA MEC4AUTO High-level Architectural Considerations on MEC in Multi-MNO and Multi-OEM Scenarios

- Three main scenarios:

    1. Both MNO A & MNO B have MEC platforms & MEC application

    2. Both MNO A & MNO B have MEC platforms, but MEC application is available only in MNO A

    3. Only MNO A has MEC platform & MEC application is available only in MNO A

- General assumptions:

    - Client application, running in a vehicle, needs to connect to MEC application (server application) running on top of the virtualization infrastructure supported by the MEC platform

    - The MEC platform can belong to either a 3GPP MNO or a 3rd party

    - All required business agreements are in place between the involved parties in order to allow the vehicle to access the requested MEC applications
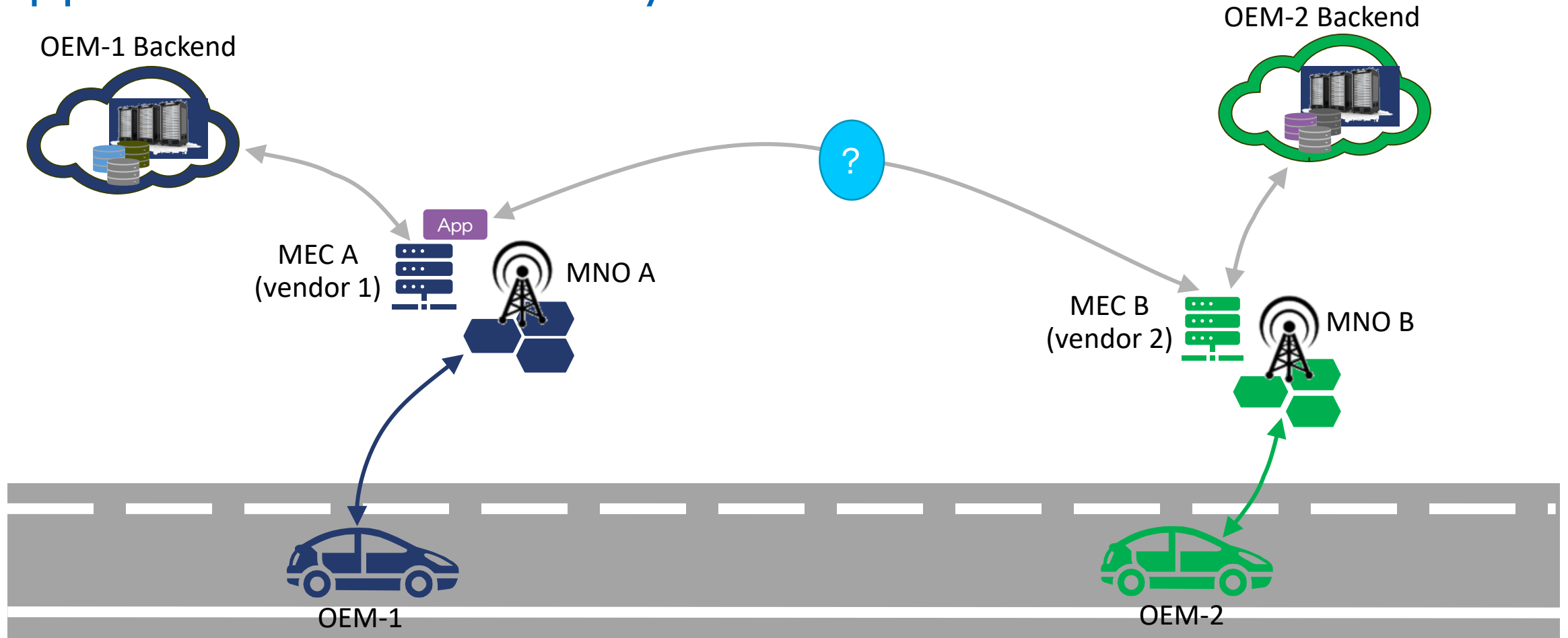
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5GAA MEC4AUTO Scenario 1
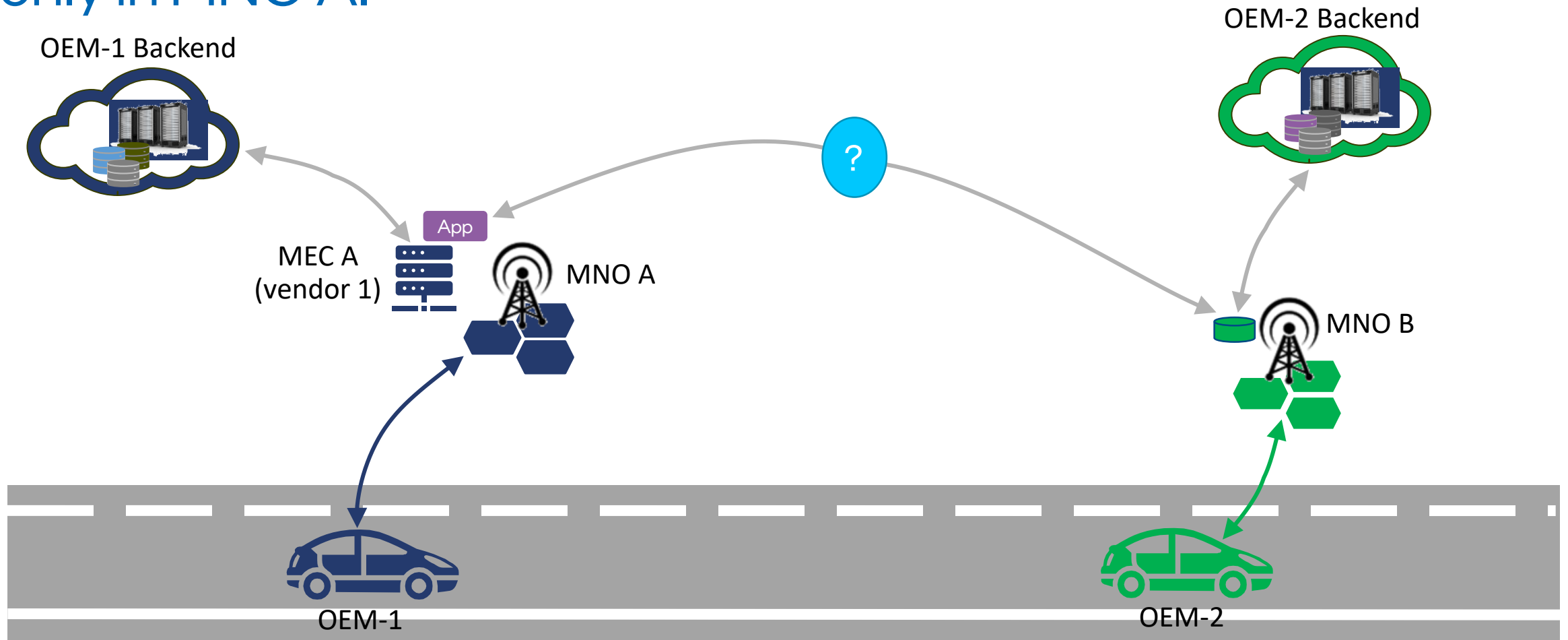## Both MNO A & MNO B have MEC platform & MEC application

OEM-1 Backend

OEM-2 Backend

MEC A (vendor 1)

App

MNO A

MEC B (vendor 2)

App

MNO B

OEM-1

OEM-2

5GAA MEC4AUTO Scenario 2
Both MNO A & MNO B have MEC platform, but MEC application is available only in MNO A

OEM-1 Backend

OEM-2 Backend

?

App

MEC A
(vendor 1)

MNO A

MEC B
(vendor 2)

MNO B

OEM-1

OEM-2

5GAA MEC4AUTO Scenario 3
Only MNO A has MEC platform & MEC application is available only in MNO A.

OEM-1 Backend

OEM-2 Backend

App

MEC A
(vendor 1)

?

MNO A

MNO B

OEM-1

OEM-2

Demonstrations activities overall alignment and coordination

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5GAA MEC4AUTO Demo Tracks

- Regional tracks: US, Europe and three for Asia, China, Japan, Korea

- China Track: IMT-2020 PG lead

- Target:
    - Same MEC application/use case
    - In, at least, 3 countries/regions
    - Involve multiple MNOs
    - Involve multiple OEMs
    - Involve multiple vendors

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Thank You

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