GISC 2025

Global ICT Standards Conference 2025

(세션1) 6G 기술 및 표준화

# MEC-엣지컴퓨팅 : MEC 기술 및 서비스 사례

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ICT Standards and Intellectual Property:
AI for All

주최 과학기술정보통신부 지식재산처 주관 국립전파연구원 TTA IITP KEA kista ETRI

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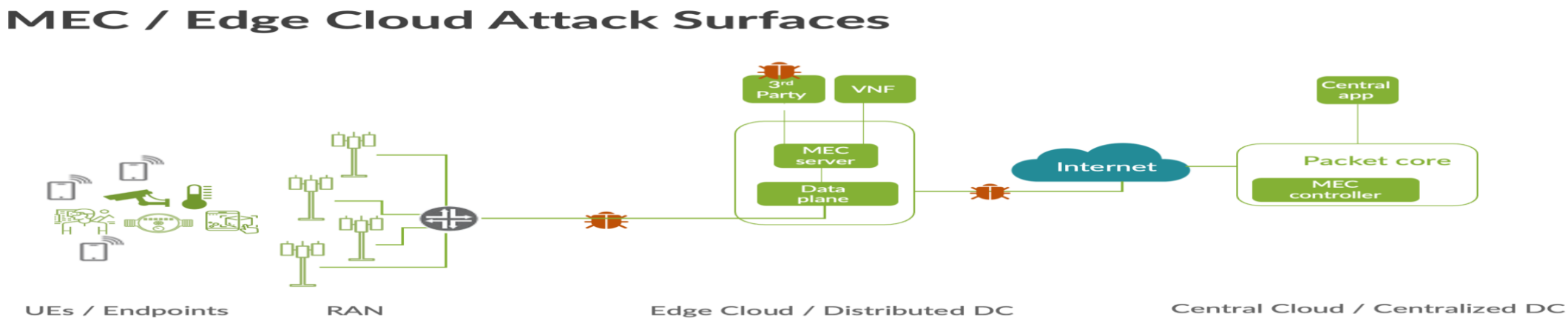
# Abstract

MEC (Multi-Access Edge Computing)는 초저지연/고대역폭 서비스를 가능하게 하는 네트워크 엣지 기반의 가상화/클라우드 기술이다. 본 발표에서는 MEC 기술에 대한 개요와 표준화 동향, 그리고 핵심 서비스 사례를 살펴본다. 그리고 MEC 기술을 Edge AI 서비스를 위한 핵심 인프라로 활용하기 위한 주요 이슈들을 논의한다.

## Concept




https://blogs.juniper.net/en-us/service-provider-transformation/5g-edge-cloud-and-multi-access-edge-computing-mec-security

# 01. ETSI MEC (1/4)

## Definition

- MEC (Multi-access Edge Computing) provides cloud computing and IT service environments at the network edge
  - "Multi-access" indicates support for various access types including mobile, fixed, and Wi-Fi
- Objective: enable ultra-low latency, high bandwidth, and real-time, context-aware services leveraging network information

## Key Features

- Processes data near end-users → reduces latency and backhaul load
- Integrates RAN, Core, and Cloud for intelligent and flexible service provisioning
- Enables third-party application deployment via standardized open APIs

# 01. ETSI MEC (2/4)

## Standardization

- Led by ETSI MEC Industry Specification Group (ISG)
    - Covers architecture, APIs, application lifecycle, security, and management
- Phase 3 completed (2024) → Phase 4 ongoing: focuses on security, federation, slicing, and 6G-oriented edge-native applications

## Expected Benefits

- Shorter response latency and reduced backhaul congestion
- Enhanced privacy and data localization
- Creation of new business ecosystems and revenue models

# 01. ETSI MEC (3/4)

## MEC Architecture

- Edge Nodes located between the RAN/Access and Core networks
- MEC Platform provides 1) Application hosting environment, 2) Access to real-time network information, 3) Orchestration and lifecycle management interfaces
- Open APIs allow integration of third-party applications and services.

## Use Cases

- V2X / Autonomous Driving: ultra-low latency vehicle coordination
- Industrial IoT / Smart Factory: local control and anomaly detection
- AR/VR / Cloud Gaming: minimized round-trip delay via edge rendering
- Drones / Robotics: real-time data processing and control
- Video Analytics / Content Caching: local traffic reduction and improved QoE

# 01. ETSI MEC (4/4)

## Technical Evolution

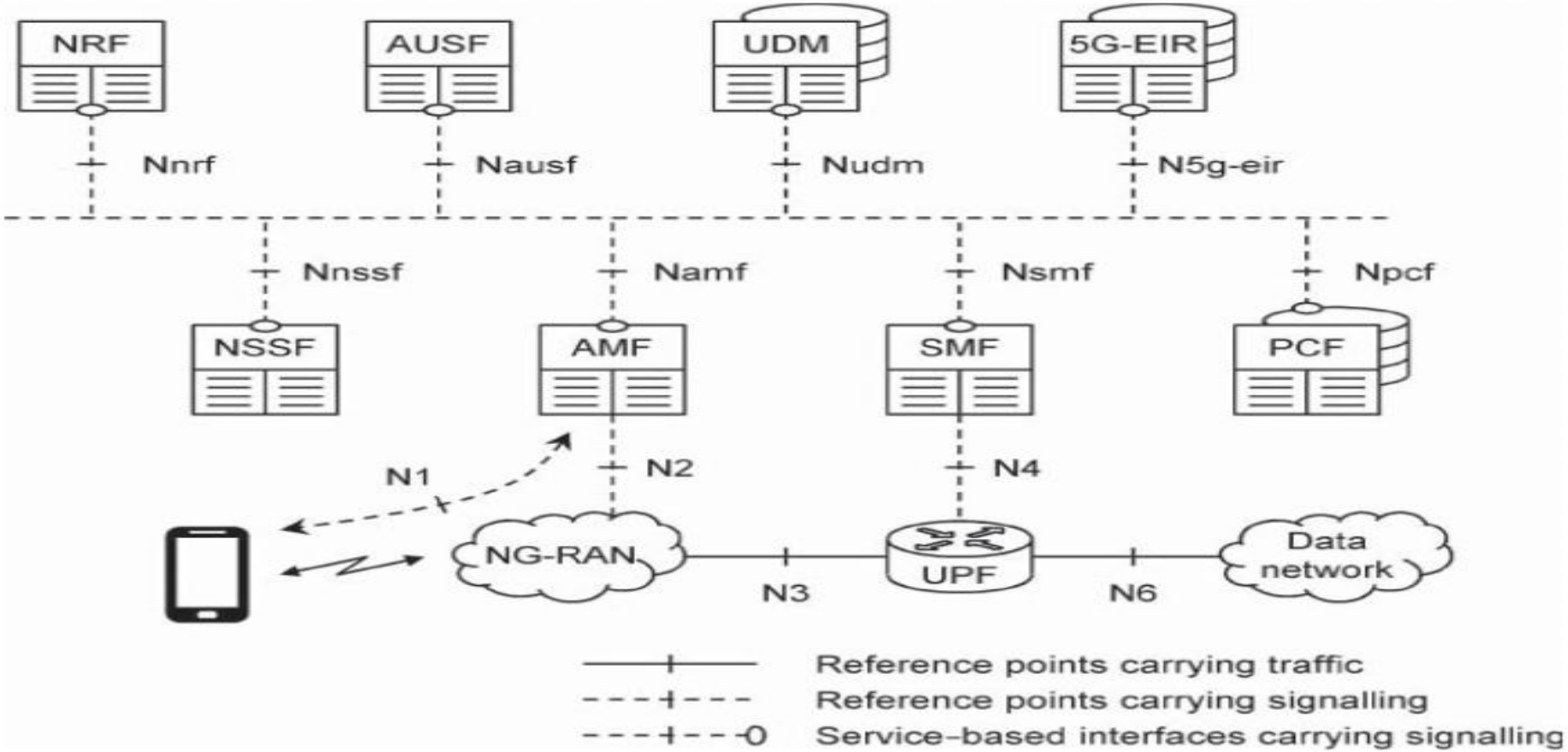
- Edge-Native Applications: exploiting location and network context of the edge
- Federation & Multi-Domain Edge: interoperability across multiple operators and domains
- Enhanced Security & Privacy: ensuring trust in distributed edge environments
- Integration with 6G: enabling intelligent, AI-driven, hyper-connected edge networks

## Industrial and Research Implications

- Telecom Operators: reduce core traffic and open new service revenue streams
- Cloud Providers: expand infrastructure and services through edge integration
- Vertical Industries (Manufacturing, Mobility, etc.): localized, secure data analytics
- Researchers: explore orchestration, security, slicing, and 5G/6G-MEC convergence

# 02. 3GPP MEC (1/5)

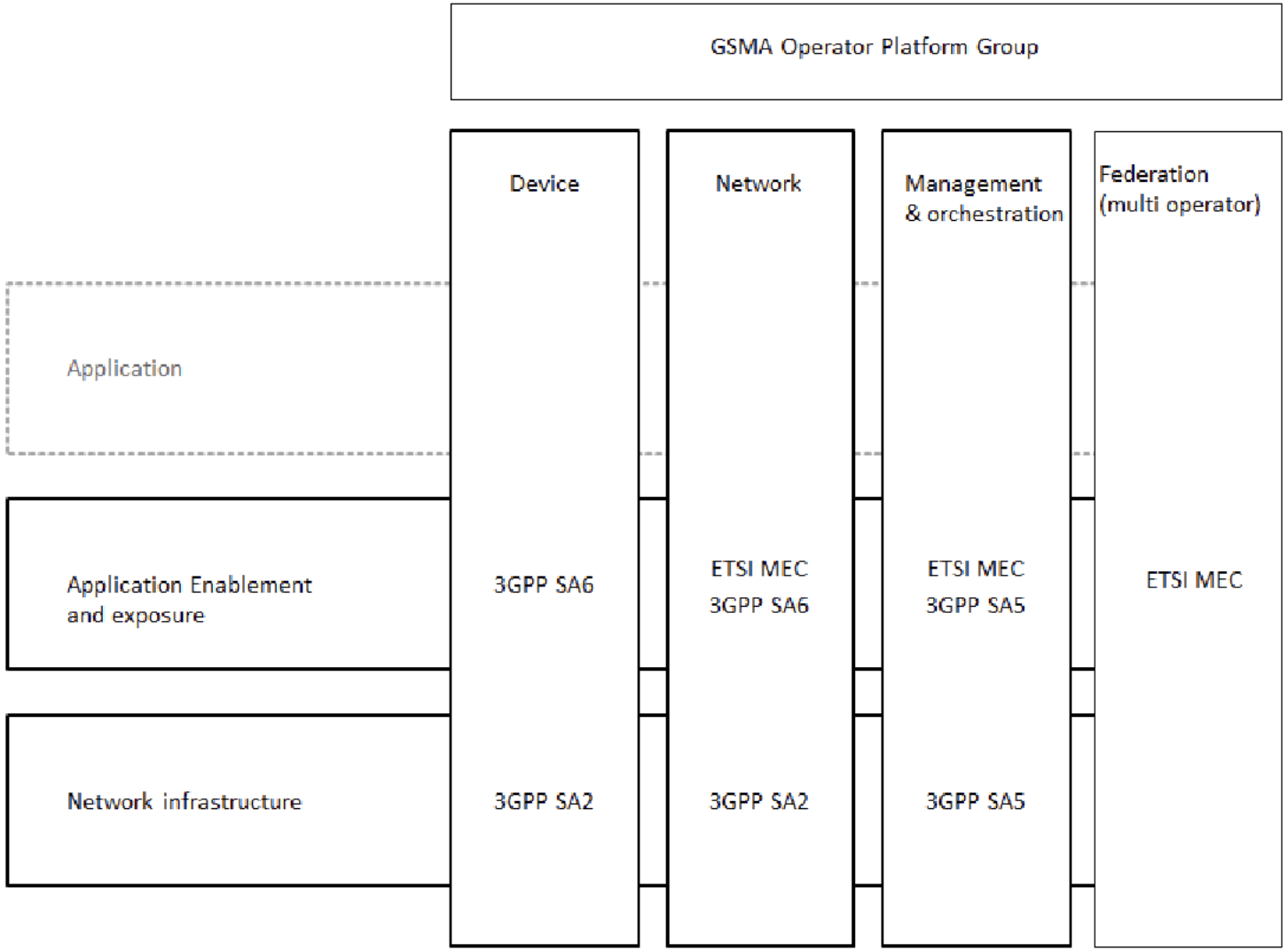
## Network Architecture



# 02. 3GPP MEC (2/5)

## Standardization Issues

- Traffic steering
- MEC Platform
- Management & orchestration
- Charging
- UE and application mobility
- Capability exposure
- UE application interface

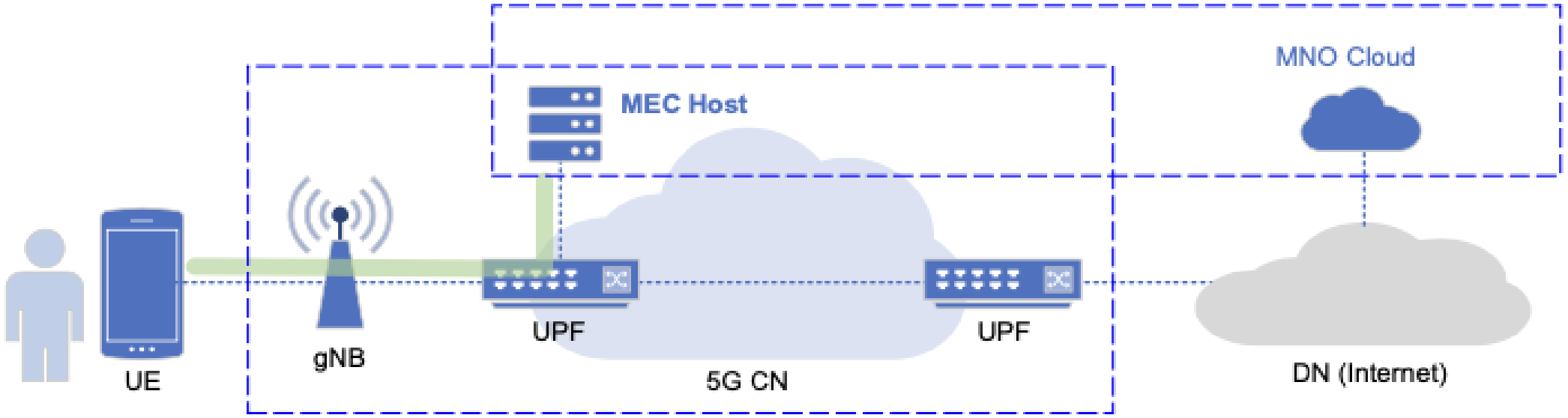



https://www.etsi.org/images/files/ETSIWhitePapers/ETSI_wp36_Harmonizing-standards-for-edge-computing.pdf

# 02. 3GPP MEC (3/5)

## Cloud Edge Service by OP

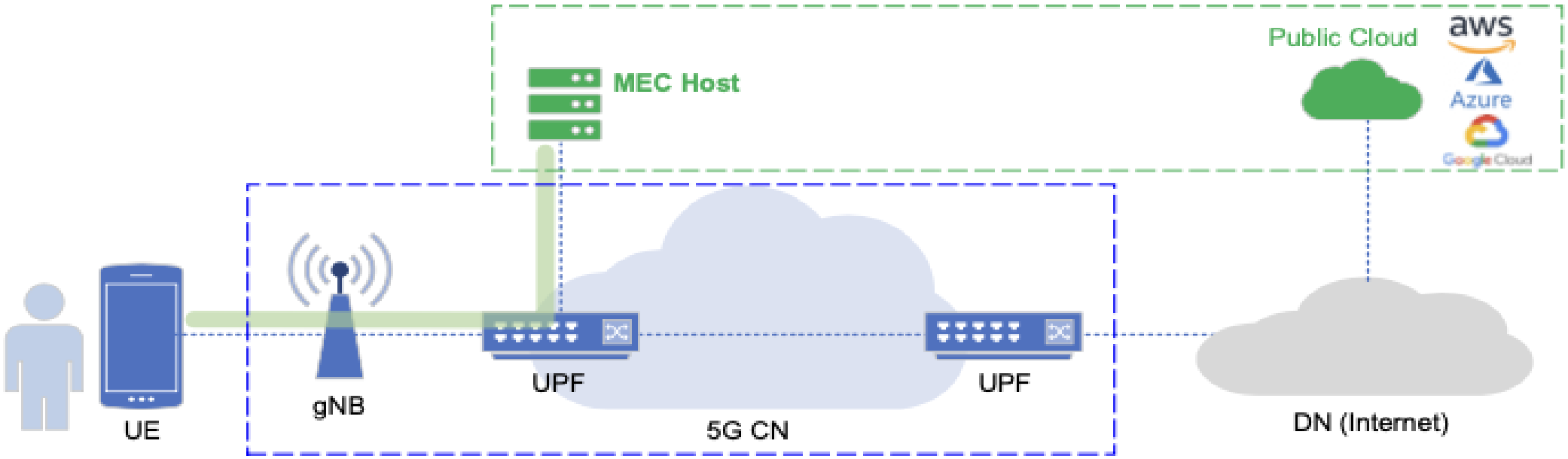
- Edge platform built in the OP's network
- Edge support in the network layer (e.g., routing, discovery)



# 02. 3GPP MEC (4/5)

## Edge Site Provided by OP

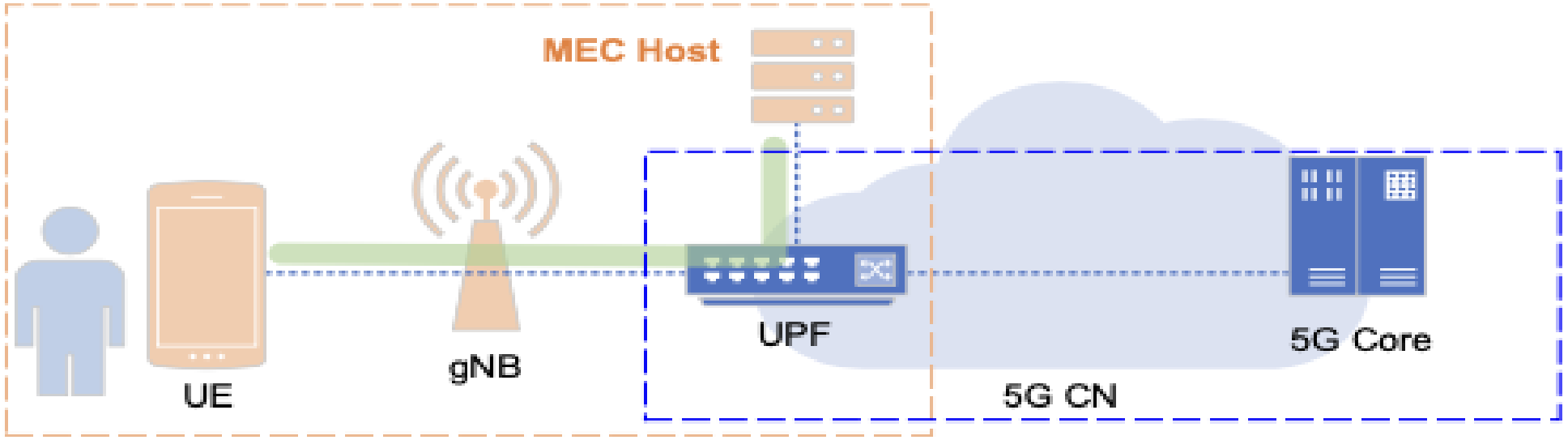
- To serve public cloud services (e.g., AWS)



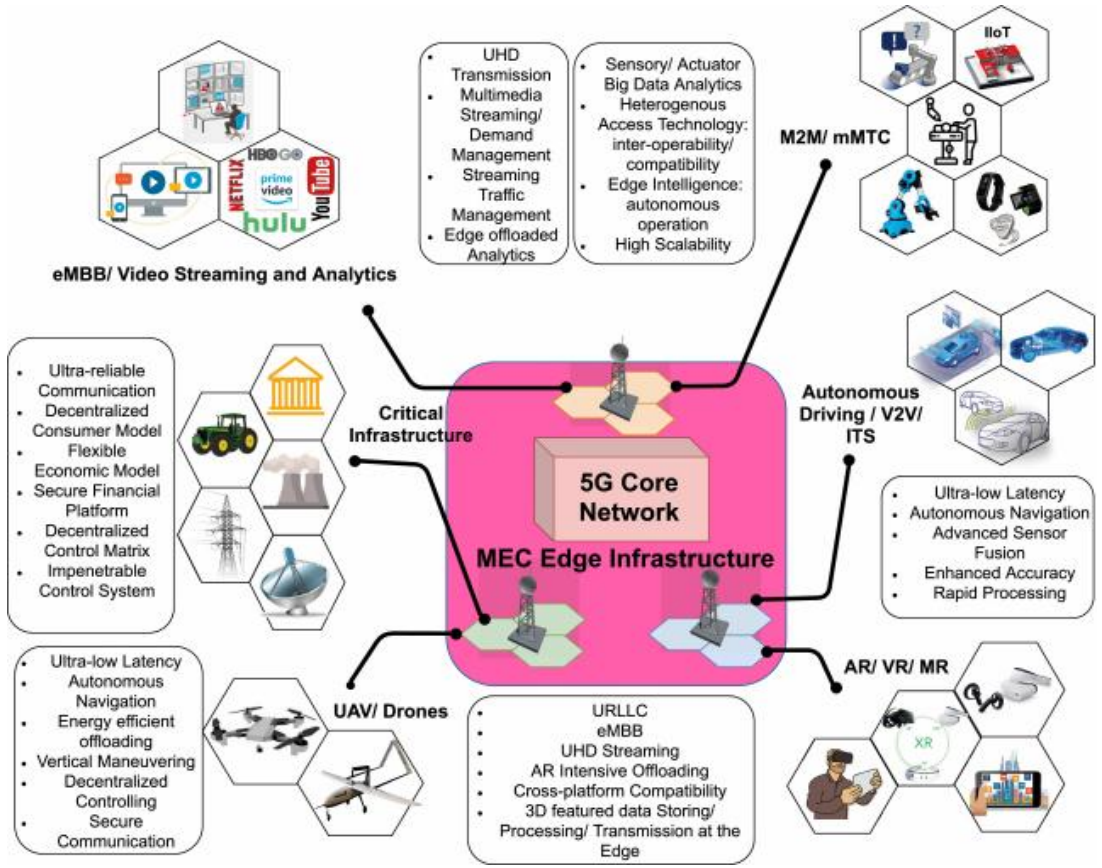
# 02. 3GPP MEC (5/5)

## Edge Support in Non Public Network (NPN)

- Edge support in NPN



# 01. Service (1/2)




Meta Ray-Ban Display

Apple Vision Pro

https://dl.acm.org/doi/fullHtml/10.1145/3474552

# 01. Service (2/2)

## Comcast makes move to edge computing, partners with Vapor IO

Dan Meyer | Executive Editor
July 20, 2023 2:55 AM

Share this article:

Comcast is making an intriguing move toward the edge computing market, taking advantage of its own physical assets and partnering with long-time virtualized edge computing pioneer Vapor IO.

The move calls for Comcast to host Vapor IO's Kinetic Edge data center platform to support third-party edge service providers. Matt Trifiro, chief marketing officer at Vapor IO, explained this "hosting" involves a physical fiber connection between its Kinectic Grid and Comcast's physical infrastructure. This connection will allow the combined product to support "near-premises" edge computing applications with lower latency at lower costs.

The trial is scheduled to officially kick off this quarter in Chicago and Atlanta.

Comcast Chief Network Officer Elad Nafshi said this "early move" is tied to the cable giant looking "at value creation is in the edge compute business." He explained the trial builds off of Comcast's current virtualized cable modem technology system (vCMTS) that underpins its current gigabit internet service.

## Vodafone extends its AWS Wavelength MEC ride

Dan Meyer | Executive Editor
July 31, 2023 9:00 PM

Share this article:

U.K.-based telecom giant Vodafone is expanding its work with Amazon Web Services (AWS) to Spain, providing enterprise customers in that country with access to low-latency services using the AWS Wavelength multi-access edge compute (MEC) platform.

The expansion provides Wavelength Zone availability to portions of Spain, including customers in Malaga, Granada, Córdoba, Jaén, Almería and areas of Seville. Initial use cases are using Vodafone's Safer Transport for European Platform (STEP) that connects vehicles with transport authorities to relay information on road hazards, the location of highway maintenance workers and control of smart traffic lights.

Vodafone will also test a distributed Wavelength-powered MEC platform to support extended reality (XR) for agriculture, logistics, industry, entertainment and social health verticals. This XR platform will provide a 3D digital twin of applications the removes the need for a physical site visit.

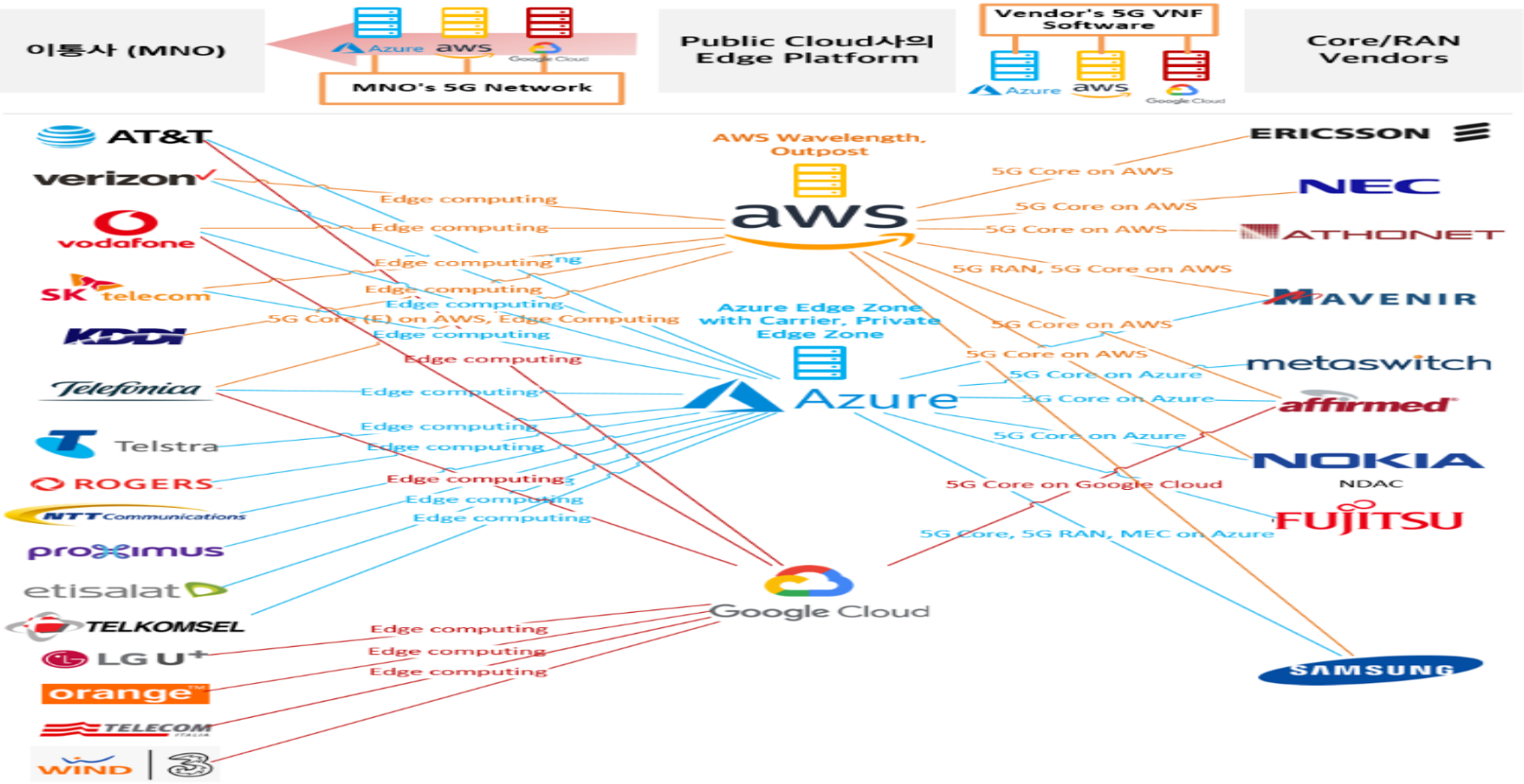
AWS initially announced its Wavelength service at its annual re:Invent show in 2019. The platform includes compute and storage services deployed at carrier edge locations and are targeted at allowing the deployment of low-latency services.

It works alongside the hyperscaler's Local Zones, which are an extension of its different cloud regions, and its Outposts platform that brings native AWS services, infrastructure and operating models to a data center, co-location space or on-premises facility.

AWS has more than 30 open Local Zones around the world, with around 20 more announced. Ishwar Parulkar, CTO for telecom and edge at AWS, recently told SDxCentral that its Outpost platform was supporting more than 200 Private 5G deployments.

This adds to what Jan Hofmeyr, VP for Amazon EC2, told SDxCentral is the vendor's goal is "to make AWS the best place to run 5G networks."

# 02. Key Players (1/2)




[클라우드/이동통신사업자/벤더 간 파트너쉽 (출처: 넷매니아즈)]

# 02. Key Players (2/2)

## Content Provider (CP)

CDN: YouTube, NETFLIX, wavve

Interactive Game: BETHESDA GAME STUDIOS, NIANTIC

AR/VR: unity

Live streaming Video Conference: twitch, zoom

Autonomous Vehicle: TESLA, HYUNDAI MOTOR GROUP

## Edge Platform Provider

### MNO Platform

SK telecom, kt, AT&T

### Open Source

STARLINGX, XOS, KubeEdge, AETHER, AKRAINO EDGE STACK, CORD

### Cloud Provider

amazon web services, Microsoft Azure, Google Cloud Platform

## Infrastructure Provider (InP)

3GPP A GLOBAL INITIATIVE

TR 23.758

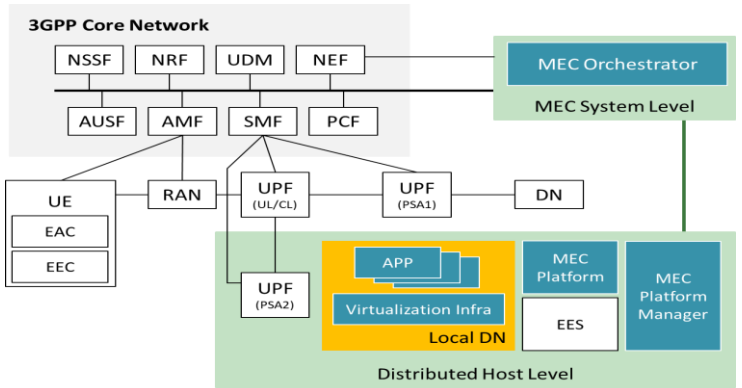
TS 23.558

TR 23.748

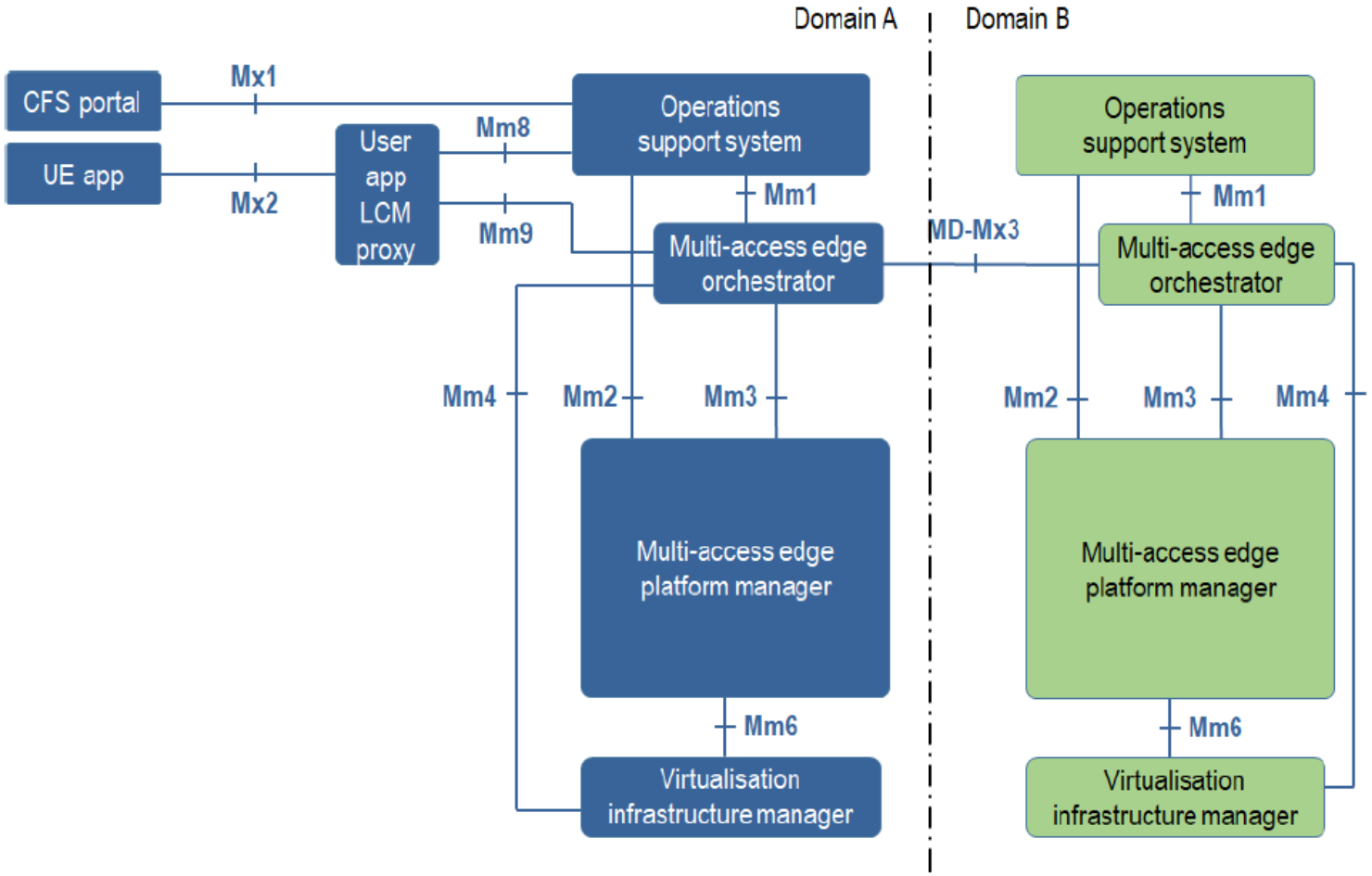
ETSI World Class Standards

MEC GS 003

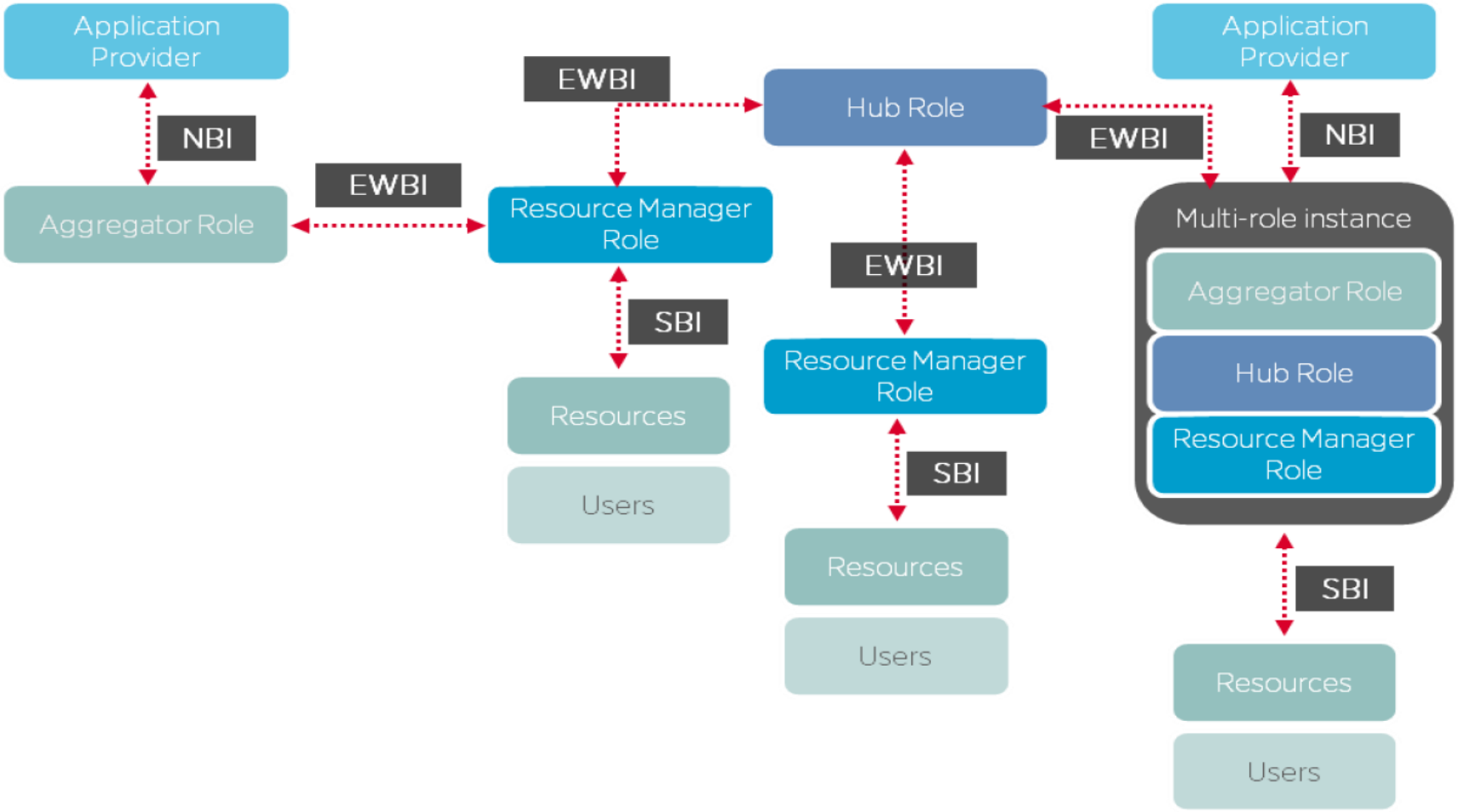
NFV GS 002



# 01. Federation in ETSI MEC

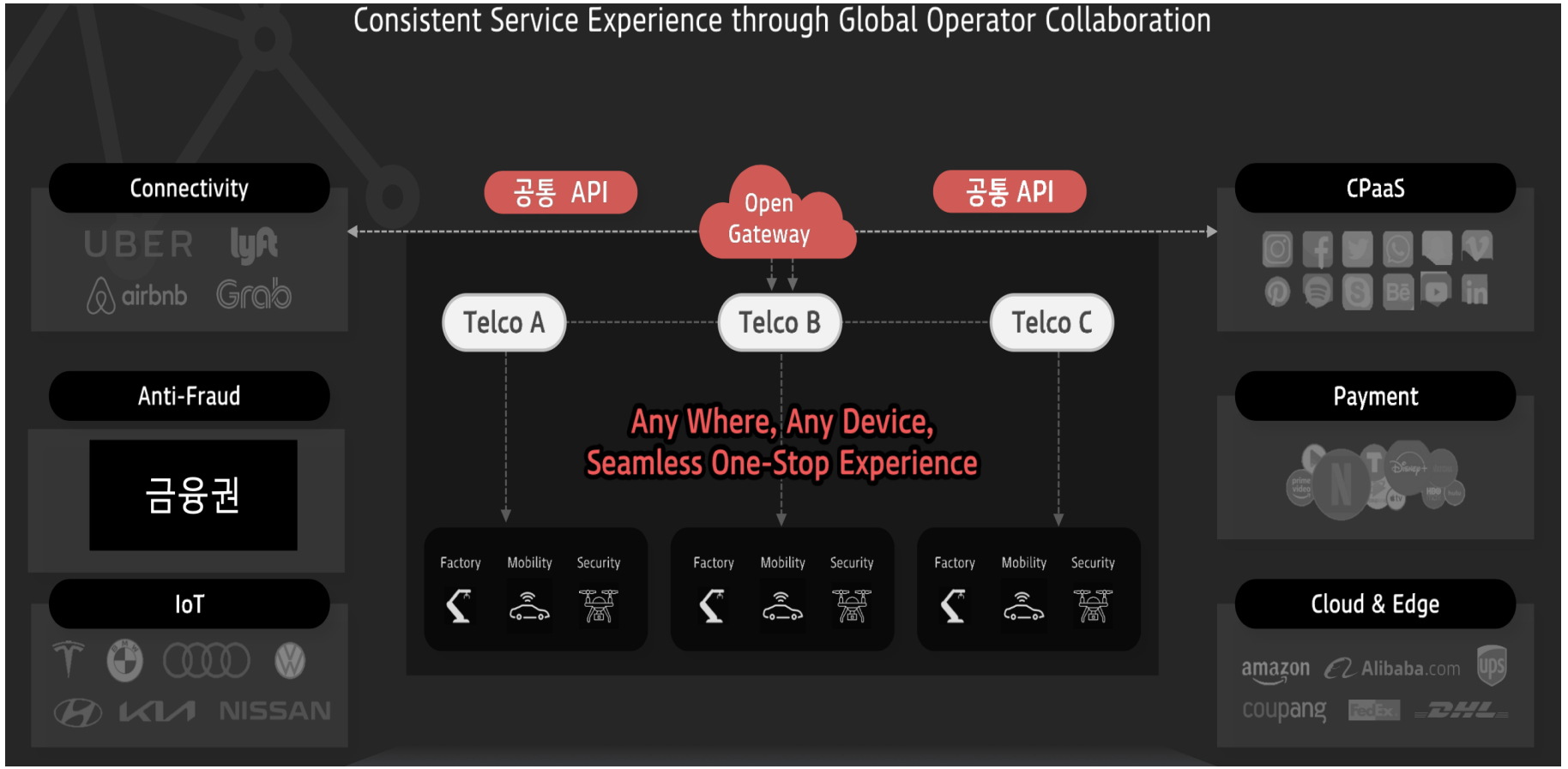


# 02. MEC Federation in GSMA



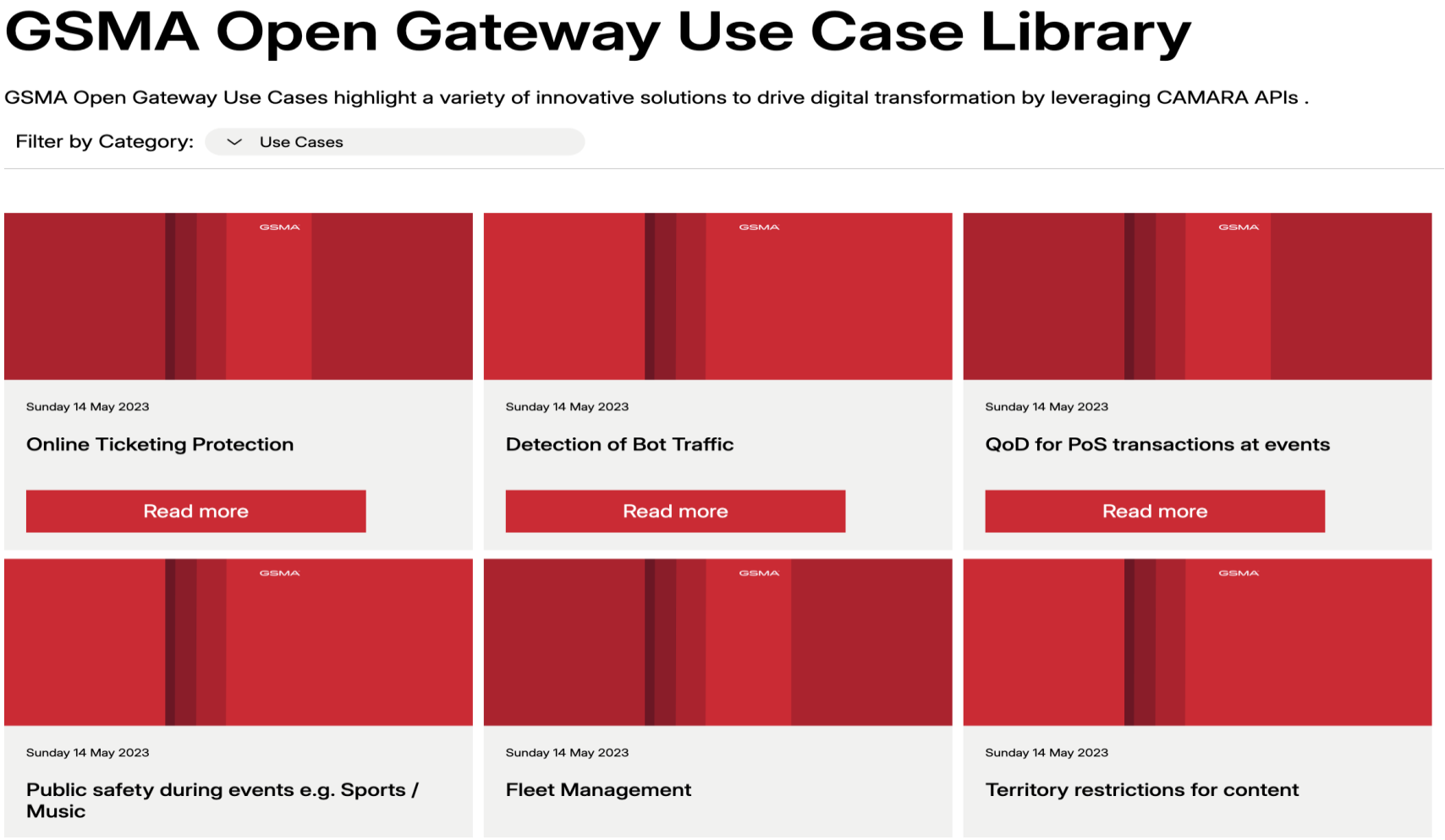
# 03. GSMA Open Gateway (1/5)

## Concept



# 03. GSMA Open Gateway (2/5)

## Use Cases



# 03. GSMA Open Gateway (3/5)

## Use Cases

### Territory restrictions for content

| | |
|---|---|
| **Use Case** | Territory restrictions for content |
| **Sector** | Media and entertainment |
| **CAMARA API** | Device Roaming Status<br>View API Descriptions |
| **Business problem being solved** | Ensuring compliance with territorial licensing agreements by restricting access to content based if the user is roaming |
| **How the solution works** | The solution integrates mobile network data to verify if a user is roaming outside of their home country and thereby be able to enforce content access restrictions.<br><br>By leveraging data from the following API, the system ensures that content is only accessible within authorised regions<br>**Device Roaming Status:** The API checks if a device is roaming, and if so in which country |

# 03. GSMA Open Gateway (4/5)

## CAMARA API

| Authentication and Fraud Prevention | Location Services | Communication Services | Communication Quality | Device Information | Computing Services | Payments and Charging |
|---|---|---|---|---|---|---|
| Call Forwarding Signal | Geofencing Subscriptions | Web RTC Call Handling | Application Profiles | Connect Network Type | Simple Edge Discovery | Blockchain Public Access |
| Customer Insights | Location Retrieval | Web RTC Event Subscription | Connectivity Insights | Connect Network Type Subscription | | Carrier Billing |
| Device Swap | Location Verification | Web RTC Registration | Connectivity Insights Subscription | Device Identifier | | Carrier Billing Refund |
| Know Your Customer Age | Population Density Data | | Home Devices QoD | Device Reachability Status | | |
| Know Your Customer Fill-In | Region Device Count | | QoD Provisioning | Device Reachability Status Subscription | | |
| Know Your Customer Match | | | QoS Profiles | Device Roaming Status | | |
| Know Your Customer Tenure | | | Quality on Demand | Device Roaming Status Subscription | | |
| Number Recycling | | | | | | |
| Number Verification | | | | | | |
| One Time Password SMS | | | | | | |
| Scam Signal | | | | | | |
| Sim Swap | | | | | | |
| Sim Swap Subscriptions | | | | | | |

# 03. GSMA Open Gateway (5/5)

## Ready for Monetization???

# From MEC Forum to Open AI Edge Forum (Since 2025)

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## - 감사합니다 -

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