

MEC: Multi-access Edge Computing

State of play from ETSI MEC

Presented by: **Dario Sabella (Intel)**
ETSI ISG MEC Chairman

For: **IEEE WoWMoM 2021**

Online meeting, June 9th 2021

ETSI ISG MEC

ETSI: The Standards People
We produce globally applicable standards for ICT-enabled systems, applications and services deployed across all sectors of industry and society

MEC: Multi-access Edge Computing
Cloud Computing at the Edge of the network.

ISG: Industry Specification Group
open to all of industry, regardless of ETSI membership and focused on all industry needs

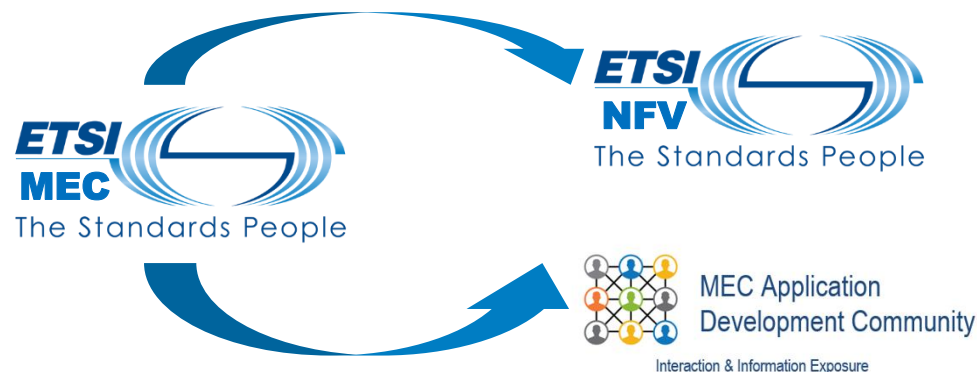
Standards +

Industry Enablement +

Telco Edge Focus

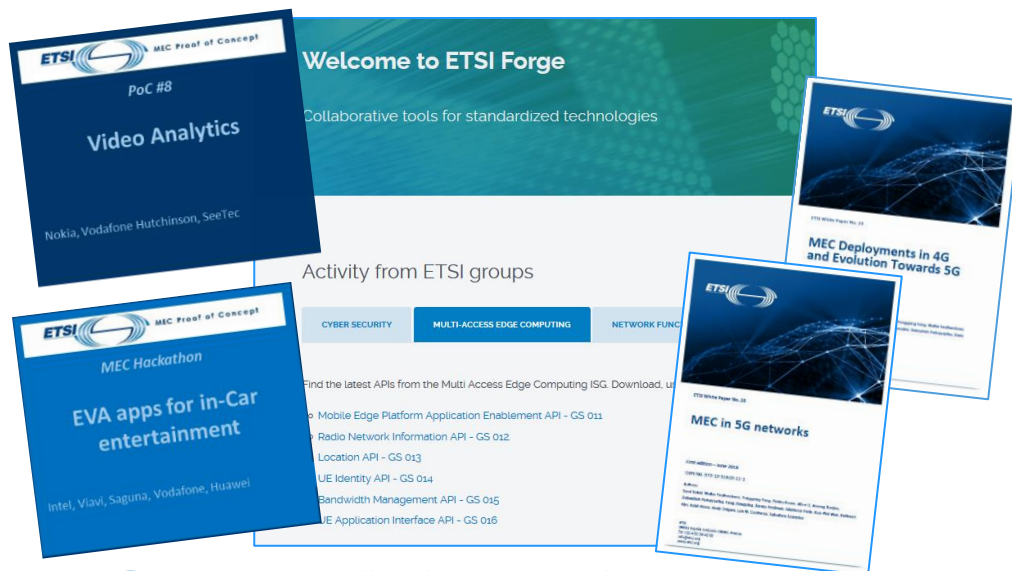
ETSI MEC – What we do

Foundation for Edge Computing created – Fully standardized solution to enable applications in distributed cloud created by ETSI MEC + 3GPP



Application Life Cycle Management

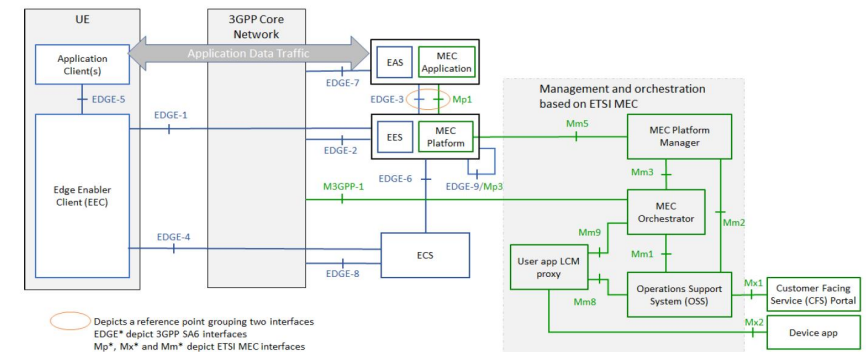
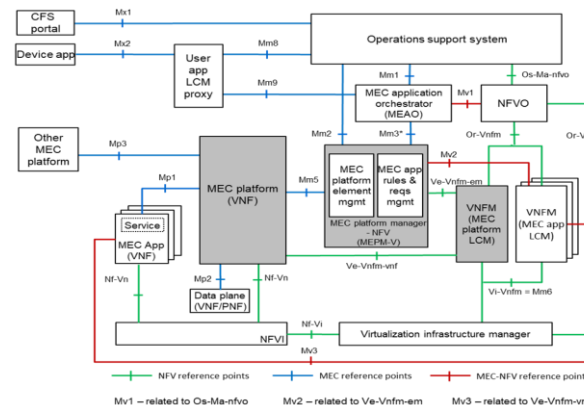
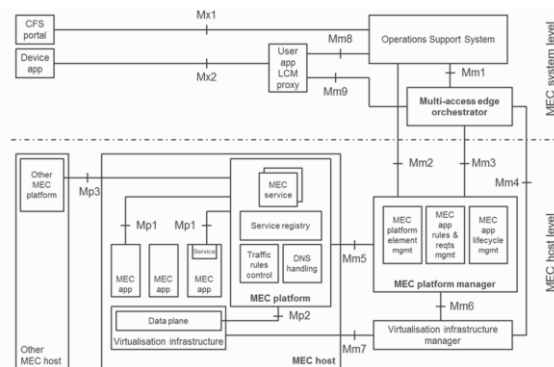
RESTful based APIs for Runtime Application Services



113 members - Operators – Technology Vendors – IT players – Application developers



- *Open standard* → allowing multiple implementations and ensuring interoperability
- MEC exploiting ETSI *NFV framework* and definitions → enabling MEC in NFV deployments
- Alignment with *3GPP* based on fruitful collaboration of common member companies → enabling MEC in 5G
- *Access-agnostic* nature (as per MEC acronym - Multi-access Edge Computing) → enabling other accesses
- Addressing the needs of a *wide ecosystem* → enable multiple verticals (e.g. automotive), federations



The essence of MEC

MEC offers to application developers and content providers cloud-computing capabilities and an IT service environment at the edge of the network

How do I reach my cloud service?

What is my QoS?

Where am I?

What is around me?

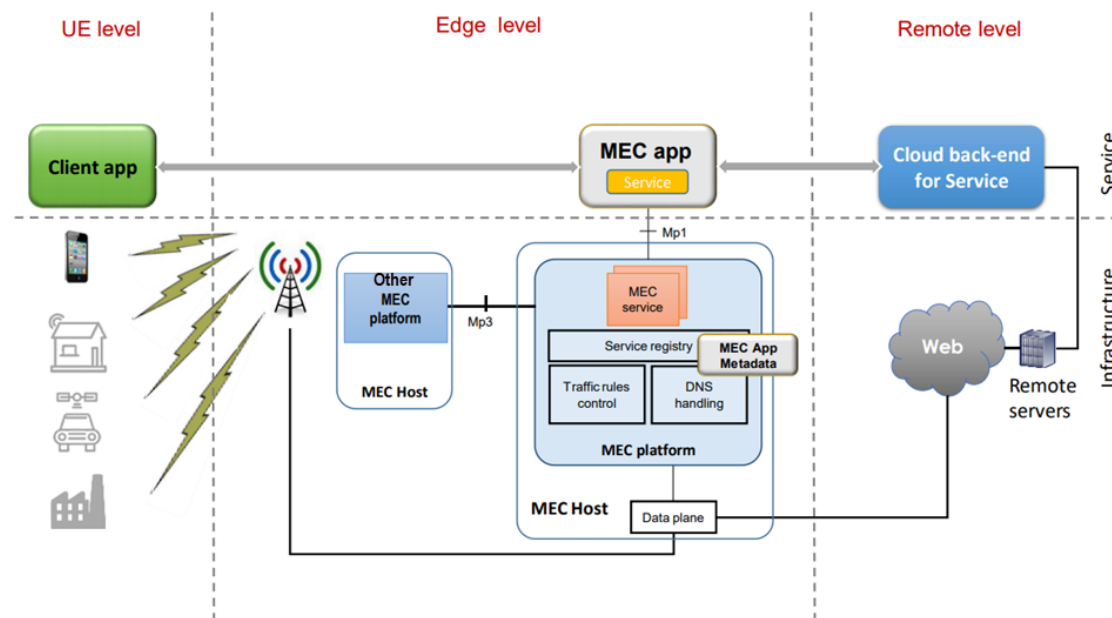


Figure 2: New application development paradigm introduced by MEC.

How do I get discovered by my users?

How am I connected to the users?

How many users am I serving? And where

How to be sure I am running when and where needed?

What if my users move?

MEC is focused on *existential* questions of applications “on the edge”

MEC: Enabling Global Application Portability



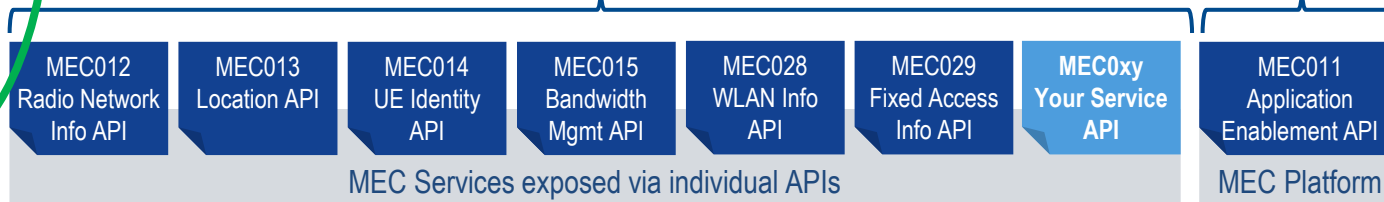
MEC Application Development Community

Interaction & Information Exposure

RESTful based HTTP APIs presented via OpenAPI compliant descriptions (<https://forge.etsi.org/>), in YAML & JSON including the full data model

ISG MEC Spec: MEC009
API Principles & Guidelines

MEC API Framework



- ✓ Simple to use, well documented APIs, published with OpenAPI Framework
- ✓ Create innovative applications quickly and easily, reducing time-to-revenue
- ✓ New APIs (compliant with the MEC API principles) can be added
- ✓ Increase the Total Addressable Market (TAM)

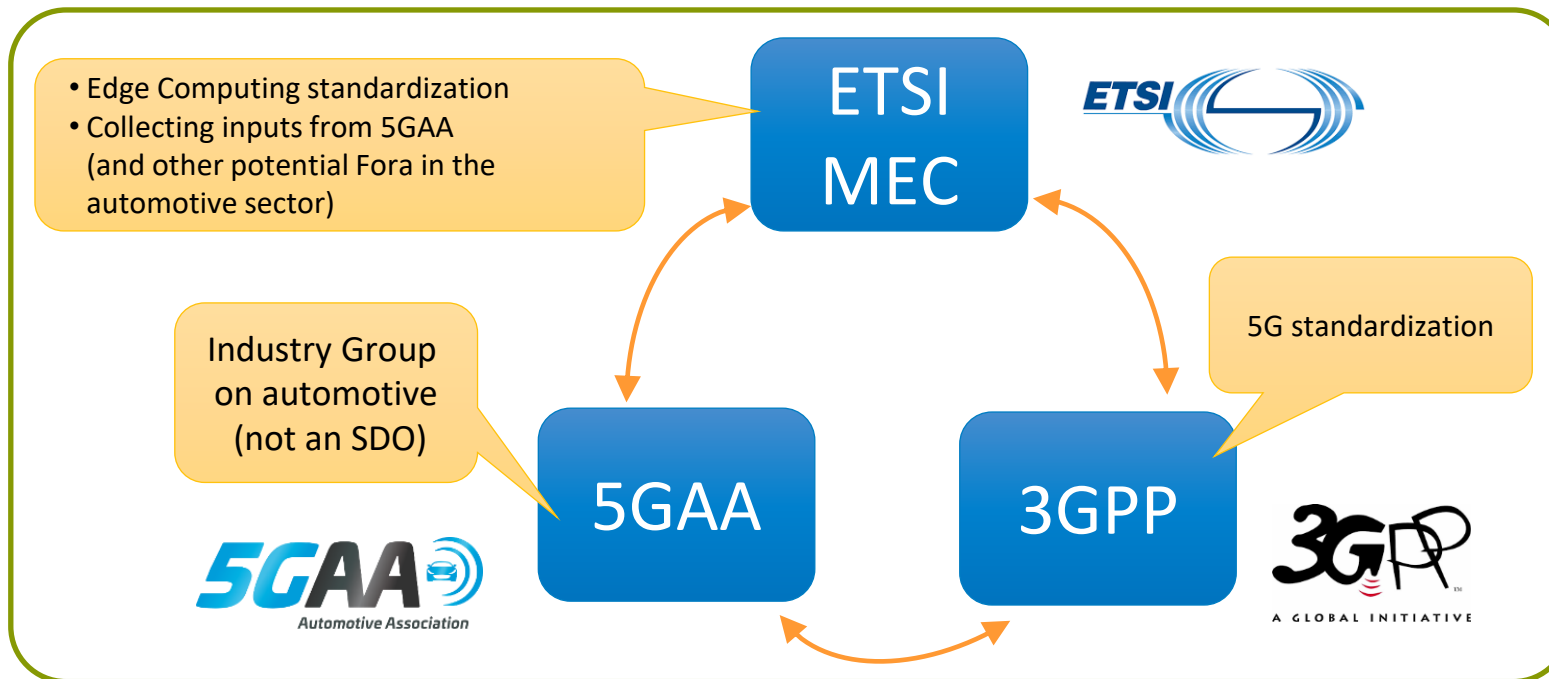
MEC: Edge Computing, 5G and **verticals**.



- ETSI MEC is covering **many verticals** like automotive, as well as other industrial use cases.

Example below: 5GAA (5G Automotive Association)

Jan 2019:
ETSI and 5GAA signed a
MoU, especially for
collaboration on V2X



ETSI MEC and Industry Groups (*)

VRARA (VR/AR association)
OFC (Open Fog Consortium)
AREA (Augmented Reality for Enterprise Alliance)
5GAA
SCF (Small Cell Forum)
GSMA
BBF (BroadBand Forum)
...

(*) ETSI MEC is establishing collaborations
with different industry organizations

3rd 3-year Phase of work under way

■ Key overall specification

- Technical Requirements (MEC 002)
- Framework and Ref. Arch. (MEC 003)
- MEC PoC Process (MEC-IEG 005)
- API Framework (MEC 009)

■ IaaS Management APIs

- Platform mgmt. (MEC 010-1)
- Application mgmt. (MEC 010-2)
- Device-triggered LCM operations (MEC 016)

■ PaaS Service Exposure

- Required Platform Svcs / App. Enablement (MEC 011)
- Service APIs (MEC 012, 013, 014, 015)

■ Key Studies for Future Work

- Study on MEC in NFV (MEC 017)
- Study on Mobility Support (MEC 018)

■ Evolution of Phase 1 and closing open items

- Application Mobility (MEC 021 – published)
- Lawful Intercept (MEC 026 – published)

■ Addressing key Industry Segments

- V2X (MEC 022 – published; MEC 030 – published)
- IoT (MEC 033), Industrial Automation, VR/AR

■ Key use-cases and new requirement

- Network Slicing (MEC 024 – published)
- Container Support (MEC 027 – published)

■ Normative work for integration with NFV

- Incorporate in v2 of existing specs as needed

■ From “Mobile” to “Multi-Access”

- Wi-Fi (MEC 028 – published)
- Fixed Access (MEC 029 – published)

■ MEC integration in 5G networks (MEC 031)

• Developer community engagement

- API publication through ETSI Forge (more overleaf)
- Hackathons, MEC Deployment Trials

• Testing and Compliance (MEC-DEC 025 – published; multipart specification MEC-DEC 032-x)

■ Preliminary activities starting now.

■ Full Phase 3 work started already, while completing outstanding Phase 2 work.

■ MEC as heterogeneous clouds

- Expanding traditional cloud and NFV LCM approaches
- Inter-MEC systems and MEC-Cloud systems coordination (MEC 035): “MEC Federation”
- Mobile or intermittently connected components, and resource constrained devices (MEC 036)
- Consumer-owned cloud resources

■ MEC deployments

- MEC in Park enterprises (MEC 038)

■ Continuing emphasis on enabling developers

- Application Package Format and Descriptor Specification (MEC 037)
- API Serialization
- Sandbox development
- Testing and compliance

■ Continue to defined services that meet industry demand

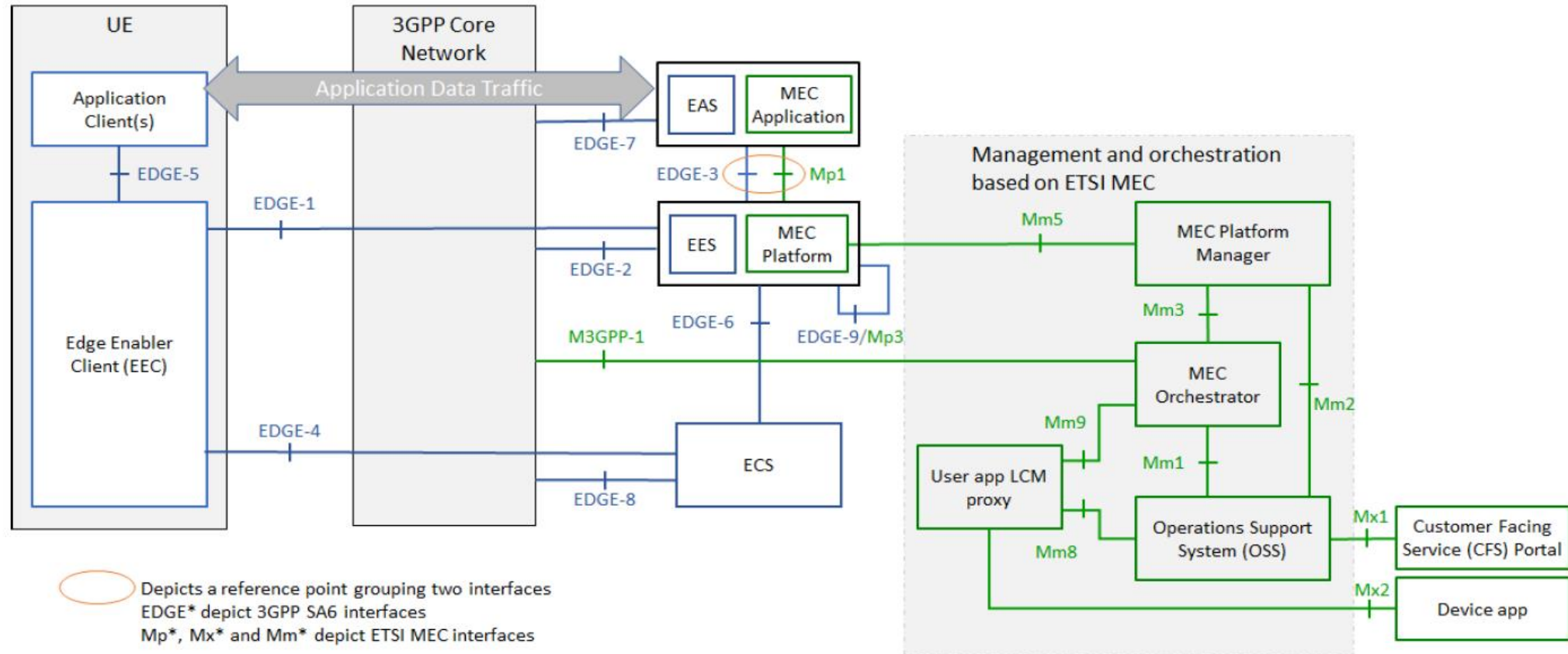
■ Maintain completed APIs

ETSI MEC phase 1 (Completed)

ETSI MEC phase 2 (Completing)

ETSI MEC phase 3 (Planning)

MEC harmonized architecture with SA6 EDGEAPP



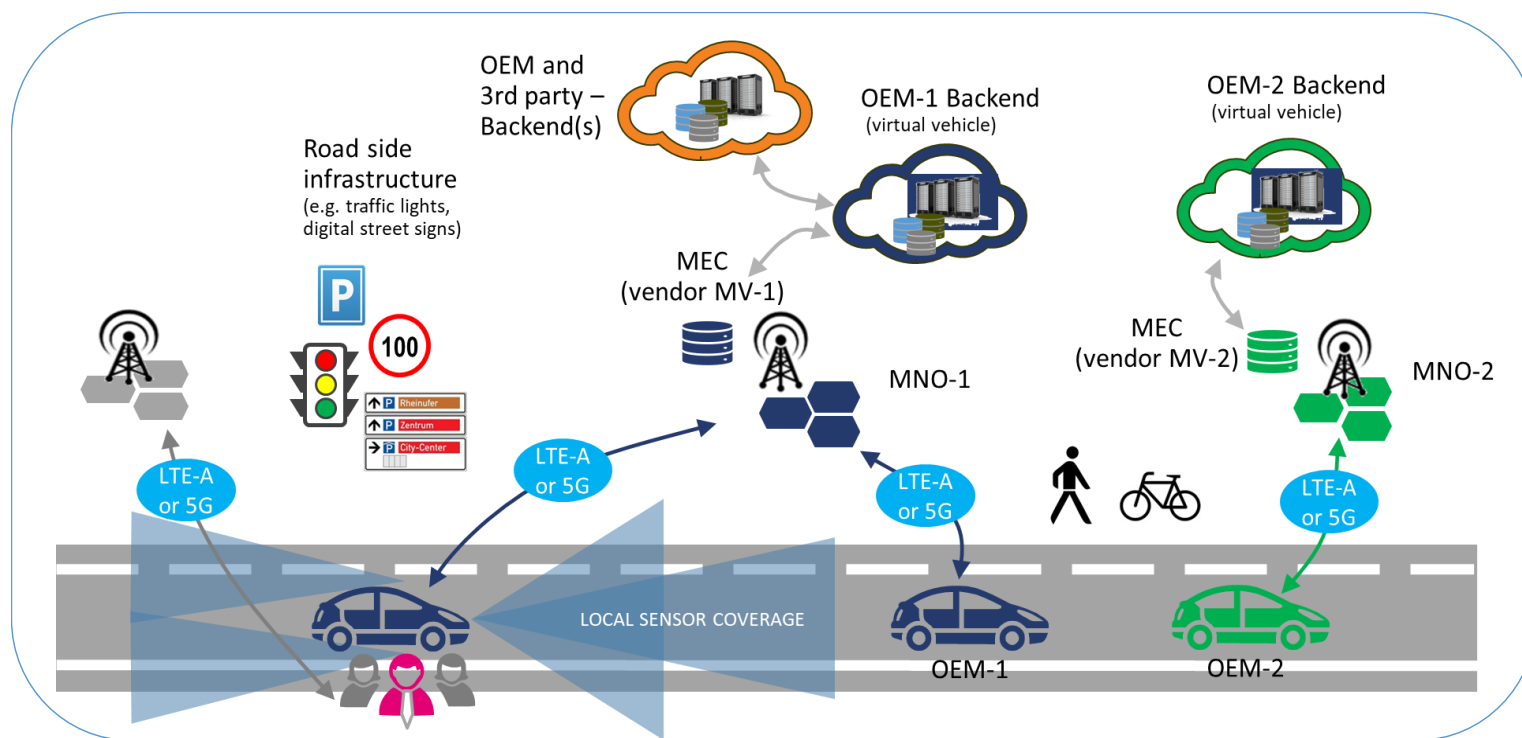
- Joint **white paper** (*) from both ETSI and 3GPP officials
- 3GPP TS **23.558** “Architecture for enabling Edge Applications; (Release 17)” v1.1.0, Oct. 2021 (informative Annex C)

Ref. ETSI White paper: “Harmonizing standards for edge computing - A synergized architecture leveraging ETSI ISG MEC and 3GPP specifications”, July 2021, link [here](#)

MEC Study on Inter-MEC systems and MEC-Cloud systems coordination (MEC 035)

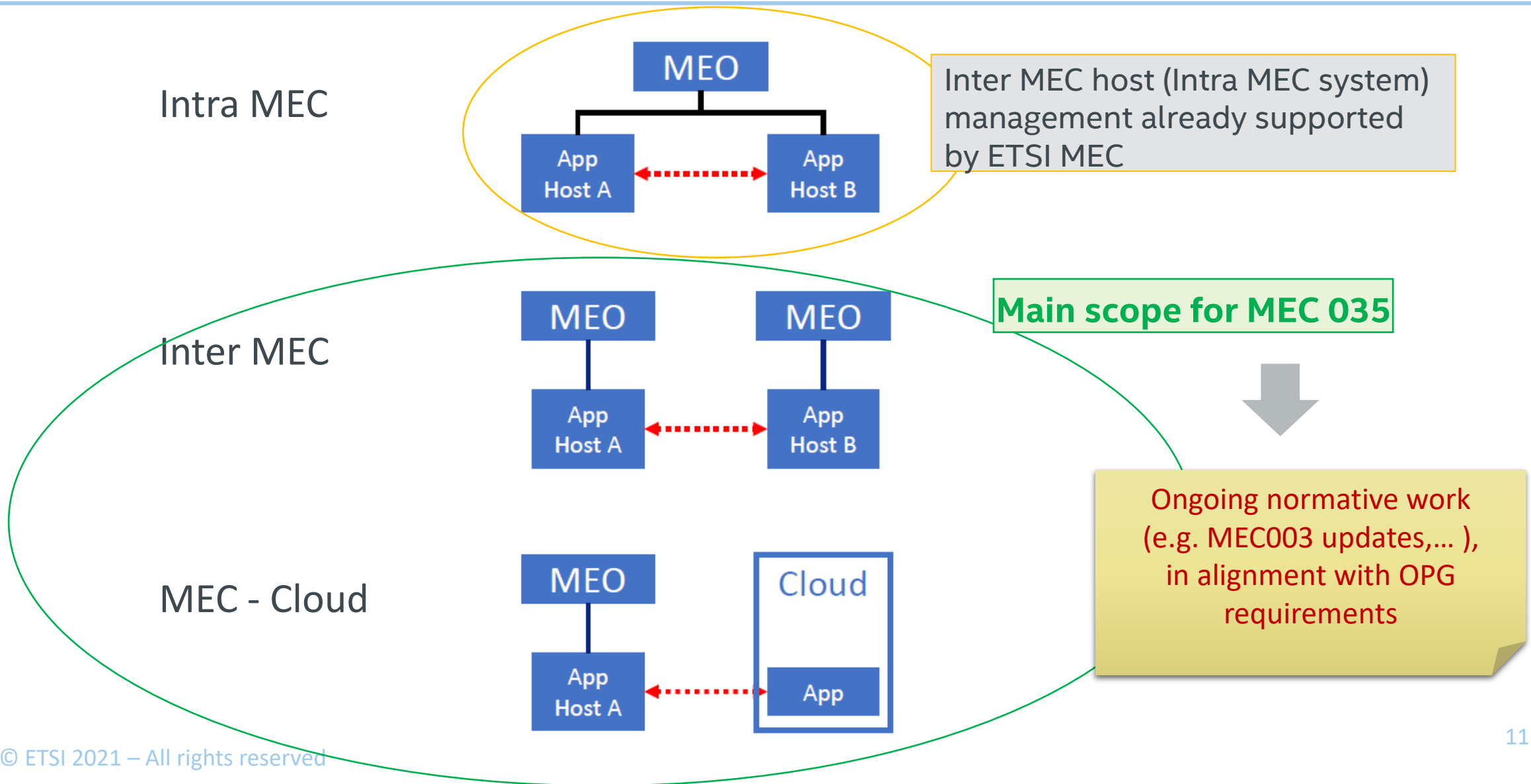
Many Use cases


example: **MEC federation** scenario of V2X services



1. Interop. between MNOs
2. Interop. between MEC vendors/suppliers
3. Interop between OEMs (applications)

Phase 3: expanding the scope to MEC Federation

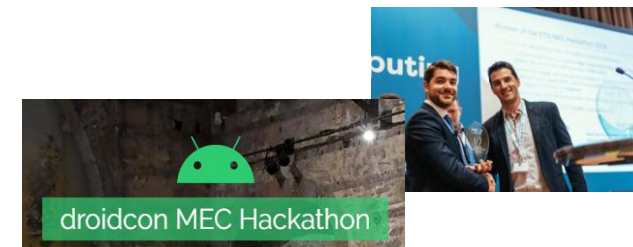
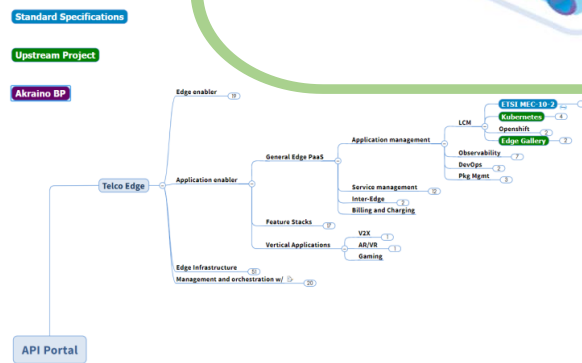
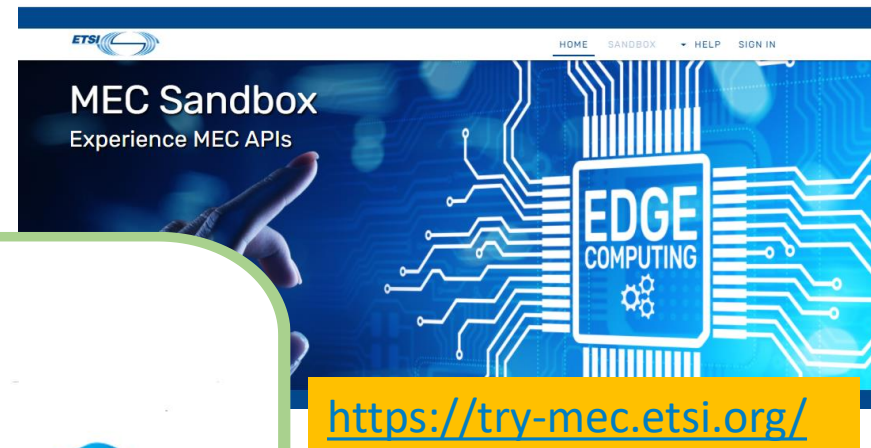
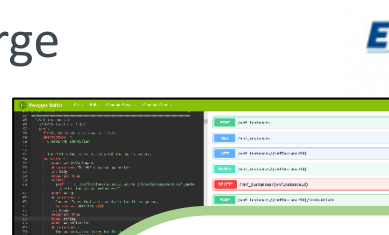


A circular inset image showing a close-up of blue network cables plugged into a server rack. The cables are bundled and connected to multiple ports on the rack. The background is a blurred view of the server rack.

WG DECODE: Enabling MEC Deployment and Ecosystem Development

MEC deployment and ecosystem engagement activities

- OpenAPI representations: ETSI Forge
- Testing and Conformance
- MEC Ecosystem wiki
- PoCs (proof-of-concepts)
- MDTs (MEC Deployment Trials)
- MEC Sandbox
- Collaborations: Akraino
- Plugtests
- Hackathons



4 - 8 Oct 2021
NFV&MEC
IOP Plugtests
2021

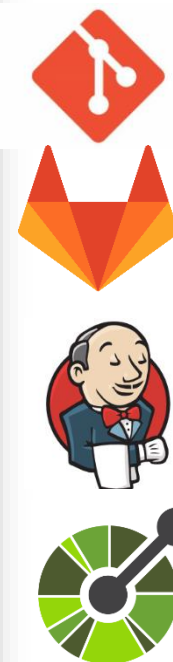
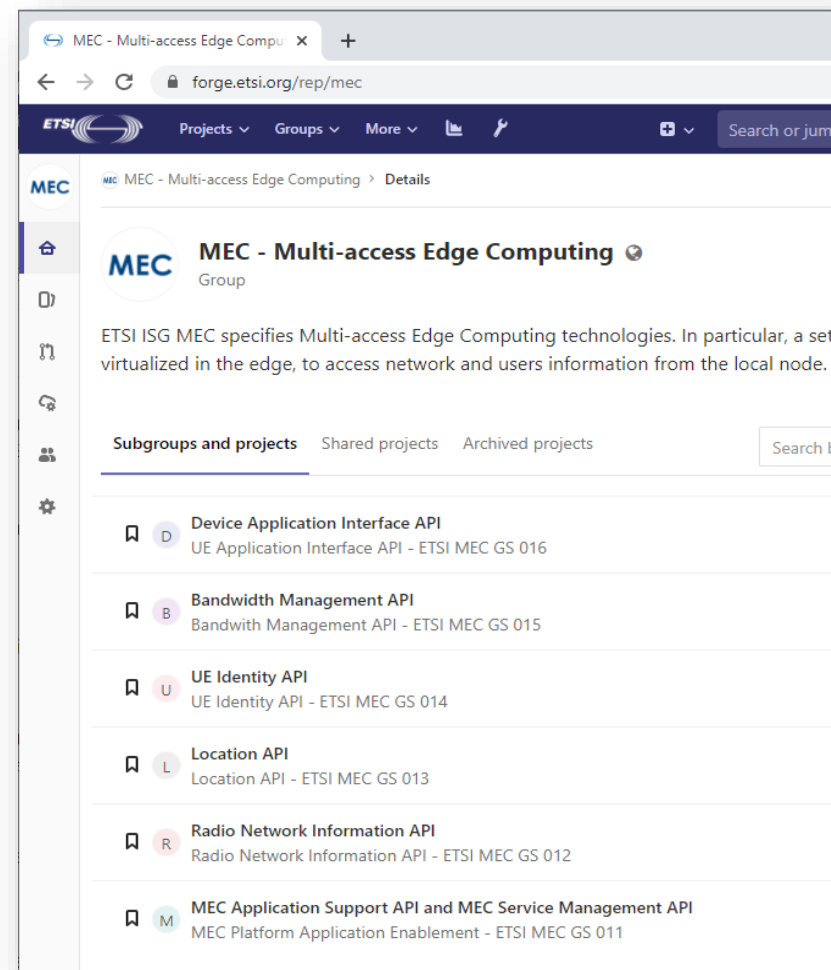


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Discover the APIs on forge.etsi.org/rep/mec

Powered by

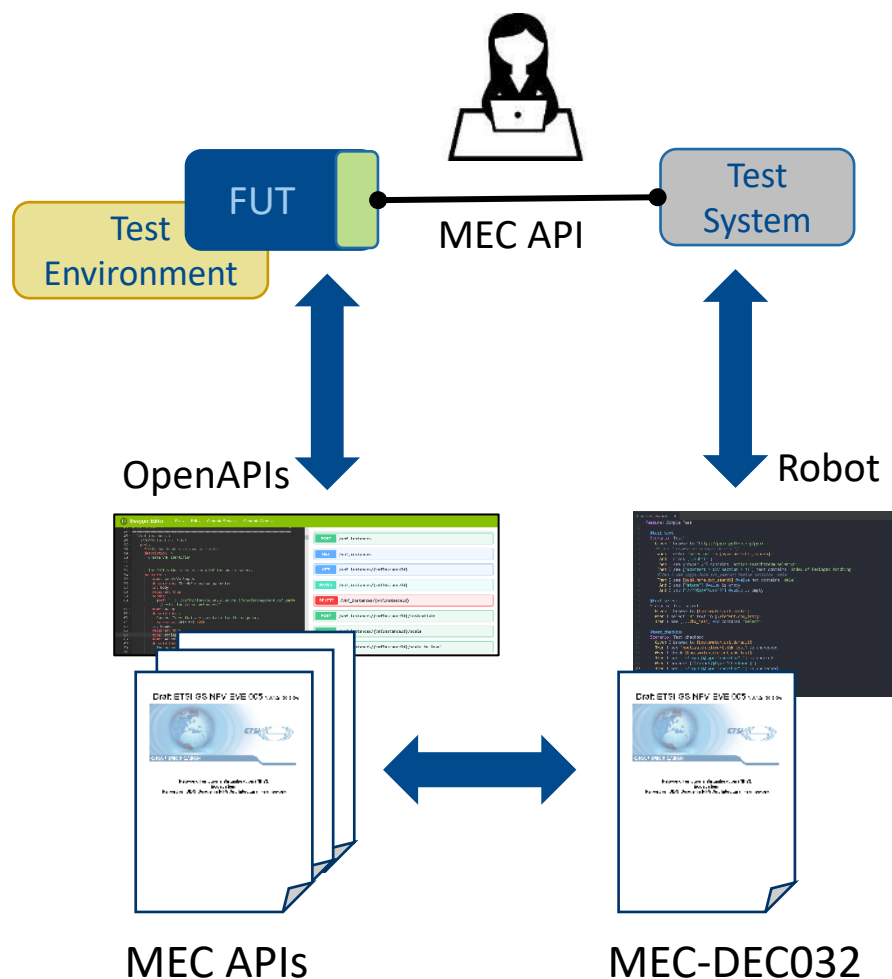


Operated by



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General testing framework for MEC Technologies ([MEC 0025](#))

API Conformance testing developed for server implementations

- Standardized test suite ([MEC-DEC 032](#)) Test implementations in [Robot Framework](#) and [TTCN-3](#)
- Openly available and released under BSD-3 license

- ## PoCs

MEC Deployment Trials

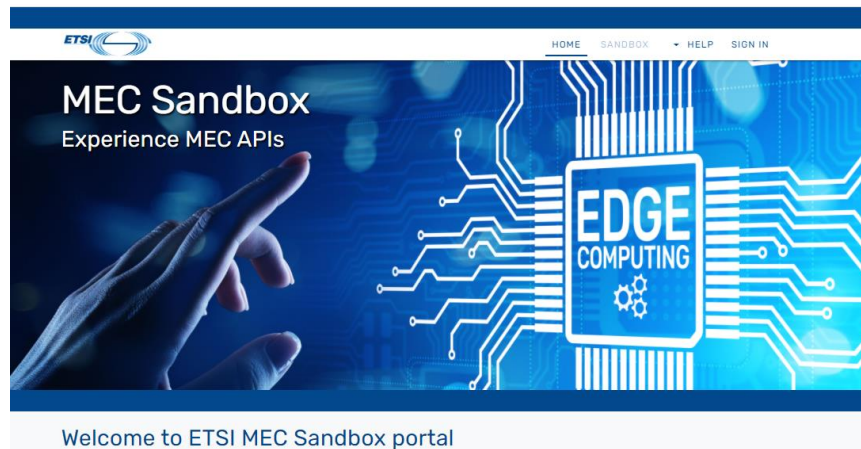
MEC Ecosystem

For further details,
please see:
<http://mecwiki.etsi.org> or
contact CTI_Support@etsi.org

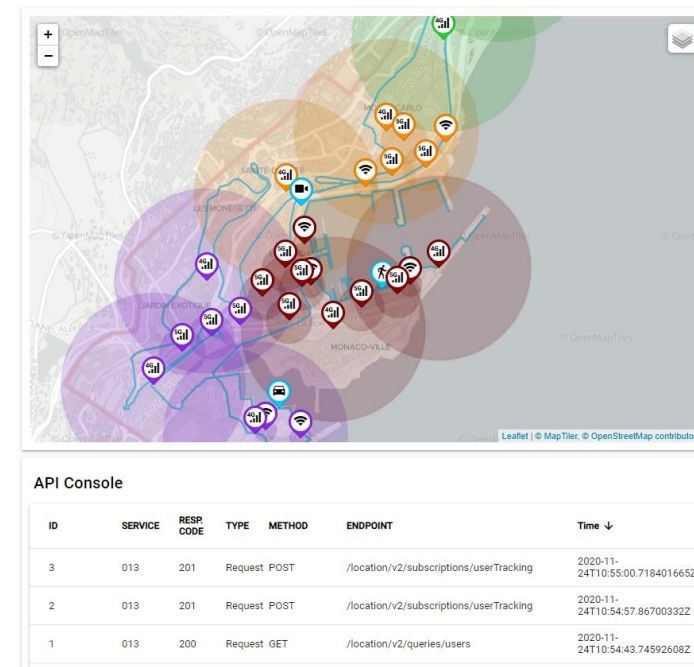
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MEC: DECODE Working Group

- OpenAPI representations: ETSI Forge
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<https://try-mec.etsi.org/>



A simulator of a real 4G/5G network as seen via the MEC APIs

- ✓ 4G/5G/Wifi access points
- ✓ Steady and moving UE (~devices)
- ✓ API Console, integrated Swagger UI, & more

MEC deployment and ecosystem engagement activities

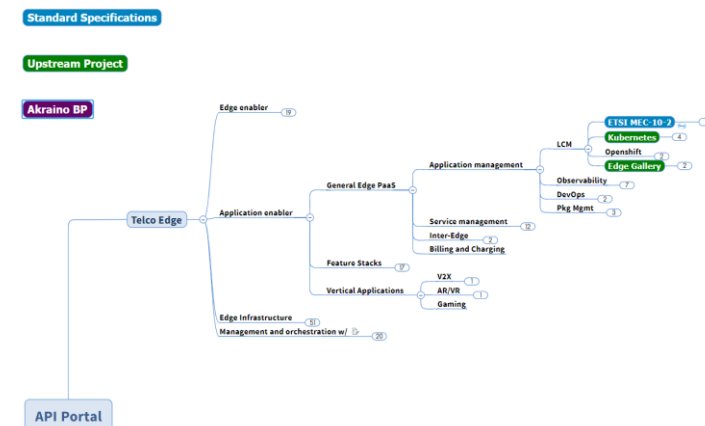
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**NFV&MEC
Remote API
Plugtests 2021**

**4 - 8 Oct 2021
NFV&MEC
IOP Plugtests
2021**

**1 – 28 February 2021
NFV&MEC API
Plugtests 2021**

<https://apiportal.akraino.org/apimap.html>



➤ [18-19 September 2018: 3 parallel events \(link\)](#)

- Berlin (co-located with Edge Computing Congress)
- Beijing (China)
- Turin (Italy)

➤ [17-18 September 2019: 2 parallel events \(link\)](#)

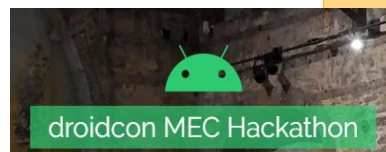
- London, UK (co-located with Edge Computing Congress)
- Shenzhen (China)

➤ [18 November 2019, in collab. with LF Edge and Akraino \(link\)](#)

- San Diego (USA) (with KubeCon + CloudNativeCon North America)

[25-26 November 2020](#)

- 2020 Droidcon MEC Hackathon (co-located with Droidcon Italy)



Conclusions

- ETSI ISG MEC is the leading voice in standardization & industry alignment around MEC (**Multi-access Edge Computing**)
 - Key building block for **next generation** networks, complementing NFV & SDN
 - Widely recognized as one of the key architectural concepts and technologies for **5G**
 - Enable a **myriad of new use cases** across **multiple sectors** and innovative business opportunities
- ETSI ISG MEC is involved in many activities for the **ecosystem** engagement
- As a standard body, ETSI ISG MEC is collaborating with **Industrial Groups**, **Open Source** communities and projects.

Thank you!



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