



# ETSI MEC: An Introduction

(almost) everything you want to know about ETSI MEC

Presented by: **ETSI MEC Leadership Team** For: **Public consumption**

## 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

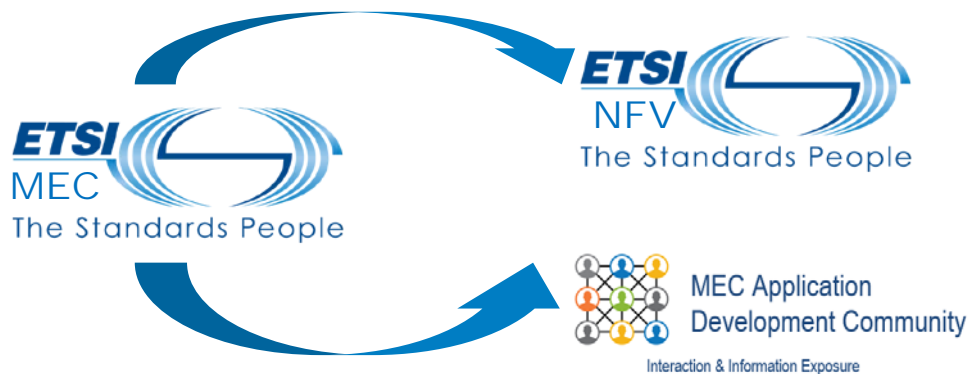
**Standards +**

**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



This block contains several screenshots and document covers. At the top left is a 'MEC Proof of Concept PoC #8 Video Analytics' document cover, listing Nokia, Vodafone, Hutchinson, and SeeTec. Below it is a screenshot of the ETSI Forge website with the heading 'Welcome to ETSI Forge' and 'Collaborative tools for standardized technologies'. To the right is a document cover titled 'MEC Deployments in 4G and Evolution Towards 5G'. At the bottom left is a 'MEC Hackathon EVA apps for in-Car entertainment' document cover, listing Intel, Viavi, Saguna, Vodafone, and Huawei. In the center is a screenshot of the 'Activity from ETSI groups' page, showing various API specifications like 'Mobile Edge Platform Application Enablement API - GS 011' and 'Radio Network Information API - GS 012'.

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



# Existential questions of applications “on the edge”

How do I reach my cloud service?

How do I get discovered by my users?

Where am I?

What is around me?

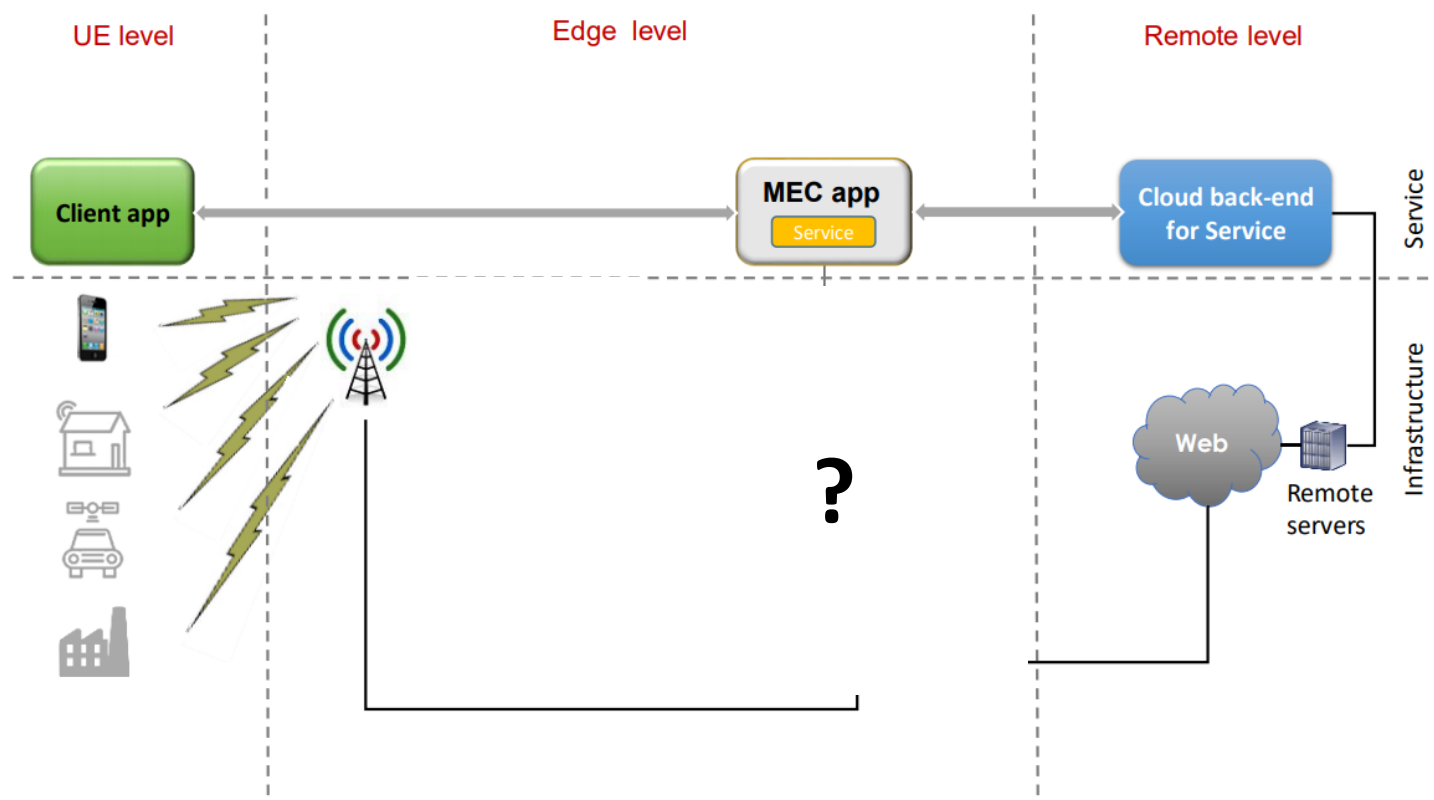


Figure 2: New application development paradigm introduced by MEC.

How am I connected to the users?

What is my **QoS**?

How many users am I serving? And where are they?

How can I be sure I am running when and where they need me?

What if my users move?

Img Source: [https://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp20ed2\\_MEC\\_SoftwareDevelopment.pdf](https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp20ed2_MEC_SoftwareDevelopment.pdf)

# Where do the APIs play their part?

- Application Support
- Service Management
- Radio Network Information
- Location
- UE Identity
- Bandwidth Management
- Fixed Access Information
- WLAN Information API
- V2X Information Service

- Application Package lifecycle and operation granting
- Device application interface

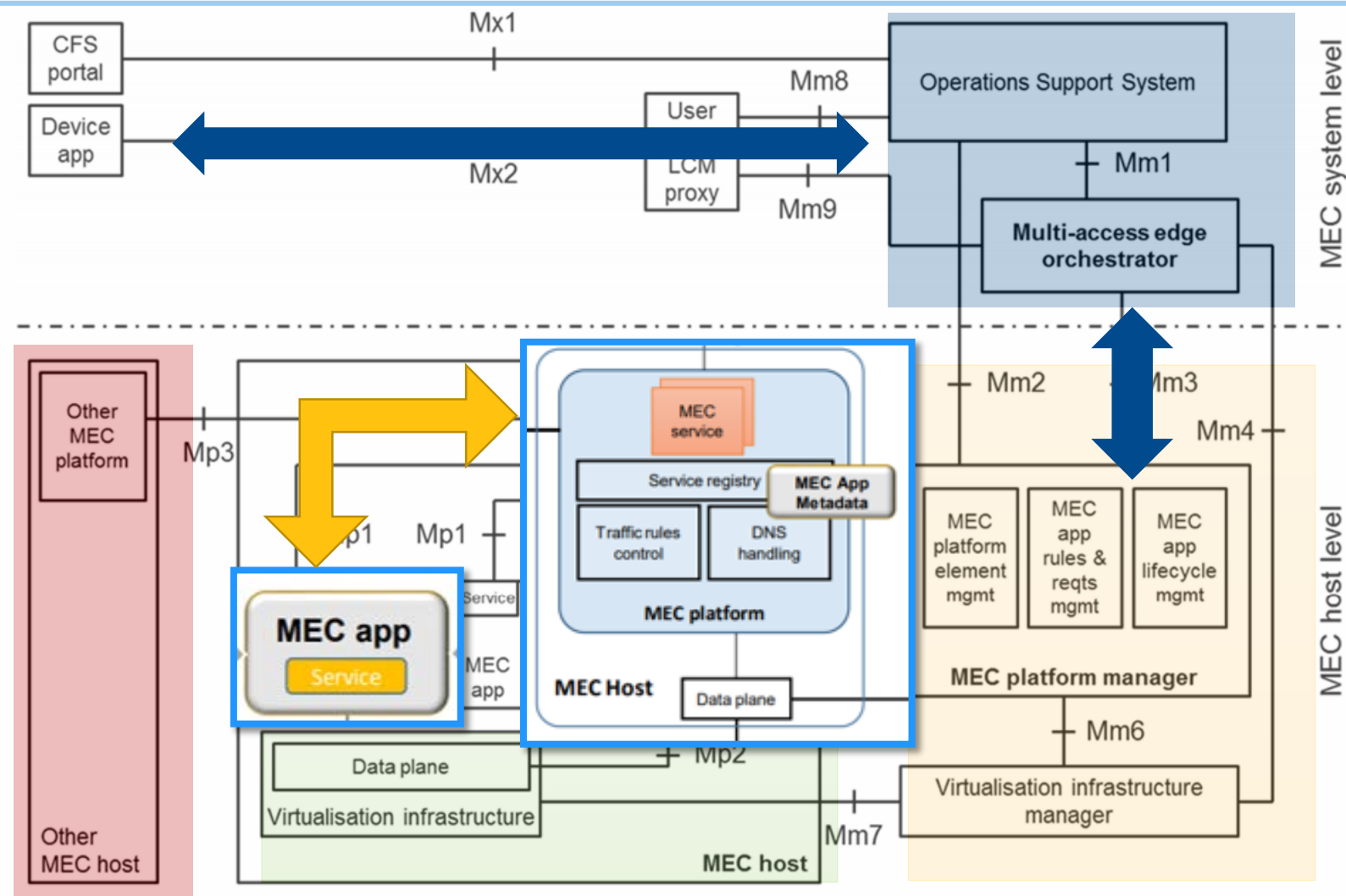


Figure 6-1: Multi-access edge system reference architecture

# 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)
- Lawful Intercept (MEC 026 - published)

## ■ Addressing key Industry Segments

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

## ■ Key use-cases and new requirement

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

## ■ Normative work for integration with NFV

- Incorporate in v2 of existing specs as needed

## ■ From “Mobile” to “Multi-Access”

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

## ■ MEC integration in 5G networks (MEC 031)

## • Developer community engagement

- API publication through ETSI Forge (more overleaf)
- Hackathons

## • Testing and Compliance (MEC 025 - published, MEC 032)

## ■ Preliminary activities starting now.

## ■ Full work planned to start late 2020

## ■ MEC as heterogeneous clouds

- Expanding traditional cloud and NFV LCM approaches
- Inter-MEC systems and MEC-Cloud systems coordination (MEC 035)
- Mobile or intermittently connected components
- Consumer-owned cloud resources

## ■ Continuing emphasis on enabling developers

- 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)

# Our Standards

# ETSI MEC – Foundation for Edge Computing

Application Enablement and Framework	API Principles	Specific service-related APIs	Management and Orchestration related APIs
<p>Service definition framework and baseline platform services authorized applications.</p> <ul style="list-style-type: none"> <li>• Registration, discovery and notification;</li> <li>• Methodology for authentication and authorization of apps providing/consuming services;</li> <li>• Communication support for services (query/response and notifications).</li> </ul>	<p>Principles and guidance for developing and documenting APIs</p> <ul style="list-style-type: none"> <li>• Developer-friendly approach to foster development</li> <li>• <b>Ensures that a consistent set of APIs</b> are used by developers.</li> <li>• Defines approach for authentication and authorization of apps providing/consuming services</li> <li>• Based on TMF and OMA best practices</li> </ul>	<p>Standardized service-exposure APIs for key services that</p> <ul style="list-style-type: none"> <li>• Expose network and context information</li> <li>• Allow definition of localized, contextual services</li> <li>• Support key use cases (e.g. enterprise, vehicular)</li> <li>• Allow fine-grained edge traffic management</li> </ul>	<p>Management of MEC hosts either as <b>stand-alone</b> entities or part of a larger <b>NFV-managed</b> framework</p> <ul style="list-style-type: none"> <li>• Facilitate running of 3<sup>rd</sup> party application</li> <li>• Enable deployment <b>at the correct location at the right time</b>, based on technical and business parameters</li> <li>• Integrate into telco operations systems, e.g. OSS</li> </ul>

**Enables a myriad of new use cases across multiple sectors as well as innovative business opportunities**

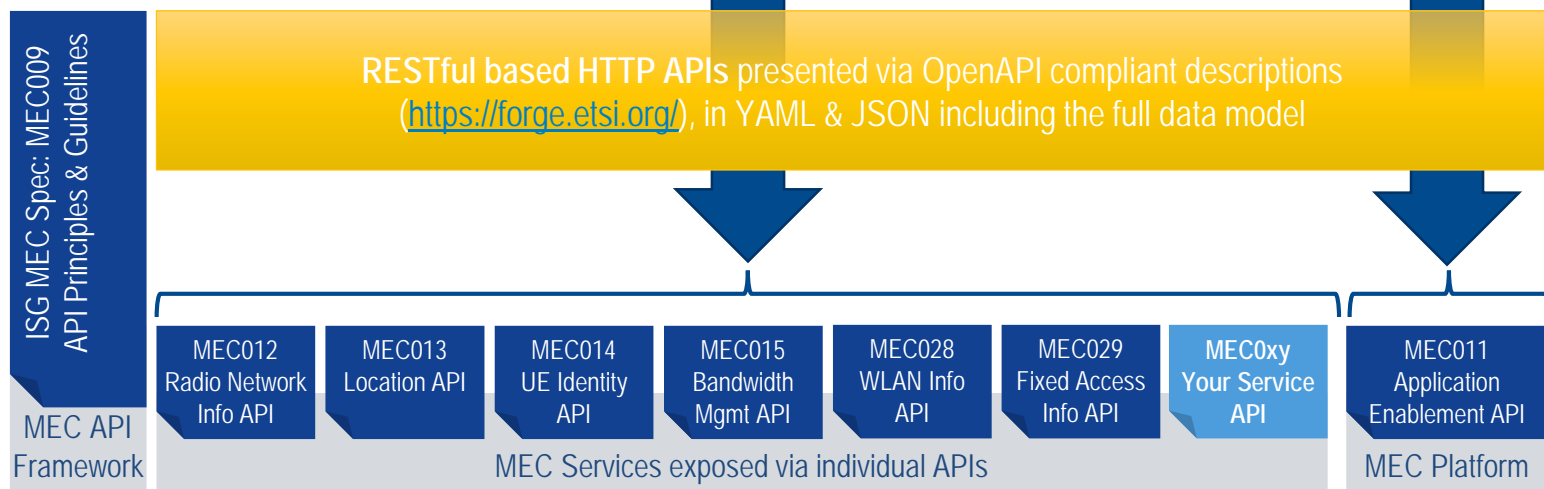


# Enabling Global Application Portability



## MEC Application Development Community

Interaction & Information Exposure

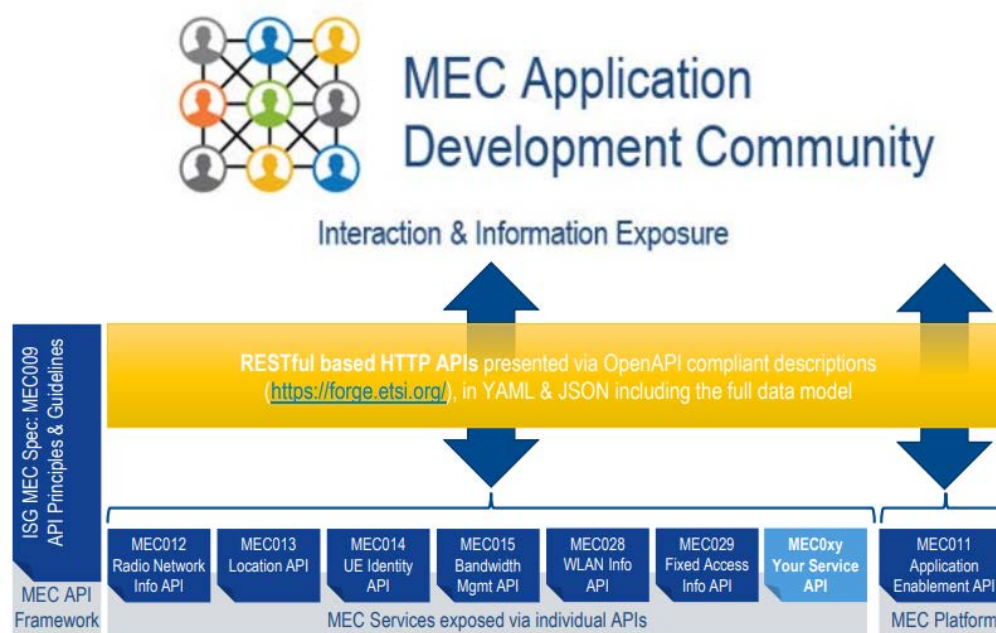


- ✓ Simple to use, well documented APIs, published with OpenAPI Framework
- ✓ Create innovative applications quickly and easily, reducing time-to-revenue
- ✓ New APIs (compliant with the MEC API principles) can be added
- ✓ Increase the Total Addressable Market (TAM)

# Application portability via the ETSI MEC APIs ecosystem

That's all you need as a MEC App developer

- ✔ Discover network, users, capabilities and local services
- ✔ Manage traffic, DNS, mobility, V2X, etc.
- ✔ Register your own service and discover third party services available locally
- ✔ Plus: APIs for interoperability among MEC systems and infra



# MEC and Management: The Killer Use Case for Automation

MEC deployments present challenging environment

- (large scale: geography) x (small scale: cloud footprint)
- Unmanned/lights out location
- Outside traditional service areas

While supporting “critical infrastructure”

- Telco, public safety, etc.
- “9’s” of availability requirements

• The following ETSI White Papers address the MEC deployment aspects:

- ❑ *WP#23: Cloud RAN and MEC: A Perfect Pairing*
- ❑ *WP#24: MEC Deployments in 4G and Evolution Towards 5G*
- ❑ *WP#28: MEC in 5G networks*
- ❑ *WP#30: MEC in an Enterprise Setting: A Solution Outline*

Unique requirements and processes

- Minimize need for human presence
- Maximize service time intervals
- Minimize skills required from those on site

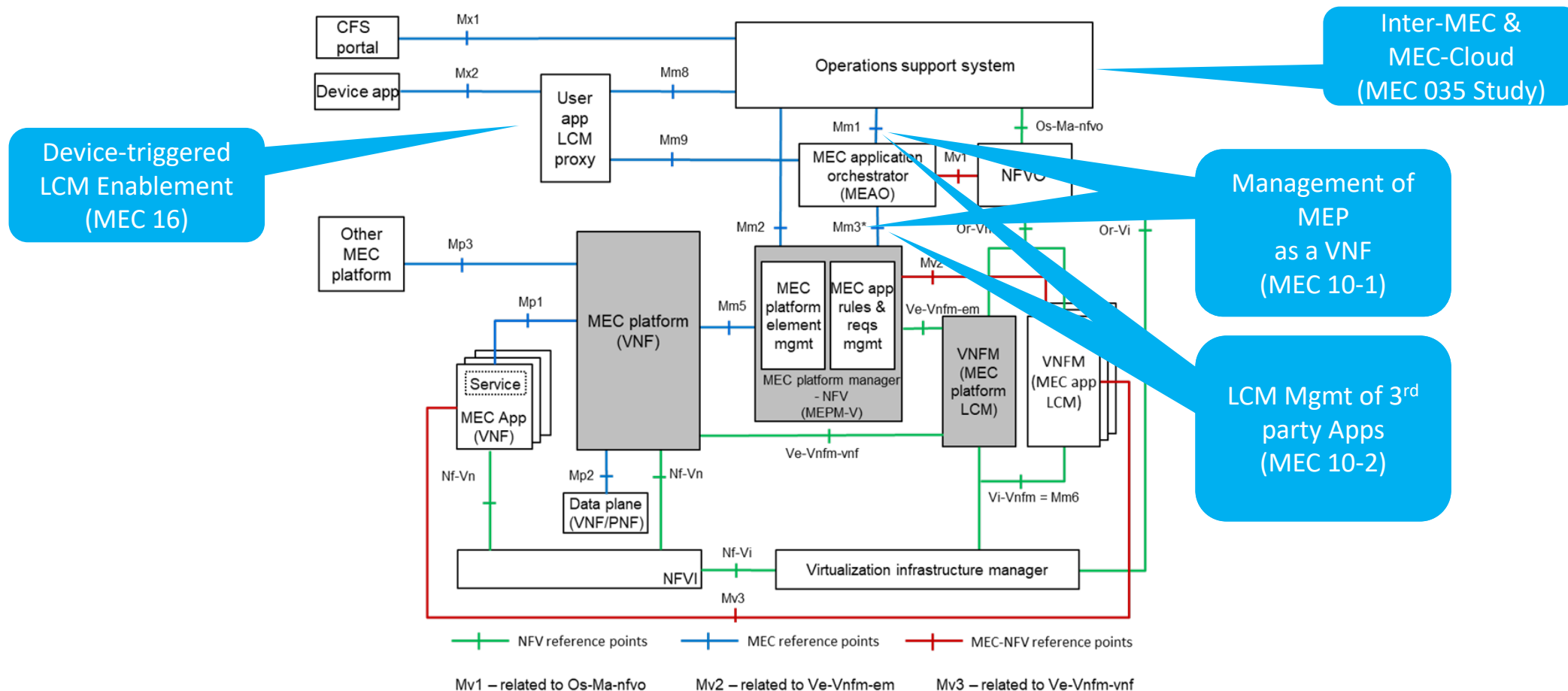
In other words

- Get as close as possible to the web-scale maintenance model
- In a very non-web-scale environment

All white papers are available in

<https://portal.etsi.org/TBSiteMap/MEC/MECWhitePapers.aspx>

# A key part of ETSI Network Automation Standards



# MEC White Papers: A view of a whole picture

## Standards are necessarily tools, not solutions

- ✔ Enable interoperability
- ✔ Support a broad range of use cases and system architecture
- ✔ Address only a specific part of the whole picture

## MEC White Papers: how we help industry see the whole picture

- ✔ Harmonizing Standards for Edge Computing: a synergized architecture leveraging ETSI MEC and 3GPP  
<https://www.etsi.org/newsroom/news/1806-2020-07-new-etsi-white-paper-harmonizing-standards-for-edge-computing-a-synergized-architecture-leveraging-etsi-3gpp-specifications>
- ✔ MEC in an Enterprise Setting  
[https://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp30\\_MEC\\_Enterprise\\_FINAL.pdf](https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp30_MEC_Enterprise_FINAL.pdf)
- ✔ MEC in 5G Networks: [http://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp28\\_mec\\_in\\_5G\\_FINAL.pdf](http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp28_mec_in_5G_FINAL.pdf)
- ✔ MEC deployment in 4G and towards 5G:  
[http://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp24\\_MEC\\_deployment\\_in\\_4G\\_5G\\_FINAL.pdf](http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp24_MEC_deployment_in_4G_5G_FINAL.pdf)
- ✔ CRAN and MEC: A Perfect Pairing:  
[http://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp23\\_MEC\\_and\\_CRAN\\_ed1\\_FINAL.pdf](http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp23_MEC_and_CRAN_ed1_FINAL.pdf)
- ✔ Developing SW for MEC (2<sup>nd</sup> Ed.)  
[https://www.etsi.org/images/files/ETSIWhitePapers/etsi\\_wp20ed2\\_MEC\\_SoftwareDevelopment.pdf](https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp20ed2_MEC_SoftwareDevelopment.pdf)
- ✔ and many more to come!  
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# WG DECODE: Enabling Edge Computing in the Telco Industry

# Discover the APIs on [forge.etsi.org/rep/mec](https://forge.etsi.org/rep/mec)

MEC - Multi-access Edge Computing

MEC - Multi-access Edge Computing Group

ETSI ISG MEC specifies Multi-access Edge Computing technologies. In particular, a set of virtualized in the edge, to access network and users information from the local node.

Subgroups and projects

- Device Application Interface API
- Bandwidth Management API
- UE Identity API
- Location API
- Radio Network Information API
- MEC Application Support API and MEC Service Management API

## Multi-access Edge Computing Platform Application Enablement API

This repository contains OpenAPIs descriptions for the interfaces specified in ETSI GS MEC 011.

### Online resources

- Specification document
- Navigate the MEC Application Support API in the browser.
- Navigate the MEC Service Management API in the browser.
- Edit the MEC Application Support API online.
- Edit the MEC Service Management API online.

## MEC Application Support API

The ETSI MEC ISG MEC011 MEC Application Support API described using OpenAPI

Server:

### appTrafficRules

- GET /applications/{appInstanceId}/traffic\_rules
- GET /applications/{appInstanceId}/traffic\_rules/{trafficRuleId}
- PUT /applications/{appInstanceId}/traffic\_rules/{trafficRuleId}

Powered by



Operated by



# Discovering what an API is about

ETSI GS MEC 013 V1.1.1 (2017-07)

GROUP SPECIFICATION

**Mobile Edge Computing (MEC);  
Location API**

*Disclaimer*

The present document has been produced and approved by the Mobile Edge Computing (MEC) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG. It does not necessarily represent the views of the entire ETSI membership.

## 5.3.2 UE Location Lookup

The UE Location Lookup is the procedure for applications acquiring the current location information of a specific UE or a group of UEs. In this procedure, the Location Service will report the lookup result once on each request.

The UE Location Lookup procedure is illustrated in figure 5.3.2-1.

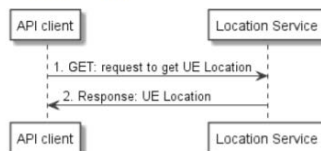


Figure 5.3.2-1: Flow of UE Location Lookup

- 1) The Mobile edge application looks up an UE location by sending a request to the resource representing the UE location, which includes the UE(s) identifier, e.g. UE IP address.
- 2) The Location Service returns a response with a message body including the location information of the UE(s) if the UE location lookup is accepted.

## 5.3.3 UE Information Lookup

The UE Information Lookup is the procedure for applications acquiring information of a list of UEs in a particular location. In this procedure, the Location Service will report the lookup result once on each request.

The UE Information Lookup procedure is illustrated in figure 5.3.3-1.

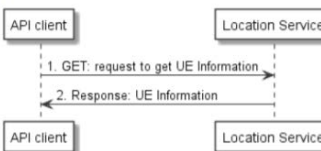


Figure 5.3.3-1: Flow of UE Information Lookup

ETSI

+

Code	Description
200	Successful response to a query users within a zone request
	Example Value   Model
	application/json
	<pre> {   "userList": {     "user": [       {         "address": "acr:192.0.2.1",         "accessPointId": "00101000000000000000000000000001",         "zoneId": "zone01",         "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A192.0.2.1"       },       {         "address": "acr:192.0.2.2",         "accessPointId": "00101000000000000000000000000001",         "zoneId": "zone01",         "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A192.0.2.2"       },       {         "address": "acr:192.0.2.3",         "accessPointId": "00101000000000000000000000000010",         "zoneId": "zone01",         "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A192.0.2.3"       },       {         "address": "acr:192.0.2.4",         "accessPointId": "00101000000000000000000000000001",         "zoneId": "zone02",         "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A192.0.2.4"       },       {         "address": "acr:192.0.2.5",         "accessPointId": "00101000000000000000000000000010",         "zoneId": "zone02",         "resourceURL": "http://example.com/exampleAPI/location/v1/users/acr%3A192.0.2.5"       }     ]   },   "resourceURL": "http://example.com/exampleAPI/location/v1/users" } </pre>

Specification document (e.g. ETSI GS MEC 013)

Machine readable representation

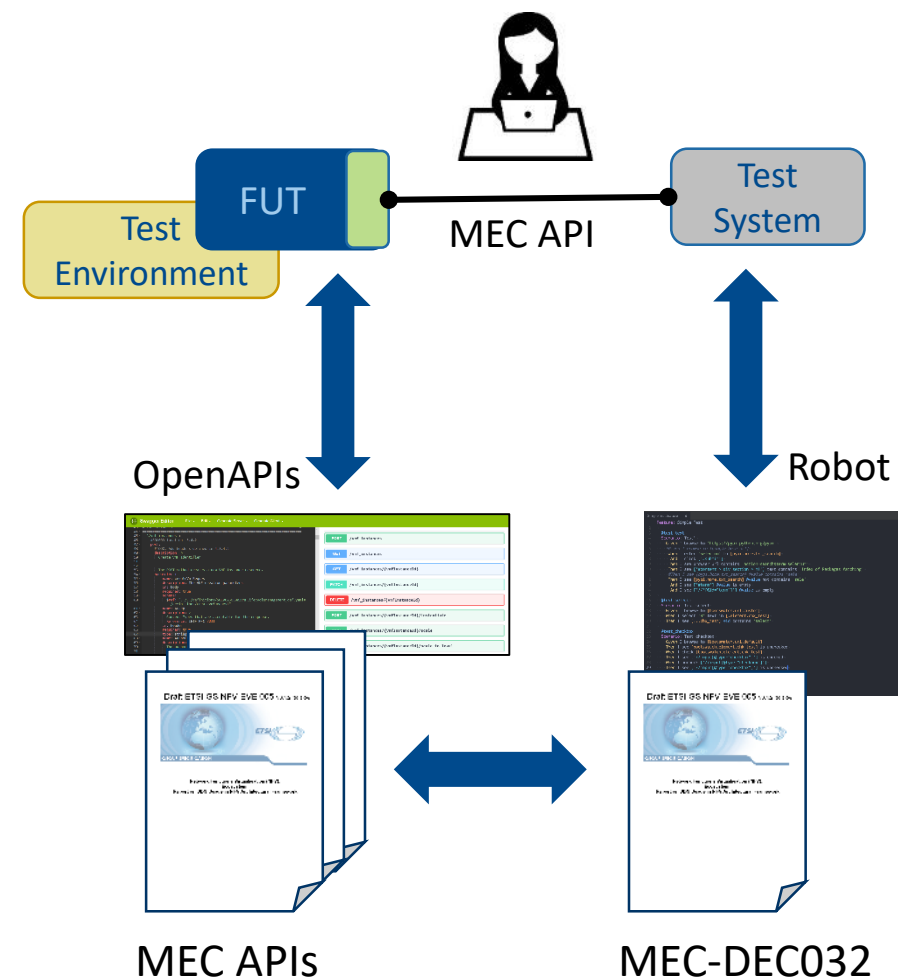


# Testing for MEC Server implementations

- ✓ 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 BDS-3 license

```

7  *** Test Cases ***
8  Get list of locations of User Equipments
9  ... [Documentation] ... Test ID: TP_MEC_PLAT_LOC_001_OK
10  ... ..
11  ... Set Headers {"Accept":"application/json"}
12  ... Get ... /location/v2/users/${zone_id}
13  ... ${output}= ... Output ... response
14  ... Set Suite Variable ... ${response} ... ${output}
15  ... Check HTTP Response Status Code Is ... 200
16  ... Check HTTP Response Body Json Schema Is ... userInfo
17  ... Log ... Check Location for userInfo element
18  ... Should be Equal ... ${response['body']['userInfo']['zoneId']} ... ${zone_id}
19  ... Log ... Location OK
20
    
```

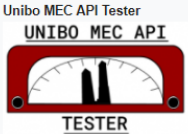


# Discover solutions at the MEC Ecosystem wiki

- ✔ Collects projects and implementations of MEC components
- ✔ Open to any organization
- ✔ A starting point to find solutions to build upon
- ✔ An opportunity to reach users and devs
- ✔ Reach out at [cti\\_support@etsi.org](mailto:cti_support@etsi.org)







## MEC Applications [\[ edit | edit source \]](#)

List of MEC Applications made available by third parties

Name of the App & logo	Description	MEC Consumed APIs	MEC API provided	Link	Contact
	The Unibo MEC API Tester is a web-based application that can be used to test the capability of a MEC Platform to support the MEC 011 defined APIs (mec_app_support & mec_service_mgmt).	MEC 011 (Mp1)	NA	<a href="#">Link</a>	<a href="#">Davide Berardi</a>

## MEC Solutions [\[ edit | edit source \]](#)

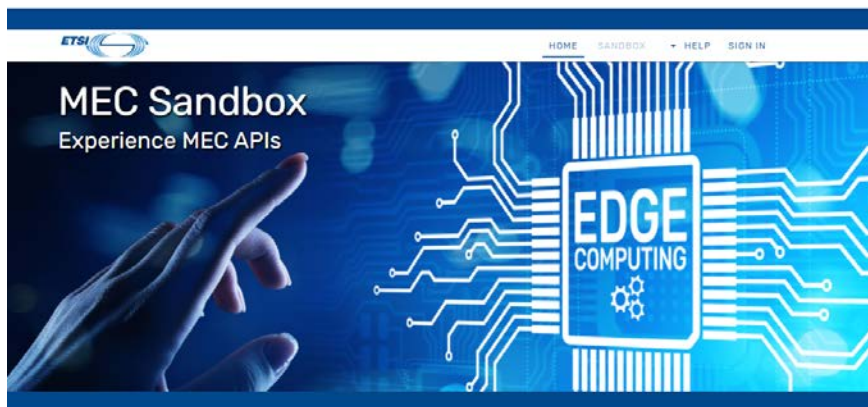
List of MEC Solutions made available by third parties (in alphabetical order). Such solutions may offer all components (functional entities) of the MEC architecture, or a subset (for instance a MEC Platform, or API implementation).

Name of the project & logo	Description	MEC Components provided	MEC APIs supported	Link	Contact
	AdvantEDGE is a Mobile Edge Emulation Platform (MEEP) that runs on Docker & Kubernetes. AdvantEDGE provides an emulation environment, enabling experimentation with Edge Computing Technologies, Applications, and Services. The platform facilitates exploring edge / fog deployment models and their impact on applications and services in short and agile iterations.	MEC Platform	MEC 012 Radio Network Information MEC 013 Location MEC 028 WLAN Information	<a href="#">Link</a>	<a href="mailto:AdvantEDGE@InterDigital.com">AdvantEDGE@InterDigital.com</a>
	CVB provides a V2X focused MEC platform, which offers services to connected vehicles. These services are delivered to applications hosted on vehicles based on a set of policies for data dispatch and response. As the blueprint continues to be developed, further connected-vehicle applications and services are being incorporated into the blueprint.	MEC Platform(s), MEC Platform Manager	MEC 011 Mp1 & Mm5	<a href="#">Link</a>	<a href="#">Yarg Yang</a>
	Lightweight telco edge platform, enabling Enterprise applications on telco edge. Offering a: Unified Portal for platform management and for App developers; Sandbox with SDKs and tools chains for MEC app developers; Heterogeneous deployment on Multi-Arch; ETSI MEC Compliance.	MEC Platform(s), MEC Platform Manager	MEC 011 Mp1 & Mm3	<a href="#">Link</a>	<a href="#">Gaurav Agrawal</a>
	Italtel MEC platform i-MEC brings high value in the network enabling a wide set of services which leverage reduced end-to-end latency (uRLLC), pre-processing at the edge (mMTC) and broadband services (eMBB). i-MEC contributes to reduce the traffic load on the backhauling transport network with relevant saving of cost for the Service Operator.	MEC Platform	MEC011 Mp1, Mm5 proprietary API, Mp2 proprietary API (OpenFlow based)	<a href="#">Link</a>	<a href="#">Italtel</a>
	The purpose of Public Cloud Edge Interface (PCEI) Blueprint family is to specify a set of open APIs for enabling Multi-Domain Inter-working across functional domains that provide Edge capabilities/applications and require close cooperation between the Mobile Edge, the Public Cloud Core and Edge, the 3rd-Party Edge functions as well as the underlying infrastructure such as Data Centers and Networks.	Provides an enabler layer that facilitates interworking between Edge Computing platforms, including Multi-Access Edge Compute, Public Cloud and 3rd-Party Edge Compute, and Mobile Networks	MEC 013 Location API	<a href="#">Link</a>	<a href="#">Oleg Berzin</a>
	Decentralized framework for the distribution of lambda functions to multiple serverless platforms, with Apache OpenWhisk connectors, supporting the ETSI MEC Device application interface (MEC 016).	User app LCM proxy	MEC 016 Device application interface (Mx2)	<a href="#">Link</a>	<a href="#">Claudio Cicconetti</a>

# MEC Sandbox – the ultimate app development companion

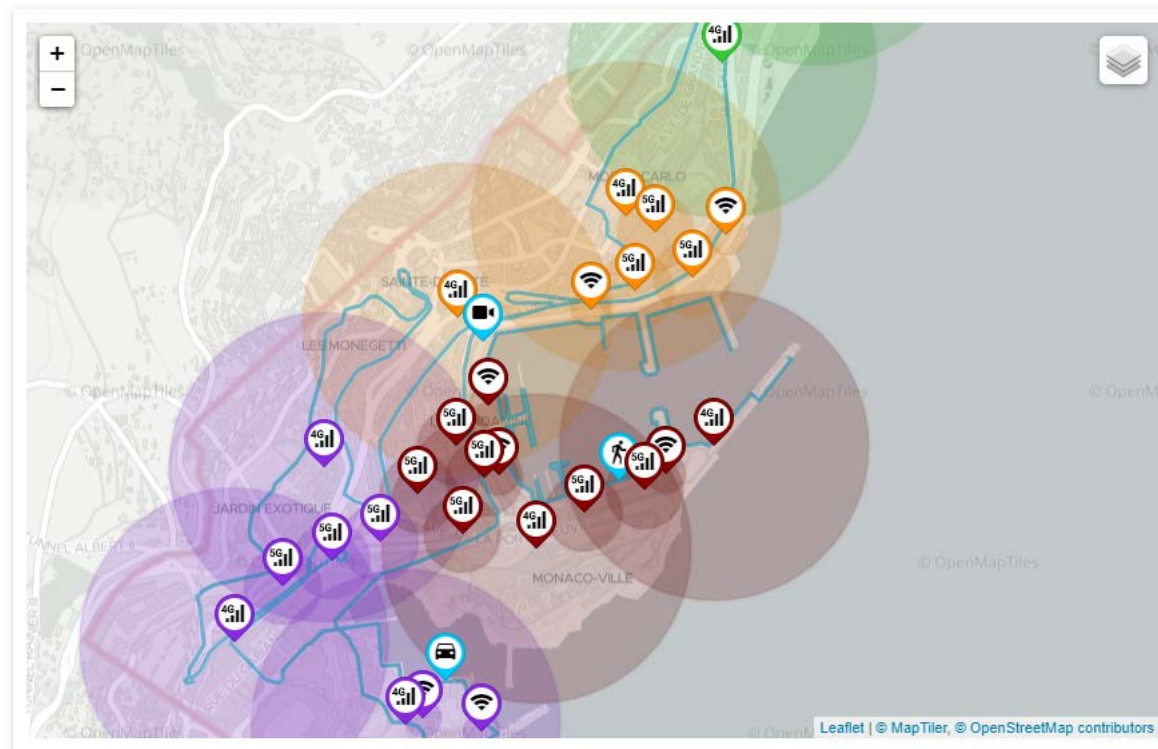
A simulator of a real 4G/5G network as seen via the MEC APIs

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



Welcome to ETSI MEC Sandbox portal

<https://try-mec.etsi.org/>



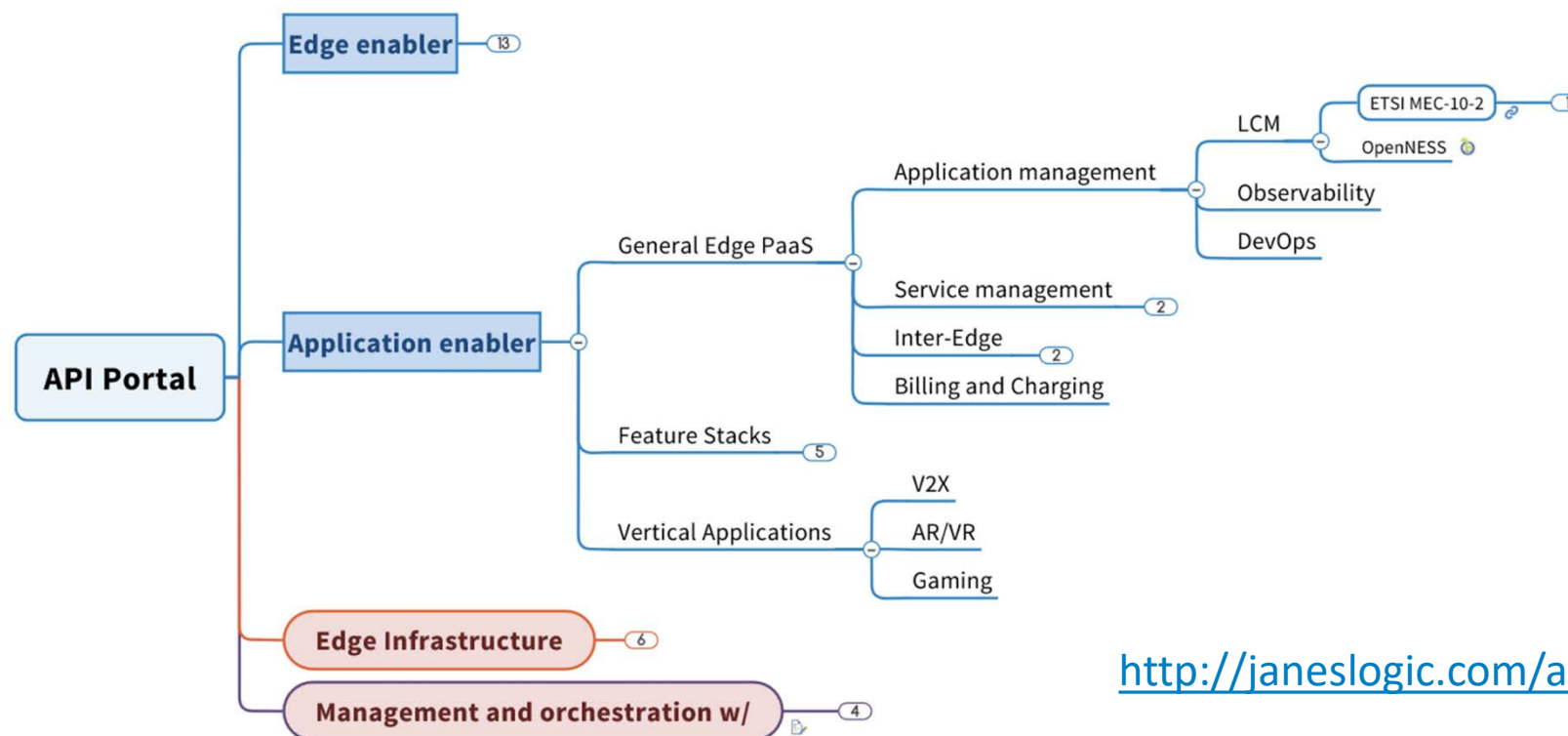
## API Console

ID	SERVICE	RESP. CODE	TYPE	METHOD	ENDPOINT	Time ↓
3	013	201	Request	POST	/location/v2/subscriptions/userTracking	2020-11-24T10:55:00.718401665Z
2	013	201	Request	POST	/location/v2/subscriptions/userTracking	2020-11-24T10:54:57.86700332Z
1	013	200	Request	GET	/location/v2/queries/users	2020-11-24T10:54:43.74592608Z

# Collaborations: Akraino

Work in progress

- Examining opportunities for collaboration, e.g. highlighting and marketing MEC APIs along with Akraino blueprints and other MEC related implementations



[http://janeslogic.com/api\\_portal\\_v2.html](http://janeslogic.com/api_portal_v2.html)

# MEC Hackathons

## ETSI ISG MEC Hackathon Framework:

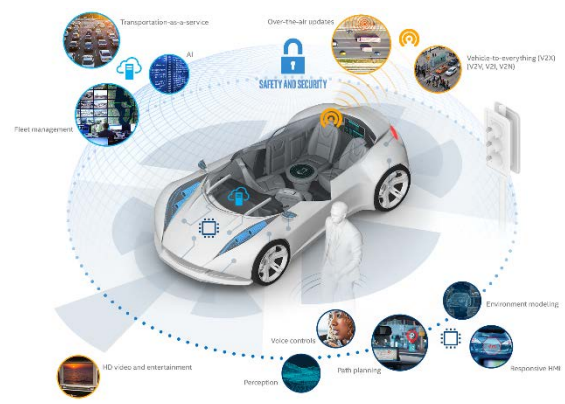
- Open Call for proposers and hosts interested in organizing a MEC Hackathon
- Submit on our Wiki page <https://mecwiki.etsi.org>

## MEC Hackathons

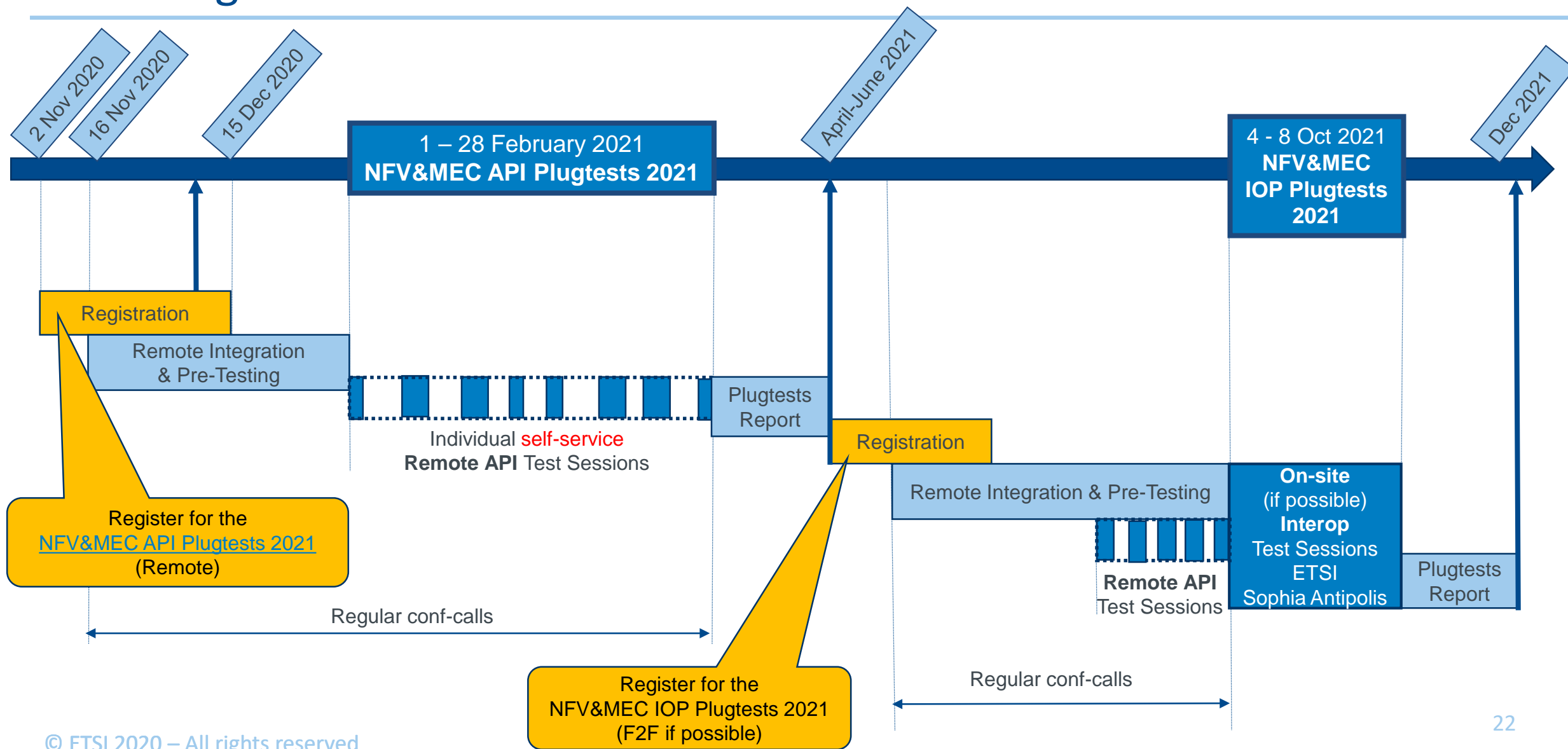
- [18-19 September 2018: 3 parallel events](#)
  - Berlin (co-located with Edge Computing Congress)
  - Beijing (China)
  - Turin (Italy)
- [17-18 September 2019: 2 parallel events](#)
  - London, UK (co-located with Edge Computing Congress)
  - Shenzhen (China)
- [18 November 2019, in collab. with LF Edge and Akraino](#)
  - San Diego (USA) (with KubeCon + CloudNativeCon North America)
- [25-26 November 2020](#)
  - Turin (co-located with Droidcon Italy)

We encourage **new proposals** for MEC Hackathons!

For further details, please see: <http://mecwiki.etsi.org> or contact [CTI\\_Support@etsi.org](mailto:CTI_Support@etsi.org)



# MEC Plugtests – 2021 Timeline



# MEC PoCs: Show off YOUR cool Edge

Recent PoCs (first 9 are complete)

**ETSI** MEC Proof of Concept

PoC #10

**Service-Aware MEC Platform to Enable Bandwidth Management of RAN**

Industry Technology Research Institute  
- Linker Network - FarEasTone

**ETSI** MEC Proof of Concept

PoC #11

**Communication Traffic Management for V2x**

KDDI Corporation - Saguna Networks Ltd.  
- Hewlett Packard Enterprise

**ETSI** MEC Proof of Concept

PoC #12

**MEC Enabled OTT Business**

China Unicom, ZTE, Intel, Tencent, Wo video, UnitedStack

**ETSI** MEC Proof of Concept

PoC #13

**MEC infotainment for smart roads and city hot spots**

TIM, Intel, Vivida, ISMB, City of Turin

**ETSI** MEC Proof of Concept

*The next PoC*

**IMAGINE YOUR BEST HERE**

Thought Leaders in Edge Computing



We encourage **new POC** submissions to ETSI MEC !

For further details, please see:  
<http://mecwiki.etsi.org> or  
 contact [CTI\\_Support@etsi.org](mailto:CTI_Support@etsi.org)

# MEC Deployment Trial: MEC in action in Live Networks

Next step from MEC PoC to keep engaging the ecosystem in MEC standards based deployments

- ✓ From Proof of Concept to proof of viability in a Live Network environment
- ✓ Follows the proven MEC PoC framework with a new set of acceptance criteria
  1. Trial deployed in Live Network
  2. Demonstrated to the industry, e.g. in an industry event or in ISG MEC
  3. Feedback to MEC standardization; improvement proposals, lessons learnt, next steps
- ✓ Currently the following MDTs are active:



**We encourage new MDT submissions to ETSI MEC !**

For further details, please see:  
<http://mecwiki.etsi.org> or  
 contact [CTI\\_Support@etsi.org](mailto:CTI_Support@etsi.org)

ETSI MEC Deployment Trial

**MDT #1**

**CDN at the Edge**

China Mobile, Nokia

ETSI MEC Deployment Trial

**MDT #2**

**MEC in Factory Network**

China Mobile, Huawei

ETSI MEC Deployment Trial

**MDT #3**

**Edge-Cloud VR cloud game scheme based on 5G network**

China Unicom, Huawei, Tencent, Intel

ETSI MEC Deployment Trial

**MDT #4**

**ARVR navigation based on 5G MEC**

China Telecom, Huawei, 21CN

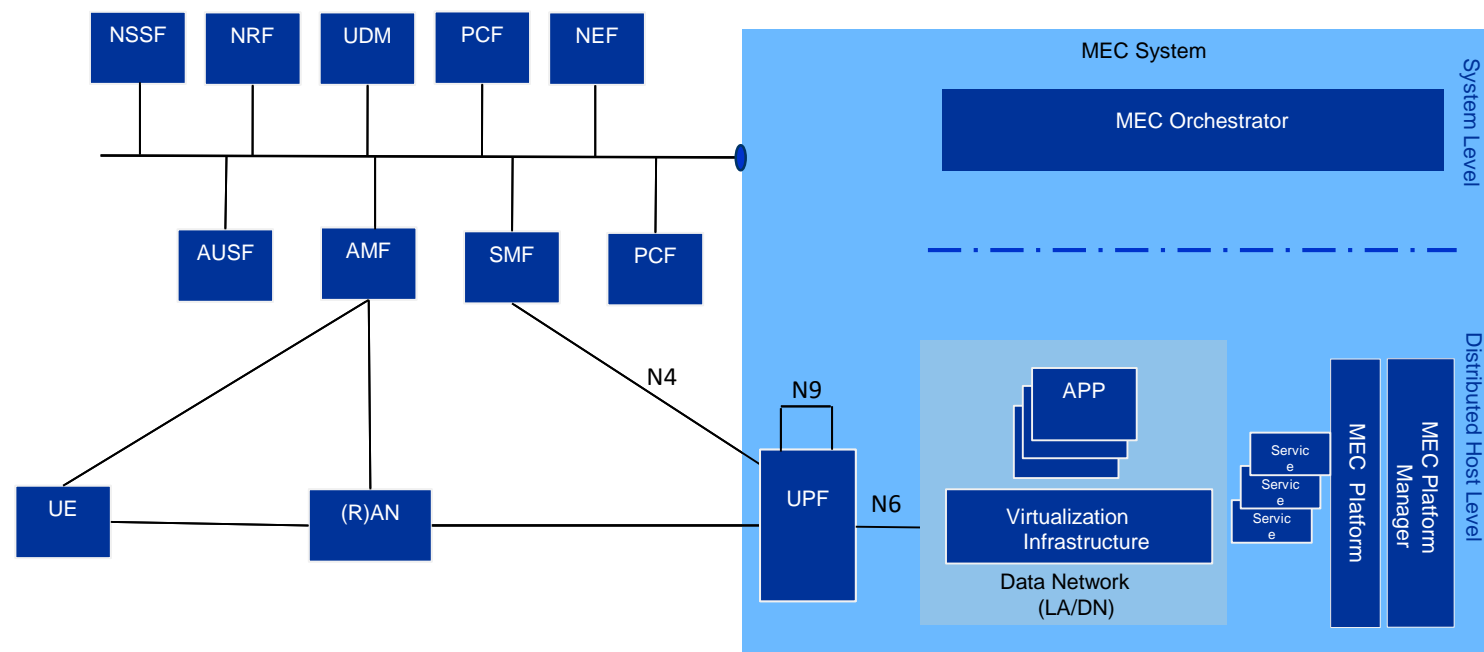




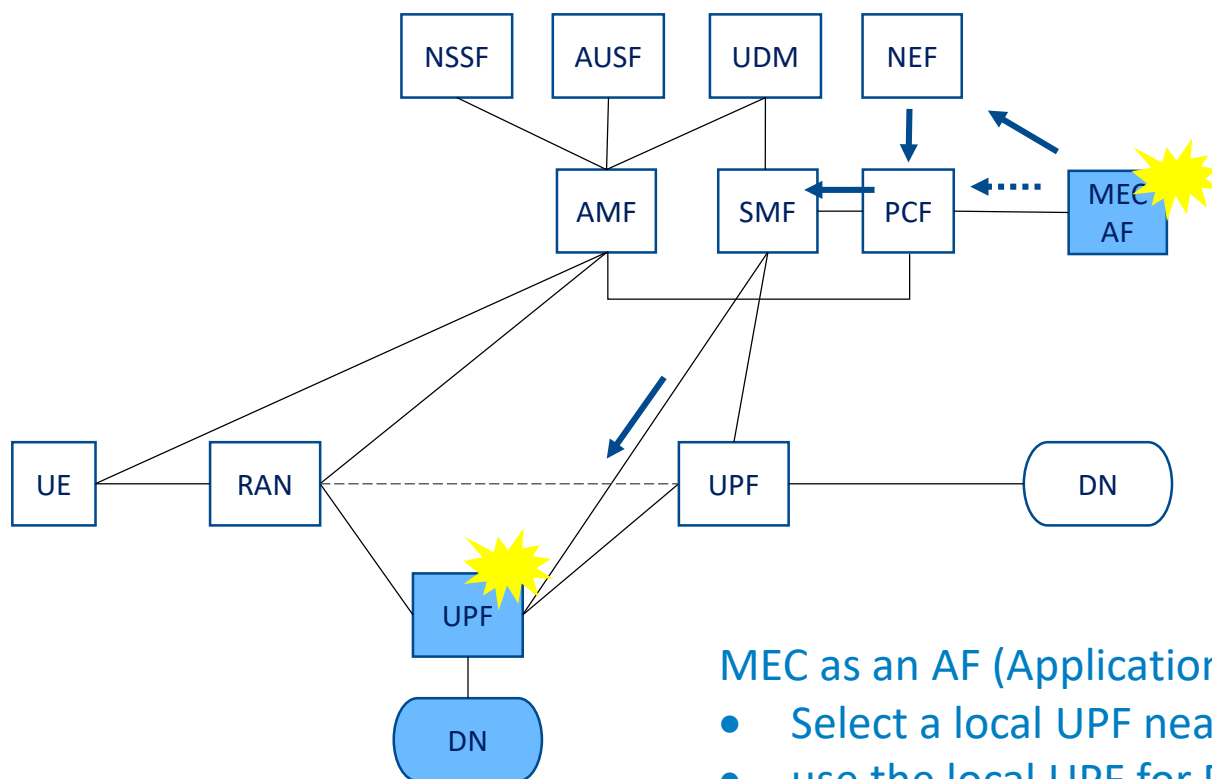
# The larger Telco World: ETSI MEC and 5G

# MEC Phase 2 – Study Item MEC in 5G (MEC 031)

- ✓ The ETSI white paper MEC in 5G networks sets the scene for this study item
- ✓ ISG MEC investigates the opportunities offered to MEC by the 5G system and its edge computing enablers
- ✓ The scope includes the following
  1. C-plane interactions with 5GC,
  2. Functional split between MEC and 5GC wrt. API framework,
  3. Organization of MEC as an AF,
  4. Pertinent interactions of MEC with (R)AN



# 3GPP enablers for MEC – Selection & re-location of UPF



Selection & re-location of UPF

AF influence on traffic routing

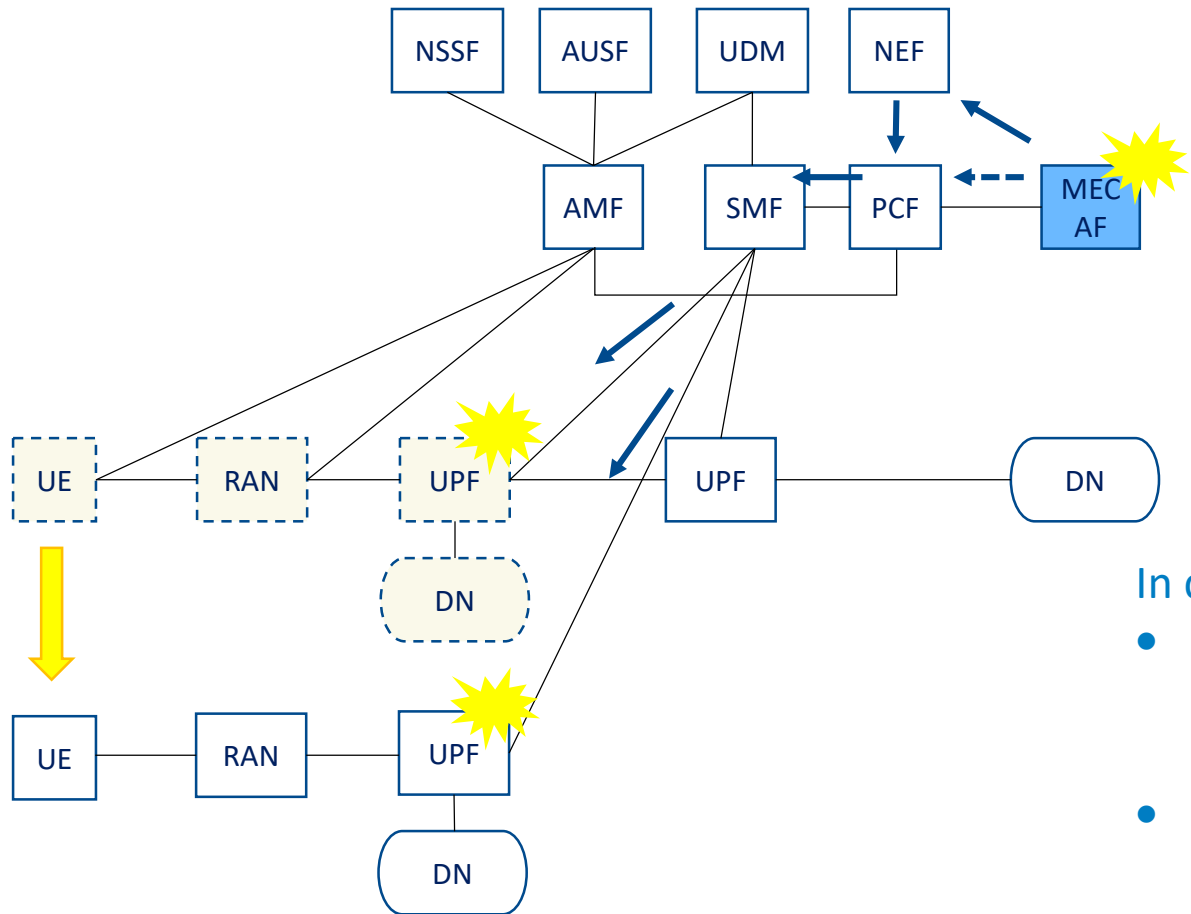
Mobility event notifications from SMF

Concurrent access to local and central DN

MEC as an AF (Application Function) can request the 5GC to

- Select a local UPF near the target (R)AN node
- use the local UPF for PDU sessions of the target UE(s)
- control the traffic forwarding from the local UPF so that the UL traffic matching with the traffic filters received from MEC (AF) is diverted towards MEC hosts while other traffic is sent to the Central Cloud

# 3GPP enablers for MEC – Selection & re-location of UPF

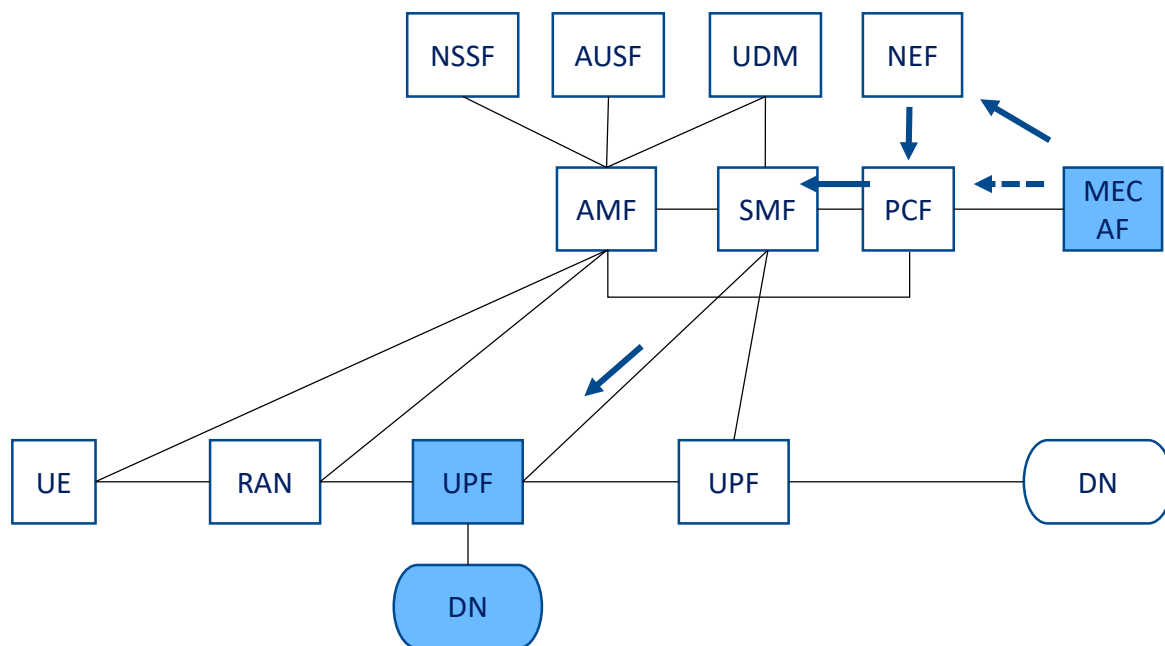


- Selection & re-location of UPF
- AF influence on traffic routing
- Mobility event notifications from SMF
- Concurrent access to local and central DN

In case of UE mobility, the 5GC can

- re-select a new local UPF more suitable to handle application traffic identified by MEC (AF)
- notify the AF about the new serving UPF

# 3GPP enablers for MEC – AF influence on traffic routing



Selection & re-location of UPF

AF influence on traffic routing

Mobility event notifications from SMF

Concurrent access to local and central DN

MEC as an AF can provide the following to 5GC

- traffic filters identifying MEC applications deployed locally on MEC hosts in Edge Cloud
- the target UEs (one UE identified by its IP/MAC address, a group of UE, any UE)
- information about forwarding the identified traffic further e.g. references to tunnels towards MEC hosts

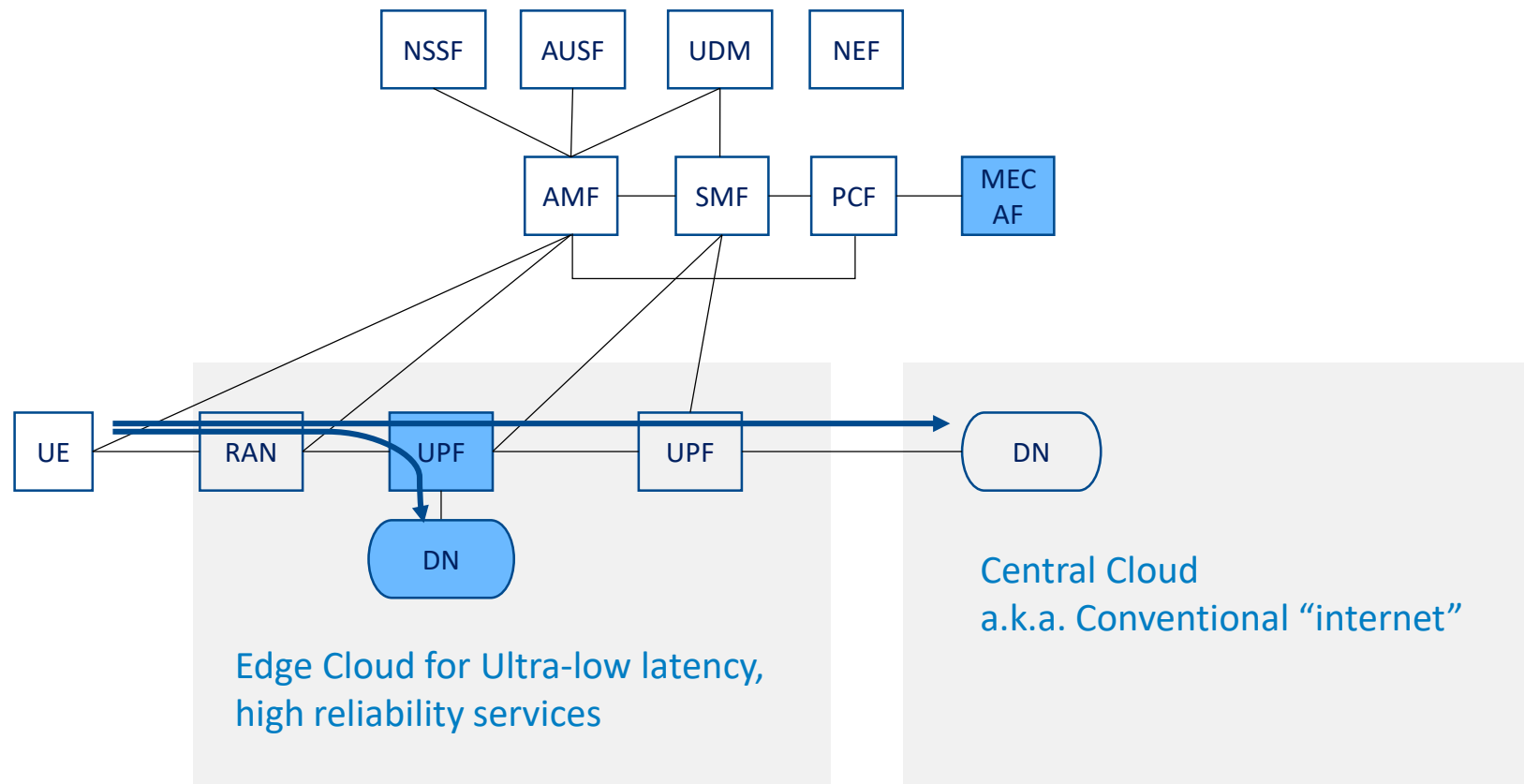


# 3GPP enablers for MEC - Concurrent access to local and central DN


Same UP session allows the UE to obtain content both from local server and central server

Service continuity enabled by IP address anchoring at the centralized UPF.

No impact on UE in case of Uplink Classifier (ULCL) option is used.



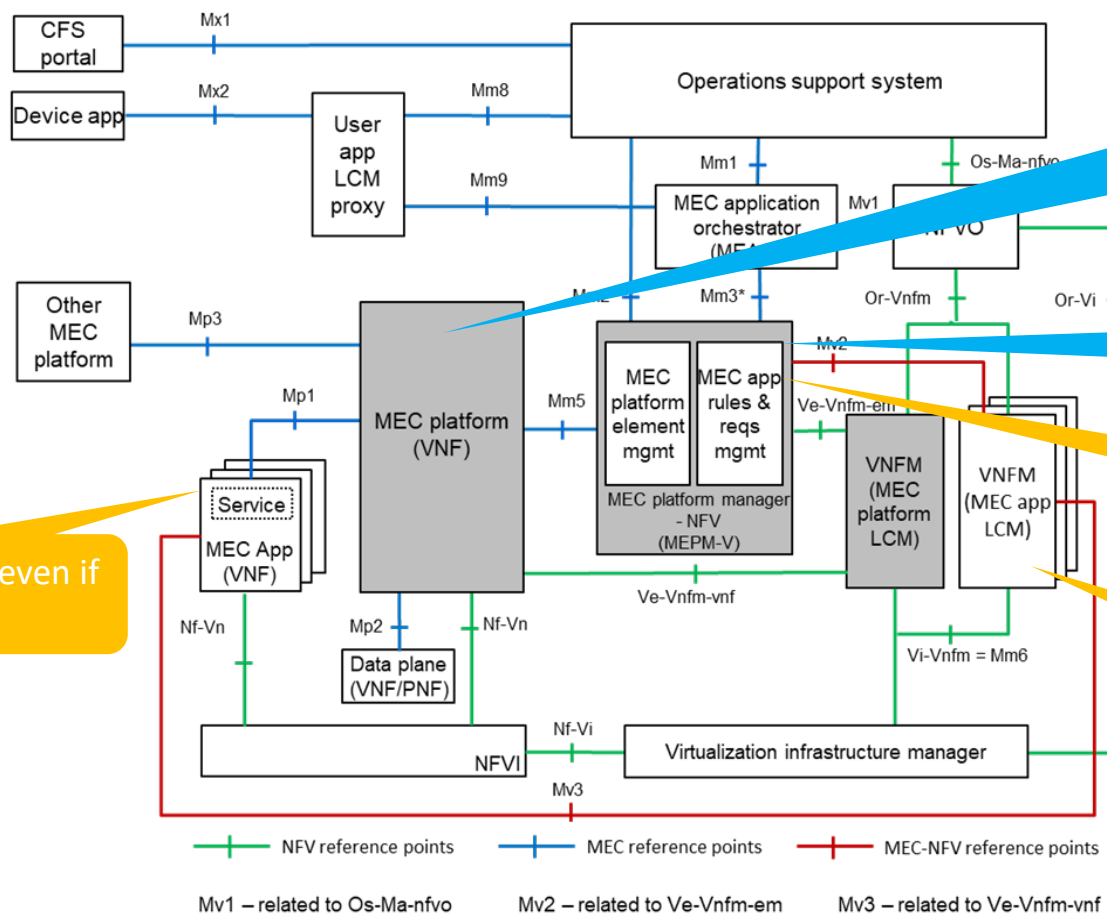
- Selection & re-location of UPF
- AF influence on traffic routing
- Mobility event notifications from SMF
- Concurrent access to local and central DN**

A hand with light-colored nail polish holds a transparent, rectangular tablet. The tablet displays a glowing blue globe of the Earth in the center, surrounded by a circular grid of white lines. The background behind the tablet is a blurred blue and white pattern with various data visualization elements, including a line graph, a grid, and some faint text. The overall scene is set against a white background.

# **MEC and NFV a common approach to management**



# MEC and NFV: MANO for the Telco Edge



MEP as a VNF: must be running for any other VNF/app to run

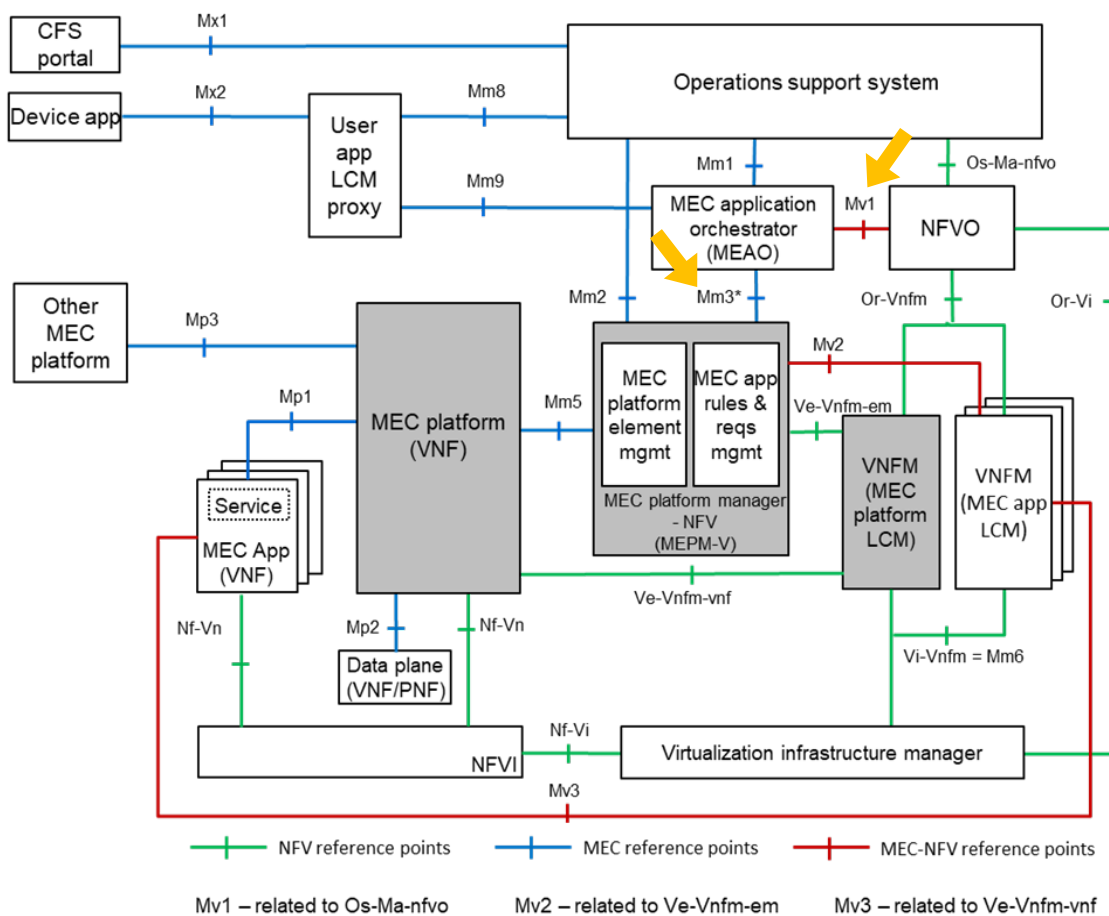
MEPM: EMS for MEP

MEPM is (part of) App's EMS

MEPM can be App's VNFM

App can be a VNF: even if it doesn't know it

# MEC management: MEC-specific Operations



Mm1 required APIs:

- Application Package Management
- Application Lifecycle Management

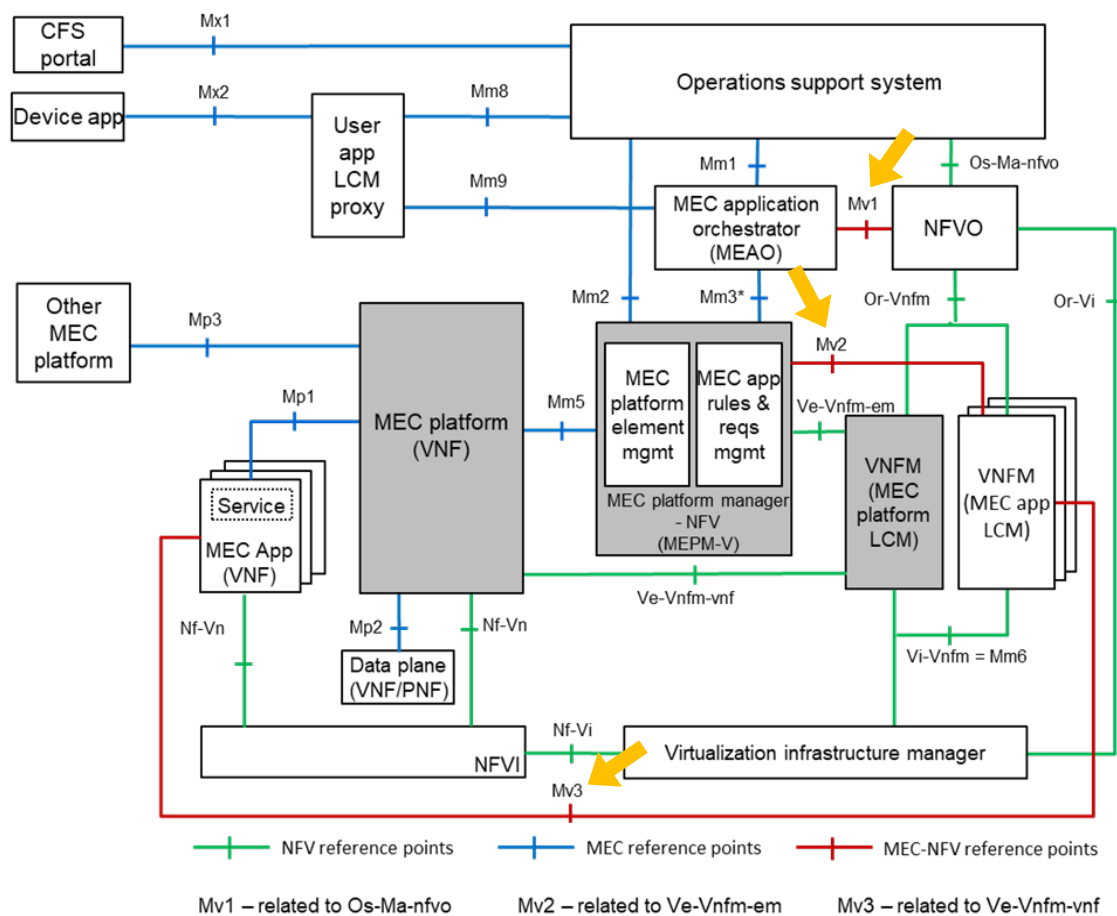
Mm3 required APIs:

- Application Package Management
- Application Lifecycle Management
- Application Lifecycle Change Notification

These NFV semi-agnostic

- Information models designed to be feasible without NFV
- Data models are NFV-consistent and compatible

# MEC management: MEC-NFV Interaction



3 “Hybrid” Reference points identified as shown

- Mv3: at this point no specific changes to Ve-Vnfm-vnf are expected (i.e. it can be used as is)
- Mv2: Necessary changes are being addressed by NFV IFA as part of FEAT12 work (MECinNFV)
- Mv1: work identified, coordination plan is on-going

Additionally, MEC descriptor (AppD) must be linked to NFV descriptor (VNFD). This has been addressed as part of Rel 3 work using Non-MANO artifact capability as defined in Annex B of ETSI GS NFV-SOL 004 v. 2.5.1 and higher.



The  
END

# Epilogue

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ETSI ISG MEC is the leading voice in standardization & industry alignment around MEC

- Key building block in the evolution of mobile-broadband networks, complementing NFV & SDN
- Key enabler for IoT and mission-critical, vertical solutions
- Widely recognized as one of the key architectural concepts and technologies for 5G
  - Can be used to enable many 5G use cases without a full 5G roll-out (i.e. with 4G networks)
- Enable a myriad of new use cases across multiple sectors as well as innovative business opportunities