The Standards People

ETSI MEC: An Introduction

(almost) everything you want to know about ETSI MEC

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

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Last update: April 2021

ETSI MEC: Enabling *Edge* through *Standardization*

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**

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ETSI MEC – What we do

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

ETSI MEC
The Standards People

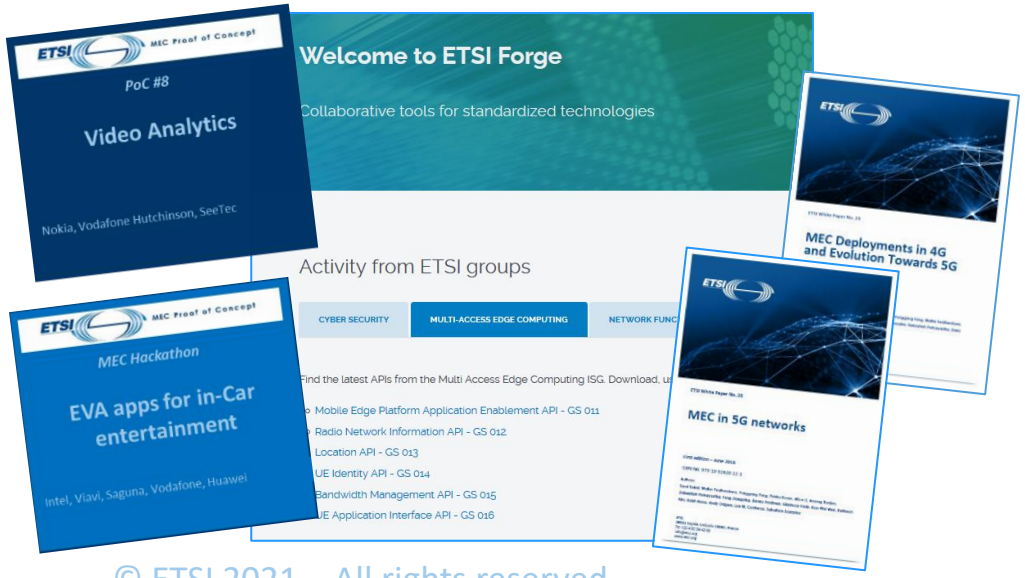
ETSI NFV
The Standards People

MEC Application Development Community
Interaction & Information Exposure

Application Life Cycle Management

RESTful based APIs for Runtime Application Services

3GPP A GLOBAL INITIATIVE · Wi Fi · broadband forum



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

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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?

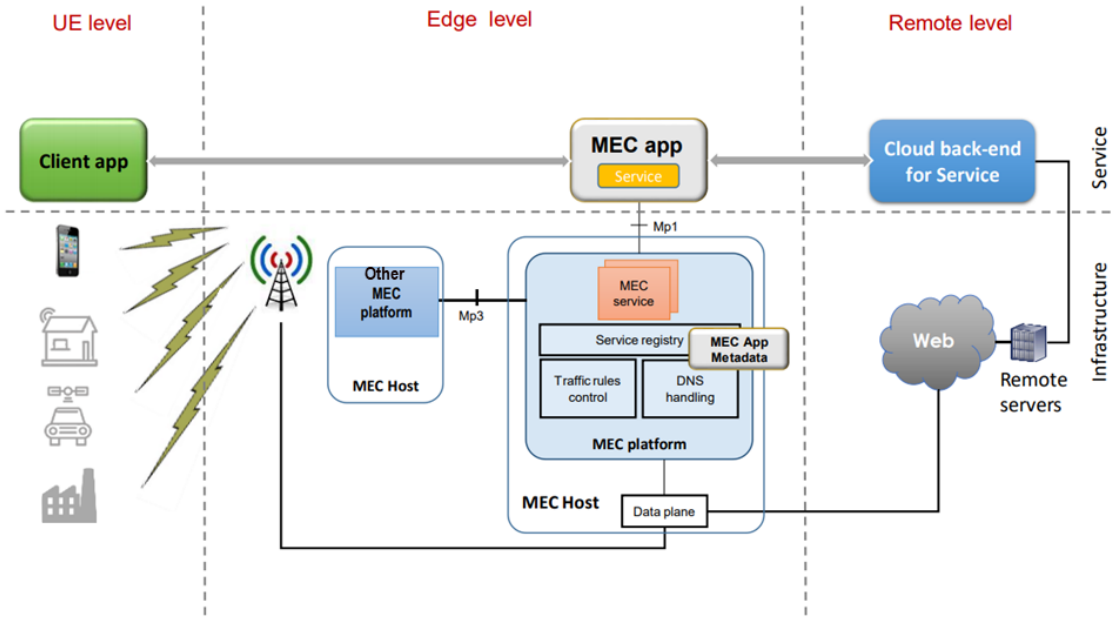

Figure 2: New application development paradigm introduced by MEC.

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"**

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Img Source: https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp20ed2_MEC_SoftwareDevelopment.pdf

Where do the APIs play their part?

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

- Application Package lifecycle and operation granting
- Device application interface

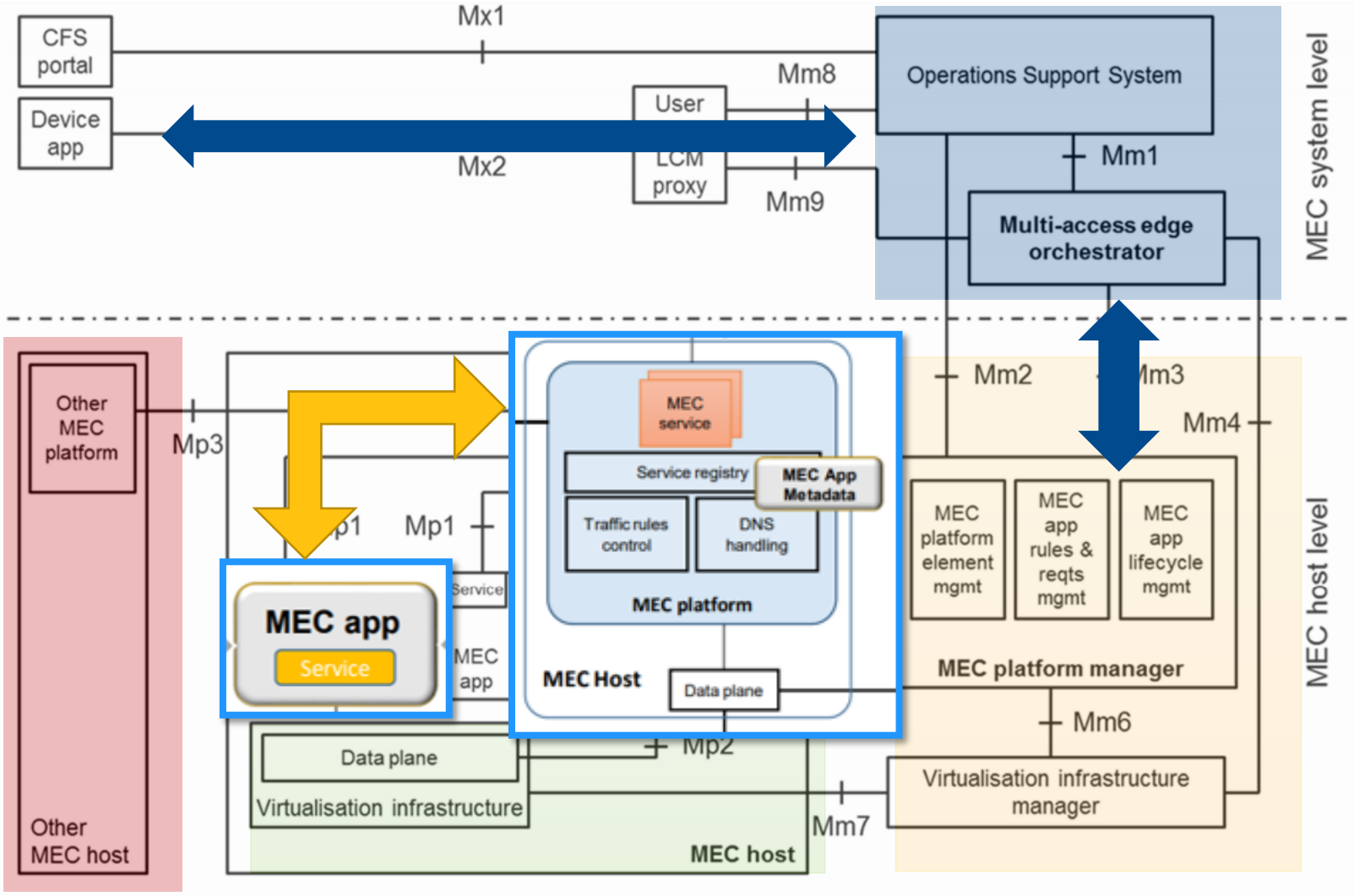

Figure 6-1: Multi-access edge system reference architecture

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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 Delpoyment 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)

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Our Standards

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ETSI MEC – Foundation for Edge Computing

Basic principles:

- *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

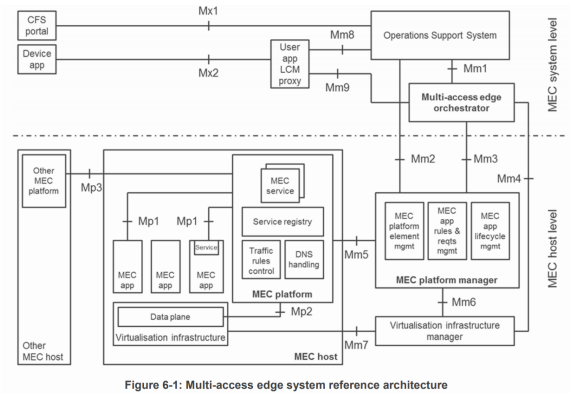
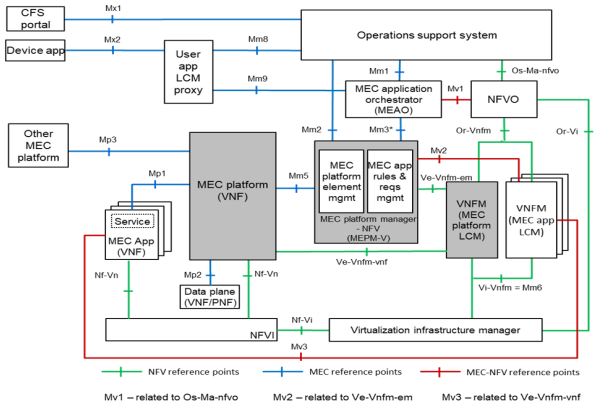
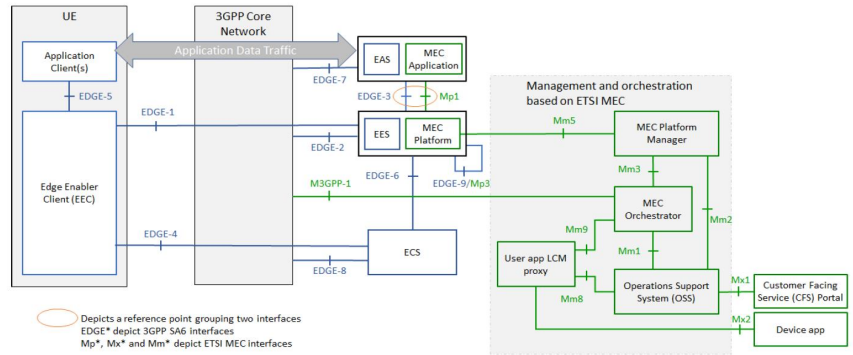


Figure 6-1: Multi-access edge system reference architecture





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ETSI MEC – Foundation for Edge Computing

Application Enablement and Framework

Service definition framework and baseline platform services authorized applications.

- Registration, discovery and notification;
- Methodology for authentication and authorization of apps providing/consuming services;
- Communication support for services (query/response and notifications).

API Principles

Principles and guidance for developing and documenting APIs

- Developer-friendly approach to foster development
- ***Ensures that a consistent set of APIs*** are used by developers.
- Defines approach for authentication and authorization of apps providing/consuming services
- Based on TMF and OMA best practices

Specific service-related APIs

Standardized service-exposure APIs for key services that

- Expose network and context information
- Allow definition of localized, contextual services
- Support key use cases (e.g. enterprise, vehicular)
- Allow fine-grained edge traffic management

Management and Orchestration related APIs

Management of MEC hosts either as ***stand-alone*** entities or part of a larger ***NFV-managed*** framework

- Facilitate running of 3rd party application
- Enable deployment ***at the correct location at the right time***, based on technical and business parameters
- Integrate into telco operations systems, e.g. OSS

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

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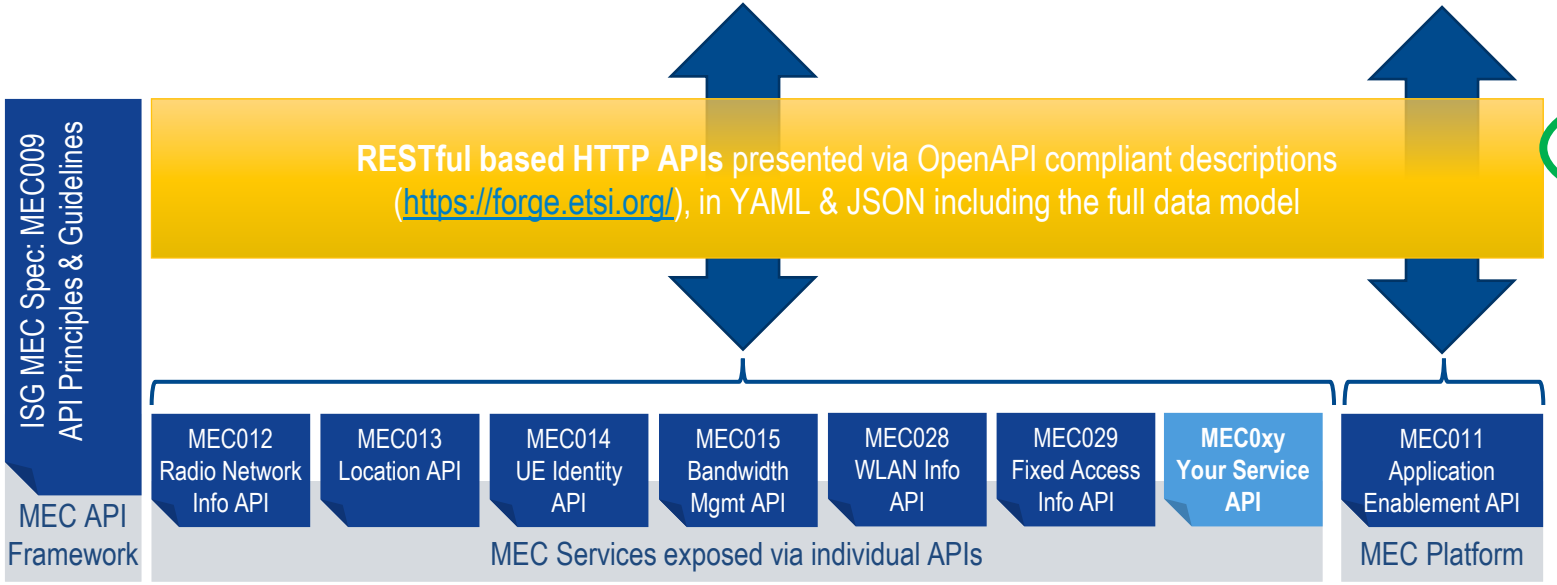
Enabling Global Application Portability

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)

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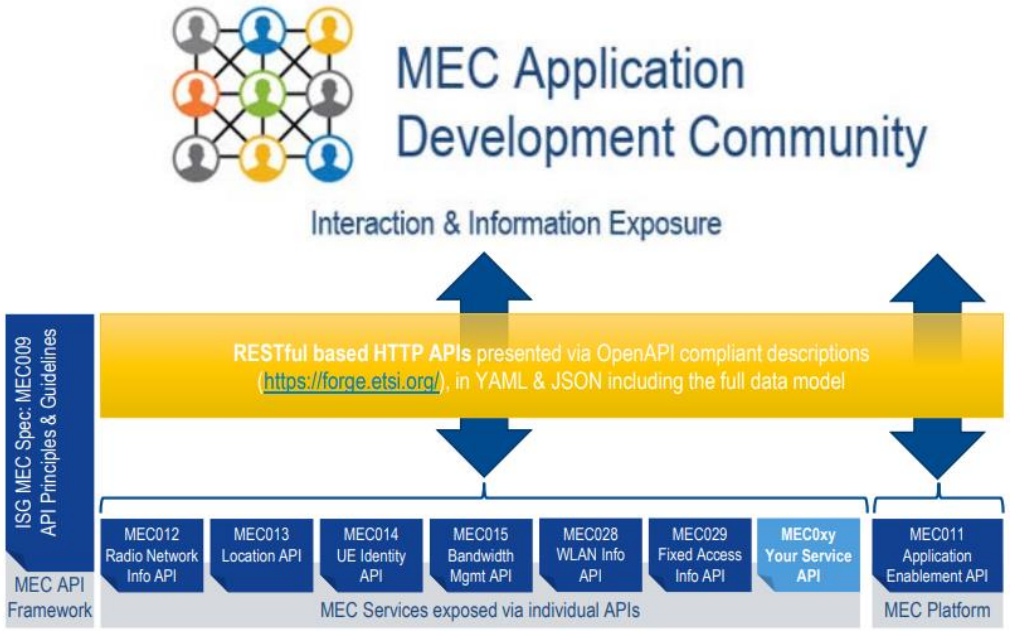
Application portability via the ETSI MEC APIs ecosystem

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



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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

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

- 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*

All white papers are available in
https://portal.etsi.org/TBSiteMap/MEC/MECWhitePapers.aspx

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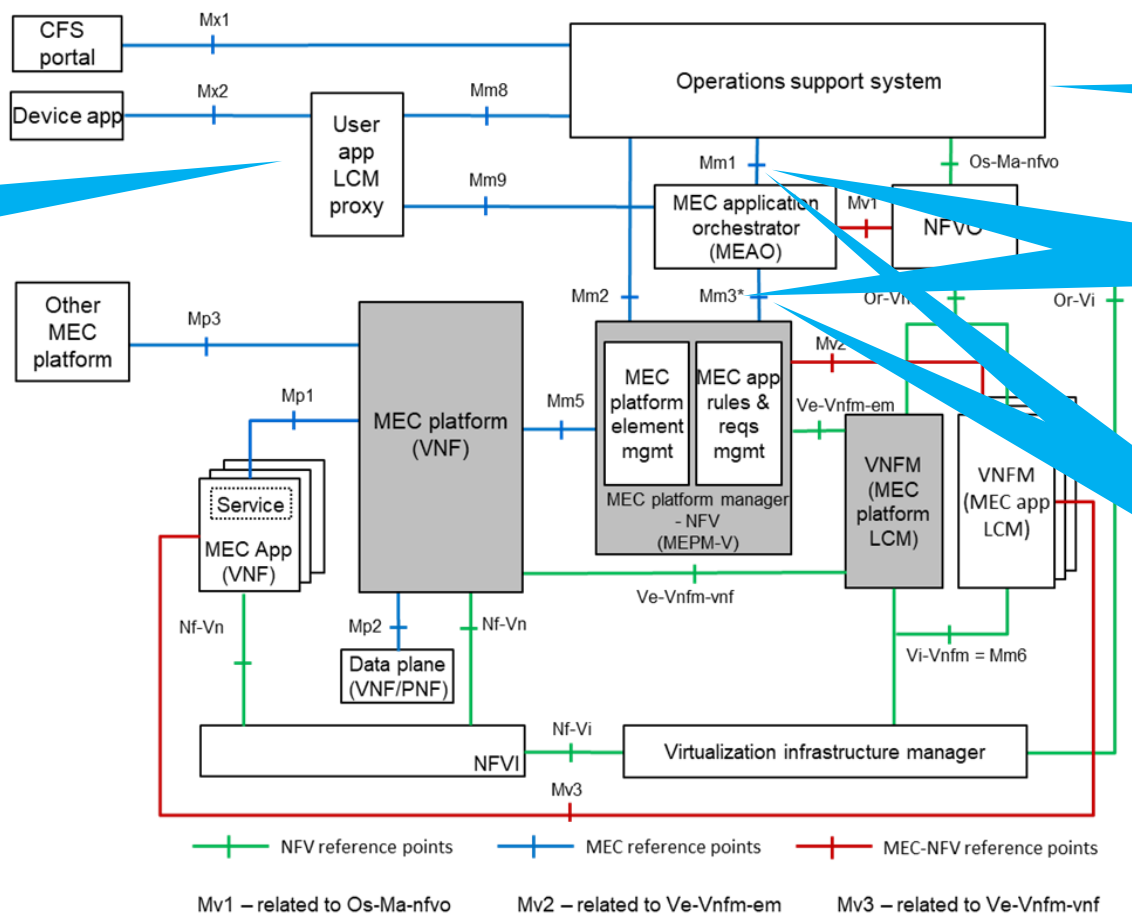
A key part of ETSI Network Automation Standards



Inter-MEC & MEC-Cloud (MEC 035 Study)

Device-triggered LCM Enablement (MEC 16)

Management of MEP as a VNF (MEC 10-1)

LCM Mgmt of 3rd party Apps (MEC 10-2)

ZSM: overall approach | NFV, OSM: managing telco clouds | MEC: managing edge telco clouds

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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/1806-2021-07-new-etsi-white-paper-harmonizing-standards-for-edge-computing-a-synergized-architecture-leveraging-etsi-isg-mec-and-3gpp-specifications
- MEC in an Enterprise Setting
  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
- MEC deployment in 4G and towards 5G:
  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
- Developing SW for MEC (2nd Ed.)
  https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp20ed2_MEC_SoftwareDevelopment.pdf

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…and many more to come!

WG DECODE: Enabling Edge Computing in the Telco Industry

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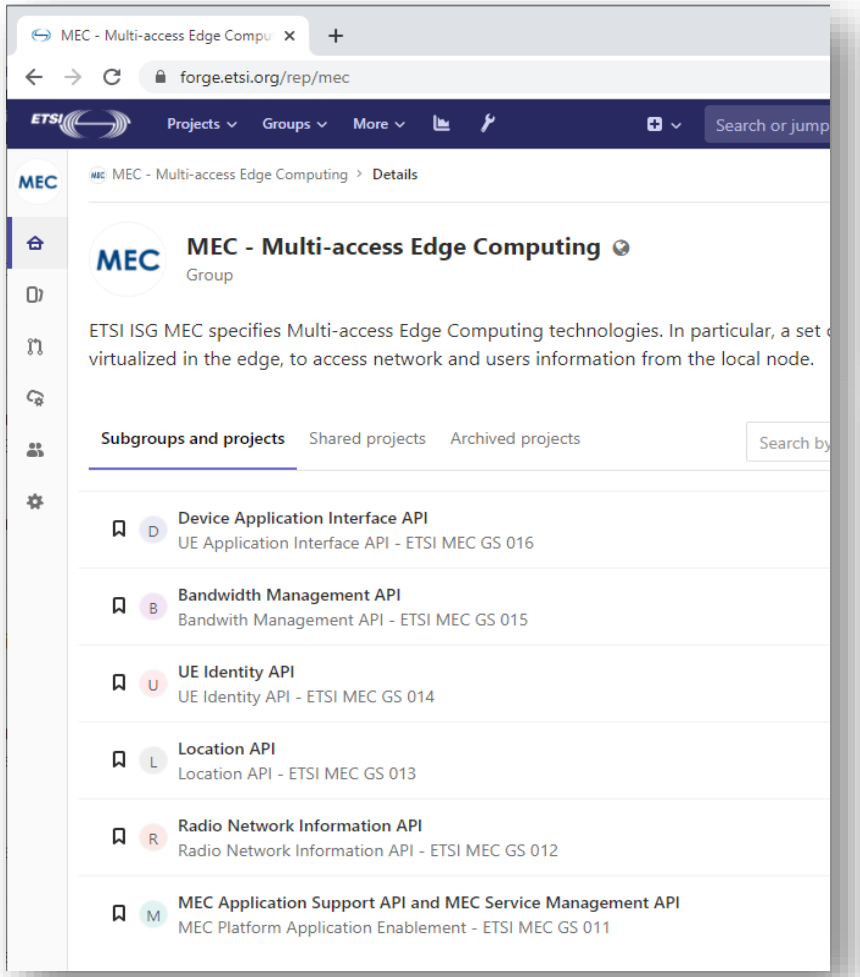
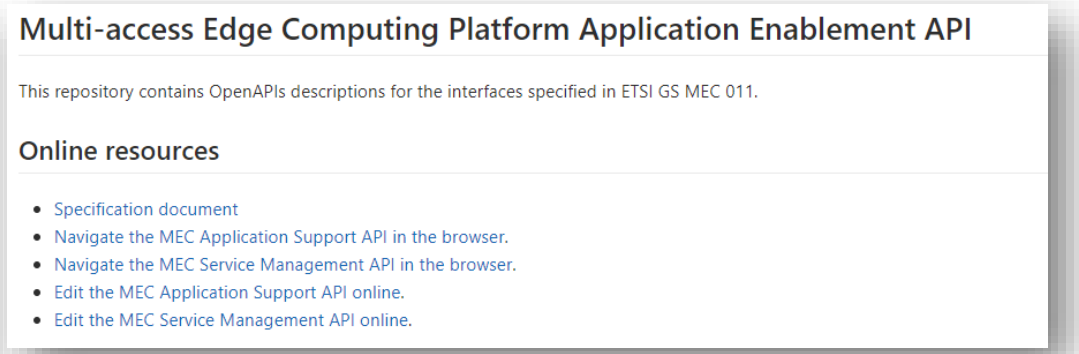
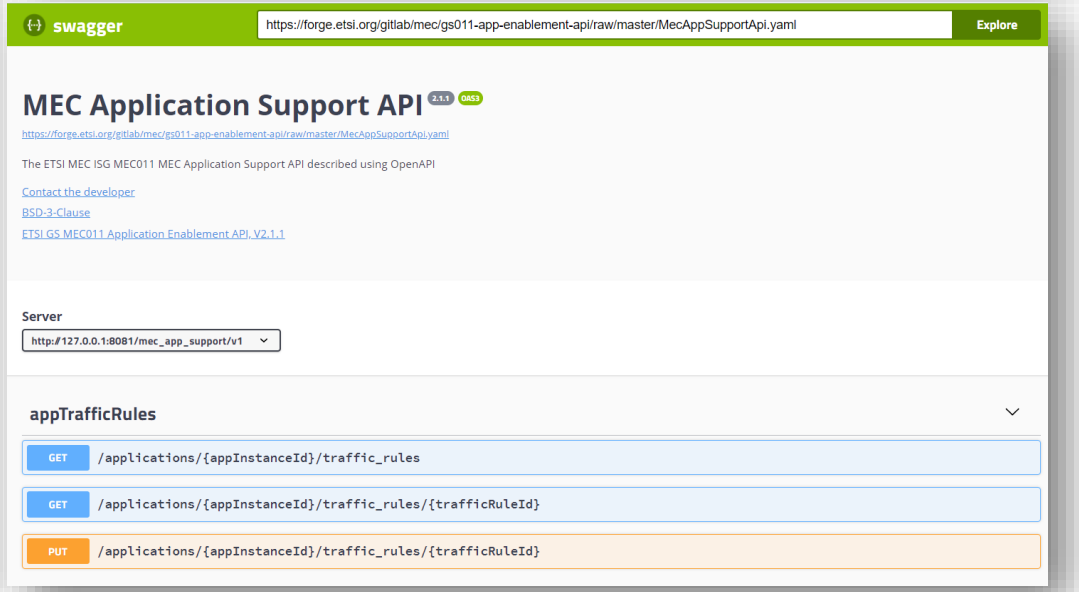
Discover the APIs on forge.etsi.org/rep/mec







Powered by

Operated by

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Discovering what an API is about

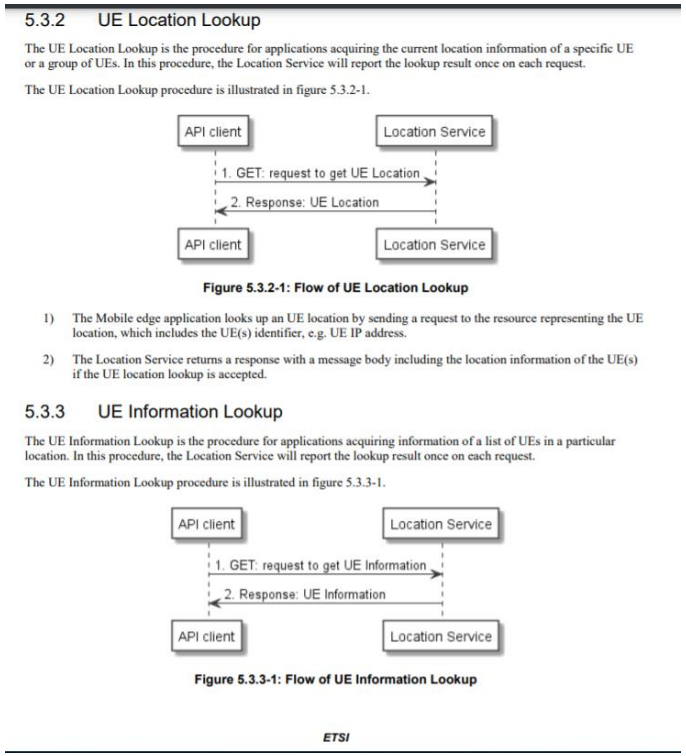
ETSI GS MEC 013 V1.1.1 (2017-07)

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

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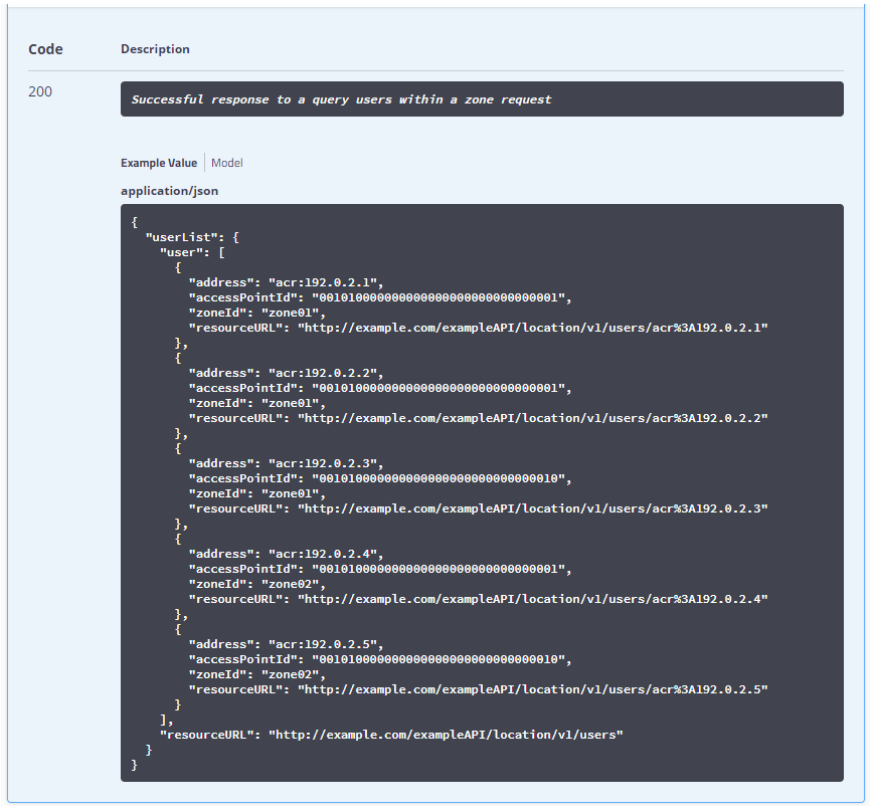

Code | Description

200 — *Successful response to a query users within a zone request*

Example Value | Model

application/json


```
{
  "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"
  }
}
```


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

Machine readable representation

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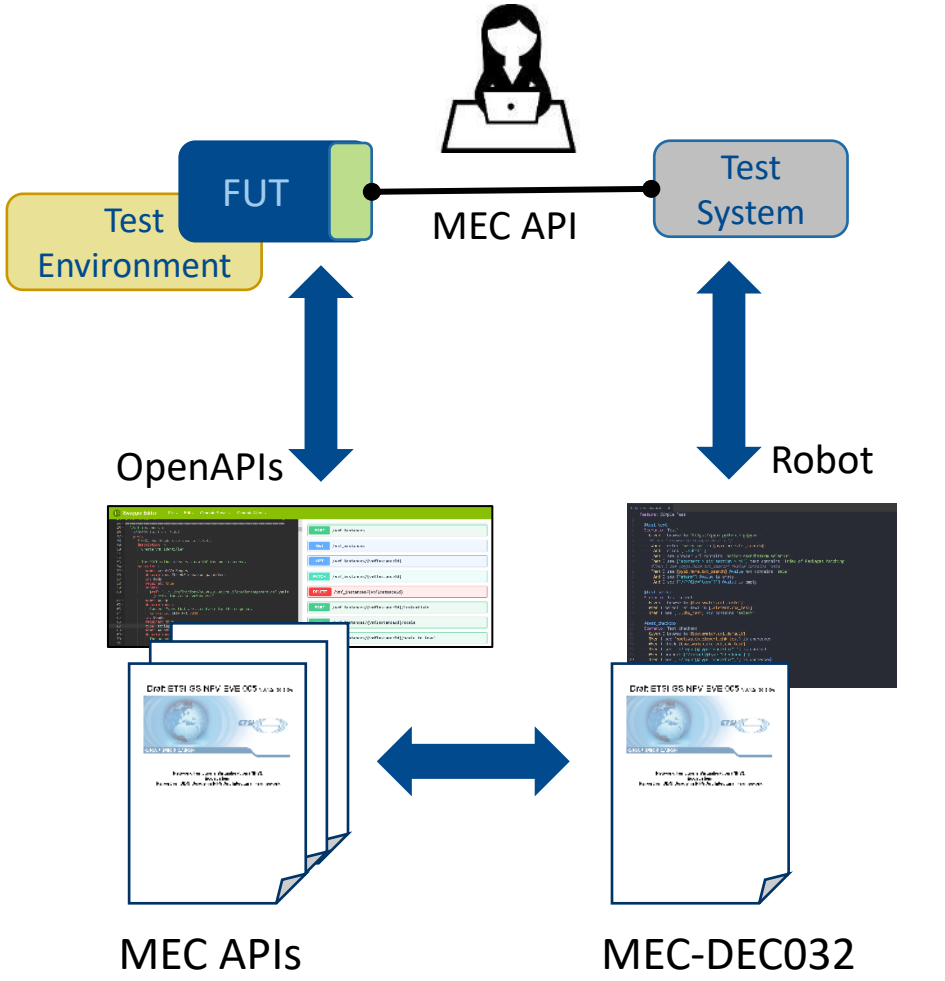
Testing for MEC Server implementations

- 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 BSD-3 license

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

```



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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

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
Unibo MEC API Tester UNIBO MEC API TESTER	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	Link	Davide Berardi

MEC Solutions

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 ADVANTEDGE Mobile Edge Emulation Platform	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	Link	AdvantEDGE
Connected Vehicle Blueprint (Aka CVB) AKRAINO	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	Link	Yang Yang
Eclipse zenoh zenoh	Eclipse zenoh unifies data in motion, data in-use, data at rest and computations. It carefully blends traditional pub/sub with geo-distributed storages, queries and computations, while retaining a level of time and space efficiency that is well beyond any of the mainstream stacks. It is a perfect fit as an alternative transport protocol for MEC applications as well as technological stack to build distributed MEC platforms.	Alternative transport protocol for MEC Platform	MEC 011 Mp1	Link	Gitter community channel
Enterprise Applications on Lightweight 5G Telco Edge (EALTEdge) AKRAINO	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	Link	Gaurav Agrawal
I-MEC ITALTEL	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)	Link	Italtel
LightEdge LIGHTEDGE	LightEdge is a lightweight, ETSI-compliant MEC solution for 4G and 5G networks. It is designed to work natively on top of Kubernetes and is transparent to the existing components of a 4G network, therefore requiring zero modifications to the MNO's environment.	MEC Platform	RNI (MEC-012), WIA (MEC-028), partially Application Enablement (MEC-011)	Link	Roberto Riggio
MEC Location API Simulator LOCATION API SIMULATOR	The Location API simulator helps developers to create applications that use MEC Location API. It provides a MEC Location Service accessible via Location API as specified in the ETSI GS MEC013 document, available as a RESTful web service. It has a Graphical User Interface enabling developers to simulate mobile users' movements by feeding the simulator with a GPS track in .gpx format. The first release implements a subset of MEC013 API but the full set of APIs and an improved engine to simulate cars, VRU and more will be part of future releases.	MEC013 accessible APIs (with an engine to simulate mobile users' movement)	MEC 013 Location	Link	Daniele Brevi
Public Cloud Edge Interface (PCEI) AKRAINO	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	Link	Oleg Berzin
ServerlessOnEdge ServerlessOnEdge	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)	Link	Claudio Cicconetti

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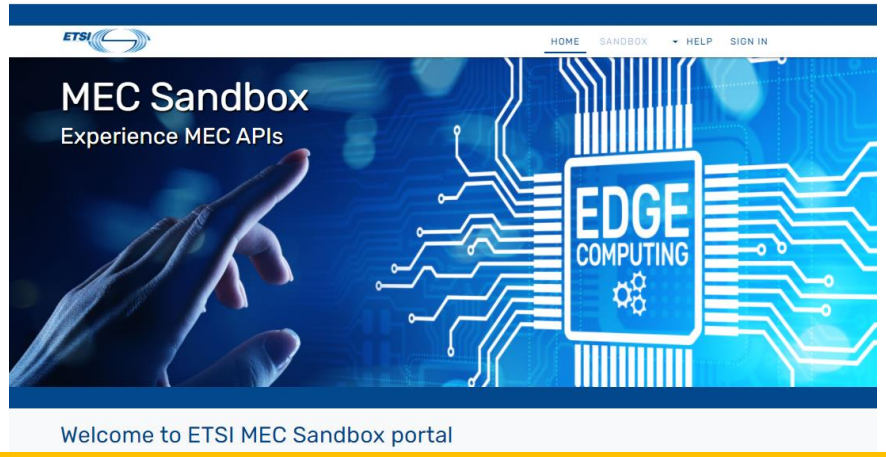
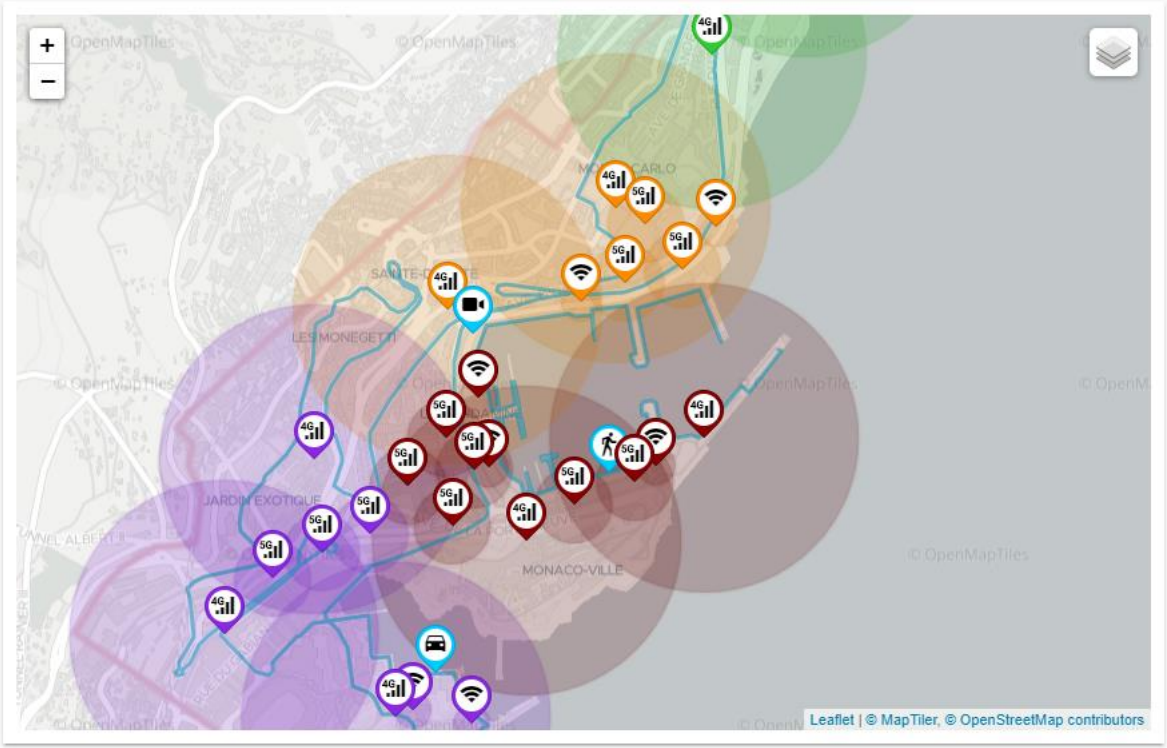
MEC Sandbox – the ultimate app development companion

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, & more



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

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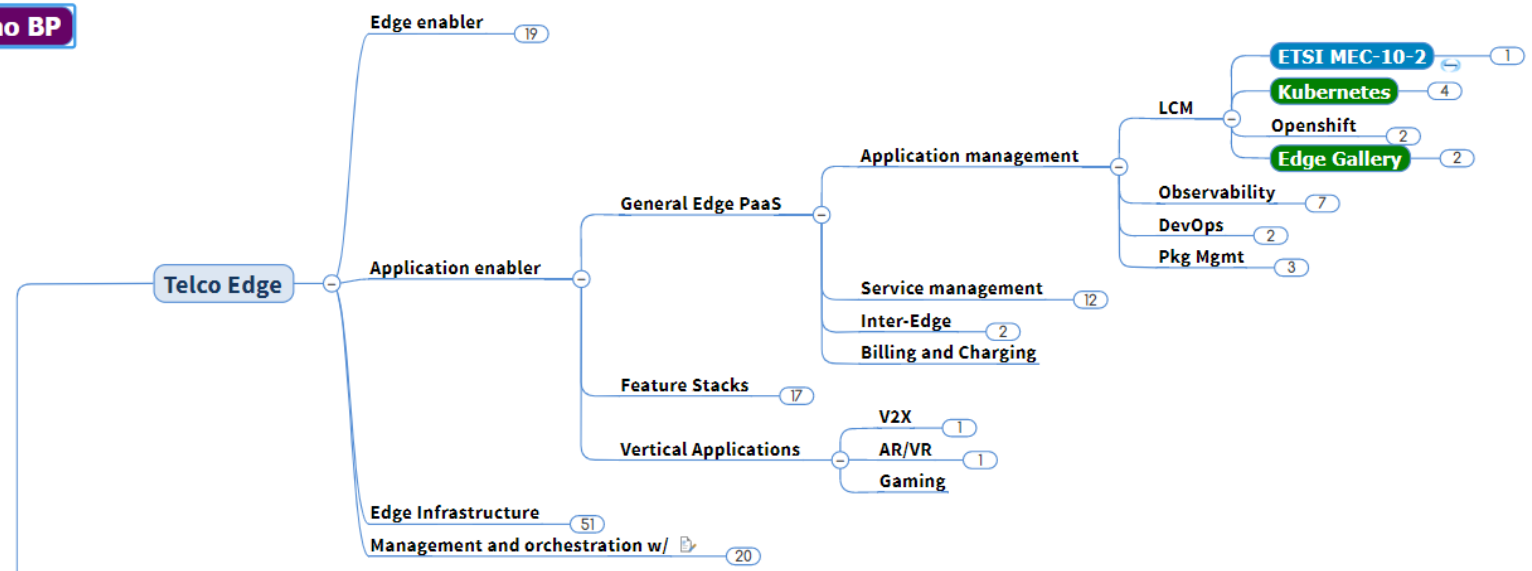
Collaborations: Akraino

Standard Specifications

Upstream Project

Akraino BP

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



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

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MEC Hackathons

ETSI ISG MEC Hackathon Framework:

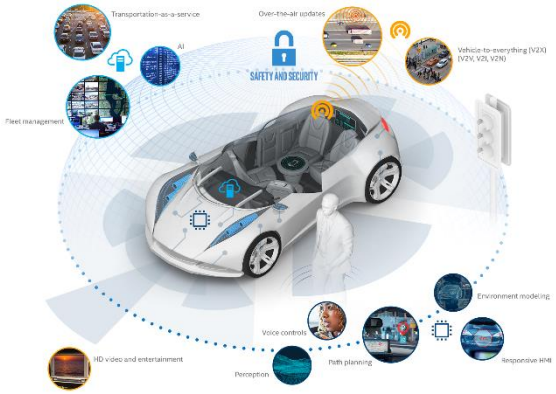
- **Open Call** for proposers and hosts interested in organizing a MEC Hackathon
- Submit on our Wiki page https://mecwiki.etsi.org

We encourage new proposals for MEC Hackathons!

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

Past 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)
  - Shenzen (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)



Fully REMOTE

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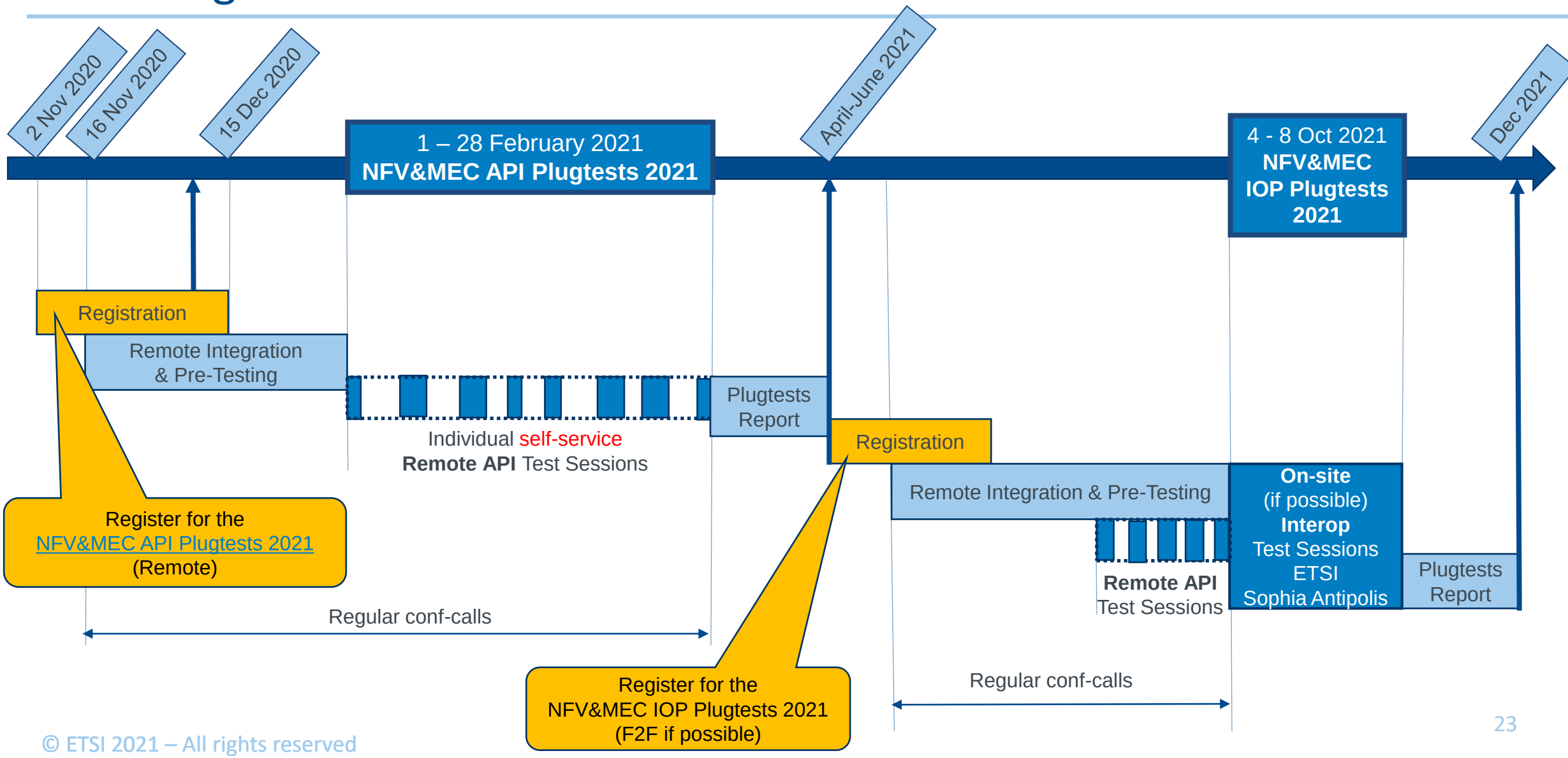
MEC Plugtests – 2021 Timeline



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MEC PoCs: Show off YOUR cool Edge

Recent PoCs (9 are complete)

MEC Proof of Concept

PoC #10

Service-Aware MEC Platform to Enable Bandwidth Management of RAN

Industry Technology Research Institute - Linker Network - FarEasTone

MEC Proof of Concept

PoC #11

Communication Traffic Management for V2x

KDDI Corporation - Saguna Networks Ltd. - Hewlett Packard Enterprise

MEC Proof of Concept

PoC #12

MEC Enabled OTT Business

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

MEC Proof of Concept

PoC #13

MEC infotainment for smart roads and city hot spots

TIM, Intel, Vivida, ISMB, City of Turin

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

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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

MEC Deployment Trial

MDT #1

CDN at the Edge

China Mobile, Nokia

MEC Deployment Trial

MDT #2

MEC in Factory Network

China Mobile, Huawei

MEC Deployment Trial

MDT #3

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

China Unicom, Huawei, Tencent, Intel

MEC Deployment Trial

MDT #4

ARVR navigation based on 5G MEC

China Telecom, Huawei, 21CN

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The larger Telco World: ETSI MEC and 5G

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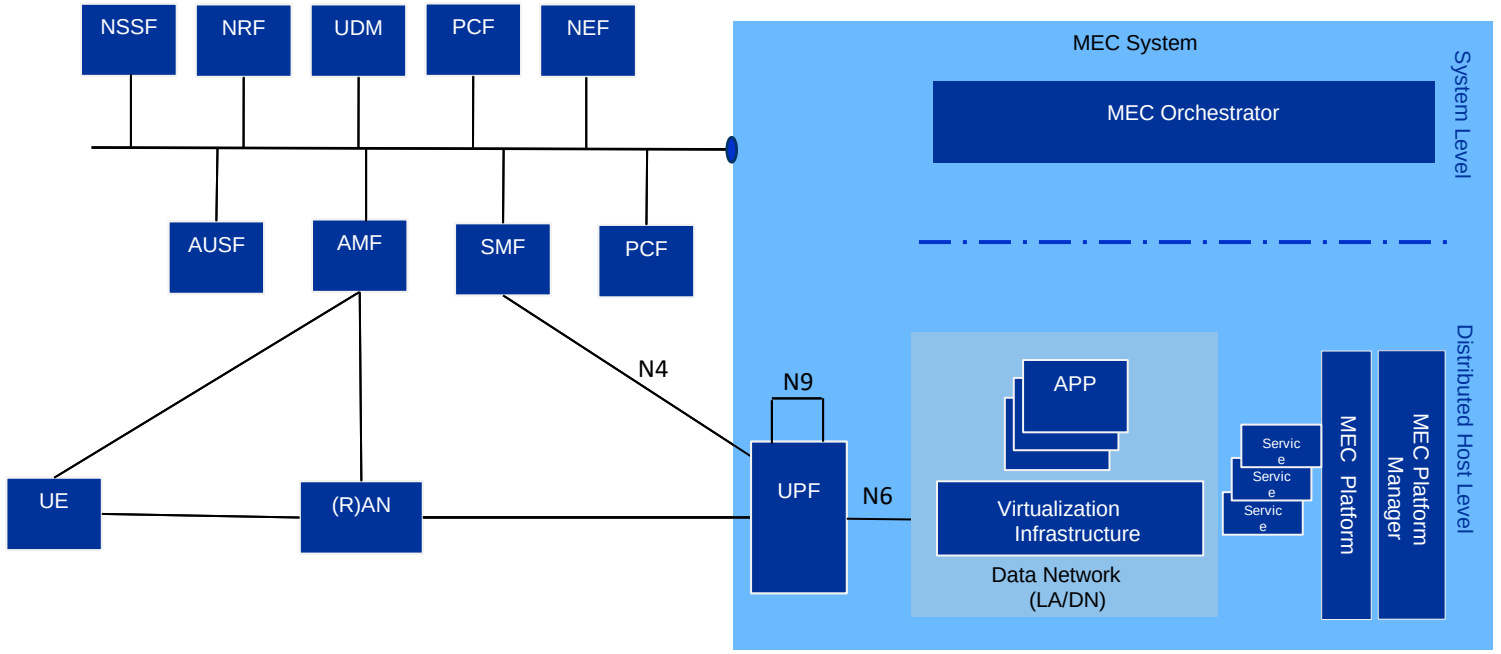
MEC Phase 2 – Study Item MEC in 5G (MEC 031)

- 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



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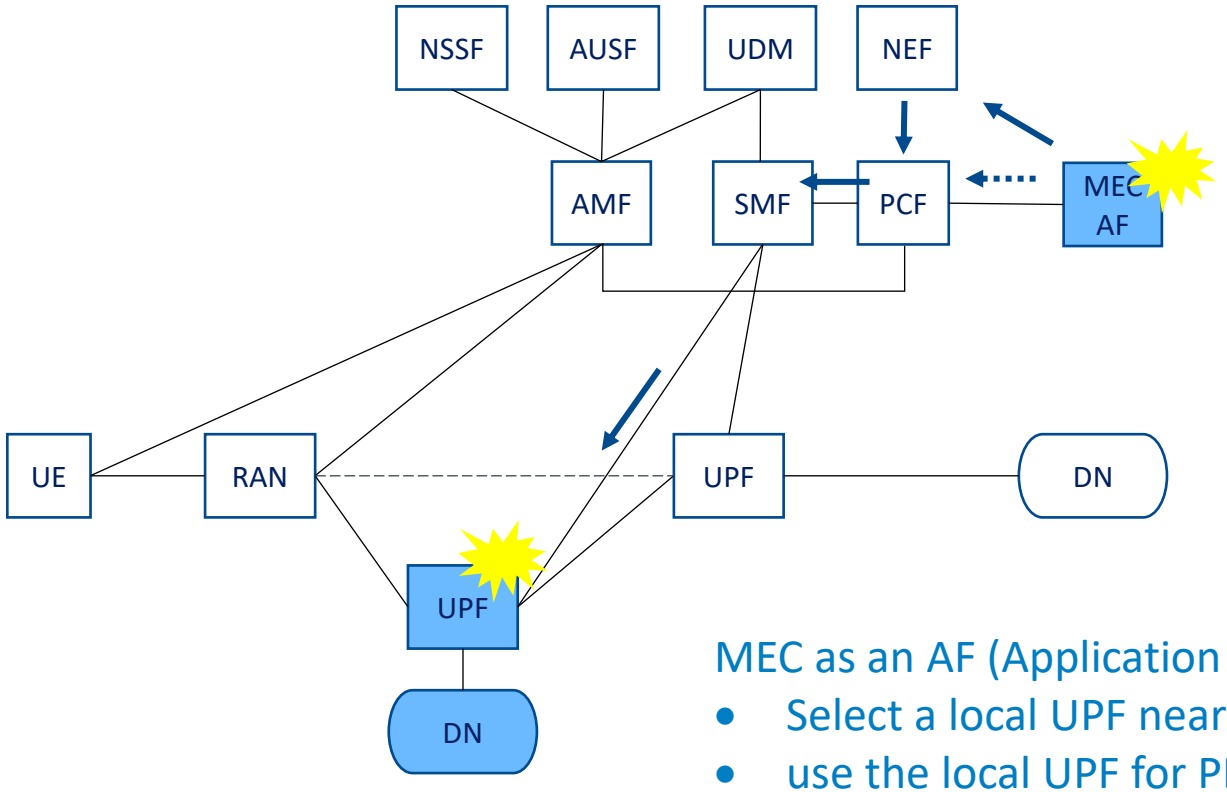
3GPP enablers for MEC – Selection & re-location of UPF



- 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

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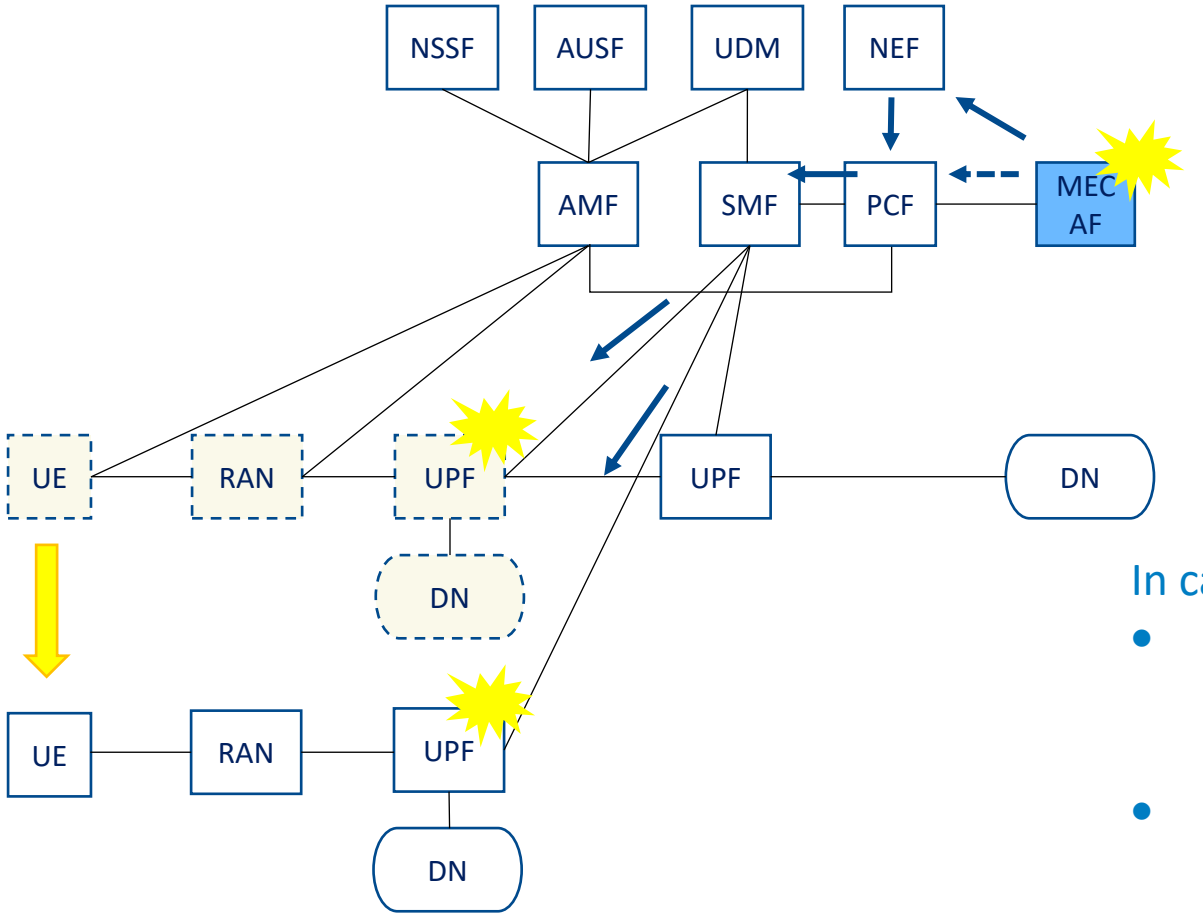
3GPP enablers for MEC – Selection & re-location of UPF



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

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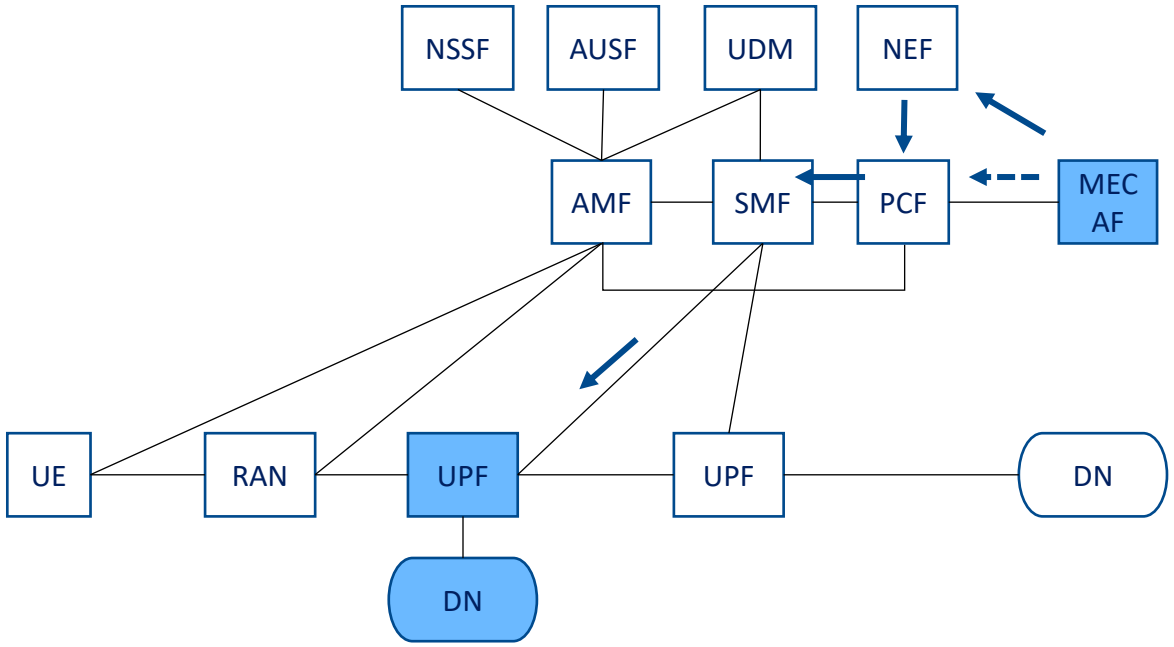
3GPP enablers for MEC – AF influence on traffic routing



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

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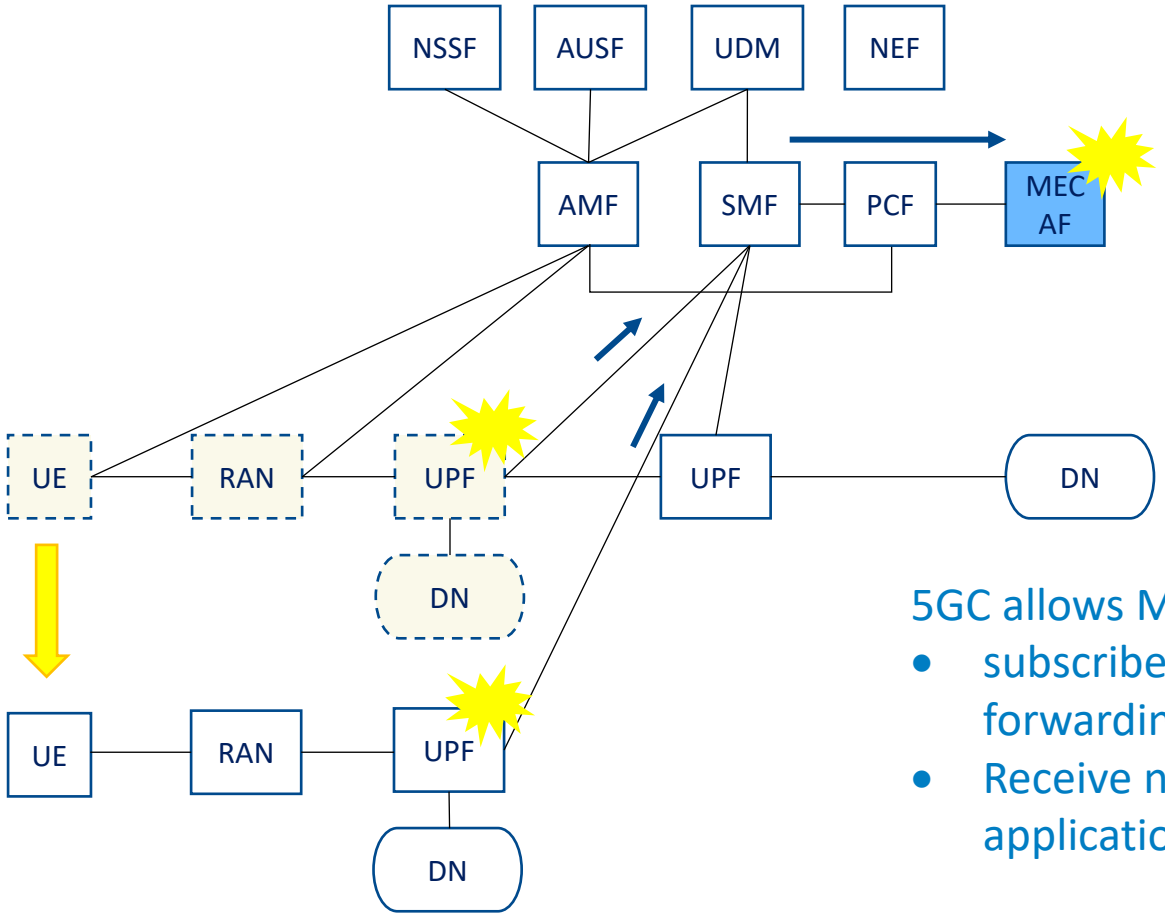
3GPP enablers for MEC – Mobility event notifications



Selection & re-location of UPF

AF influence on traffic routing

Mobility event notifications from SMF

Concurrent access to local and central DN

5GC allows MEC as an AF

- subscribe to UE mobility events that may affect traffic forwarding to MEC applications
- Receive notifications of UE mobility events affecting MEC application instances

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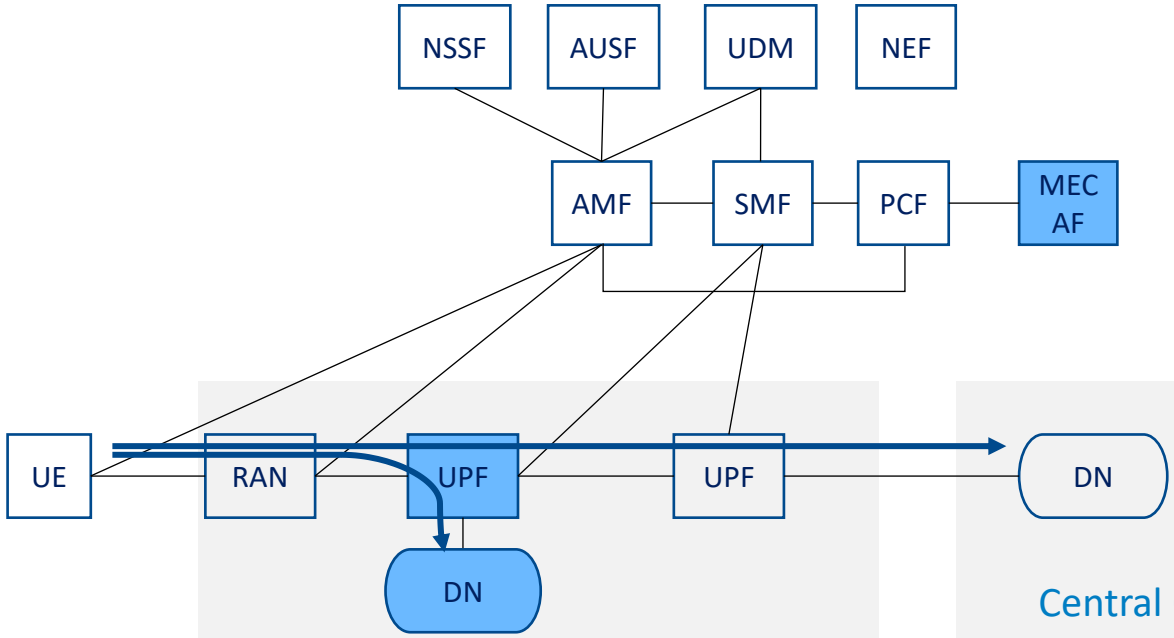
3GPP enablers for MEC - Concurrent access to local and central DN

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.



Edge Cloud for Ultra-low latency, high reliability services

Central Cloud
a.k.a. Conventional “internet”

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

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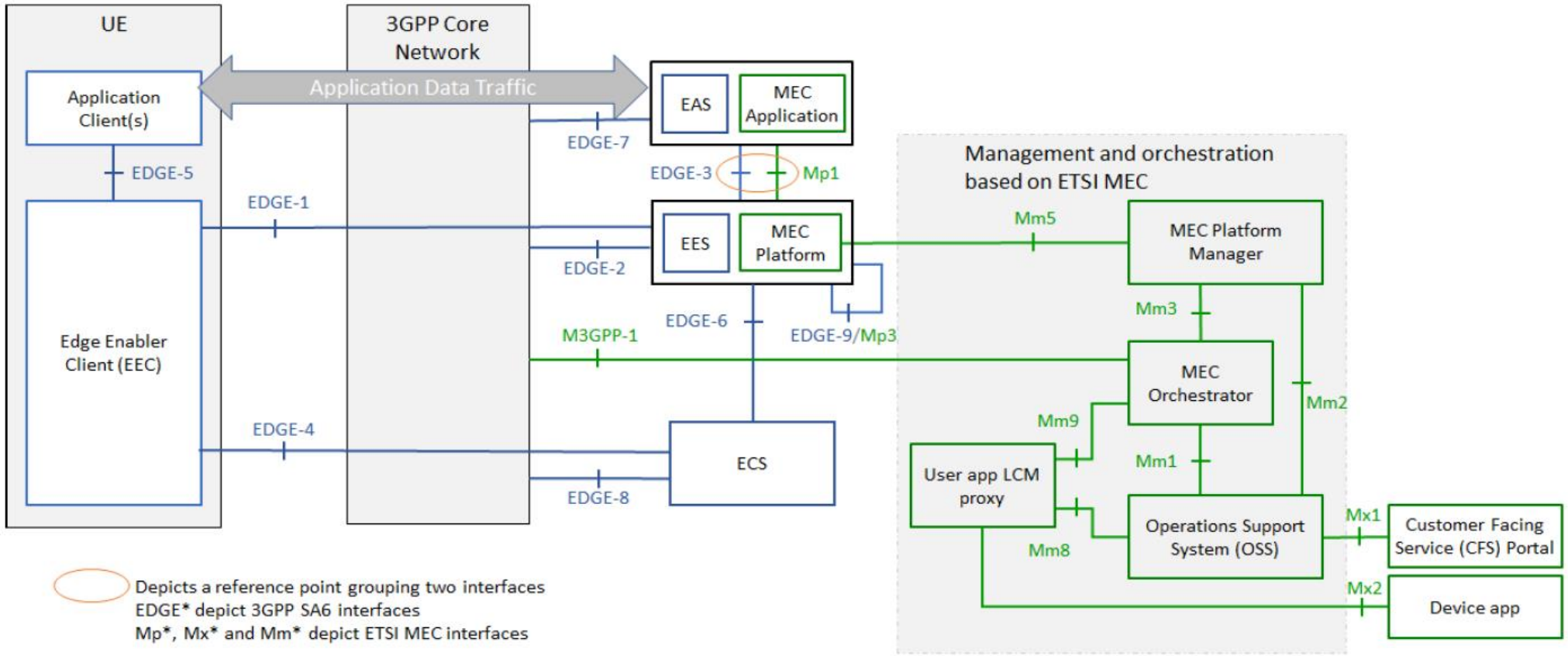
MEC harmonized architecture with SA6 EDGEAPP



- 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

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MEC and NFV
a common approach to management

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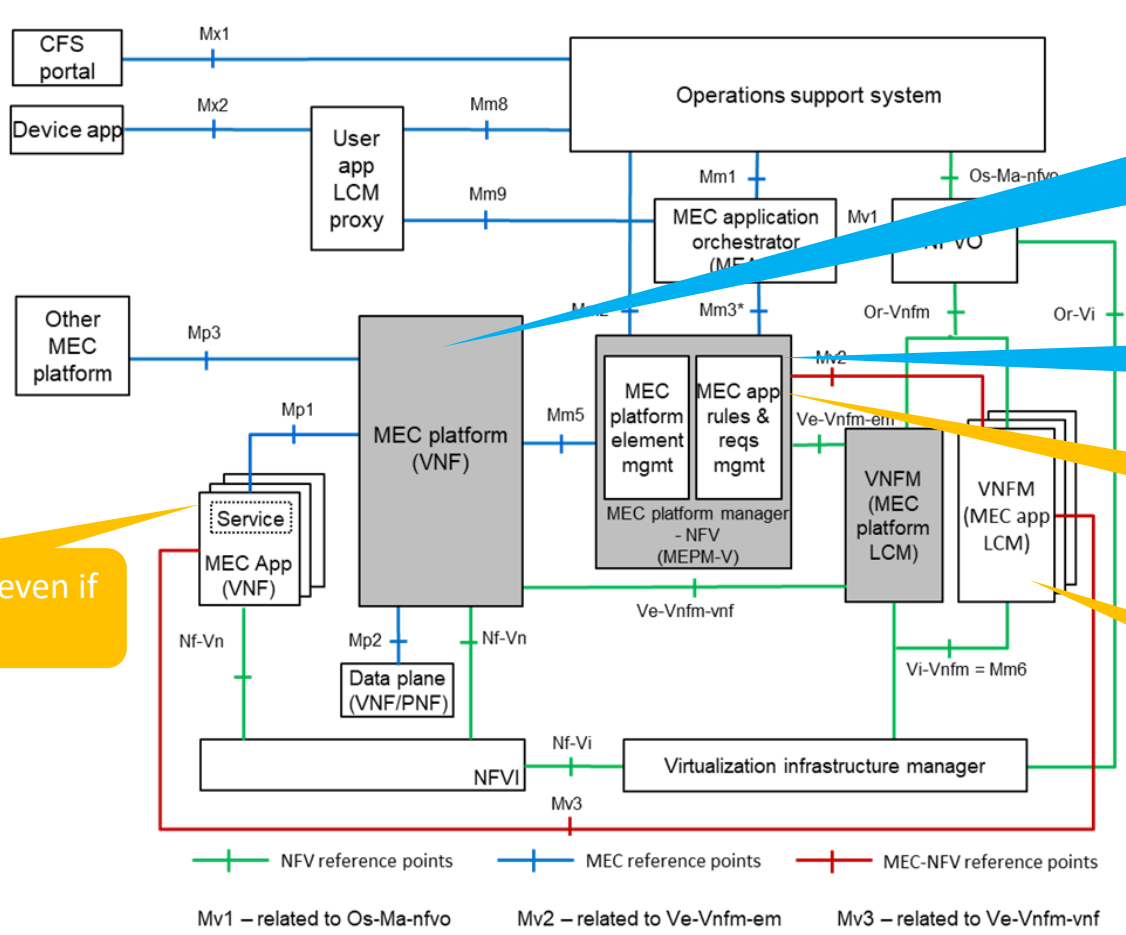
MEC and NFV: MANO for the Telco Edge



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

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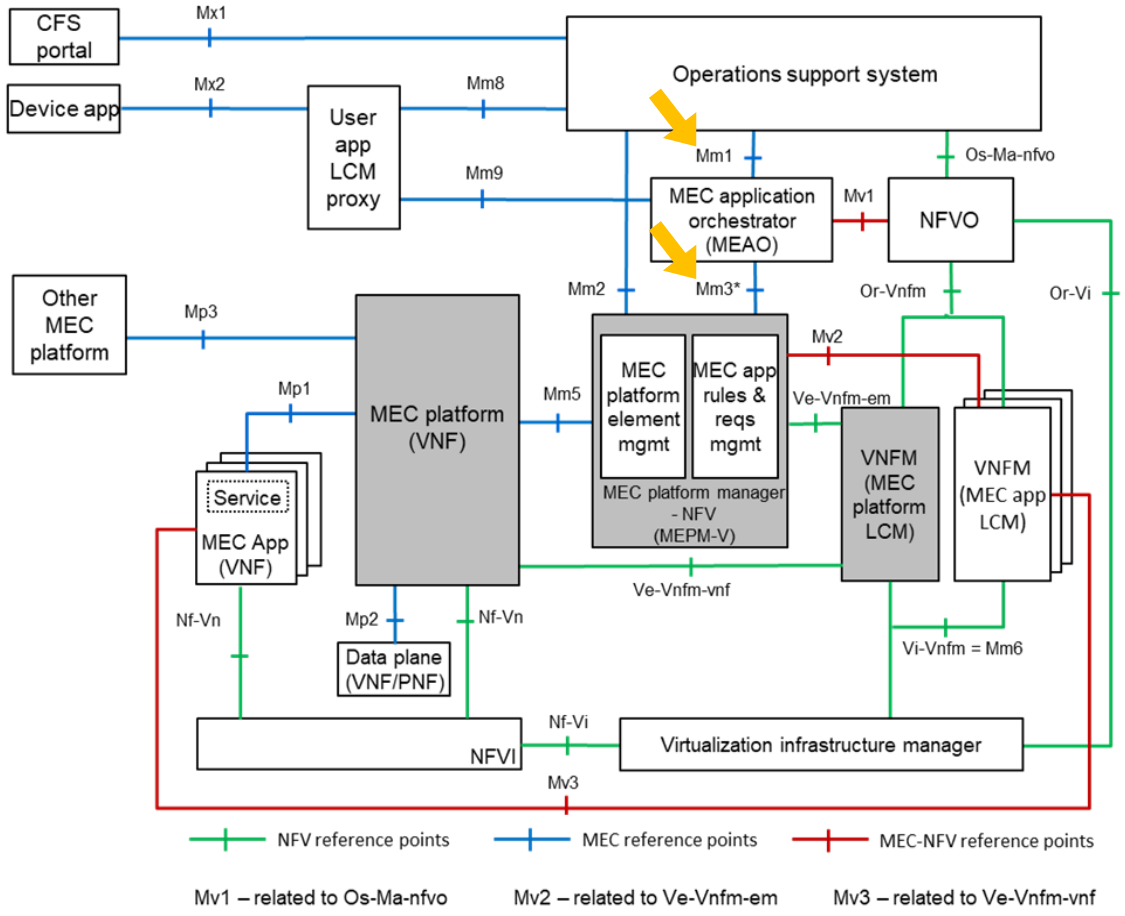
MEC management: MEC-specific Operations



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

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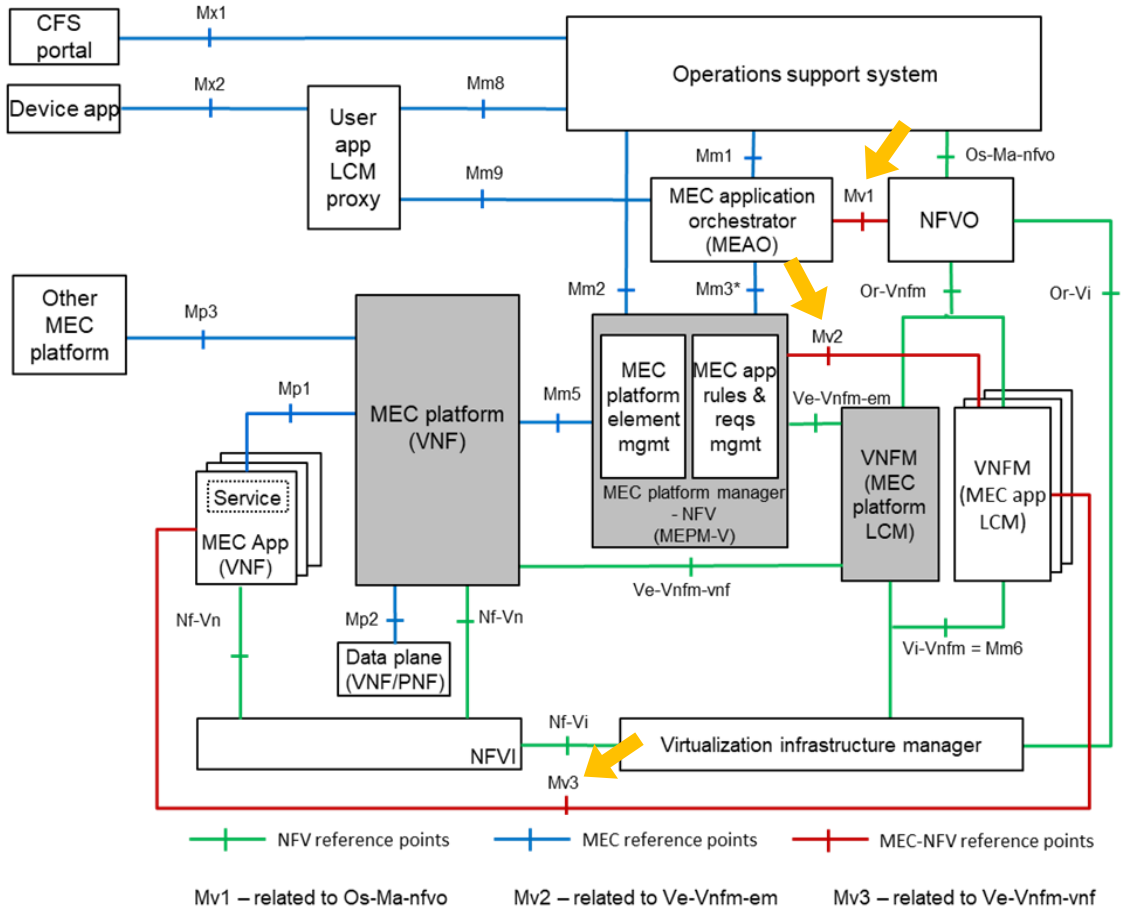
MEC management: MEC-NFV Interaction



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.

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The END

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Epilogue

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

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