The Standards People

Develop for the Edge with ETSI MEC Architecture and APIs

Presented by: **Michele Carignani (ETSI)** For: **Droidcon IT MEC Hackathon 2020**

25.11.2020

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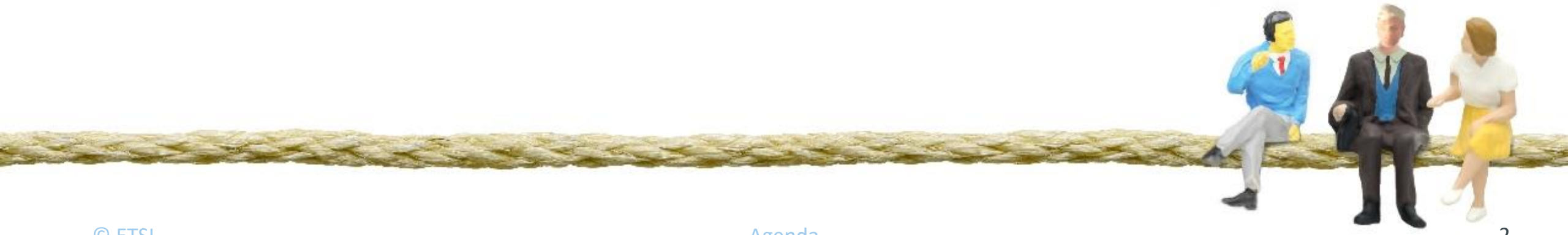
Agenda

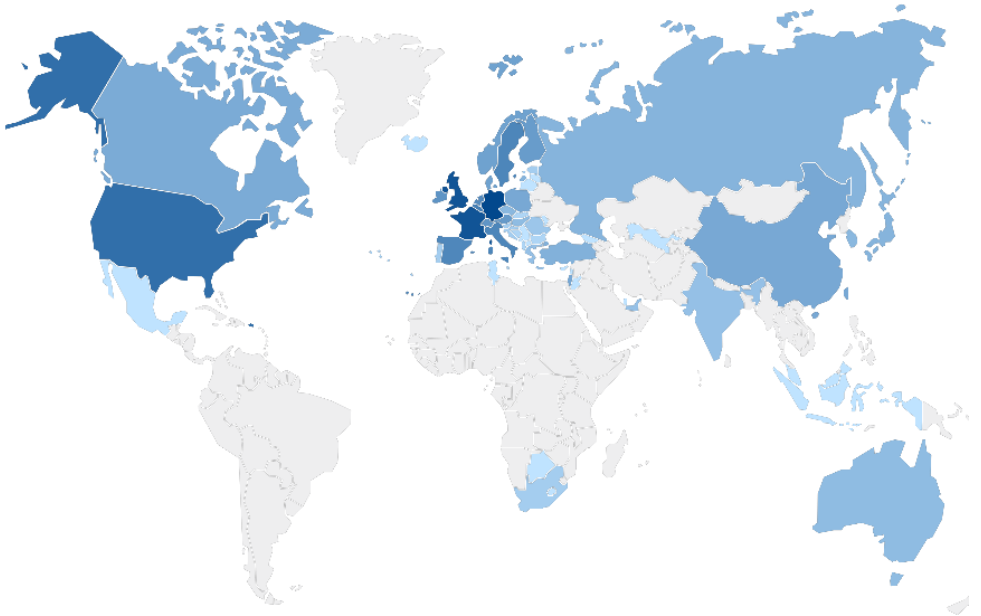
- Introductions
- Existential questions of an app “on the Edge”
- ETSI ISG MEC
- Enable portability and empower your app with MEC APIs
- How to discover, experiment, adopt and test APIs
- How to get involved



Bringing people together at ETSI

#TheStandardsPeople

- Open, inclusive environment
- To support the development and testing of globally applicable standards
- For ICT systems and services across all sectors of industry and society
- Independent, non-profit organization
- 30-years track record of technical excellence in the ICT sector
- Available to all, our standards are free of charge



Centre for Testing and Interoperability

A team in ETSI Staff to help organizations join the pieces - and see what breaks!

https://www.etsi.org/about/our-expertise

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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?

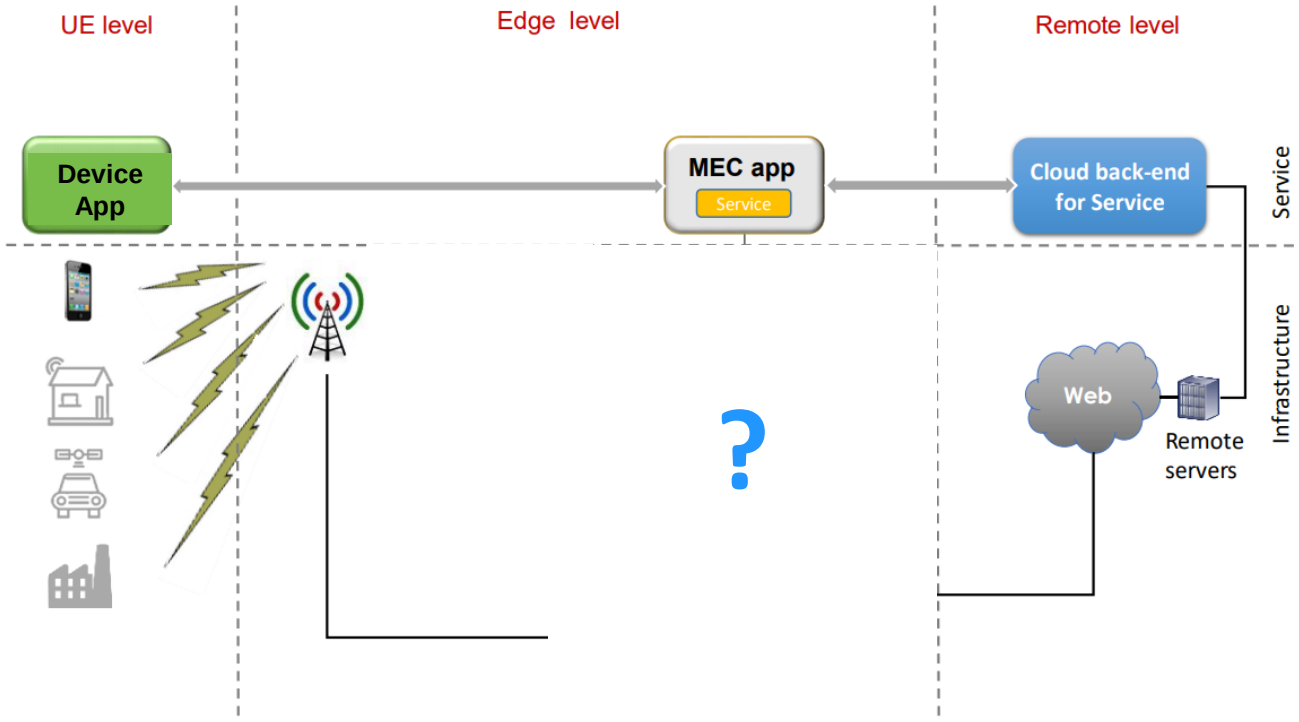

Figure 2: New application development paradigm introduced by MEC.

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

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Existential questions of applications “on the edge”

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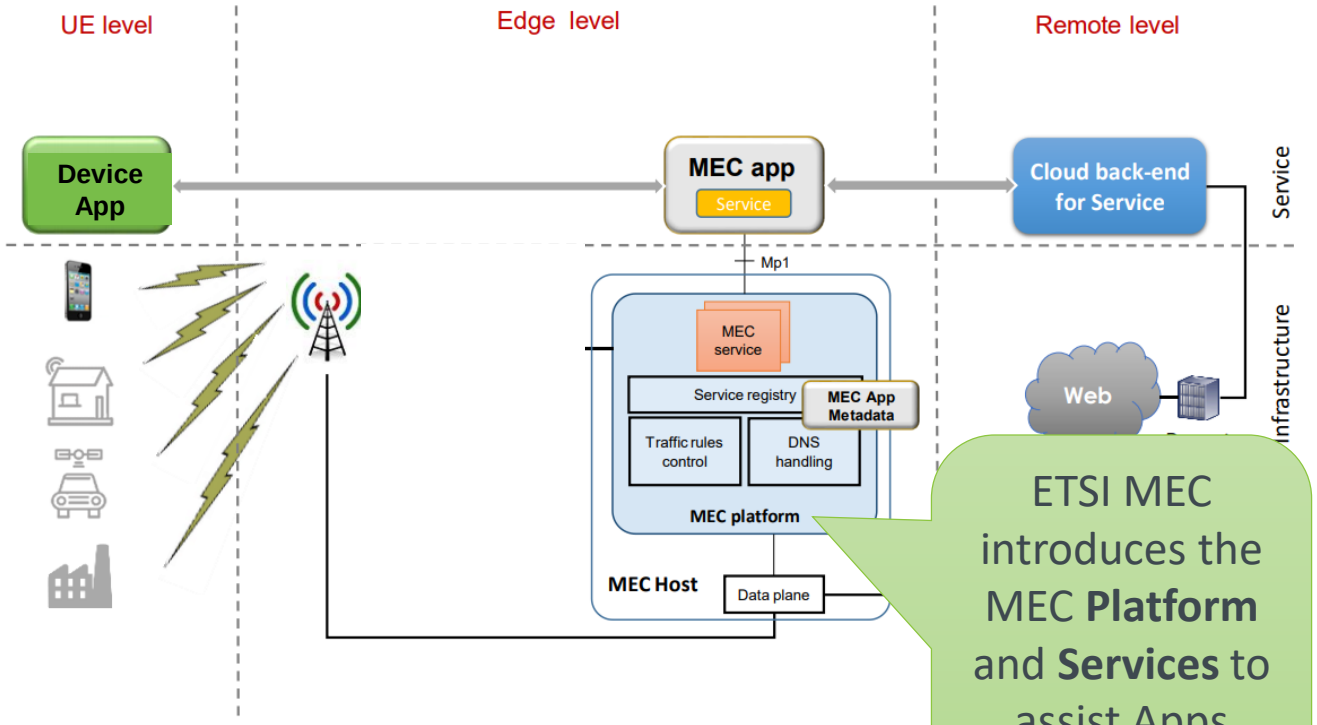

Figure 2: New application development paradigm introdu

ETSI MEC introduces the MEC **Platform** and **Services** to assist Apps with their existential questions

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

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Under the hood, MEC Reference Architecture

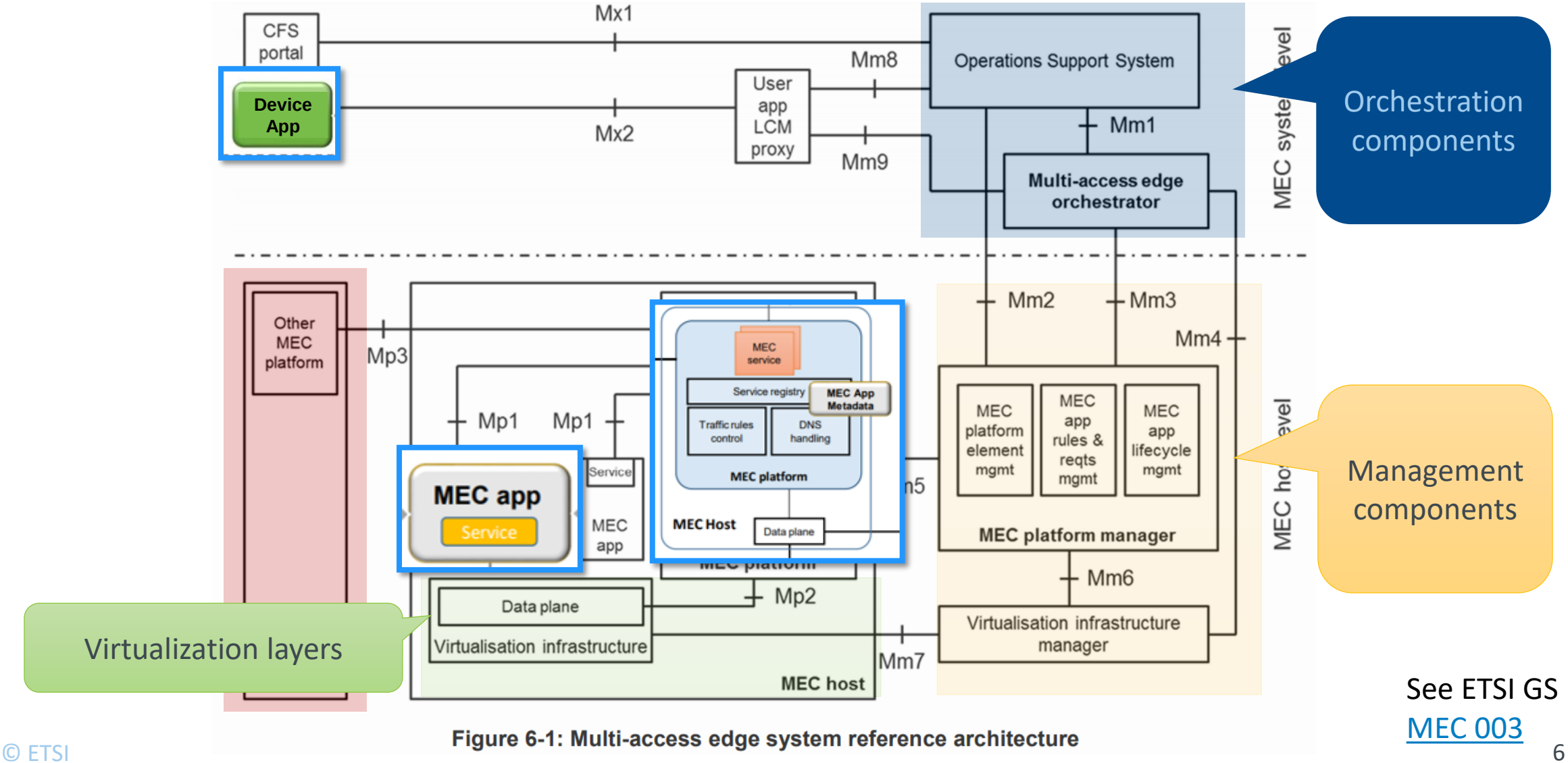

Figure 6-1: Multi-access edge system reference architecture

See ETSI GS MEC 003

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The Role of ETSI MEC

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

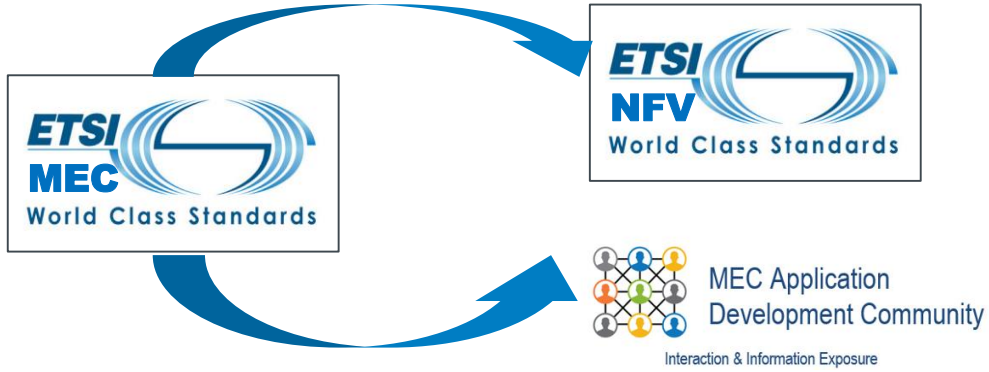
MEC: Multi-access Edge Computing
Cloud Computing at the Edge of the network.

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 Industry Specification Group

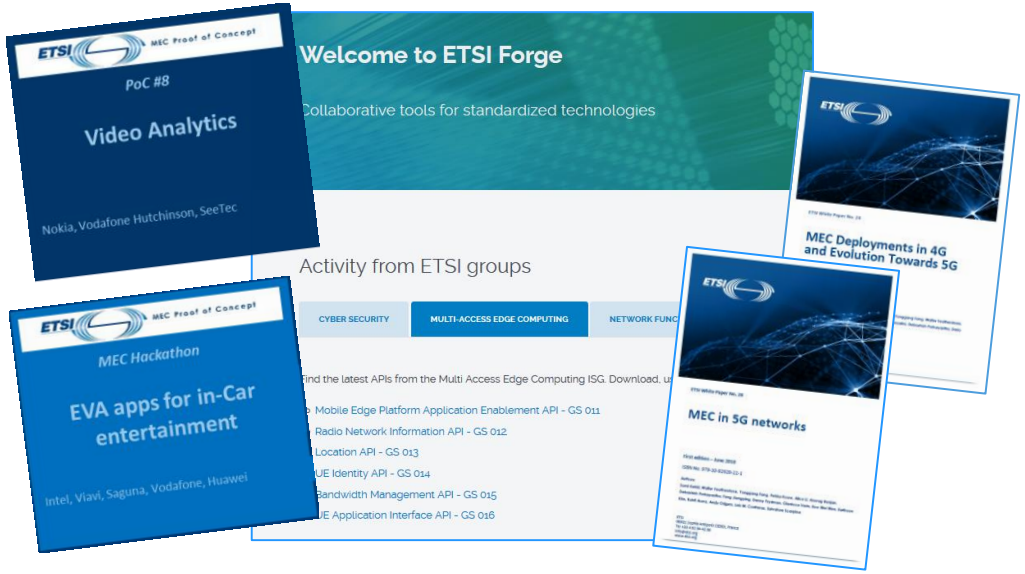
Foundation for Edge Computing created – Fully standardized solution to enable applications in distributed cloud created by ETSI MEC + 3GPP



Application Life Cycle Management

RESTful based APIs for Runtime Application Services

3GPP A GLOBAL INITIATIVE · WiFi · broadband forum



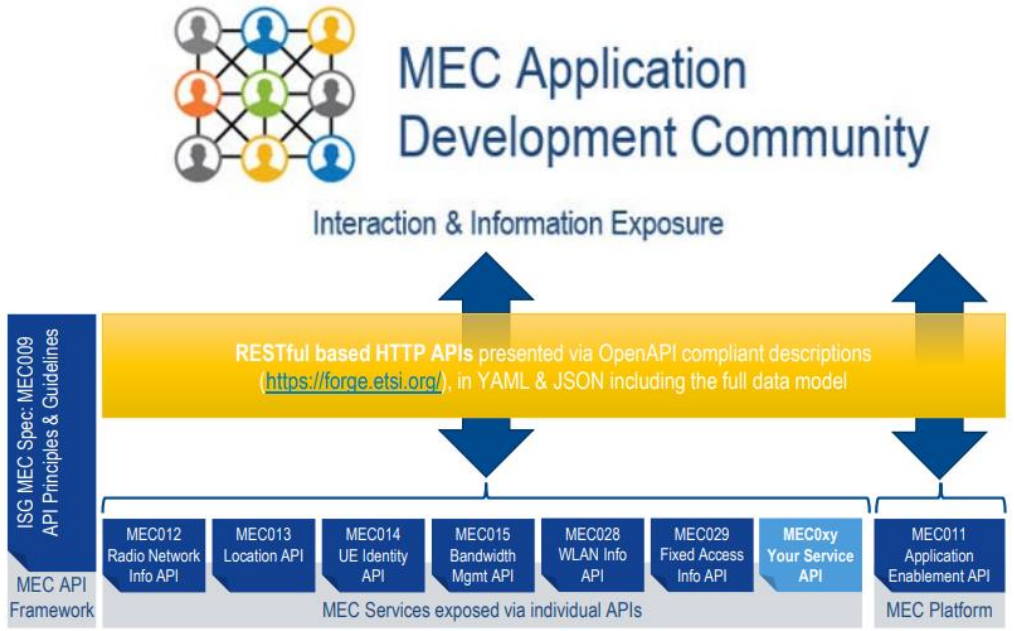
110 members - Operators – Technology Vendors – IT players – Application developers

More info at https://www.etsi.org/committee/1425-mec

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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Where do the APIs play their part? (1/2)

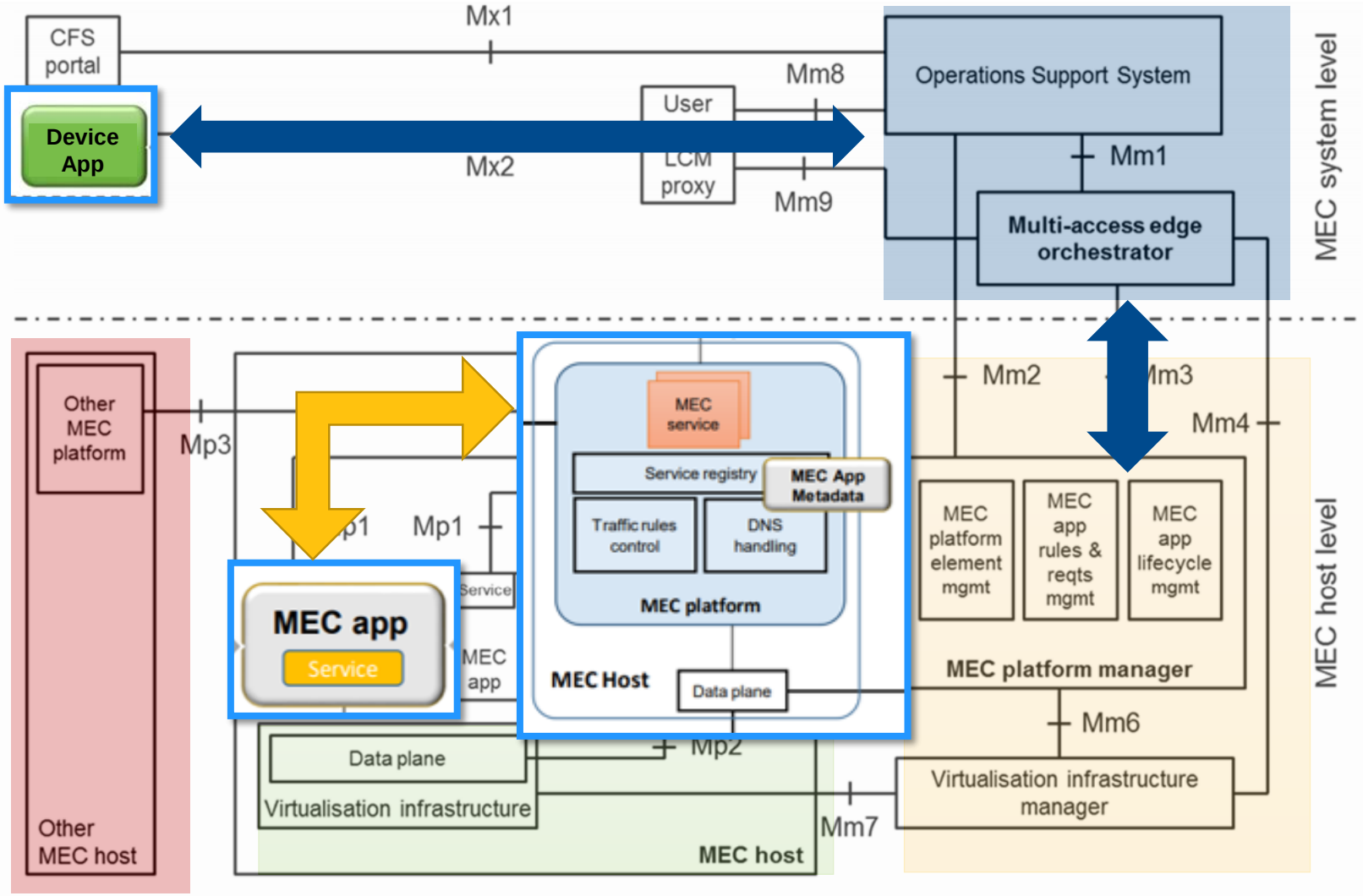

Figure 6-1: Multi-access edge system reference architecture

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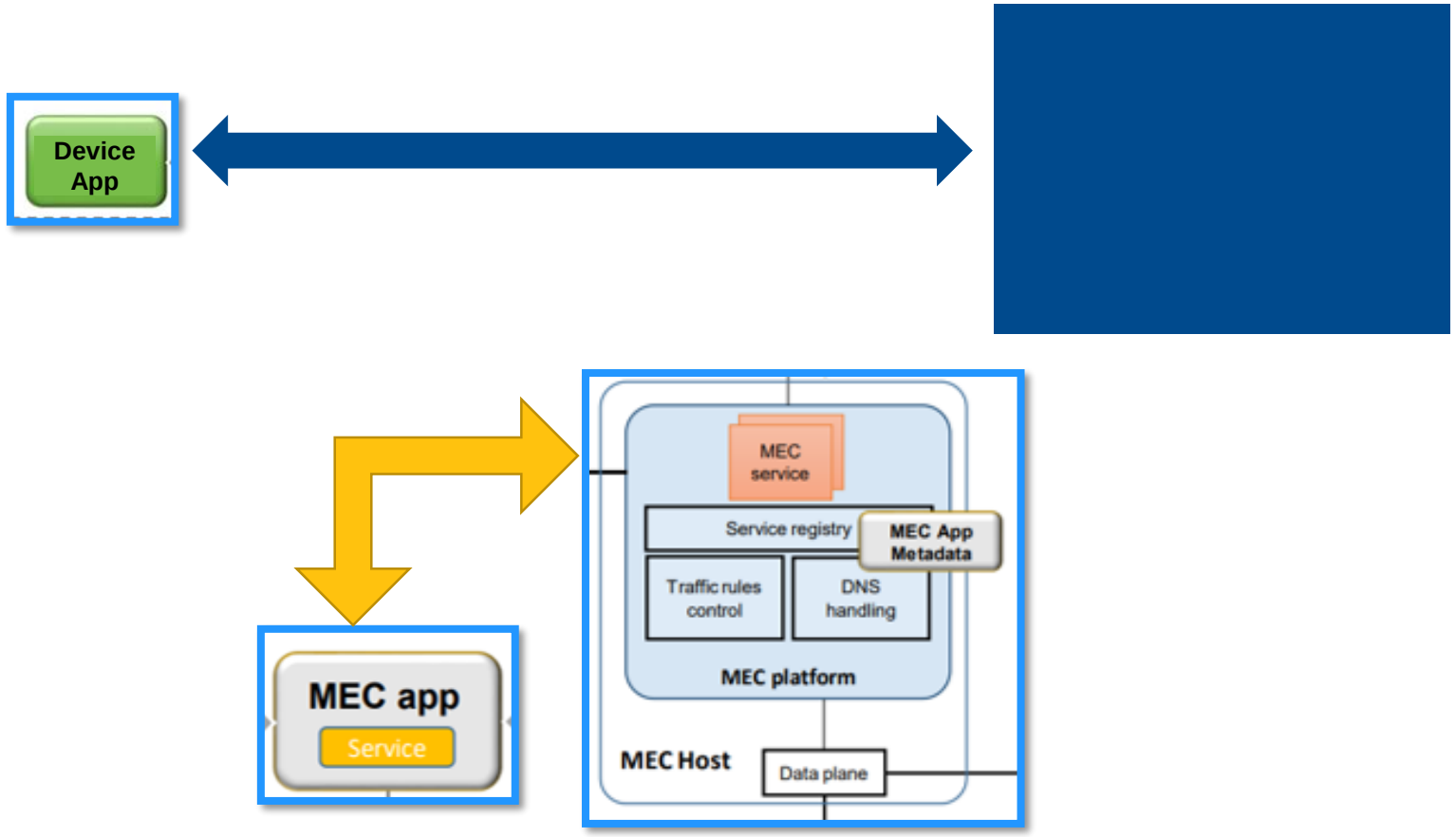
Where do the APIs play their part? (2/2)

- 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



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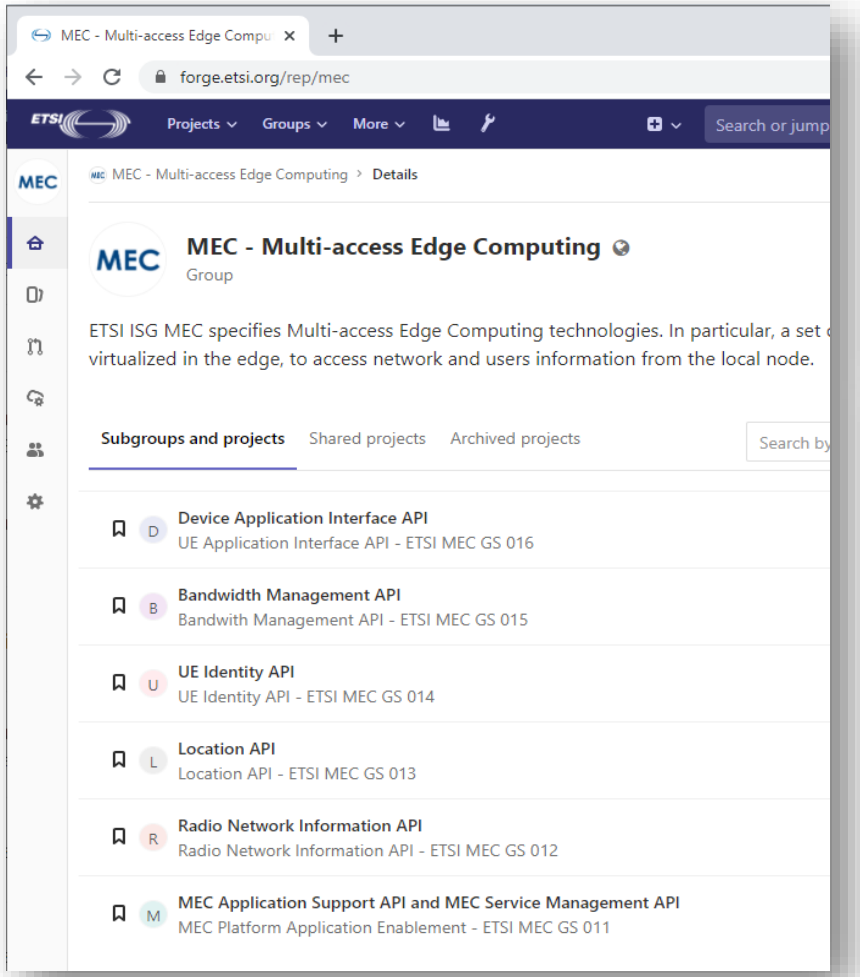
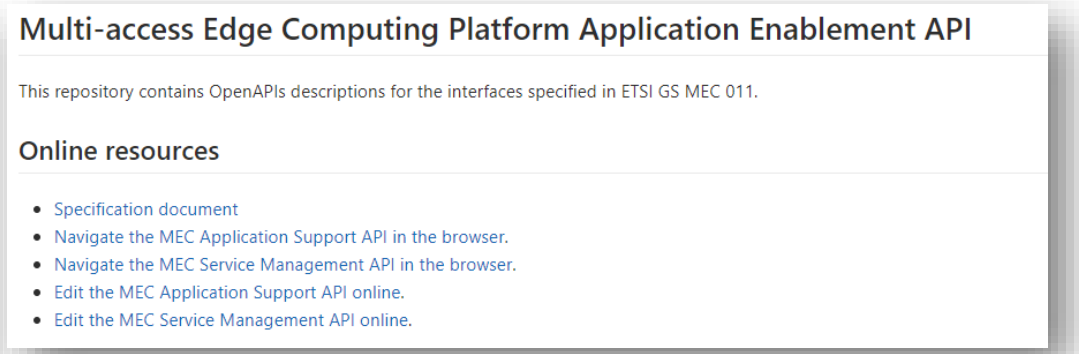
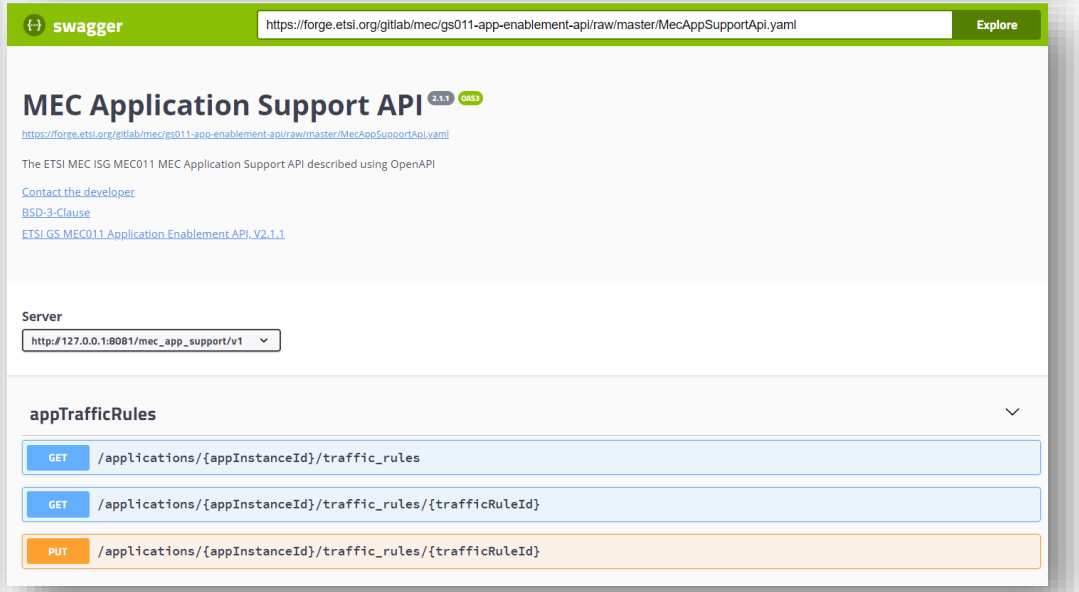
Discover the APIs on forge.etsi.org/rep/mec







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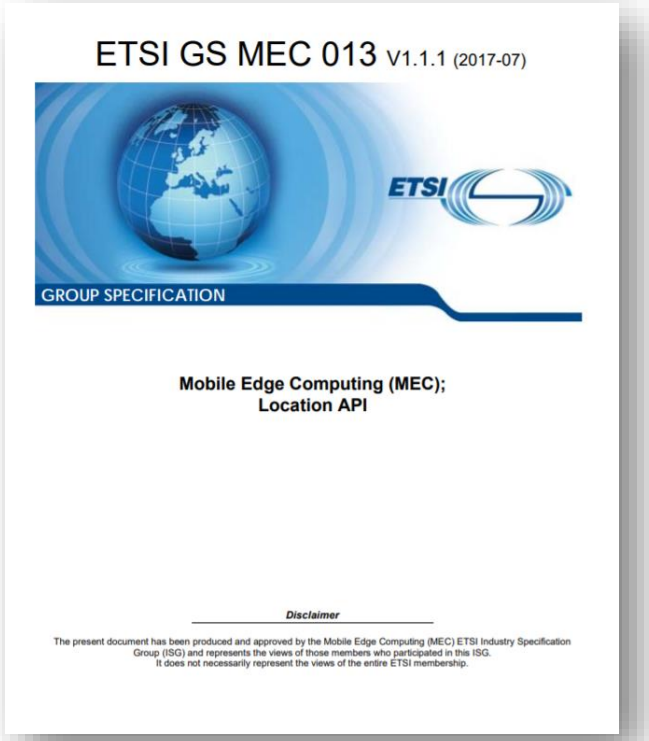
Discovering what an API is about



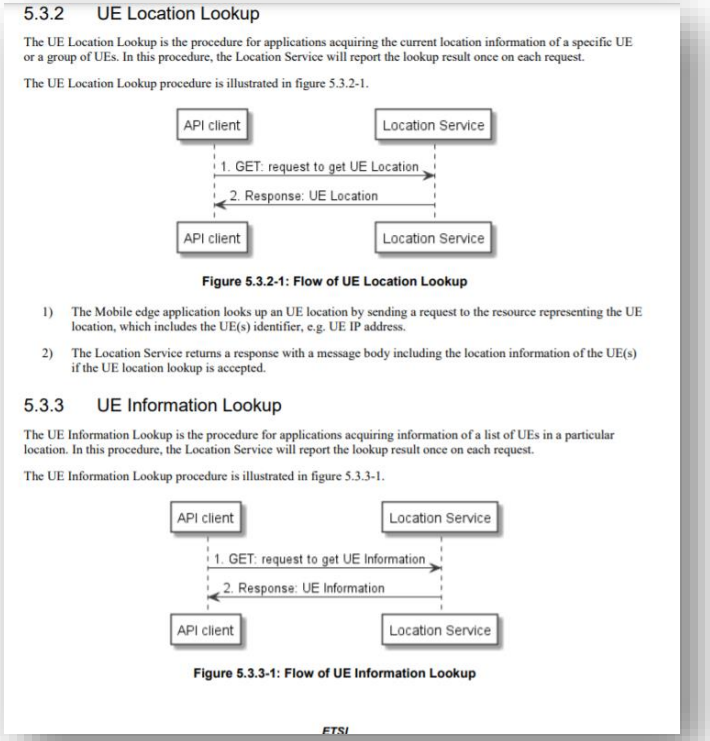
ETSI GS MEC 013 V1.1.1 (2017-07)

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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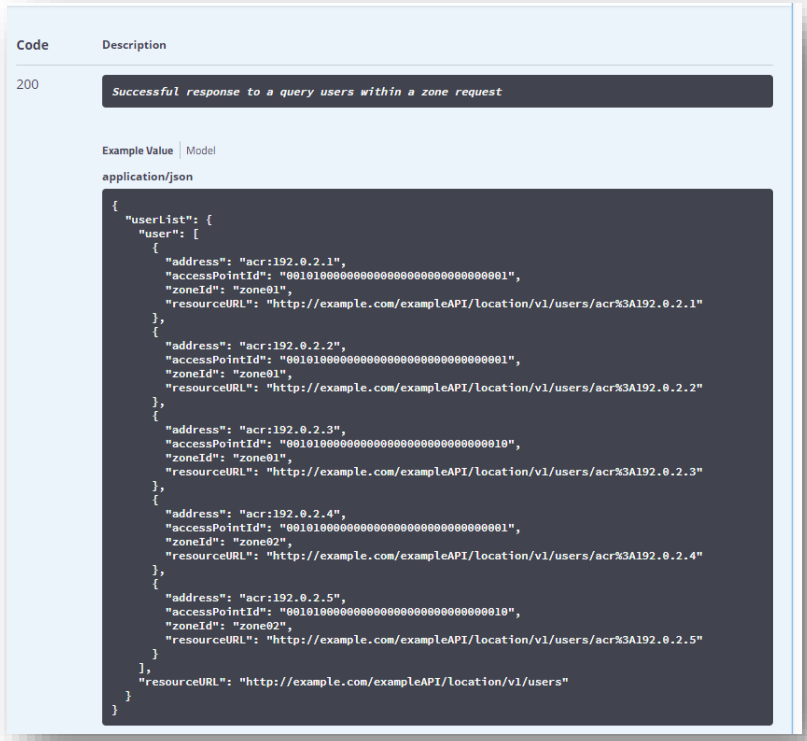


Code | Description

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)

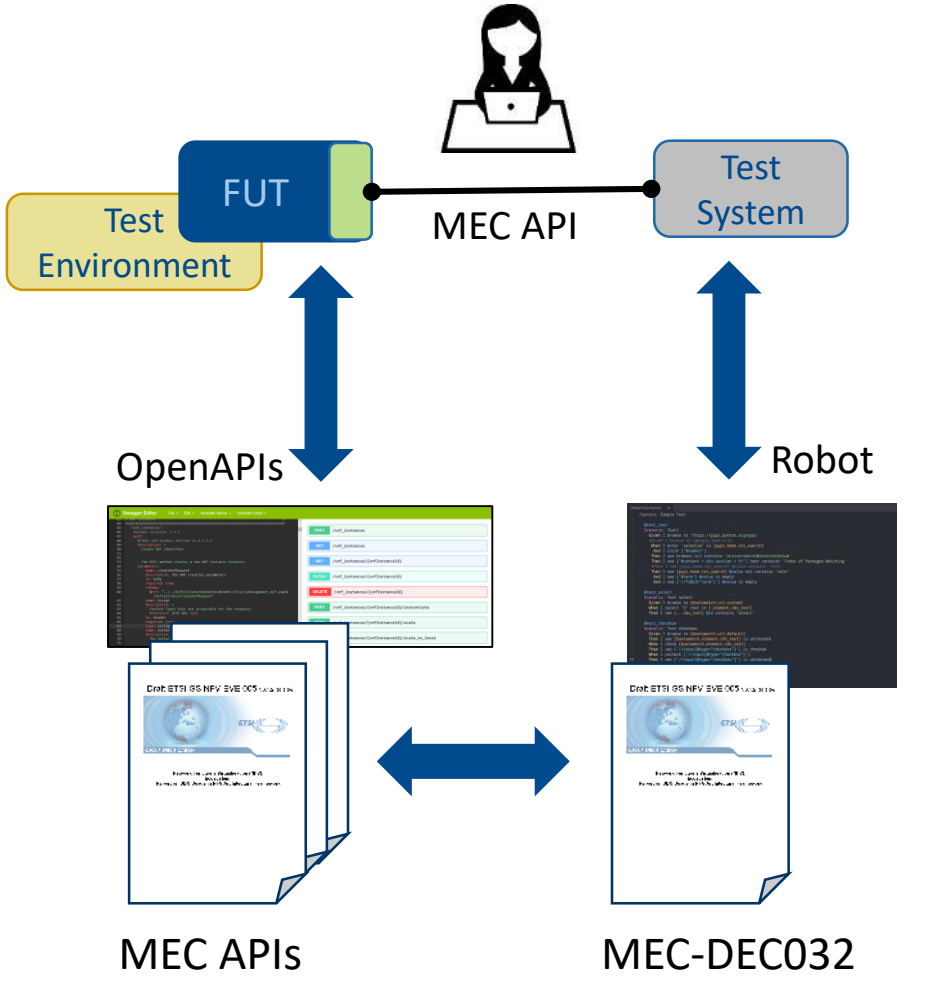
Machine readable representation

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

```
*** 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	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 [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	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@InterDigital.com
Connected Vehicle Blueprint (Aka CVB)	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	Yarg Yang
Enterprise Applications on Lightweight 5G Telco Edge (EALTEdge)	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 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
Public Cloud Edge Interface (PCEI)	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	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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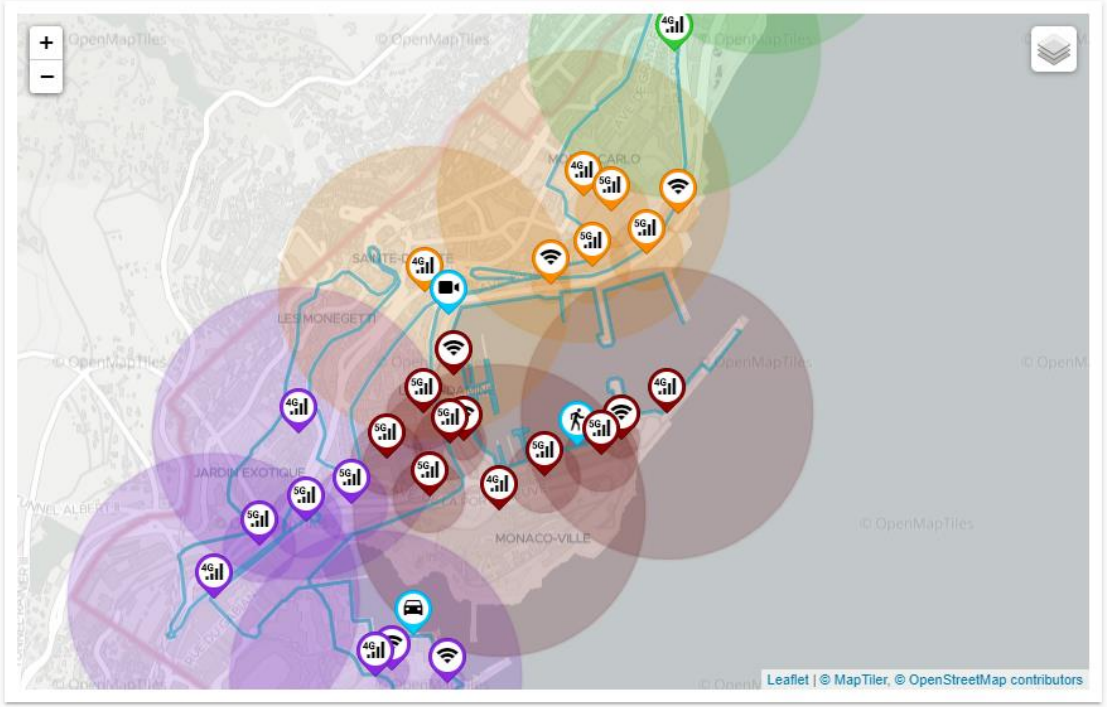
MEC Sandbox – the ultimate app development companion

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, and more

Coming soon!
Stay tuned on ETSI Channels



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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Coming up in 2021 #MECplugtests #NFVplugtests

- Remote NFV&MEC API Plugtests 2021
  - 1-28 February 2021
  - Fully remote event **#TestFromHome**
  - Individual **MEC & NFV API Conformance** test sessions
  - **Registration OPEN**, deadline December 15th!
  - https://www.etsi.org/events/1840-nfv-mec-remote-api-plugtests-2021

- NFV&MEC IOP Plugtests 2021
  - 4-8 October 2021
  - ETSI, Sophia Antipolis, France (if possible)
    - Fallback to remote (and extension to 2 weeks) if needed
  - Multi-vendor **MEC & NFV interoperability** test sessions

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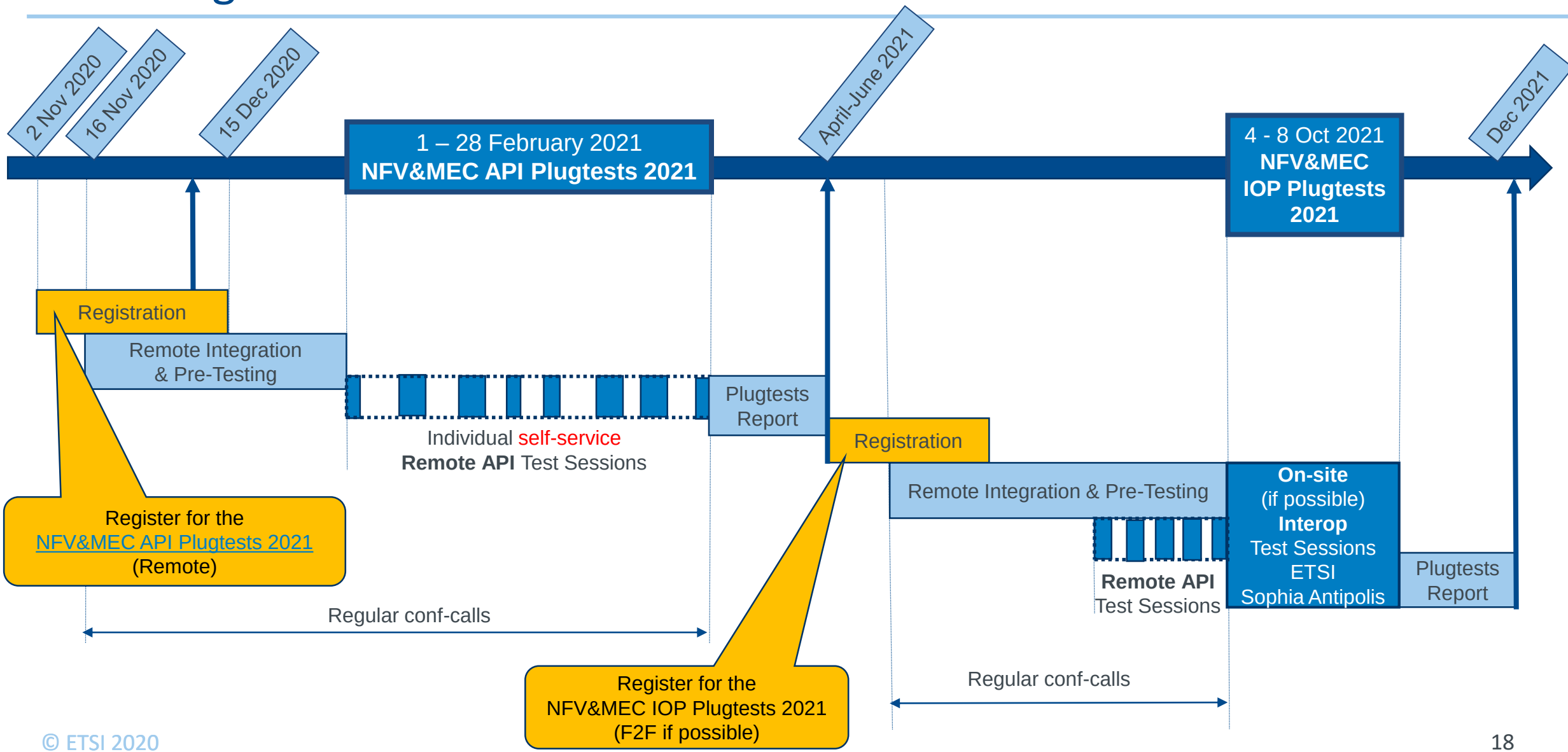
MEC Plugtests – 2021 Timeline



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Get involved in ETSI MEC!

- Learn and implement MEC APIs on forge.etsi.org
- Test, experiment and collaborate with API tests and the MEC Sandbox (stay tuned)
- Share your projects on the MEC Ecosystem wiki (mecwiki.etsi.org)
- Join the discussion on social media (**#MEC**, **#theStandardsPeople**)
- Register for the NFV&MEC Plugtests programme (link)
- Join ISG MEC for design, standardization and ecosystem activities (link)

Thank you and enjoy the hackathon

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