ETSI MEC feedback on SDO mapping

Presented by: **ETSI ISG MEC**

For: **GSMA OPG joint workshop**

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Agenda

- High level considerations (ETSI MEC perspective)

- Overall approach proposed by ETSI MEC

- Consolidated answers on the SDO mapping from OPG

- Overview of ETSI MEC specifications relevant to OP

- Conclusions

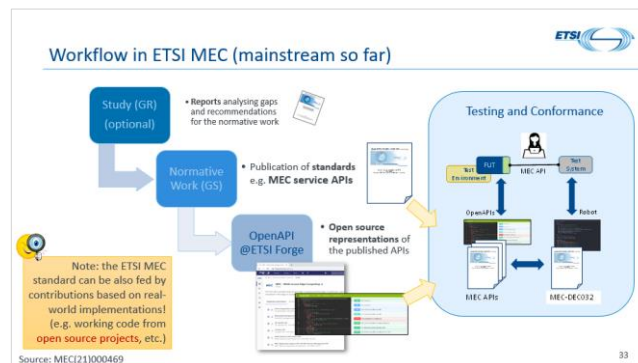# High level considerations (ETSI MEC perspective)

- ETSI MEC standard approach

- Workflow in ETSI MEC

- Ecosystem engagement (DECODE WG)

- Work in ETSI MEC is aiming at not overlap with 3GPP (and assume viceversa: let's avoid duplication of work)

- Both ETSI MEC and 3GPP can show complementary coverage.

- The following slides (revised from the LS reply in Dec 2021) describe, from a technical perspective, a more consolidated feedback from ETSI MEC, to start an effective dialogue with both GSMA OPG and 3GPP.

  - Agreed conclusions after the present Joint Workshop (21/01/2022) are also seeked,
    as a way forward for the joint std work and collaboration.

Overall approach proposed by ETSI MEC

Alignment between GSMA OPG, ETSI MEC and 3GPP SA6

A possible relationship could consist in the following high-level steps:

1. GSMA asks SDOs to cover standards for the OP architecture (and OSCs to complement with open source)
2. Worksplit (ETSI, 3GPP, OSCs,..) and consequent std work, publication of standards etc..
3. Finally, GSMA will certify OP compliance

1.
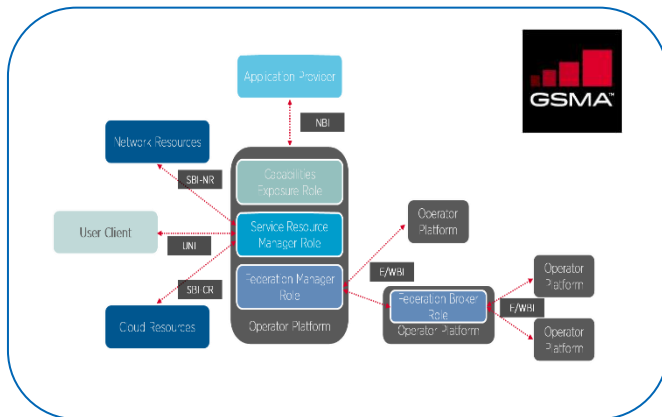
GSMA PRD document (requirements)

2.

OSC#2

OSC#1

...

Work from SDOs and OSCs (under the GSMA guidance)

3.

GSMA certification of compliance to OP

Proposal: general overview

Vision toward standards alignment

> • Expected to have a mix of APIs, ETSI, 3GPP, Implementation + others = Frankenstein. Need to align activities

How to align work in SDOs:

Step#1 - Based on the API list and OP definitions, define a more detailed mapping and worksplit between ETSI MEC and 3GPP, by using as a starting point the synergized architecture (from the ETSI white paper here), and builid on top of that

Step#2 – For the normative work (stage 2 – sequence diagrams) reuse existing specs from ETSI MEC and 3GPP

Step#3 - Prioritize the normative work in SDOs to fill the remaining gaps (for compliance to OP interfaces)

PS: how to complement STD by OSC APIs work: this is also a topic that can be discussed at the present joint workshop (Jan 21st). In a nutshell, ETSI MEC would welcome contributions from members, e.g. to feed Stage 3 APIs definitions (see step#3)

Step#1: define mapping and worksplit

Tentative mapping, need to be updated taking into account of feedback from GSMA OPG and other SDOs

NOTE 1: Mff is currently under specification in ETSI MEC GS MEC 040
NOTE 2: Mx1 is suitable for MEC Federation, although ETSI MEC has still not specified APIs
NOTE 3: API specifications for Mm4 and Mm6 can be fulfilled by those provided by NFV (see next slide)
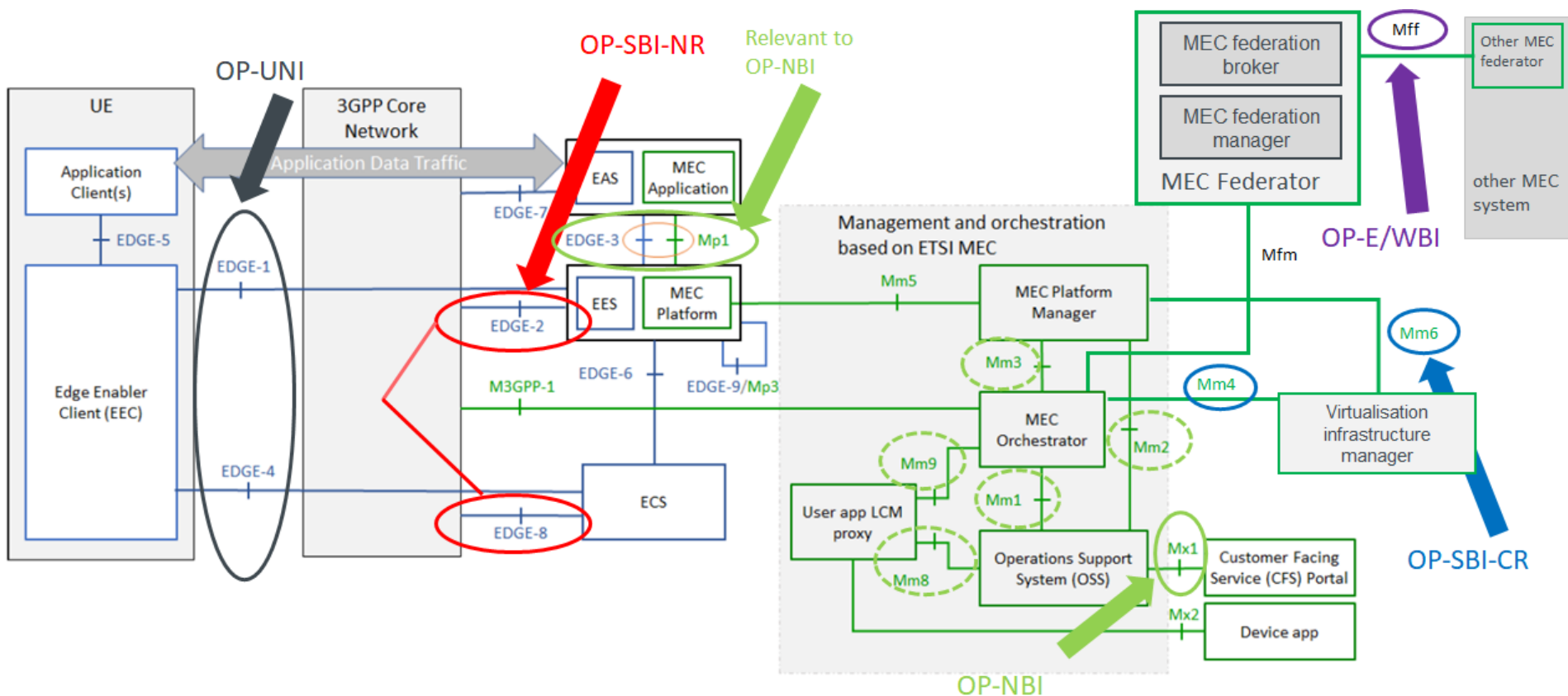
Updated MEC 003 architecture (see slide 20)

Initial proposals:

Proposal 1: push synergy between Mp1 and EDGE-3, as they are relevant for NBI

Proposal 2: ETSI MEC can host EWBI (i.e. in MEC 040)

Proposal 3: It is convenient that ETSI MEC also hosts NBI standard (e.g. in MEC 040), subject to feedback from GSMA OPG and other SDOs (see next slides).

Tentative OP interfaces mapping with existing reference points

- NOTE: relevance in this table is meant **from a GSMA OPG compliance point of view!**

OP interface	ETSI MEC relevance	3GPP relevance	Comments
OP-NBI	Mx1, Mp1	Provisioning MnS, EDGE-3	Synergy between EDGE-3 and Mp1 is currently under study in ETSI and 3GPP. Similarly, a clarification on the relationship between Mx1 and Provisioning Mns is needed.
OP-EWBI	Mff	**n.a.**	Mff is currently under specification in ETSI MEC GS MEC040 (drafts available in the MEC Open Area).
OP-SBI-CR	Mm4, Mm6	EES <-> EMS (*)	ETSI MEC has not specified APIs for Mm4 or Mm6. API specifications for Mm4 or Mm6 can be fulfilled by those provided by NFV for the Vi-Vnfm and Or-Vi reference points respectively. This interface (*) lies also in the scope of 3GPP SA5.
OP-SBI-NR	Mp2	EDGE-2, EDGE-8	
OP-UNI	**n.a.**	EDGE-1, EDGE-4	

Step#2: reuse of existing specs in ETSI/3GPP

- **NBI**

  - No specs exist, for the whole OP-NBI definition.

  - There are existing **TMF, 3GPP and ETSI MEC specs** covering various APIs components.

  - Available specifications should be reused as much as possible: we propose a "**packaging approach**" which consists in purely indicating which existing APIs are applicable (*).

  - At least Stage 2 sequence diagrams should be provided.

- **EWBI**

  - Similar situation here (since many EWBI components are in common to NBI).

  - ETSI GS MEC 040 ("MEC Federation enablement APIs") is currently defining messages/procedures, starting from the EWBI interface management (unique).

  - Available specifications can be reused as much as possible: also here, we propose a "**packaging approach**" which consists in purely indicating which existing APIs are applicable (*).

  - The spec ETSI GS MEC 040 can host EWBI. The spec is open for contributions, and NOW is the right time frame to contribute!

  - At least Stage 2 sequence diagrams should be provided.

1	Required API		Covered by SDOs
			•NBI: No single SDO covers a complete interface NBI as required by OPG to handle the application provider relationship. Since this is an area where application developers and OSCs are very active, we propose a parallel task to align them with the selected SDOs and provide convergence. ETSI ISG MEC and 3GPP both handle the application side interactions required to host NBI and shall align the capabilities exposure. OPG proposes for ETSI ISG MEC to host the NBI standard.
2	NBI		
4	Application onboarding and image management		ETSI MEC 010-2
5	Application Instance Management (Resource Life-Cycle		ETSI MEC 010-2
6	Telemetry		3GPP TS 29.122 (SCEF)	TS 29.522 (NEF), 3GPP 28.552, 3GPP 28.554 (depending on data source)
7	Notifications		3GPP TS 29.122 (SCEF)	TS 29.522 (NEF)
8	Network Events		3GPP TS 29.122 (SCEF)	TS 29.522 (NEF)
9	Trouble Ticketing		TMF 621
10	Application Resource Catalogue		ETSI MEC 011, TMF 639, TMF 634 (Resource inventory), (Resource Catalog)
			TMF 641
			3GPP 29.522 (NEF), TMF 636 (BSS)
13	QoS Management		3GPP TS 29.122 (SCEF)	TS 29.522 (NEF)	TGAA (wip), ETSI GS MEC 015 (NEF)
14	Traffic Influence		3GPP TS 29.522 (NEF), , ETSI GS MEC 015 (NEF)
15	Collecting Network Status		3GPP TS 29.122 (SCEF)	TS 29.522 (NEF)
16	Managing Service availability in LADN		LADN Concept defined by 3GPP 23.501
17	Application relocation		3GPP 23.558 (3GPP 23.558 is a stage 2 (architecture) spec. The RESTful APIs to address the identified ref.

EWBI
Application onboarding
Application Instance Management (Resource Life-Cycle Management)
Telemetry
Notifications
Network Events
Trouble Ticketing
East/West Bound Interface Management
Availability Zone Information Synchronisation Service
LBO Roaming (Monitoring)
LBO Roaming (Authentication)
Edge Node Sharing (resource onboarding & Management)

NOTE1: the same ETSI GS MEC 040 can be used both in EWBI and NBI as a convenient "container", subject to feedback from other SDOs.

NOTE2: the structure of ETSI GS MEC 040 contains clause 5 (informative) on message exchanges, and clause 6 and 7 (normative) on data types and API design

(*) listing specs can be done e.g., in the MEC 040 annex. The right "level" of reuse in this approach should be preferably decided case-by-case, based on the specific data type and document

Step#3: *normative* work aligning ETSI MEC and 3GPP

- **EWBI** is in scope of ETSI GS MEC 040

  - Stage 2 – messages definition via Mff can include all EWBI-relevant messages.

  - Stage 3: API definition (data types) can refer to the OPG list of APIs (see figure).

    - GSMA OPAG can directly contribute and/or invite LF to join MEC (if appropriate and convenient).

- **NBI** can be hosted by ETSI MEC (as per past LS exchanges with GSMA)

  - Possibly MEC 040 can highlight the Mx1 mapping to NBI.

    - For discussion: "Provisioning MnS" in SA5 can be considered as a particular implementation of Mx1.

  - Stage 2 – similar to EWBI (Mff).

    - A relevant MEC enabler is Mp1, with its APIs

  - Stage 3 -- API definition (data types) can refer to the OPG list of APIs (see figure).

    - Reuse the existing specs from other SDOs

> NOTE1: It is essential to reuse existing specifications from other SDOs (*)

> NOTE2: For stage 3 the API definitions, GSMA OPAG can directly contribute and/or invite LF to join MEC

EWBI
Application onboarding
Application Instance Management (Resource Life-Cycle Management)
Telemetry
Notifications
Network Events
Trouble Ticketing
East/West Bound Interface Management
Availability Zone Information Synchronisation Service
LBO Roaming (Monitoring)
LBO Roaming (Authentication)
Edge Node Sharing (resource onboarding & Management)

NBI
Application onboarding and image management
Application Instance Management (Resource Life-Cycle Management)
Telemetry
Notifications
Network Events
Trouble Ticketing
Application Resource Catalogue
Ordering
Billing
QoS Management
Traffic Influence
Collecting Network Status
Managing Service availability in LADN
Application relocation
NEW: Confirm User Location
NEW: Get User Consent

(*) also here, the right "level" of reuse in the "packaging approach" should be preferably decided case-by-case, based on the specific data type and document

Consolidated answers
on the
SDO mapping
from OPG

GSMA OPAG API Mapping Feedback – NBI (1/2)

⚙️ OP APIs	🗄️ ETSI MEC Reference(s)	✅/📅 Stage 2 Availability	✅/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments from ETSI MEC	
Application onboarding and image management.	ETSI GS 037 V3.1.1 target July 2022	MEC037 (work in progress) provides the package format for the MEC applications.			• ETSI MEC defined "application package"; software image is one of artifacts of an application package. • MEC010-2 provides application package management related APIs. Image management is implemented as partial of package management. • MEC010-2 provides MEC application LCM related APIs. An elaborated answer is described in **slide 21**	ETSI GS MEC 040 (drafts in MEC Open Area) MEC 040 can be convenient to host OP-NBI, while other MEC specs (e.g. MEC010-2 and MEC011) are the relevant MEC enablers for OP-NBI. An elaborated answer is described in **slides 23-25**
	ETSI GS MEC 10-2 V2.2.1, target Q1 2022 (draft in MEC Open Area)	Available at clause 5.2, 5.6 and 6.3.3	Available at clause 7.3	OpenAPI representations published in ETSI forge: app-pkgm API: here app-lcm API: here		
Application Instance Management (Resource Life-Cycle Management)	ETSI GS MEC 10-2 V2.2.1, target Q1 2022 (draft in MEC Open Area)	Available at clause 5.3, 5.7 and 6.3.1	Available at clause 7.4			
Telemetry						
Notifications						
Network Events						
Trouble Ticketing						
Application Resource Catalogue	ETSI GS MEC 10-2 ETSI GS MEC 011 V3.1.1, target Q2 2022 (draft in MEC Open Area)	ETSI GS MEC 011 Clauses 5.2.4 and 5.2.5	ETSI GS MEC 011 Clauses 8.1.2 and 8.2	Gaps are still present (Work in progress) ETSI GS MEC 011 - MEC service management API - MEC application support API	Both MEC011 and MEC010-2 and are relevant MEC enablers for OP-NBI. • MEC011 provides MEC services related information (availability, capabilities, etc.). Some gap is still present (work in progress) • MEC010-2 is indirectly relevant to NBI, as internal enabler providing MEC application LCM related APIs.	

Source: OPG webinar (document MEC(21)000617)

GSMA OPAG API Mapping Feedback – NBI (2/2)

⚙ OP APIs	🗄 ETSI MEC Reference(s)	☑/📅 Stage 2 Availability	☑/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments from ETSI MEC	
Ordering	<e.g. Doc number, "Not available">	<e.g. Available, Target Qx 202y, …>	<e.g. Available, Target Qx 202y, …>			ETSI GS MEC 040 (drafts in MEC Open Area)
Charging						
Billing						
QoS Management	ETSI GS MEC 015 V2.1.1, published Q2 2021	Clause 6	Clauses 7 and 8	OpenAPI representations published in ETSI forge: bwm API: here	To support QoS management, we can map the 3GPP APIs (NEF, SCEF) to SBI-NR (between CN and Edge) and as enablers of NBI. The ETSI MEC API (MEC 015) is more directly relevant to NBI (between Edge and Apps). No overap issues, since MEC 015 only specifies interfaces/APIs between edge and applications, while 3GPP is more focused on enablers/solutions.	MEC 040 can be convenient to host OP-NBI, while other MEC specs (e.g. MEC010-2 and MEC011) are the relevant MEC enablers for OP-NBI.
Traffic Influence	ETSI GS MEC 015 V2.1.1, published Q2 2021	Clause 6	Clauses 7 and 9	OpenAPI representations published in ETSI forge: mts API: here		
Managing Service availability in LADN						An elaborated answer is described in slides 23-25
Application relocation	ETSI GS MEC 021 V2.2.1, target Q1 2022 (draft in MEC Open Area)	Available at clause 6	Available at clause 8	OpenAPI representations in ETSI forge (here) • adj-app-inst • app-mob-ser • app-mob-ser-der • subscriptions	MEC 021 is a relevant MEC enabler for application mobility. An elaborated answer is described in slide 22 Notifying user device of change of communication endpoint is covered by MEC 016, which is limited to user apps instantiated over Mx2.	
Confirm User Location	ETSI GS MEC 013 target Q1 2022 (draft v2.1.5 is here)	Clause 6	Clauses 7	OpenAPI representations published in ETSI forge: location API: here	MEC 013 can be another enabler	

Source: OPG webinar (document MEC(21)000617)

GSMA OPAG API Mapping Feedback – EWBI (1/2)

⚙ OP APIs	🗄 ETSI MEC References	✅/📅 Stage 2 Availability	✅/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments from ETSI MEC	
Application onboarding	ETSI GS MEC 10-2 V2.2.1, Q1 2022 (draft in MEC Open Area)	Available at clause 5.2, 5.6 and 6.3.3	Available at clause 7.3	OpenAPI representations published in ETSI forge: app-pkgm API: here	An elaborated answer is described in slide 21	ETSI GS MEC 040 (drafts in MEC Open Area)

MEC 040 can be convenient to host OP-NBI, while other MEC specs (e.g. MEC010-2 and MEC011) are the relevant MEC enablers for OP-NBI.

An elaborated answer is described in slides 23-25 |
Application Instance Management (Resource Life-Cycle Management)	ETSI GS MEC 10-2 V2.2.1, Q1 2022 (draft in MEC Open Area)	Available at clause 5.3, 5.7 and 6.3.1	Available at clause 7.4	OpenAPI representations published in ETSI forge: app-lcm API: here	An elaborated answer is described in slide 21	
Telemetry						
Notifications						
Network Events						
Trouble Ticketing						
East/West Bound Interface Management	ETSI GS MEC 040 (draft in MEC Open Area) plans to move to stable in April 2022	Clause 5 of ETSI GS MEC 040	Clauses 6 and 7 of ETSI GS MEC 040	API name and design is TBD at stage 3	MEC 040 is specifying Mff covering OP Federation manager/broker roles.	
Charging						
Billing						
QoS Management						

NOTE: more clarity from OPG on this «EWBI interface management» would be appreciated.

Source: OPG webinar (document MEC(21)000617)

GSMA OPAG API Mapping Feedback – EWBI (2/2)

⚙ OP APIs	📚 ETSI MEC References	✅/📅 Stage 2 Availability	✅/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments from ETSI MEC	
Traffic Influence						
Application Resource Catalogue	ETSI GS MEC 10-2 ETSI GS MEC 011 V3.1.1, target Q2 2022	ETSI GS MEC 011 Clauses 5.2.4 and 5.2.5	ETSI GS MEC 011 Clauses 8.1.2 and 8.2	Gaps are still present (Work in progress) ETSI GS MEC 011 - MEC service management API - MEC application support API	Both MEC011 and MEC010-2 and are relevant MEC enablers for OP-NBI. • MEC011 provides MEC services related information (availability, capabilities, etc.). Some gap is still present (work in progress) • MEC010-2 is indirectly relevant to NBI, as internal enabler providing MEC application LCM related APIs.	ETSI GS MEC 040 (drafts in MEC Open Area) MEC 040 can be convenient to host OP-NBI, while other MEC specs (e.g. MEC010-2 and MEC011) are the relevant MEC enablers for OP-NBI. An elaborated answer is described in slides 23-25
East/West Bound Interface Management	ETSI GS MEC 040					
Availability Zone Information Synchronisation Service						
LBO Roaming (Monitoring)						
LBO Roaming (Authentication)						
Edge Node Sharing (resource onboarding & Management)	ETSI GS MEC 040 (draft in MEC Open Area) plans to move to stable in April 2022					

• Duplicated row? (see previous page, where a full answer was provided already)

GSMA OPAG API Mapping Feedback – SBI-CR (1/1)

⚙ OP APIs	📇 ETSI MEC References	☑/📅 Stage 2 Availability	☑/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments from ETSI MEC
Orchestration	ETSI GS MEC 10-2 V2.2.1, target Q1 2022 (draft in MEC Open Area)	Not available	Not available	Not available	Orchestration in ETSI MEC is leveraging NFV standard. With respect to SBI-CR interface, ETSI MEC reference architecture choose the **"Integration with Infrastructure Manager" solution (clause 5.1.3.1.2 in PRD)** . MEO and MEPM are the users of interfaces provided by VIM. ETSI MEC integrates with cloud resources APIs on SBI to support the needed functionalities for application and resources management, such as: • Application onboarding/instantiation on specific site; • Image management; • Application lifecycle management; • Etc.
Virtualised Infrastructure Manager	ETSI GS MEC 10-2 V2.2.1, target Q1 2022 (draft in MEC Open Area)			See slides on NBI. Example: VimConnectionInfo is specified in MEC 10-2 (see also clause 9.5.3.2 of ETSI GS NFV-SOL 003).	MEO and MEPM are the entities interfacing with VIM. The specific interface depends on the implementation, such as chosen version of OpenStack, etc. Specification is not in the scope of MEC010-2.
Container Infrastructure Manager	ETSI GR MEC 027 V2.1.1 (2019-11), available here			Not planned	GR MEC 027 is a «Study on MEC support for alternative virtualization technologies».
Telemetry					
Notifications					

Source: OPG webinar (document MEC(21)000617)

GSMA OPAG API Mapping Feedback – SBI-NR (1/1)

⚙ OP APIs	🗄 ETSI MEC References	☑/📅 Stage 2 Availability	☑/📅 Stage 3 Availability	📄 ETSI MEC corresponding APIs	💬 Comments
User Authentication and Authorisation					
Mobility Triggers					
Mobility Control					
Confirm user location					
QoS Management	ETSI GS MEC 015 V2.1.1, published Q2 2021	Clause 6	Clauses 7 and 8	OpenAPI representations published in ETSI forge: bwm API: here	See slide on NBI.
Traffic Influence	ETSI GS MEC 015 V2.1.1, published Q2 2021	Clause 6	Clauses 7 and 9	OpenAPI representations published in ETSI forge: mts API: here	
Managing Service availability in LADN					
Application relocation	ETSI GS MEC 021 V2.2.1, target Q1 2022	Available at clause 6	Available at clause 8	OpenAPI representations in ETSI forge (here) • adj-app-inst • app-mob-ser • app-mob-ser-der • subscriptions	MEC 021 is a relevant MEC enabler for application mobility An elaborated answer is described in slide 22
Location Privacy Indicator					

Source: OPG webinar (document MEC(21)000617)

GSMA OPAG API Mapping Feedback – SBI-CHF, UNI, Edge App to Infra

⚙ APIs	ℹ Description	🗄 SDO References	💬 Comments
Charging events	Provide charging data on application usage of resources and capabilities to be included in charging records.	• 3GPP TS 32.291	

⚙ APIs	ℹ Description	🗄 SDO References	💬 Comments
Registration	Register and authenticate a UE with the OP.	• 3GPP TS 23.558	
Discovery	Discover the available resources, capabilities and applications.	• 3GPP TS 23.558	
Mobility/QoE	Handling of mobility and QoE reporting.	• 3GPP TS 23.558	

⚙ APIs	ℹ Description	🗄 SDO References	💬 Comments
Containers	Allow applications based on containers to interact with container infrastructure.		
VMs	Allow applications based on VMs to interact with virtualised infrastructure.		

• No other ETSI MEC feedback so far

Source: OPG webinar (document MEC(21)000617)

Preliminary ETSI MEC feedback

- Todo

Overview of ETSI MEC specifications relevant to OP

GS MEC 003 – Update MEC reference architecture specification

MEC 003 prepared for publication of architecture supporting federation

- Introduce new FB „MEC Federator"

- Introduce new reference points

- Initial mapping to GSMA OPG interfaces

- OP-E/WBI supported through new Mff reference point

- Work started for next step to include detailed requirement mapping
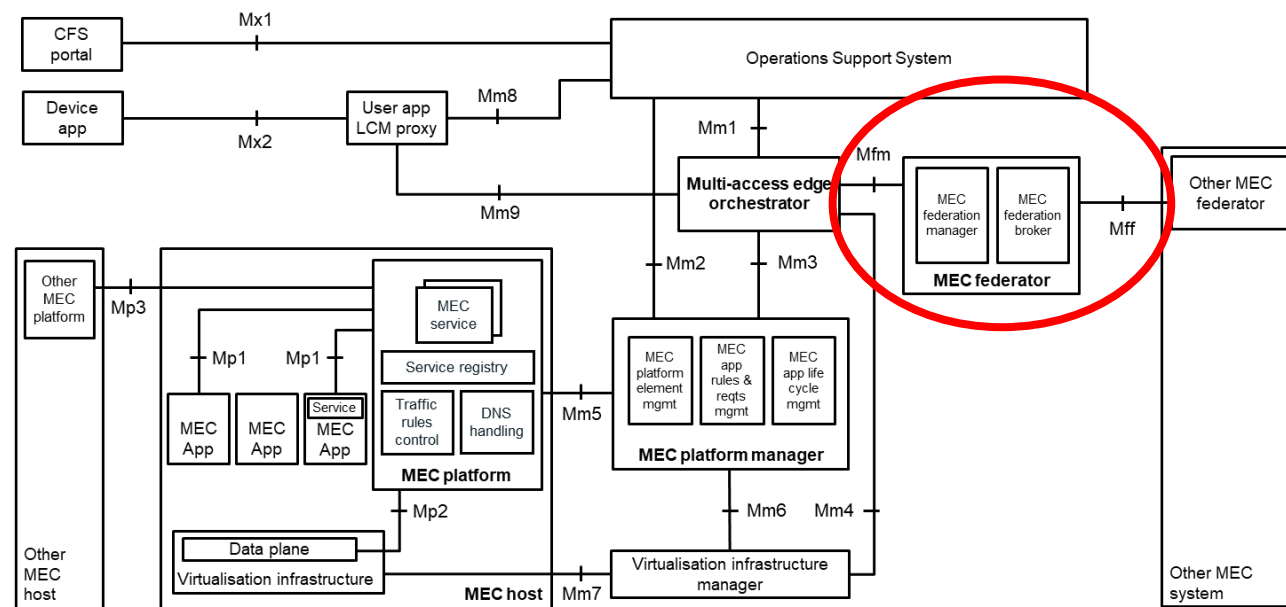
- Document already available at https://docbox.etsi.org/ISG/MEC/Open

Figure 6-3: Multi-access edge system reference architecture variant for MEC federation

GS MEC 10-2 – relevance for OP-NBI

Application package management APIs and application LCM APIs are currently used on Mm1 and Mm3/Mm3* reference point.
All these APIs could be reused on OP-NBI (taking as Mm1) or Mfm reference point in the federation variant architecture.

Application provider: Providing LCM input parameters

Application package management interface in MEC010-2:
- On-board application package.
- Query application package information.
- Disable application package.
- Enable application package.
- Delete application package.
- Fetch application package.
- Subscribe to notification relating to package change

Application provider:

Setting values for the parameters in the template to create a specific application package

ETSI MEC:
- ✓ MEC010-2 defines the date model of application descriptor
- ✓ MEC037 (work in progress) specifies the format of application package and its constituents

application instantiation based on application package

on-boarded application package into a MEC system

application package

application template

Application LCM interface in MEC010-2:
- Create application instance identifier
- Instantiate application
- Query application instance information.
- Change application instance state.
- Terminate application instance
- Query application lifecycle operation Status.
- Delete application instance identifier.
- Subscribe to notifications relating to application LCM

application package

- package metadata
  - manifest
  - application descriptor
    - application rules
    - requirements of a MEC application
- artifacts or URIs to artifacts
  - software image(s)
  - optionally other files

Mv1 – related to Os-Ma-nfvo   Mv2 – related to Ve-Vnfm-em   Mv3 – related to Ve-Vnfm-vnf
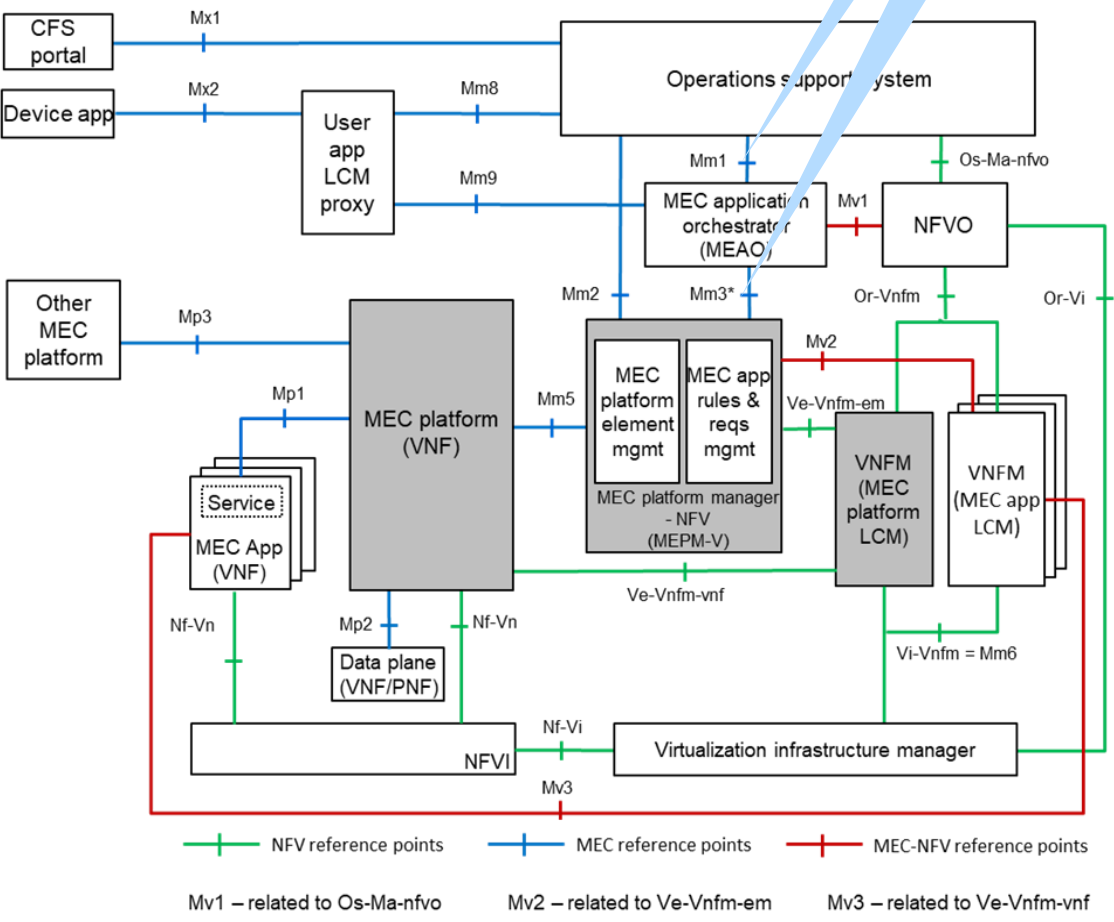
GS MEC 021- relevance of Application relocation

Application Mobility Service support may be considered as part of the service continuity support, for which the service to the user will resume and continue when the application instance is made available in the target MEC host and the user context, if needed, is transferred to the application instance there.
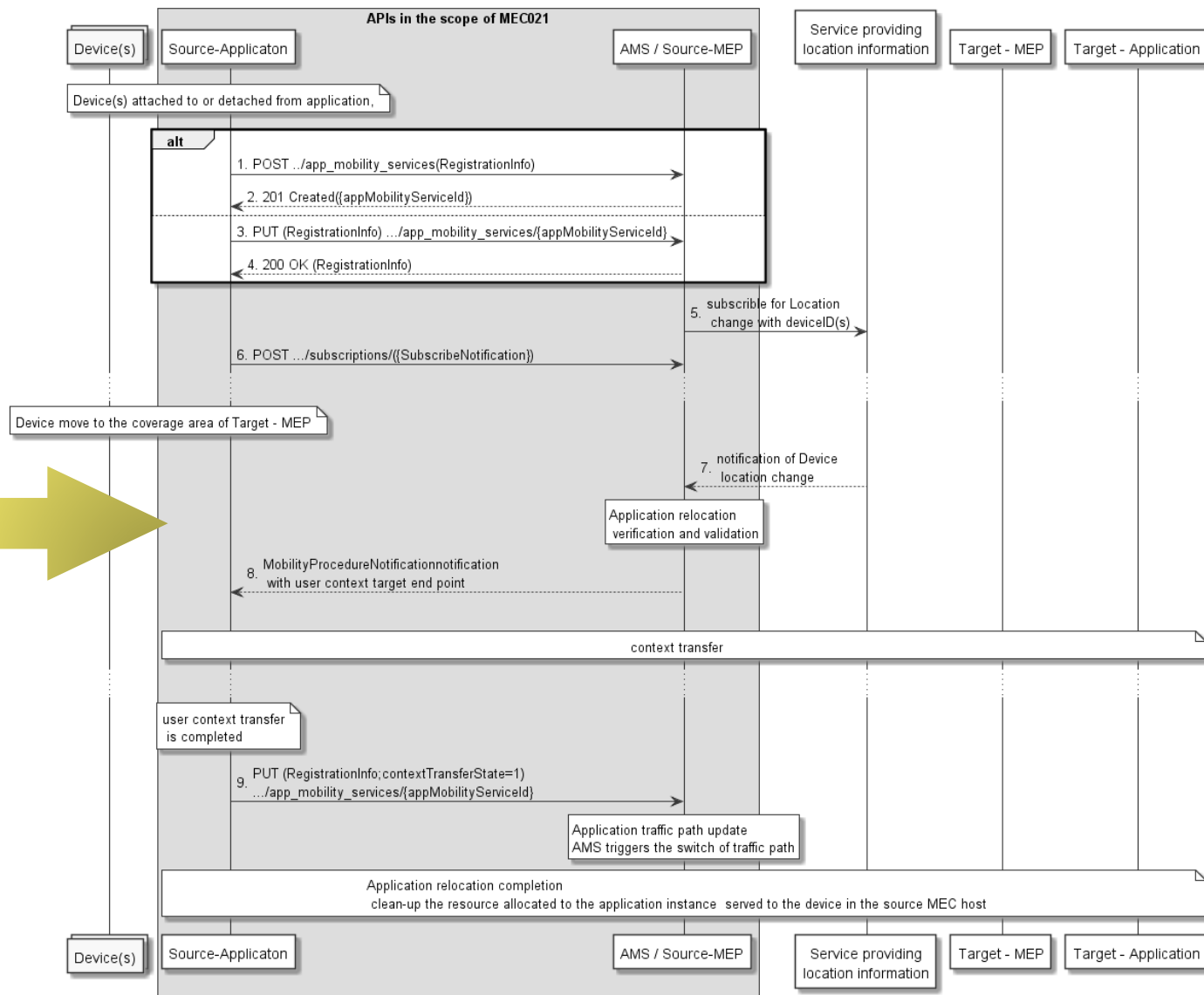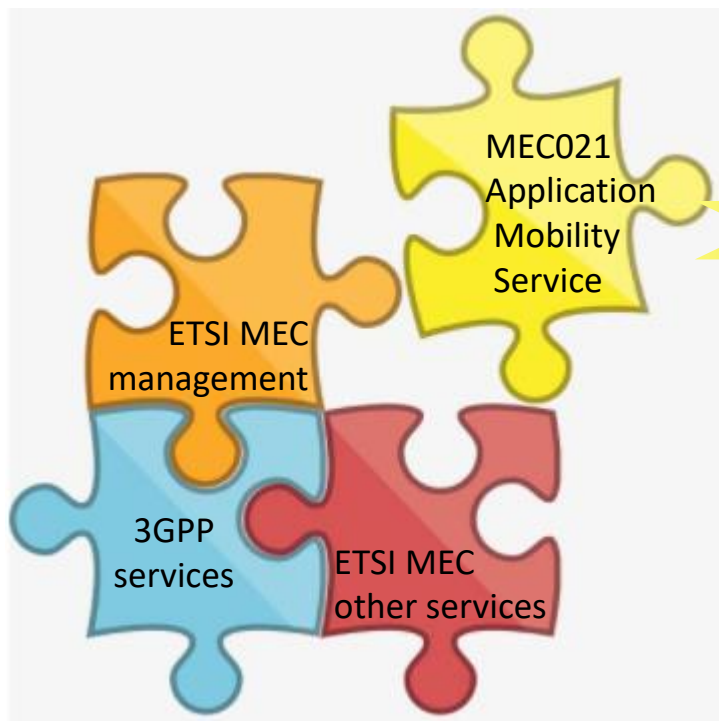
GS MEC 040 – relevance for OP-NBI and OP-EWBI

- Overview of ETSI GS MEC 040

  - Scope:

      The present document focuses on the functionalities enabled over the relevant reference points (i.e., Mfm̶ ̶f̶e̶d̶, Mff ̶f̶e̶d̶,̶ ̶a̶n̶d̶ ̶M̶f̶b̶ ̶f̶e̶d̶) to support MEC federation. It describes the information flows, required information, and specifies the necessary operations, data models and API definitions. The present document carefully considers the relevant work of other industry bodies relating to MEC federation (e.g., GSMA OPG, 5GAA, etc.) and all relevant work done in ETSI.

  - MEC 040 can be convenient to host NBI and E/WBI, while technical enablers are defined in other specifications.

  - State of play:
    - Currently defining information flows
    - About to start defining data models and APIs
    - (drafts available in MEC Open Area)

GS MEC 040 – relevance for OP-NBI and OP-EWBI

- OP-NBI

| APIs	Comments
"Application onboarding and image management" and "Application Instance Management (Resource Life-Cycle Management)"	Application lifecycle management is in scope of GS MEC 040. However, the corresponding reference point is not currently defined, e.g., reference point between OSS and MEF. The information flows of those functionalities are not defined yet as well as those data models and APIs, ETSI ISG MEC needs to define them.
"Telemetry", "Notifications", "Network Events", and "Trouble Ticketing"	Out of current scope of GS MEC 040 (see packaging approach in slide 9).
"Application Resource Catalogue"	It might be covered by "MEC host discovery". ETSI ISG MEC needs to define its message flow, data models and APIs. Other MEC enablers are MEC011 and MEC 10-2
"Ordering", "Charging", "Billing", "QoS Management", "Traffic Influence", and "Managing Service availability in LADN"	Out of current scope of MEC 040 (see packaging approach in slide 9).
"Application relocation"	It can be partially covered by MEC 040, application lifecycle management. Notifying user device of change of communication endpoint is covered by MEC 016, which is limited to user apps instantiated over Mx2. Other MEC enabler is MEC021

GS MEC 040 – relevance for OP-NBI and OP-EWBI

- OP-EWBI

APIs	Comments
"Application onboarding", "Application Instance Management (Resource Life-Cycle Management)", "Telemetry", "Notifications", "Network Events", "Trouble Ticketing"	Please see the previous slide (see packaging approach in slide 9).
"East/West Bound Interface Management"	It should be covered by "Registration/Update/Deregistration of MEC system(s) to the federation". The information flows have been agreed. The data models and APIs should be defined by ETSI ISG MEC.
"Availability Zone Information Synchronisation Service"	It can be covered by "MEC host discovery". ETSI ISG MEC needs to define information flows, data models and APIs. However, regardless of what "Zone" means, e.g., geographical zone or topological zone, etc., the exposed information should be defined based on the agreement among federated MEC systems.
"LBO roaming (Monitoring)" and "LBO Roaming (Authentication)"	Out of current scope of MEC 040 (see packaging approach in slide 9).
"Edge Node Sharing (resource onboarding & Management)"	It should be covered by "MEC service discovery", "MEC host discovery", and "application lifecycle management". ETSI ISG MEC needs to define information flows, data models and APIs.

GS MEC 011 – relevance for OP-NBI and OP-EWBI

- MEC 011 is a relevant enabler for both OP-NBI and OP-EWBI.
- MEC 011 provides information and support about MEC services and MEC applications.
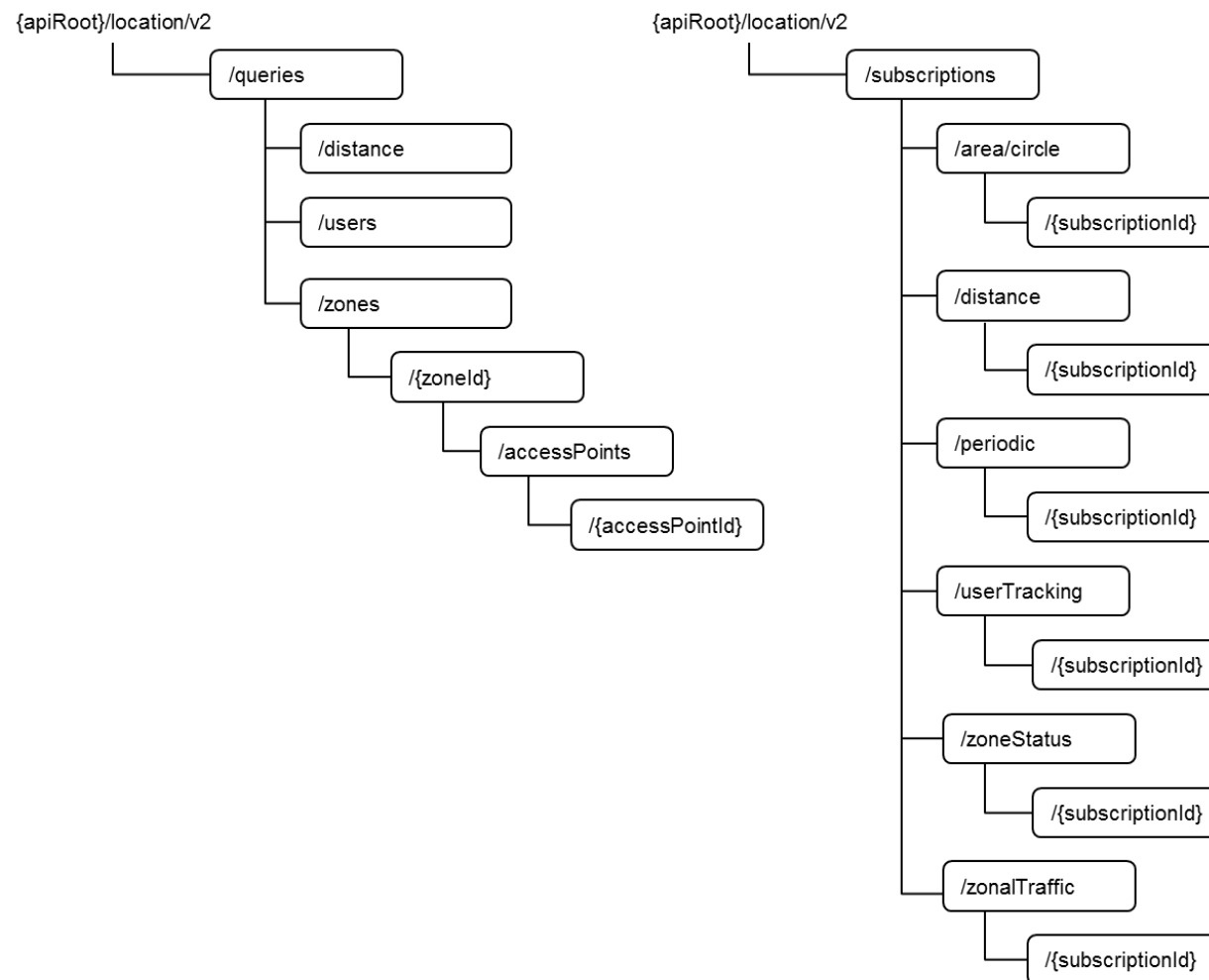

MEC service management API

MEC application support API
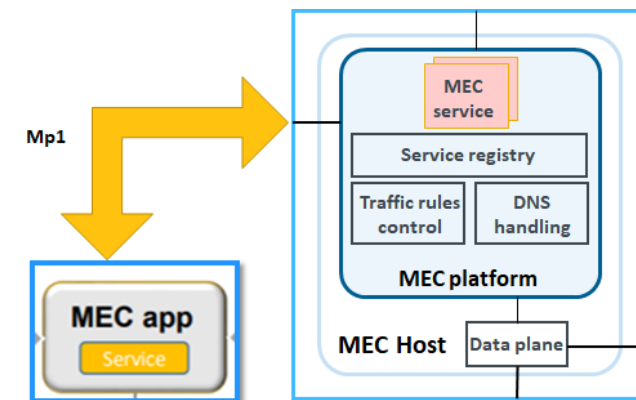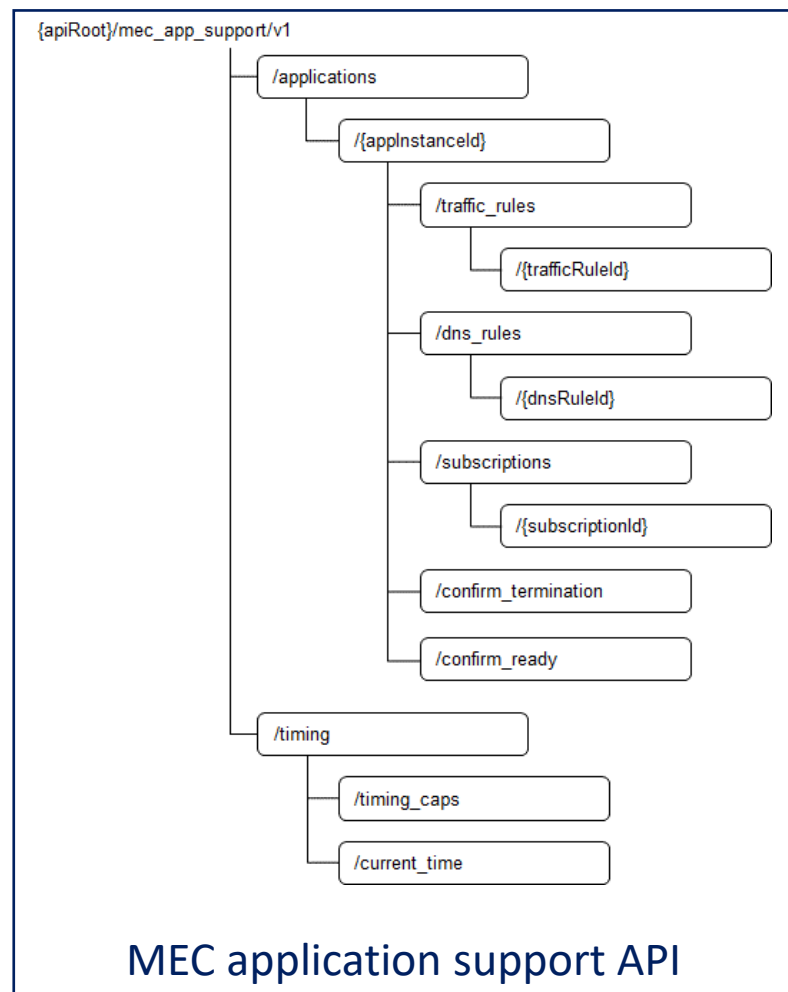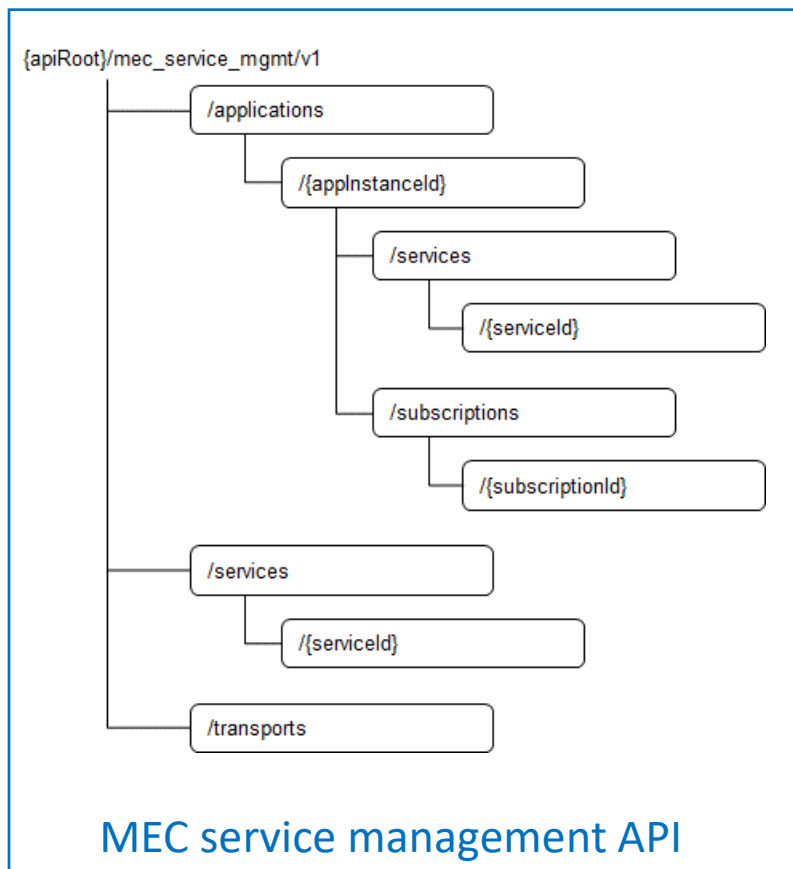
Work in progress to
- Identify and address the gap in support of OP-EWBI (potentially also OP-NBI)
- Align with 3GPP work on the relevant aspects

GS MEC 013 – relevance for OP-NBI

- MEC013 supports querying UE(s) location and subscribing for reporting UE(s) location periodically or triggered by some events, like entering an area, leaving an area, etc.

- MEC013 also supports querying and subscribing location information by zone and access point granularity. The access point ID is equal to an ECGI concatenated with a Cell Portion ID as defined in 3GPP TS 29171.

{apiRoot}/location/v2

```
/queries
    /distance
    /users
    /zones
        /{zoneId}
            /accessPoints
                /{accessPointId}
```

{apiRoot}/location/v2

```
/subscriptions
    /area/circle
        /{subscriptionId}
    /distance
        /{subscriptionId}
    /periodic
        /{subscriptionId}
    /userTracking
        /{subscriptionId}
    /zoneStatus
        /{subscriptionId}
    /zonalTraffic
        /{subscriptionId}
```

Conclusions

Conclusions (ETSI MEC perspective)

Current status of ETSI MEC:

- Updated MEC Architecture, with variant for MEC federation: ETSI GS MEC 003 stable draft available at the [MEC Open Area](#)

- Specifications covering some enablers and/or or interfaces / APIs:

  - MEC 040 proposed to host EWBI and NBI standard, while technical enablers are defined in other MEC specs and SDOs
    - Covered APIs: "Federation Enablement APIs" in ETSI GS MEC 040 (WIP): drafts available at the MEC Open Area
    - Note: the structure of MEC 040 contains clause 5 (informative) on message exchanges, and clause 6 and 7 (normative) on data types and API design

  - Main MEC technical enablers: MEC 10-2, MEC 011, MEC 013, MEC 015, MEC 016, MEC 021, MEC 037
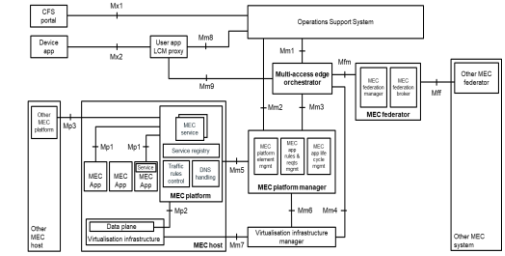
Proposed approach for the areas where gaps would exist, for:

- Defining the required APIs

  - Normative work (stage 2 – sequence diagrams) reuse existing specs from ETSI MEC and 3GPP

  - MEC 040 with a "packaging approach" to indicating the applicable APIs (from ETSI, 3GPP, TMF)

- Building a collaboration framework between GSMA, ETSI and 3GPP for that definition

  - GSMA to finalize the detailed mapping and worksplit, based on synergized architecture (see slide 7)
    - (e.g. in a White Paper, a future PRD, or also by directly contributing to an Annex of MEC 040, etc..)
  - ETSI MEC and 3GPP to work on aligned standards, and finally GSMA to certify OP compliance (see slide 5)
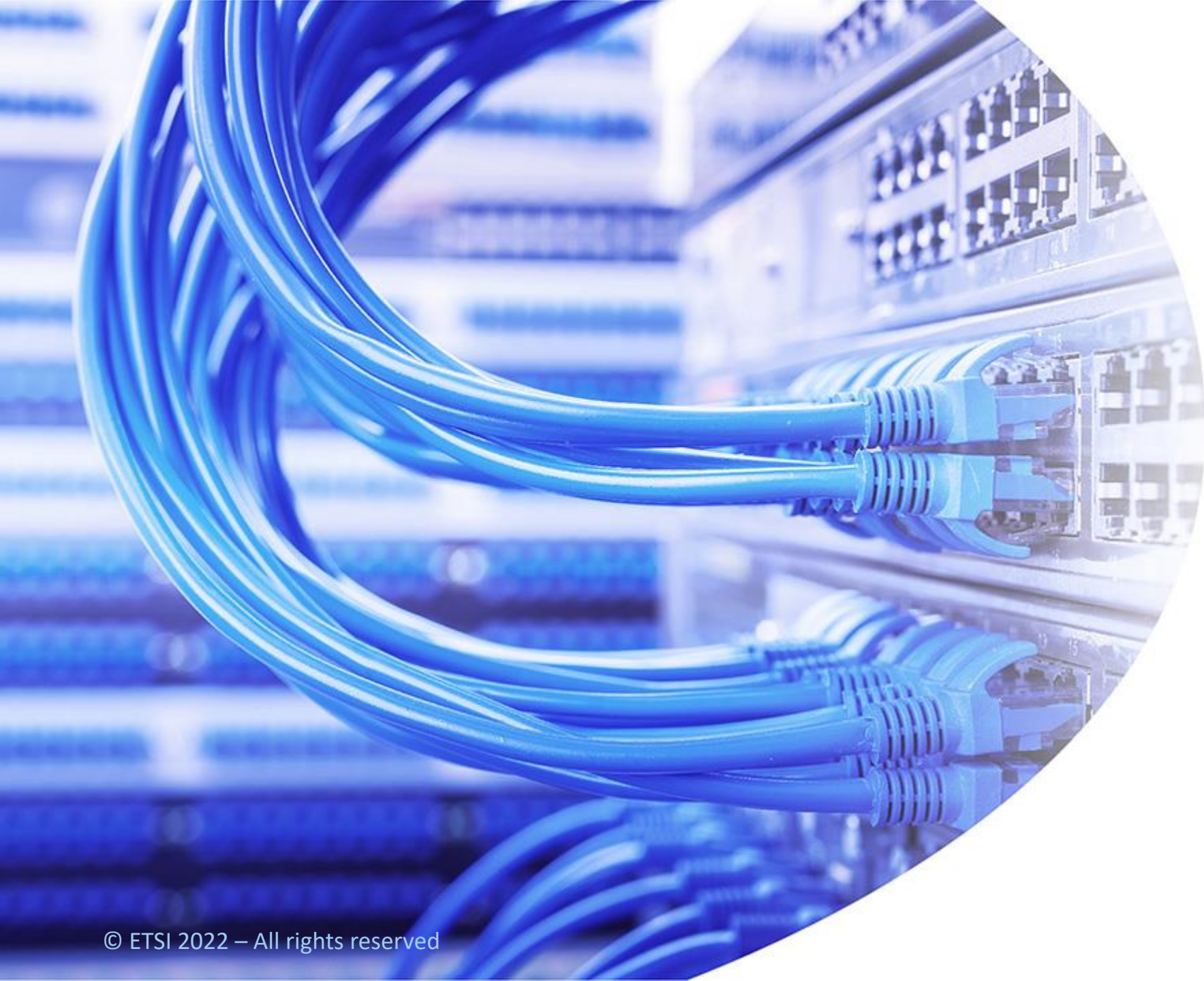
1.
GSMA PRD document
(requirements)

2.
Work from SDOs and OSCs
(under the GSMA guidance)

3.
GSMA certification of
compliance to OP
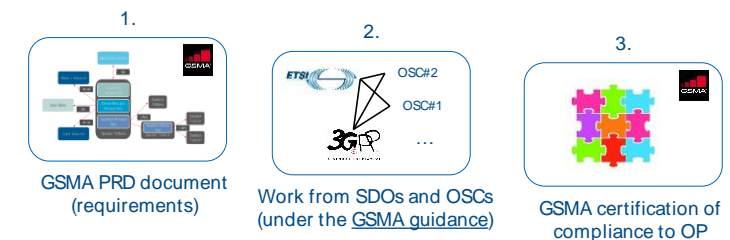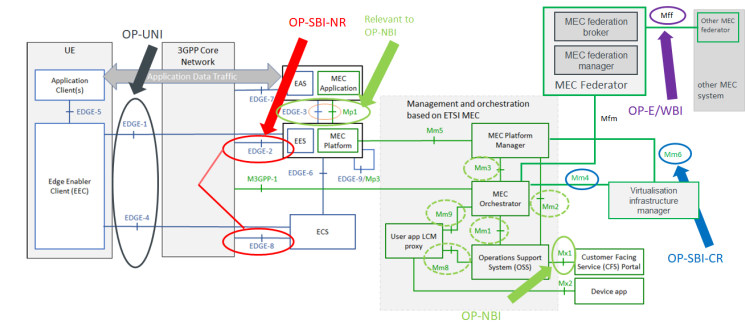
Proposed actions: all parties to discuss, reach an agreement, finally GSMA to minute any agreed plans

Thank you!

BACKUP slides

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
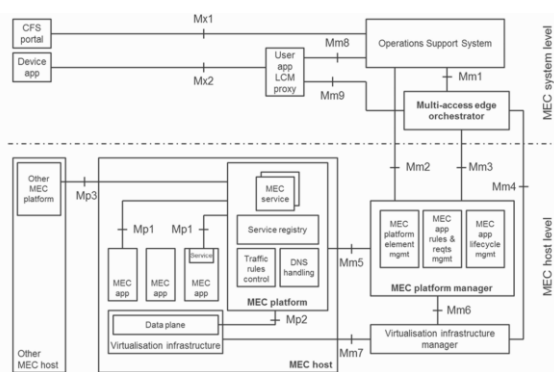
Figure 6-1: Multi-access edge system reference architecture
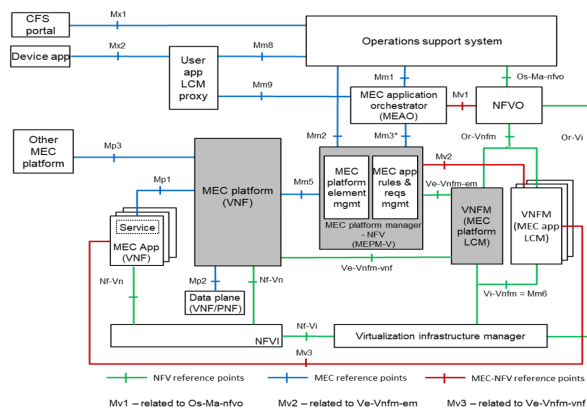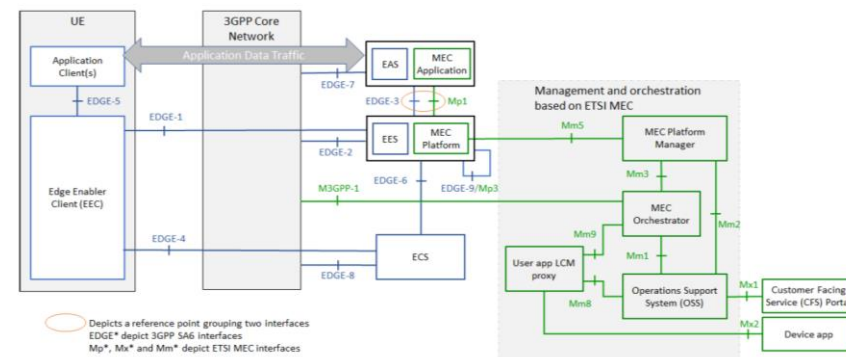
Workflow in ETSI MEC (mainstream so far)

Study (GR) (optional)

- **Reports** analysing gaps and recommendations for the normative work

Normative Work (GS)

- Publication of **standards** e.g. **MEC service APIs**

OpenAPI @ETSI Forge

- **Open source representations** of the published APIs
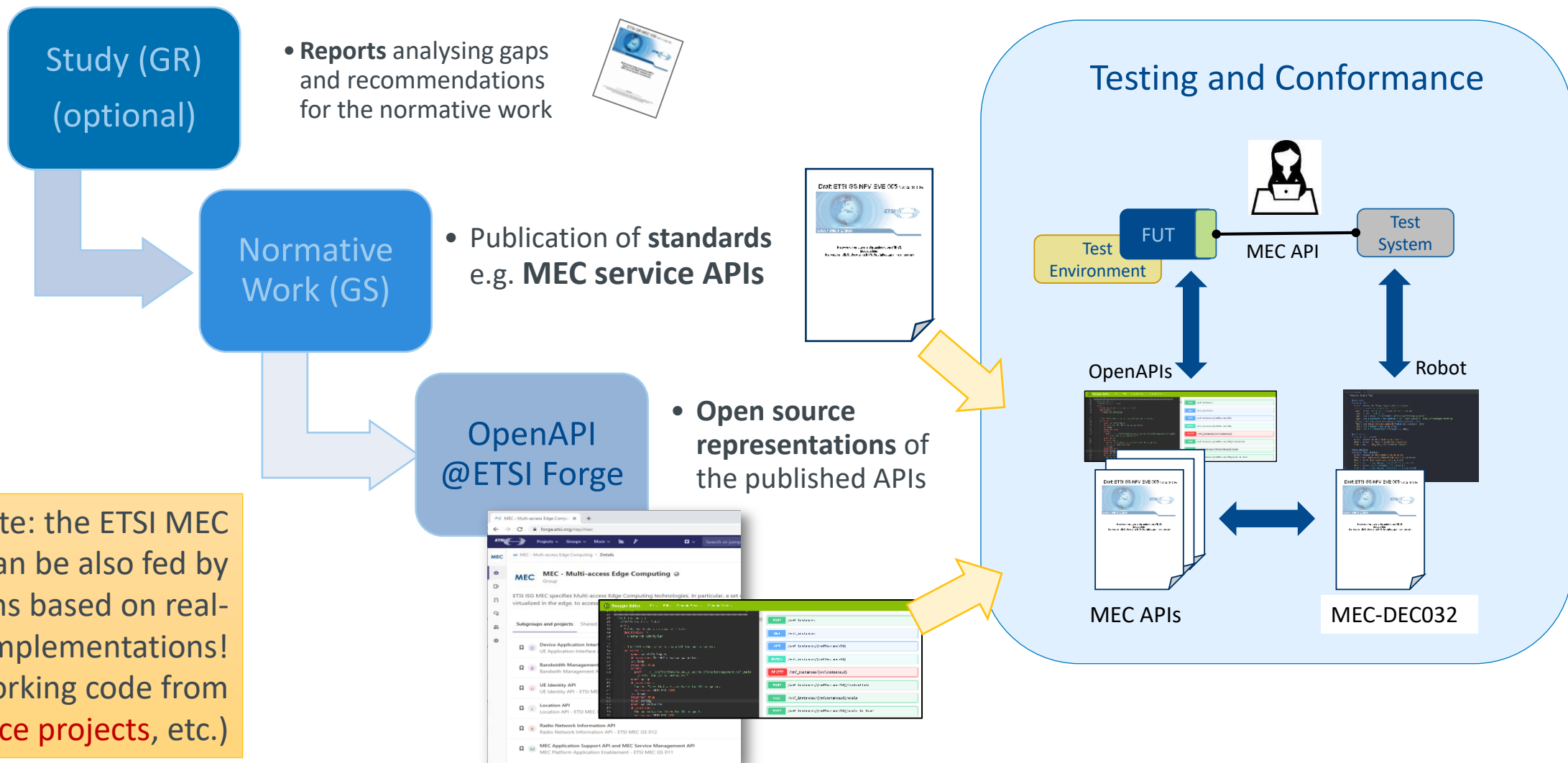
Note: the ETSI MEC standard can be also fed by contributions based on real-world implementations! (e.g. working code from open source projects, etc.)
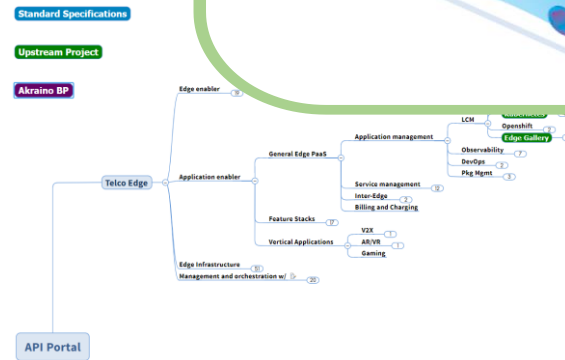
Testing and Conformance

Test Environment

FUT

MEC API

Test System

OpenAPIs

Robot

MEC APIs

MEC-DEC032

33

MEC Phase 3: expanding the scope to MEC Federation

Intra MEC

Inter MEC host (Intra MEC system) management already supported by ETSI MEC

Inter MEC

Main scope for MEC 035 study

MEC - Cloud

Ongoing **normative work** (e.g. GS MEC 040), in alignment with GSMA OPG requirements

MEC 040 New WI

Ref: ETSI GR MEC 035 v3.1.1, June 2021, https://www.etsi.org/deliver/etsi_gr/MEC/001_099/035/03.01.01_60/gr_mec035v030101p.pdf
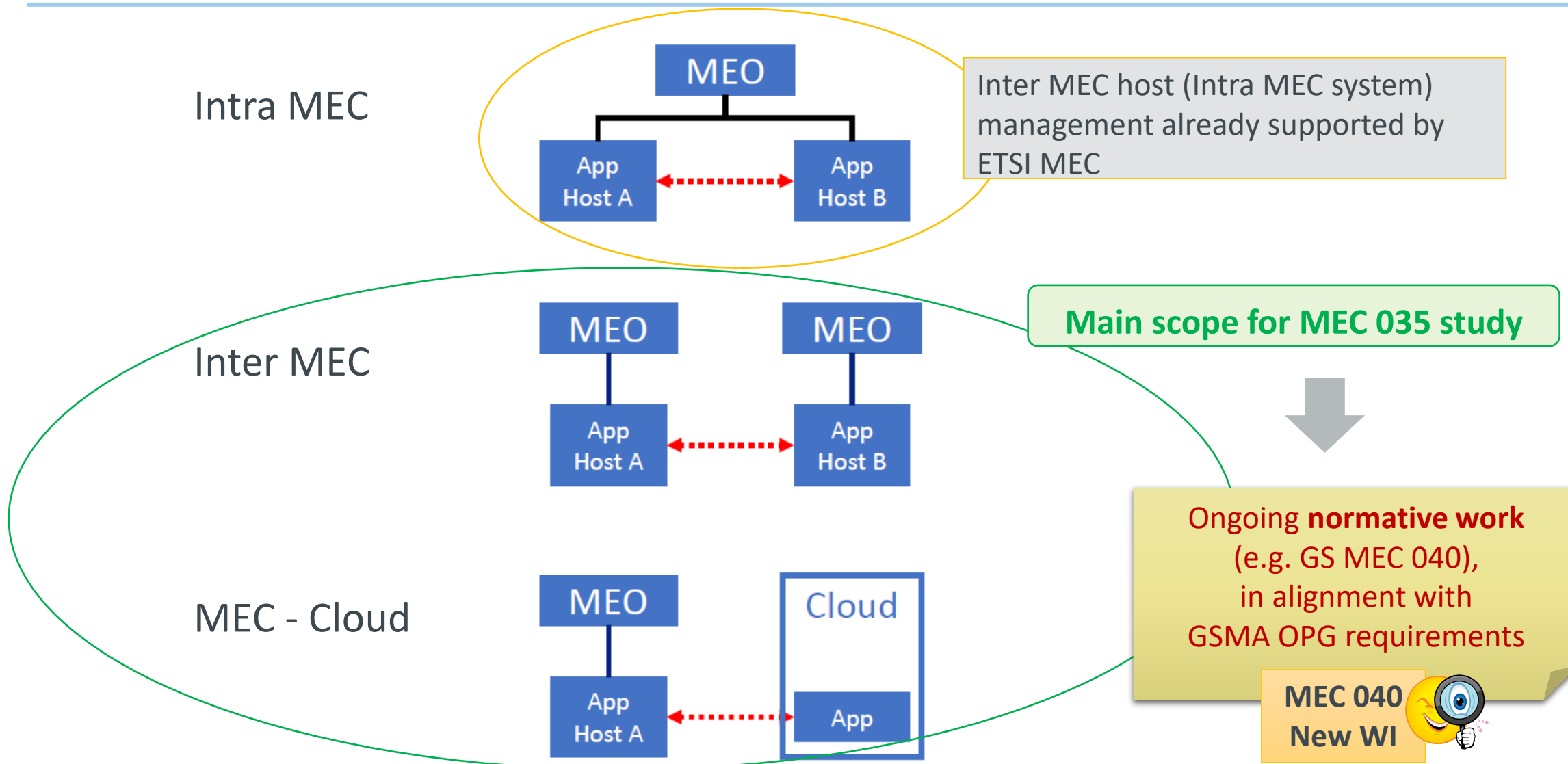
ETSI ISG MEC DECODE Working Group:
MEC Deployment and Ecosystem engagement activities

- OpenAPI representations: ETSI Forge

- Testing and Conformance

- MEC Ecosystem wiki

- PoCs (proof-of-concepts)

- MDTs (MEC Deployment Trials)

- MEC Sandbox

- Collaborations: Akraino

- Hackathons

- Plugtests

- MEC Tech Series

forge.etsi.org/rep/mec

mecwiki.etsi.org

MEC Sandbox
Experience MEC APIs

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

EDGE COMPUTING WORLD

12 Oct 2021,
https://www.edgecomputingworld.com/hackathon/

1 - 15 Oct 2021
NFV&MEC IOP Plugtests 2021

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

https://mecwiki.etsi.org/index.php?title=MEC_Ecosystem

Enabling Global Application Portability

MEC Application Development Community

Interaction & Information Exposure

ISG MEC Spec: MEC009
API Principles & Guidelines

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

MEC API Framework

| MEC012 Radio Network Info API | MEC013 Location API | MEC014 UE Identity API | MEC015 Bandwidth Mgmt API | MEC028 WLAN Info API | MEC029 Fixed Access Info API | **MEC0xy Your Service API** | MEC011 Application Enablement API |

MEC Services exposed via individual APIs

MEC Platform

✓ 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)