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| ToR STF 587 (Ref. Body ISG MEC) |
| Version: 1.3 |
| Author: Walter Featherstone – Date: 2019-09-10 |
| Last updated by: Youssouf Sakho – Date: 2019-10-09 |
| page 1 of 4 |

Terms of Reference –Specialist Task Force Proposal

STF 587 (Ref. Body ISG MEC)

MEC Sandbox scenarios and interface development

Summary information

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| --- | --- | --- | --- |
| Approval status | Approved by Ref. Body ISG MEC (doc ref: MEC(19)000370r1)  Editor’s Note: Regarding the “doc ref”, a contribution is to be created for Friday ISG MEC closing plenary | | **YES** |
| Approved by Board#124 (24 Sept 2019) | | **YES** |
| Reference Body | Ref. Body ISG MEC | | |
| ETSI Funding | **Maximum budget : 60 000 EUR** | | |
| Minimum of 4 ETSI Members Support | **YES** | | |
| Time scale | **From** | 2020-01-27 | |
| **To** | 2020-12-18 | |
| Work Items | *List and date of the WI creation*  *DMI/MECDEC-034* | | |
| Board priority | [ETSI STF funding criteria](https://portal.etsi.org/STF/STFs/Funding/ETSIbudget.aspx)   |  |  | | --- | --- | | **Priority Criteria** |  | | Maintenance of standards in mature domains |  | | Innovation in mature domains |  | | Emerging domains for ETSI | X | | Horizontal activities (quality, security, etc.) |  | | Societal good / environmental |  | | | |

Part I – STF Technical Proposal

# Rationale & Objectives

## Rationale

Through its specifications, ISG MEC has developed a set of service APIs targeted for consumption by MEC applications and services deployed in an edge cloud environment. These APIs include Radio Network Information (MEC-012), Location (MEC-013), WLAN Information (MEC-028) and Fixed Access Information (MEC-029). Publically accessible, OpenAPI specification compliant, descriptions have been provided for each of these APIs using ETSI’s Forge site, which ISG MEC was instrumental in pioneering in collaboration with ETSI CTI. Subsequently other groups including ETSI NFV have also adopted the Forge platform. MEC is now aiming to make another pioneering step by offering application developers the opportunity to interact live with MEC’s service APIs through an ETSI hosted web-portal. Through the portal, scenario dependant emulated data will be provided via those APIs. This will provide developers with a far more engaging and educational experience than considering the specifications in isolation. This is considered critical since aspects of the service APIs are very telco centric (e.g. radio network information exposure), whereas developers have traditionally focused on the IT central cloud. The need for such ecosystem developing activities has already been recognised within the ISG through the formation of Working Group (WG) Deployment and Ecosystem Development (DECODE).

A significant motivation for the proposal is driven from MEC hackathon entrant feedback. For instance, from the MEC Hackathon winner (Berlin 2018): “The Forge Site is nice, but running APIs is what I want”. This STF proposal is targeted at addressing this requirement and will significantly better place the ISG and ETSI in supporting and encouraging entrants in the run-up to future hackathon and Plugtests events, as well as triggering the expansion of the MEC ecosystem.

## Objectives of the work to be executed

The objective is to provide a publicly accessible running sandbox environment on the ETSI Forge website for demonstrating and experimenting with the MEC service APIs. This is targeted at providing sufficient capability to facilitate exploration of selected MEC service APIs by application developers.

The sandbox will be accessible via a web-portal. The web-portal will provide:

* User authentication and isolation towards the backend
* User selectable scenarios (e.g. macro or micro mobile network environment) and configuration parameters (number of UEs, points of access (e.g. AP, or cells, etc.)
* MEC service end-point entry via the MEC specified APIs
* Links to further MEC developer environments made available by ETSI ISG MEC members companies

The backend solution for the web portal is to be selected by the STF with the requirement that it is possible (e.g. technical or administrative constraints) to host it at ETSI and may either be based on an existing platform, or one developed by the STF themselves. A commercial product as a backend solution is not recommended.

## Previous funded activities in the same domain

### Specialist Task Force 551: MEC Testing Framework

<https://portal.etsi.org/STF/STFs/STFHomePages/STF551>

The MEC Testing Framework defines a methodology for development of interoperability and conformance test strategies, test systems and the resulting test specifications for MEC standards. The MEC Testing Framework has been published and is available at:

<https://www.etsi.org/deliver/etsi_gr/MEC-DEC/001_099/025/02.01.01_60/gr_MEC-DEC025v020101p.pdf>

### Specialist Task Force 569: MEC API Conformance Test Specifications

<https://portal.etsi.org/STF/STFs/STFHomePages/STF569>

MECDEC-032, part 1: Test Requirements and Implementation Conformance statements (ICS)

Stable draft: <https://docbox.etsi.org/ISG/MEC/Open/>

MECDEC-032, part 2: Test Suite Structure and Test Purposes (TSS&TP) written in TDL-TO

Stable draft: <https://docbox.etsi.org/ISG/MEC/Open/>

MECDEC-032, part 3: Test Scripts developed into Abstract Test Suites (ATS)

Early draft: <https://forge.etsi.org/rep/mec/gs032p3-robot-test-suite> & <https://forge.etsi.org/rep/mec/gs032p3-ttcn-test-suite>

The resulting set of specifications will allow successful testing activities in the many industrial contexts and segments where MEC technology is relevant. In order to reach this objective, best practices and tools from both the Telecommunication and IT communities are being applied. The output will contain Tests Scripts in both TTCN-3 and Robot Framework languages. Collaboration with the Edge Task Force within the GCF is already at a mature state, which it is anticipated will lead to the establishment of an MEC API focused certification programme.

## Market impact

ISG MEC is now in its third phase, with many service API specifications in their second, or even third, release. Application Developers need to understand what these APIs are able offer and how to interpret the information they provide, which is often rather telco focused (e.g. the Radio Network Information API). The proposed action will provide the means to more fully engage with potential application developers, who must be encouraged to explore the opportunities the edge offers as compared to traditional cloud specific applications. Future MEC hackathons and Plugtests will also be facilitated by the availability of the MEC Sandbox for exposure of MEC API server endpoints. This in turn will influence the standardization activities in ISG MEC, through the real-life feedback from the end users, i.e. the application developers for which the MEC system has been designed to accommodate and ultimately the end users of the resulting MEC applications.

## Consequences if not agreed

Although MEC and edge computing in general has received much attention in recent years, the market has remained fragmented and not easily accessible to potential application developers. ETSI ISG MEC recognised this and formed WG DECODE to focus in this area. The WG is already addressing accessibility of the ISG created specifications through the production of OpenAPI compliant descriptions of the MEC defined service APIs. It has also initiated work on a test framework, with the development of API conformance test specifications well underway. Regardless, there continues to be a lack of MEC applications to utilise the service APIs offered by MEC systems, currently being offered in experimental trials. Such applications are critical in providing the drive and motivation to take MEC beyond experimental trials and into full operational widespread commercial deployment. Without encouraging more application developers into the MEC ecosystem, through initiatives such as this MEC sandbox proposal, the deployment of MEC services will undoubtedly be delayed. As the only SDO solely focused on edge computing, ETSI MEC is ideally placed to facilitate the edge ecosystem development and become the focus point for application developers wishing to discover and developing in the MEC environment. Without initiatives, such as that presented in this STF proposal, the market will continue in its current fragmented state, jeopardizing the likelihood of widespread deployment and availability of edge computing.

# Relation with ETSI strategy and priorities

|  |  |
| --- | --- |
| **Priority Criteria** | **Rationale** |
| Maintenance of standards in mature domains |  |
| Innovation in mature domains |  |
| Emerging domains for ETSI | The STF will contribute to the following ETSI Strategy:  keep ETSI effective, efficient and recognised as such  create high quality standards for global use and with low time-to-market  establish leadership in key areas impacting members' future activities |
| Horizontal activities (quality, security, etc.) |  |
| Societal good / environmental |  |

# ETSI Members Support

|  |  |  |
| --- | --- | --- |
| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | Hewlett-Packard Enterprise | Alex Reznik |
| 2 | InterDigital, Inc. | Robert Gazda |
| 3 | ZTE Corporation | Yonggang Fang |
| 4 | Intel Corporation (UK) Ltd | Dario Sabella |
| 5 | Samsung R&D Institute UK | Walter Featherstone |
| 6 | Huawei Technologies France | Sami Kekki |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Status** |
| ETSI GS MEC 002 2.1.1 | Multi-access Edge Computing (MEC);  Use Cases and Requirements | Published |
| ETSI GS MEC 003 2.1.1 | Multi-access Edge Computing (MEC);  Framework and Reference Architecture | Published |
| ETSI GS MEC 011 2.1.1 | Multi-access Edge Computing (MEC);  Edge Platform Application Enablement | Published |
| ETSI GS MEC 012 2.1.1 | Multi-access Edge Computing (MEC);  Radio Network Information API | Final draft for approval |
| ETSI GS MEC 013 2.1.1 | Multi-access Edge Computing (MEC);  Location API | Final draft for approval |
| ETSI GS MEC 014 2.1.1 | Mobile Edge Computing (MEC);  UE Identity API | Published |
| ETSI GS MEC 015 2.1.1 | Mobile Edge Computing (MEC);  Bandwidth Management API | Published |
| ETSI GS MEC 016 2.1.1 | Mobile Edge Computing (MEC);  UE Application API | Published |
| ETSI GS MEC 021 2.1.1 | Multi-access Edge Computing (MEC); MEC Application Mobility Service API | Early draft |
| ETSI GS MEC 028 2.1.1 | Multi-access Edge Computing (MEC);  WLAN Information API | Stable draft |
| ETSI GS MEC 029 2.1.1 | Multi-access Edge Computing (MEC);  Fixed Access Information API | Published |
| ETSI GS MEC 030 2.1.1 | Multi-access Edge Computing (MEC);  MEC V2X API | Stable draft |

## New deliverables

|  |  |  |  |
| --- | --- | --- | --- |
| **Deliv.** | **Work Item code**  **Standard number** | **Working title**  **Scope** | **Expected date for publication** |
| D1 | DMI/MEC-DEC34Sandbox | Working title: Multi-access Edge Computing (MEC) MEC Sandbox  Scope: The target of this work item is to provide a, publicly accessible, running sandbox environment on the ETSI Forge website for demonstrating and experimenting with MEC service APIs. The minimal output is to provide API server prototypes with sufficient capability to: facilitate exploration of selected MEC service APIs by application developers and candidate MEC hackathons entrants and; support an associated informative Webinar. A second output is to facilitate the availability of MEC developer environments made available by ETSI MEC member companies to let application developers experiment with their applications in real MEC system environments. The final output is to provide coverage for all MEC service APIs and the ability to demonstrate selected test cases aligned with the outcomes of MEC032. The final output will also provide a user guide for the sandbox environment targeted at MEC API service consumers, e.g. MEC Application software developers. | 2020-05-08  NOTE: Upon approval of the STF ToR the work item schedule will be updated. |

# Maximum budget

## Task summary/Manpower Budget

|  |  |
| --- | --- |
| **Task short description** | Budget (EUR) |
|
| MEC Sandbox scenarios development | 10 000 |
| MEC Sandbox user interface design and development | 15 000 |
| Back-end selection, or development | 15 000 |
| Front-end / back-end integration | 10 000 |
| API development in back-end to support all scenarios | 10 000 |
| **TOTAL** | 60 000 |

## Travel budget

NA

## Other budget line

NA

Part II – Details on STF Technical Proposal

# Tasks, Technical Bodies and other stakeholders

## Organization of the work

The selected expert(s) will mainly work autonomously on the basis of the work plan detailed in the present ToR.

*A Steering Group (SG) will be created to be the first contact point and interface between the STF and ISG MEC, in particular its DECODE WG. The SG will be composed by ISG MEC officials and experts and will be chaired by the DECODE WG Chairman.*

*Milestones and major updates will be reported by the STF Leader to the DECODE WG, through the means of contributions on the ETSI Portal.*

Remote meetings between the STF and the Steering Group will be organized and planned upon initialization of the STF. Frequency and logistics of the remote meetings may be re-discussed throughout the duration of the STF.

## Tasks for which the STF support is necessary

* MEC Sandbox scenarios development,
* MEC Sandbox user interface design and development,
* Back-end selection, or development,
* Front-end / back-end integration with support and maintenance of the links to external developer environments,
* API development in back-end to support all scenarios.

## Other interested ETSI Technical Bodies

NA

## Other stakeholders

NA

Part III: Execution of Work

# Work plan, time scale and resources

## Task description

|  |  |
| --- | --- |
| **Task 1** | **MEC Sandbox scenarios development** |
| **Objectives** | To define and document a set of scenarios for application of MEC Service APIs, i.e. data sets for MEC service provision based on relevant environment, verticals, domains.  An example of a MEC Service Scenario is the “Montecarlo race track location service “ available at <http://build.forge.etsi.org/mec-sandbox/> |
| **Input** | Base ETSI MEC specifications, recommendations and priorities from ISG MEC and DECODE WG. |
| **Output** | A set of MEC Service Scenarios formatted in a mark-up language collected in a repository on ETSI Forge as identified together with the SG. The number of scenarios and the MEC Services supported will be agreed with SG, with a maximum of 2 scenarios for each MEC Service in the base specifications. |
| **Interactions** | Guidance, review and feedback from the SG will be provided on the Scenarios selection, development and documentation. Discussions on Scenarios may be shared on the DECODE WG mailing list when WG input is required, at the discretion of the STF Leader or of the SG Chair. |
| **Resources required** | Background in Edge Computing. Expertise in Edge Network deployments and topologies. Working knowledge of MEC service APIs. Expertise in micro-services development, containers, MEC & emulation techniques |

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| **Task 2** | **MEC Sandbox user interface design and development** |
| **Objectives** | Design and development of the interface to serve as an entry point for users of the MEC Sandbox, i.e. the Front-end towards the MEC development environments referenced and the Scenario implementation endpoint.  The User interface must be hosted as a web portal hosted on ETSI Forge. |
| **Input** | Output of Tasks 1 |
| **Output** | A publicly available graphical user interface displaying the scenario documentation, referenced developers environments and any other resources provided by the MEC Sandbox. |
| **Interactions** | Feedback and review from the SG |
| **Resources required** | Web design and web development expertise. |

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| --- | --- |
| **Task 3** | **Back-end selection or development** |
| **Objectives** | Identify existing open-source projects that could realize the MEC Sandbox backend, based on scenarios defined in Task 1.  Alternatively, design and develop the backend portion of the MEC Sandbox, i.e. the MEC environment realizing the selected MEC Scenarios.  The MEC Sandbox backend shall align with current cloud technologies (micro-service architecture, etc), compliant with OpenAPI specification and hosted (hostable) on ETSI Forge. |
| **Input** | Output of Task 1 |
| **Output** | A documented & implemented MEC Sandbox backend micro-service solutiuon deployed on ETSI Forge.  The backend solution must:  - support concurrent users running scenarios independently  - support MEC Sandbox instance(s) lifecycle management   * - provide an OpenAPI interface in preparation of Frontend integration * - support MEC scenarios lifecycle management * - support extending with new ETSI MEC APIs as the MEC Sandbox evolves |
| **Interactions** | Feedback and review from the SG. |
| **Resources required** | Expertise in micro-services development, containers, MEC & emulation techniques |

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| --- | --- |
| **Task 4** | **Front-end / back-end integration with support and maintenance of the links to external developer environments** |
| **Objectives** | Development and deployment of the front-end and back-end solutions on ETSI Forge. in order to provide the MEC Services API endpoints to support the scenarios developed in Task 1. |
| **Input** | Output of Tasks 1, 2, 3. |
| **Output** | A deployed solution for the MEC Sandbox on ETSI Forge. |
| **Interactions** | Feedback and review from the SG. Interactions with ETSI Secretariat for the logistics and support on the IT infrastructure. |
| **Resources required** | Web development, web services and devops skills to design the solution and deploy on ETSI Infrastructure. |

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| --- | --- |
| **Task 5** | **API development in back-end to support all scenarios** |
| **Objectives** | Development of the MEC Services API endpoints to support the scenarios developed in Task 1 on the solution resulted from Task 4. |
| **Input** | Outputs of Tasks 1 and 4. |
| **Output** | ETSI MEC APIs implemented in the sandbox backend, based on scenarions selected in Task 1.  Output must include:  - for each API selected in the scenarios, endpoint implemented in the backend with bahvior matching the scenario.  - API endpoint integration with the sandbox frontend for expose to users. |
| **Interactions** | Feedback and review from the SG. |
| **Resources required** | Backend expertise including: micro-services deployment, containers, MEC & emulation techniques, required for front-end interfacing |

## Milestones

Milestone A – Draft Scenarios and User interface

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | Draft scenarios and draft user interface available for WG review on ETSI Forge repository. | 2020-03-31 |
| Reference Body Deliverable | NA |
| ETSI Deliverable | Progress report#1 approved by MEC DECODE WG. |

Milestone B – Draft Scenarios and User interface

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | Back-end solution available. Scenarios finalized. | 2020-06-30 |
| Reference Body Deliverable | NA |
| ETSI Deliverable | Progress report#2 approved by MEC DECODE WG. |

Milestone C – MEC Sandbox Integration and deployment

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | MEC Sandbox Integration and deployment. | 2020-09-30 |
| Reference Body Deliverable | NA |
| ETSI Deliverable | Progress report#3 approved by MEC DECODE WG. |

Milestone D – MEC Sandbox finalized

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | MEC Sandbox finalized, i.e. all scenarios implemented. STF Closed. | 2020-12-18 |
| Reference Body Deliverable | NA |
| ETSI Deliverable | Final report approved by ISG MEC#24 |

## Task summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Task / Milestone** | Target Date | | Estimated Cost (EUR) |
| From | To |
|  | Start of work |  |  |  |
| T1 | MEC Sandbox scenarios development | Jan 2020 | Jun 2020 | 10 000 |
| T2 | MEC Sandbox user interface design and development | Jan 2020 | Dec 2020 | 15 000 |
| Milestone A | Draft scenarios and draft user interface available for WG review on ETSI Forge repository.  Progress report#1 approved by MEC DECODE WG. |  | 2020-03-31 |  |
| T3 | Back-end selection or development | Apr 2020 | Jun 2020 | 15 000 |
| Milestone B | Back-end solution available. Scenarios Finalized.  Progress report#2 approved by MEC DECODE WG. |  | 2020-06-30 |  |
| T4 | Front-end / back-end integration with support and maintenance of the links to external developer environments | Jun 2020 | Sep 2020 | 10 000 |
| Milestone C | MEC Sandbox Integration and deployment. Progress report#3 approved by MEC DECODE WG. |  | 2020-09-30 |  |
| T5 | API development in back-end to support all scenarios | Apr 2020 | Dec 2020 | 10 000 |
| Milestone  *D* | Final report approved by ISG MEC#24.  MEC Sandbox finalized, i.e. all scenarios implemented.  STF Closed. |  | 2020-12-18 |  |
|  | | | | **60 000** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Task/ Mil.** | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |
| MA |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |
| MC |  |  |  |  |  |  |  |  |  |  |  |  |
| T5 |  |  |  |  |  |  |  |  |  |  |  |  |
| MD |  |  |  |  |  |  |  |  |  |  |  |  |

# Expertise required

## Team structure

(Up to) 2 participants to ensure the following mix of competences:

|  |  |
| --- | --- |
| **Priority** | **Qualifications and competences** |
| High | Excellent knowledge of Edge Computing and MEC specifications |
| High | Proven expertise in Web development and devops |
| High | Working knowledge in network and edge emulation techniques |

Part IV: STF performance evaluation criteria

# Performance Indicators

|  |  |
| --- | --- |
| **Select relevant Performance indicators applicable for these ToR (X)** | |
| Contribution from ETSI Members to STF work | |
| Direct financial contribution (co-funding) |  |
| Support to the STF work (e.g., provision of test–beds, organization of workshops, events) |  |
| Steering Group meetings (number of meetings / participants / duration) | X |
| Number of delegates directly involved in the review of the deliverables |  |
| Contributions/comments received from the reference Reference Bodies | X |
| Contributions/comments received from other Reference Bodies |  |
|  |  |
| **Contribution from the STF to ETSI work** | |
| Contributions to Reference Body meetings (number of documents / meetings / participants) | X |
| Contributions to other Reference Bodies |  |
| Presentations in workshops, conferences, stakeholder meetings |  |
|  |  |
| **Liaison with other stakeholders** | |
| Stakeholder participation in the project (category, business area) |  |
| Cooperation with other standardization bodies |  |
| Potential interest of new members to join ETSI |  |
| Liaison to identify requirements and raise awareness on ETSI deliverables |  |
| Comments received on drafts (e.g. on WEB site, mailing lists, etc.) |  |
|  |  |
| **Quality of deliverables** | |
| Approval of deliverables according to schedule | X |
| Respect of time scale, with reference to start/end dates in the approved ToR | X |
| Comments from Quality review by Reference Body |  |
| Comments from Quality review by ETSI Secretariat |  |
|  |  |

Time recording

For reporting purposes, the STF experts shall fill in the time sheet provided by ETSI with the days spent for the performance of the services

During the activity, the STF Leader shall collect the relevant information, as necessary to measure the performance indicators. The result will be presented in the Final Report.

# Document history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 1.0 | 2019-09-10 | Walter Featherstone | Draft |  |
| 1.1 | 2019-09-12 | Youssouf Sakho | Draft | Editorials before BOARD/OCG consultation |
| 1.2 | 2019-09-13 | Michele Carignani | Draft |  |
| 1.3 | 2019-10-09 | Youssouf Sakho | Board Approved | Update before CL publication |