

**Title\*:** Radio aware video optimization in a fully virtualized network

from **Source\*:** TELECOM ITALIA S.p.A. ; EURECOM  
Contact: Dario Sabella, Navid Nikaein

input for **Committee\*:** MEC IEG

|                           |             |          |
|---------------------------|-------------|----------|
| Contribution <b>For*:</b> | Decision    | <b>X</b> |
|                           | Discussion  |          |
|                           | Information |          |

Submission date\*: 2015-12-14

Meeting & Allocation: -  
Relevant WI(s), or  
deliverable(s):

|  |
|--|
| <b>Decision/action requested:</b> Please approve |
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**ABSTRACT:** *This is an MEC PoC submission about Radio aware video optimisation application implemented in a fully virtualized network, under the collaboration between Telecom Italia, Intel, Eurecom and Politecnico di Torino.*

*The present version is updated by addressing comments from the PoC support team.*

## PoC Proposal

### 1 PoC Project Details

#### 1.1 PoC Project

PoC Number (assigned by ETSI):

PoC Project Name: **Radio aware video optimization in a fully virtualized network**

PoC Project Host: **Telecom Italia**

**Short Description:** *The PoC is demonstrating a video optimisation application aware of the Radio conditions in the cell, where MEC application is co-located with eNB and communicating with video content server, and quality of video streams are adjusted according to radio conditions of the users. As a result, video streams and the quality perceived by users will be improved thanks to the usage of MEC video optimization application.*

## 1.2 PoC Team Members

|   | Organisation name     | ISG MEC participant (yes/no) | Contact (Email)   | PoC Point of Contact (*) | Role (**)                    | PoC Components        |
|---|-----------------------|------------------------------|---|--------------------------|------------------------------|-----------------------|
| 1 | Telecom Italia        | yes                          | Dario Sabella<br><a href="mailto:dario.sabella@telecomitalia.it">dario.sabella@telecomitalia.it</a> | X                        | operator                     | MEC Test Bed          |
| 2 | Intel UK Corporation  | yes                          | Jordan Rodgers<br><a href="mailto:jordan.rodgers@intel.com">jordan.rodgers@intel.com</a>            |                          | infrastructure provider      | SDK for MEC framework |
| 3 | Eurecom               | yes                          | Navid Nikaein<br><a href="mailto:navid.nikaein@eurecom.fr">navid.nikaein@eurecom.fr</a>             | X                        | infrastructure provider      | eNB protocol stack    |
| 4 | Politecnico di Torino | no                           | Michela Meo<br><a href="mailto:michela.meo@polito.it">michela.meo@polito.it</a>                     |                          | application/content provider | application/content   |

(\*) Identify the PoC Point of Contact with an X.

(\*\*) The Role will be network operator/service provider, infrastructure provider, application provider or other.

All the PoC Team members listed above declare that the information in this proposal is conformant to their plans at this date and commit to inform ETSI timely in case of changes in the PoC Team, scope or timeline.

## 1.3 PoC Project Scope

### 1.3.1 PoC Topics

PoC Topics identified in this clause need to be taken for the PoC Topic List identified by ISG MEC and publicly available in the MEC WIKI. PoC Teams addressing these topics commit to submit the expected contributions in a timely manner.

| PoC Topic Code | PoC Topic Description                                 | Related WG/WI  | Expected Contribution  | Target Date |
|----------------|---|--|--|-------------|
| PT01           | Demonstration of MEC Service Scenarios (new scenario) | MEC-004 Service Scenarios (GS MEC-IEG 004) - Mobile Edge Computing (MEC) Service Scenarios | Technical Report providing the lessons learnt and technical information requested by PT#01 | July 2016   |
|                |   |  |  |             |
|                |   |  |  |             |
|                |   |  |  |             |

### 1.3.2 Other topics in scope

List here any additional topic for which the PoC plans to provide input/feedback to the ISG MEC.

| PoC Topic Code | PoC Topic Description                    | Related WG/WI | Expected Contribution  | Target Date |
|----------------|--|---------------|--|-------------|
| A              | MEC API (e.g. radio network information) | MEC-TECH      | Useful insights and background for the definition of MEC APIs                                  | July 2016   |
| B              | MEC metrics (and baseline results)       | MEC-IEG-006   | Useful insights and background for the definition of MEC Metrics Best Practices and Guidelines | July 2016   |
|                |  |               |  |             |

## 1.4 PoC Project Milestones

| PoC Milestone | Milestone description                       | Target Date     | Additional Info   |
|---------------|---|-----------------|---|
| P.S           | PoC Project Start                           | 01/11/2015      |   |
| P.D1          | PoC Demo 1 - radio aware video optimization | 27-30 June 2016 | ETSI MEC plenary #7b (interim), (June 27-30, 2016, Sophia Antipolis), F2F                         |
| P.C1          | PoC Expected Contribution 1                 | 31/07/2016      | Technical Report on radio aware video optimization thanks to the introduction of MEC technologies |
| P.CA          | PoC Contribution A                          | 31/07/2016      | MEC API   |
| P.CB          | PoC Contribution B                          | 31/07/2016      | MEC Metrics   |
| P.D2          | PoC Demo 2 - radio aware video optimization | September 2016  | MEC congress 2016 (Informa), Munich, 20-22 September 2016   |
| P.D3          | PoC Demo 3 - radio aware video optimization | February 2017   | MWC 2017, February 2017, Barcelona, F2F   |
| P.R           | PoC Report                                  | March 2017      | This report will include lessons learnt during the overall project & demos                        |
| P.E           | PoC Project End                             | March 2017      |   |

NOTE: Milestones need to be entered in chronological order.

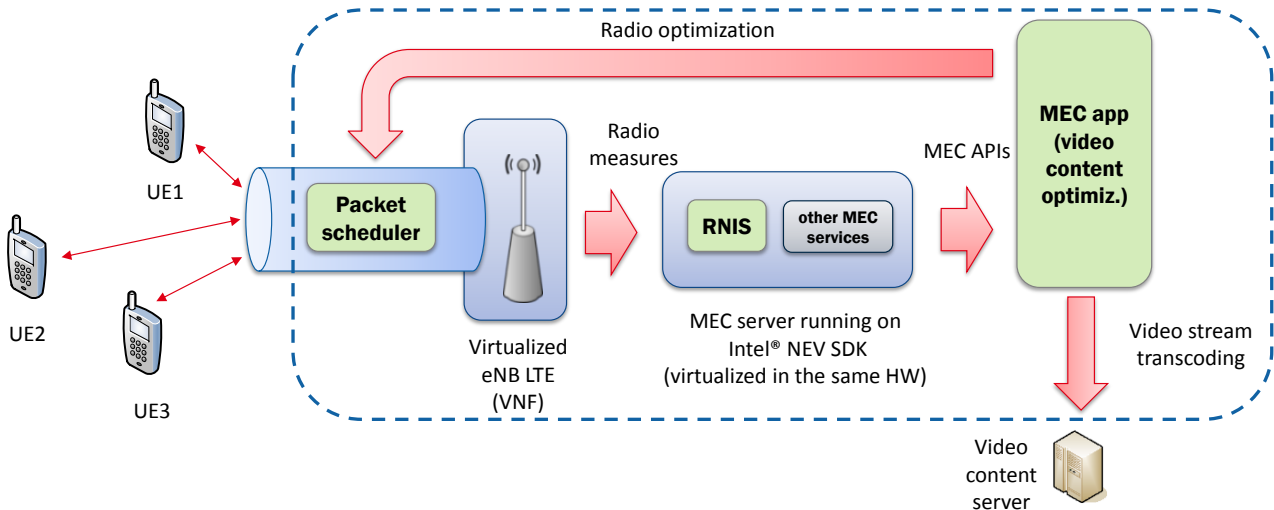
## 1.5 Additional Details

Under evaluation also a possible paper on eNB MEC API for video optimization, and latency in user perceived QoE.

# 2 PoC Technical Details

## 2.1 PoC Overview

Mobile Edge Computing (MEC) is a key recognized technology for the evolution toward 5G. Early implementation of MEC features (currently based on LTE systems) will serve as proof-of-concept for future 5G services (that will be implemented on 5G systems, and thus with even better networks performances). Among the use cases and service scenarios related to MEC we chosen to demonstrate the radio aware video optimization, for both the consolidated importance of video traffic (in perspective but even now in 4G networks) and practical constraints also due to the physical instantiation of the PoC in a selected venue.



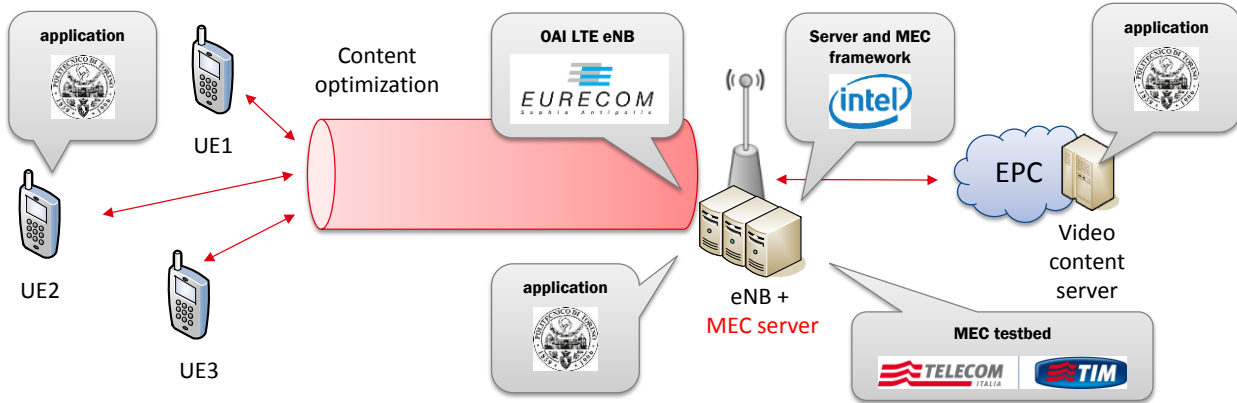
In particular, the present PoC is demonstrating a video optimisation application aware of the Radio conditions in the cell. Video content is served from the local content server (co-located with virtualized eNB), where all the system (including MEC services and applications) is fully virtualized. When congestion is detected on the radio (or some users may experience low quality), the video optimisation application can:

- give more bandwidth (Resource Blocks) and/or higher priority to the VIP users (lower priority users will get less bandwidth and lower priority).
- be capable of transcoding video to different formats to improve QoE during congestion (the video transcoding application reduces the video quality to avoid video stalling, bad user experience and alleviate congestion)

Success criteria for the PoC will be based on quality metrics at user/application level (such as delay of the video, buffering attempts and durations, ...) and potentially also at network level (throughput, energy efficiency, ..).

## 2.2 PoC Architecture

The following scheme depicts a possible instantiation of the PoC, where all components are defined. Alternative architecture (e.g. more convenient location of the video content server, ...) can be evaluated, for example in order to compare different deployment options (and related performances).



## 2.3 Additional information