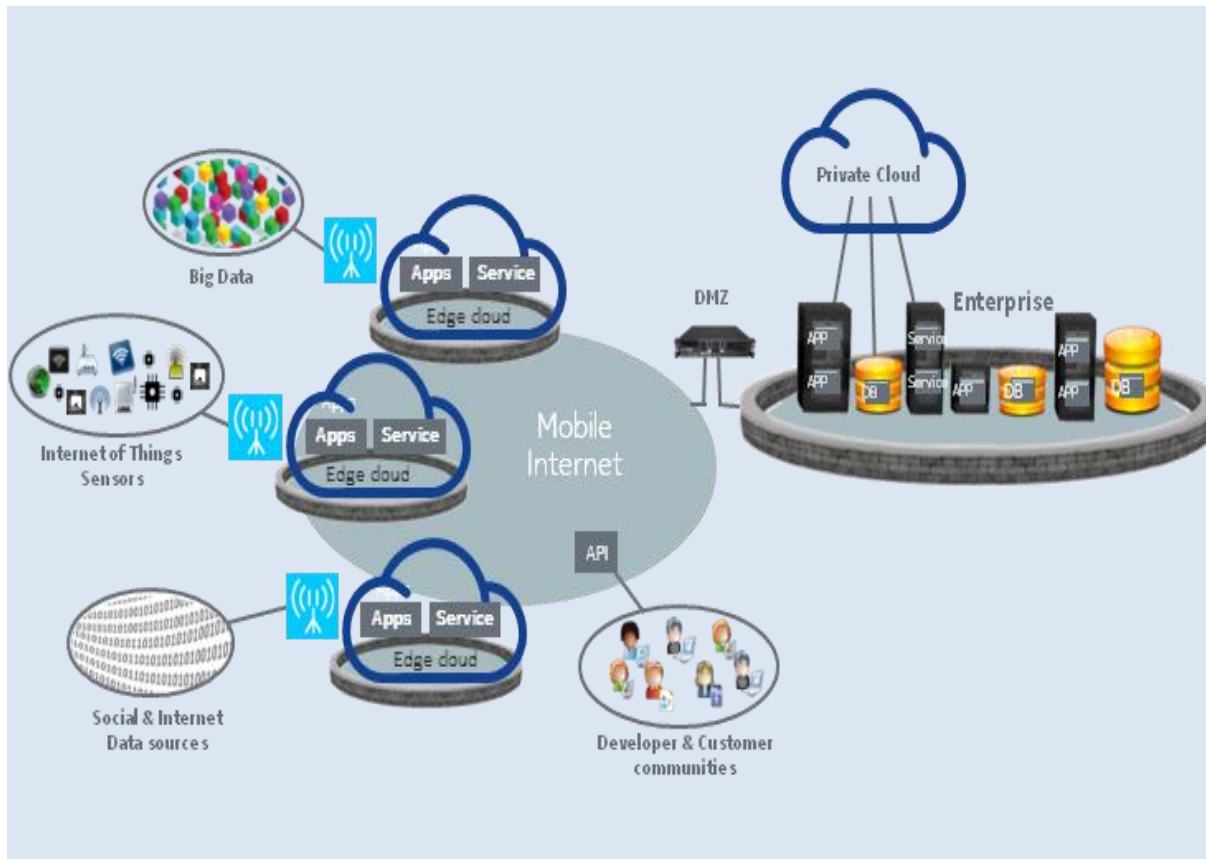# ETSI Multi-Access Edge Computing
MEC POCS

Dario Sabella (Intel), ETSI ISG Secretary and Lead of Industry Group

Global IoT Summit 2017 - June 8, 2017, Geneva, Switzerland

Why Edge Computing?

… as in Real Estate, it's about just 3 things: **Location, Location, Location**

Cloud-computing at the network edge.

- **Proximity**
- **Ultra-low latency**
- **High bandwidth**
- **Real-time access to access network and context information**
- **Location awareness**

What Can We Do at the Edge?

- Quality of Experience

- Contextualized services

- Efficient utilization of the Radio and the Network resources

- Innovative applications and services towards mobile subscribers, enterprises and vertical segments

Real time	Interactive	Analytical	Security and privacy	Distributed

MEC (Multi-Access Edge Computing)
Business Benefits

New Ecosystem / Value Chain	Wider collaboration can help to drive favorable market conditions for sustainable business for all players in the value chain.
Business transformation	New market segments (enterprises, verticals and subscribers); short innovation cycle; revenue generation and differentiation
A myriad of new use cases	Video acceleration, augmented reality, connected vehicles, IoT analytics, enterprise services, network performance and utilization optimization, retail, eHealth, etc.

ETSI **Multi-Access** Edge Computing

Pioneering open standards for Edge Computing

- Since 2014
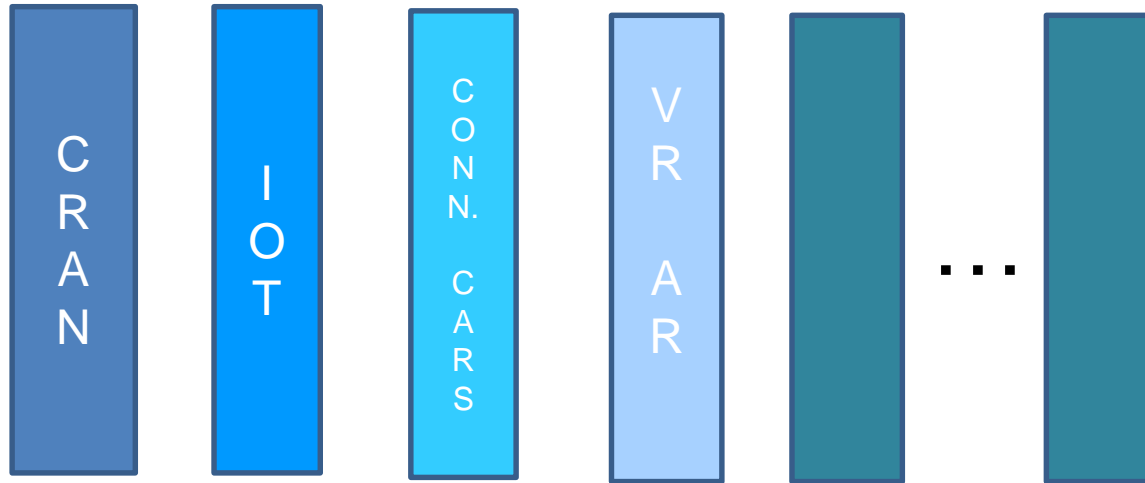- First and still only international SDO focused on this space

Leadership across Ecosystem

Broad Participation
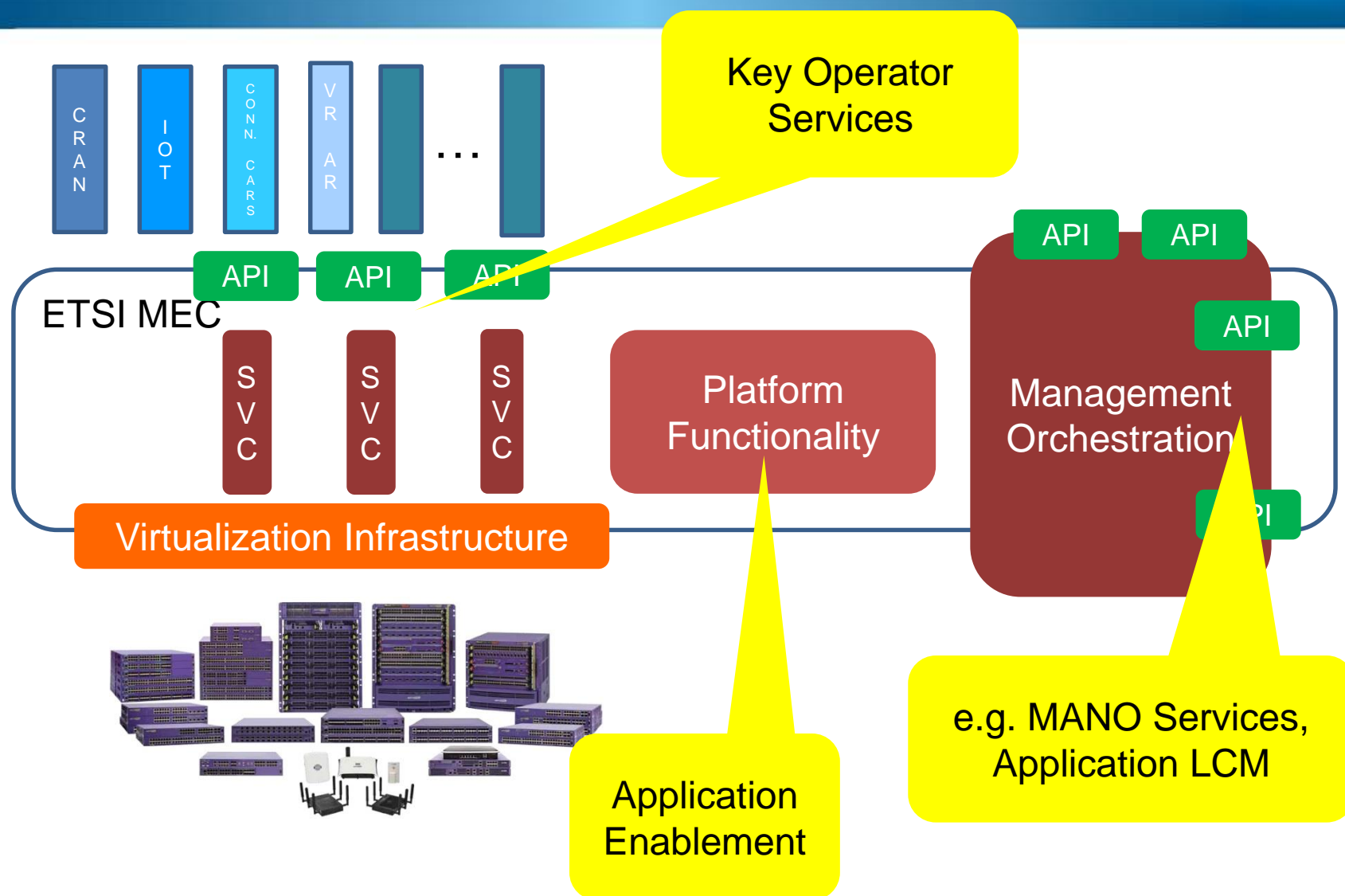
CRAN

IOT

CONN. CARS

VR AR

. . .

We don't make any of this work

ETSI MEC

We make it all work on your Generic Edge infrastructure

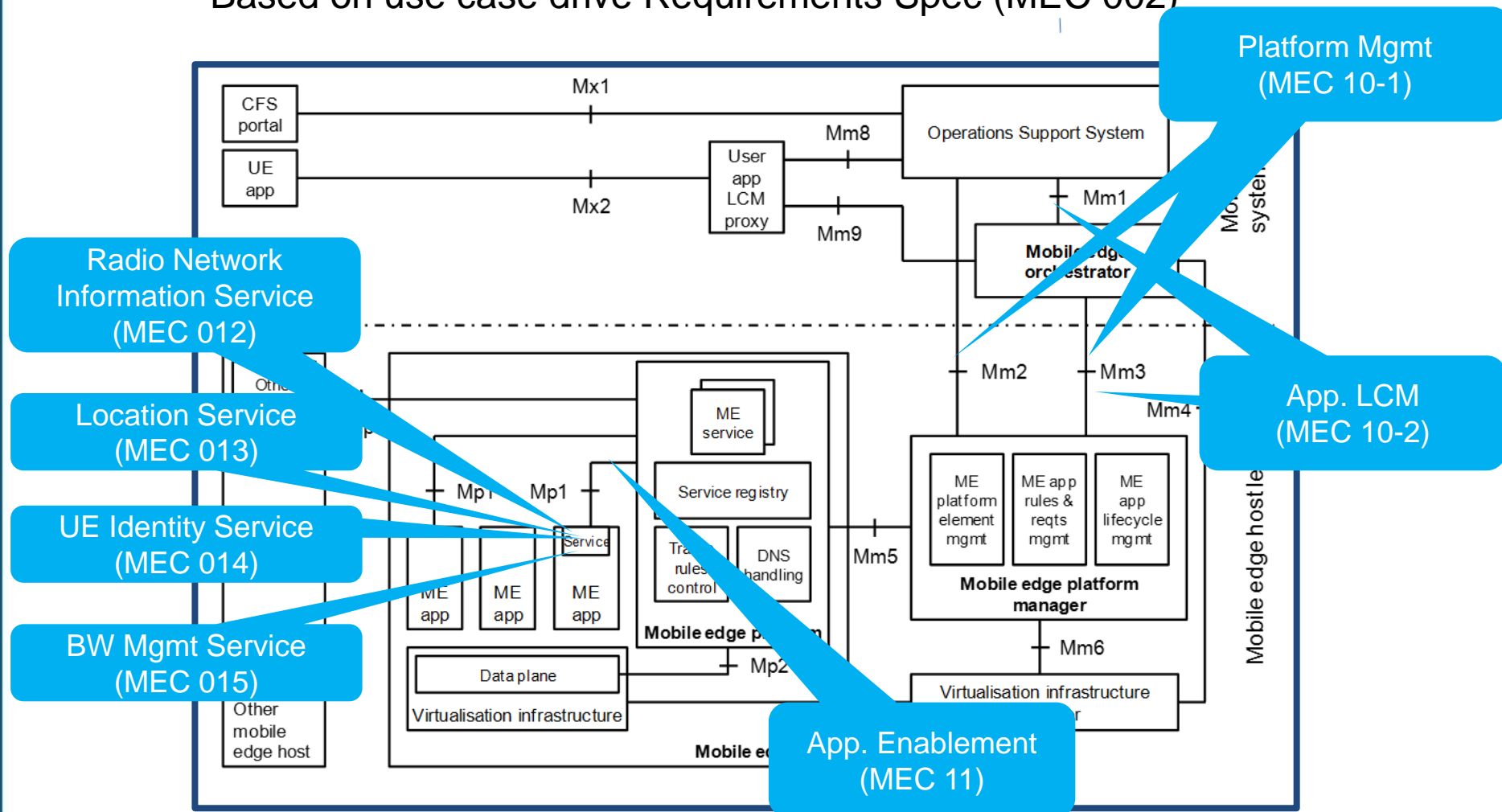And we help you expose the cool new things apps can do on your networks

ETSI MEC ISG: What Do We Specify?

Key Operator Services

CRAN | IOT | CONN. CARS | VR AR | ...

ETSI MEC

API | API | API | API | API | API

SVC | SVC | SVC

Platform Functionality

Management Orchestration

Virtualization Infrastructure

Application Enablement

e.g. MANO Services, Application LCM

Let's Make this More Specific

Based on use case drive Requirements Spec (MEC 002)

Platform Mgmt (MEC 10-1)

Radio Network Information Service (MEC 012)

Location Service (MEC 013)

UE Identity Service (MEC 014)

BW Mgmt Service (MEC 015)

App. LCM (MEC 10-2)

App. Enablement (MEC 11)

We defined an architecture (MEC 003)

API Rules for MEC APIs (MEC 009)

Let's reflect on the work status...

We've come a long way in just 2 years!

Published

- Technical Requirements, including use cases (GS MEC 002)
- Framework and Reference Architecture (GS MEC 003)
- MEC Proof of Concept (PoC) Process (GS MEC-IEG 005)
- Service Scenario (GS MEC-IEG 004)
- Metrics (GS MEC-IEG 006)

Coming Soon

- API Framework (GS MEC 009)
- Management APIs (GS MEC 010-1, GS MEC 010-2, GS MEC 011)
- Service APIs (GS MEC 012, 013, 014, 015)
- UE Application Interface (GS MEC 016)
- Study on NFV Alignment (GS MEC 017)
- Study on Mobility Support(GS MEC 018)

Phase 2

- Evolution of Phase 1 and closing open items
  - Lawful Intercept
  - Charging
  - Mobility
- Normative work for integration with NFV
- From" Mobile" to "Multi-Access"
  - Wi-Fi
  - Fixed Access
- From VMs to Containers
- Developer community engagement
- Supporting partner organizations as they move towards deployment

End 2014

End 2016

ETSI MEC phase 1

ETSI MEC phase 2

But there is so much more to do!

MEC POCS

What is a MEC PoC ?

- The ETSI MEC ISG has developed a **MEC PoC Framework** to coordinate and promote multi-vendor Proofs of Concept (PoC) illustrating key aspects of MEC ISG work.

- **MEC PoCs** are multi-party projects including at least one service provider, one infrastructure provider and one application/content provider.

- MEC PoCs are intended to demonstrate MEC as a viable technology.

- MEC PoCs also help to develop a diverse and open MEC ecosystem.

> NOTE: The PoC Point of Contact will be
> an ISG MEC Member or ISG MEC Participant

MEC Proofs of Concept

- MEC PoCs are multi-party projects officially accepted by ETSI according to the MEC PoC Framework.

- MEC PoCs address at least one of the PoC Topics listed on the ETSI MEC WiKi page (next slide)

- The results and lessons learnt by the MEC PoCs are fed back to the ISG MEC specification activities

ETSI MEC wiki page

- The goal of ETSI MEC ISG is also to promote the adoption of MEC technology and increase the awareness on that topic.

- Recently ETSI established a WiKi page for MEC purposes (http://mecwiki.etsi.org), that mainly includes:
  - Ongoing PoCs
  - PoC Topics
  - PoC Framework
  - Logos&Guidelines
  - Q&A

List of currently accepted MEC PoCs

ETSI

ETSI MEC Proof of Concept

PoC #1

Video User Experience Optimization via MEC
A Service Aware RAN MEC PoC

Intel - China Mobile - iQiYi

ETSI MEC Proof of Concept

PoC #2

Edge Video Orchestration and Video Clip Replay

Nokia - EE - Smart Mobile Labs

ETSI MEC Proof of Concept

PoC #3

Radio-aware video optimization
in a Fully Virtualized Network

Telecom Italia - Intel - Eurecom - Politecnico di Torino

ETSI MEC Proof of Concept

PoC #4

Flexible IP-based services

InterDigital - Bristol is Open - Intracom - CVTC - Essex University

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ETSI MEC Proof of Concept

PoC #5

Enterprise Services

Saguna - Adva Optical Networking - Bezeq International

ETSI MEC Proof of Concept

PoC #6

Healthcare
Dynamic Hospital User, IoT and Alert Status Management

Quortus Ltd - Argela - Turk Telecom

ETSI MEC Proof of Concept

PoC #7

Multi-Service MEC Platform
For Advanced Service Delivery

Brocade - Gigaspaces - Advantech - Saguna - Vasona - Vodafone

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ETSI MEC Proof of Concept

PoC #8

Video Analytics

Nokia - Vodafone Hutchison Australia - SeeTec

ETSI MEC Proof of Concept

PoC #9

Low-latency Industrial IoT

Vasona Networks - RIFT.io - Xaptum - Oberthur - Intel - Vodafone

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We encourage new POC submissions to ETSI MEC !

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

- MEC PoCs are intended to demonstrate MEC as a viable technology. Results are fed back to the MEC Industry Specification Group. No verification or test is performed by ETSI on any part of these MEC PoC.

- ETSI's Centre for Testing and Interoperability (CTI) works with the MEC ISG to coordinate the different Proofs of Concept.

  - The CTI has long experience in supporting technology evaluations and interoperability events which can be useful to assist the PoC teams with test expertise, administration and project management support.

Example of past demos: MEC Congress 2016

ETSI established a MEC PoC ZONE as an integral part
of the MEC World Congress 2016.

- The ETSI MEC PoC ZONE, adjacent to the event's exhibition area, was dedicated to the demonstration of Mobile Edge Computing Proofs of Concept (MEC PoCs) accepted by the ETSI MEC ISG.
  - Description of these POCs in backup slides.

Conclusions

- We presented **MEC PoCs**, as multi-party projects with the benefit to demonstrate the viability of MEC implementations.

- The results and lessons learnt by the MEC PoCs are fed back to the ISG MEC specification activities.

- ETSI MEC encourages PoCs to demonstrate the viability of MEC implementations.

- Proposing a POC in ETSI MEC could give several visibility opportunities.

- We encourage all companies to evaluate the possibility to join ETSI MEC ISG or simply to collaborate with a MEC member/participant to submit a POC.

Thank you!

Contact Details:

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BACKUP SLIDES

MEC PoC ZONE @ MEC World Congress 2016

List of ETSI MEC PoCs in the PoC zone:

- **PoC 3**: RAVEN - Radio Aware Video Optimization in a Fully Virtualized Network (Telecom Italia - Intel UK Corporation - Eurecom - Politecnico di Torino)

- **PoC 4**: FLIPS – Flexible IP-based Services (InterDigital - Bristol is Open - Intracom - CVTC - Essex University)

- **PoC 5**: Enterprise Services (Saguna - Adva Optical Networking - Bezeq International)

- **PoC 6**: Healthcare – Dynamic Hospital User, IoT and Alert Status Management (Quortus Ltd - Argela - Turk Telecom)

- **PoC 7**: Multi-Service MEC Platform for Advanced Service Delivery (Brocade - Gigaspaces - Advantech - Saguna - Vasona – Vodafone)

- **PoC 8**: Video Analytics (Nokia – SeeTec – Vodafone Hutchison Australia)

ETSI MEC PoC ZONE Showcase your PoC!
@ MEC World Congress | 21-22 September 2016 Munich, Germany

PoC#3 - RAVEN – Radio Aware Video Optimization in a Fully Virtualized Network

[Telecom Italia - Intel UK Corporation - Eurecom - Politecnico di Torino]

This PoC is demonstrating a Video Optimization Application, which is aware of the radio conditions in the cell, where the MEC Application is co-located with the eNB and communicating with the video content server. The quality of the video streams is adjusted according to the radio conditions of the users.
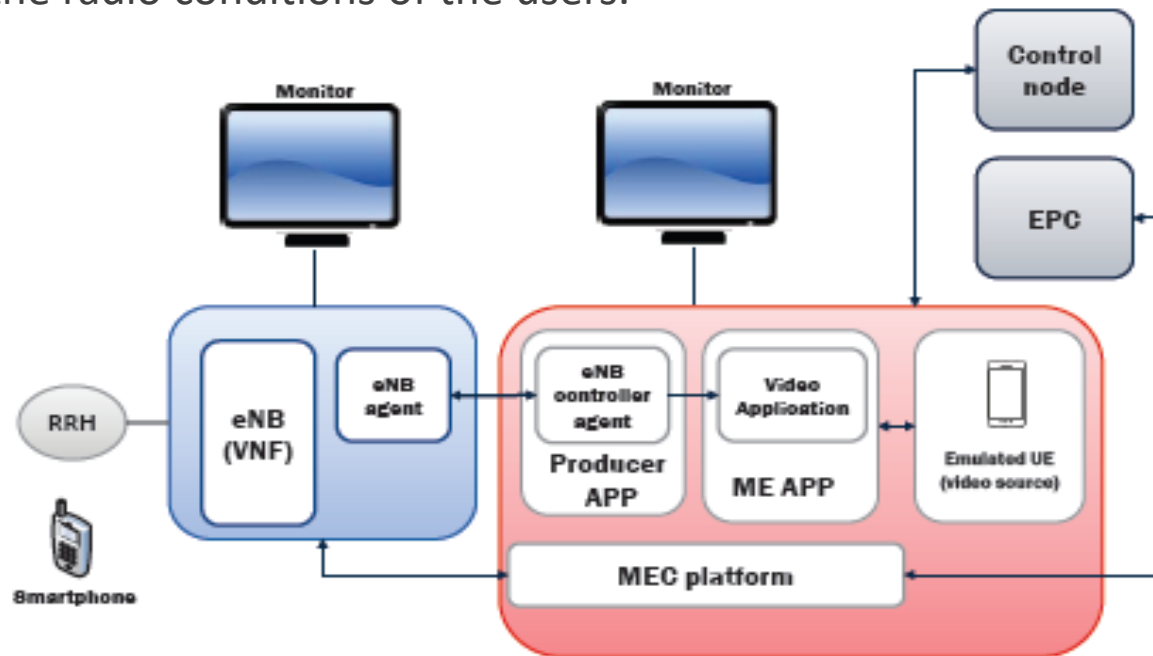
As a result, the video streams and the quality perceived by users are improved thanks to proximity and the usage of the MEC Video Optimization Application.

PoC#4 - FLIPS – Flexible IP-based Services

[InterDigital - Bristol is Open - Intracom - CVTC – Essex University]

An operator-based MEC Application is designed to transparently accelerate delivery of IP-based content and streaming media, providing improved latency and video quality for mobile users.

For this, the Application exposes an in-network surrogate server to nearby mobile users while the original server continues to serve other users of the demo.

Ultimately, we foresee such Application to allow operators to offer Surrogate-as-a-Service for web-based media delivery.
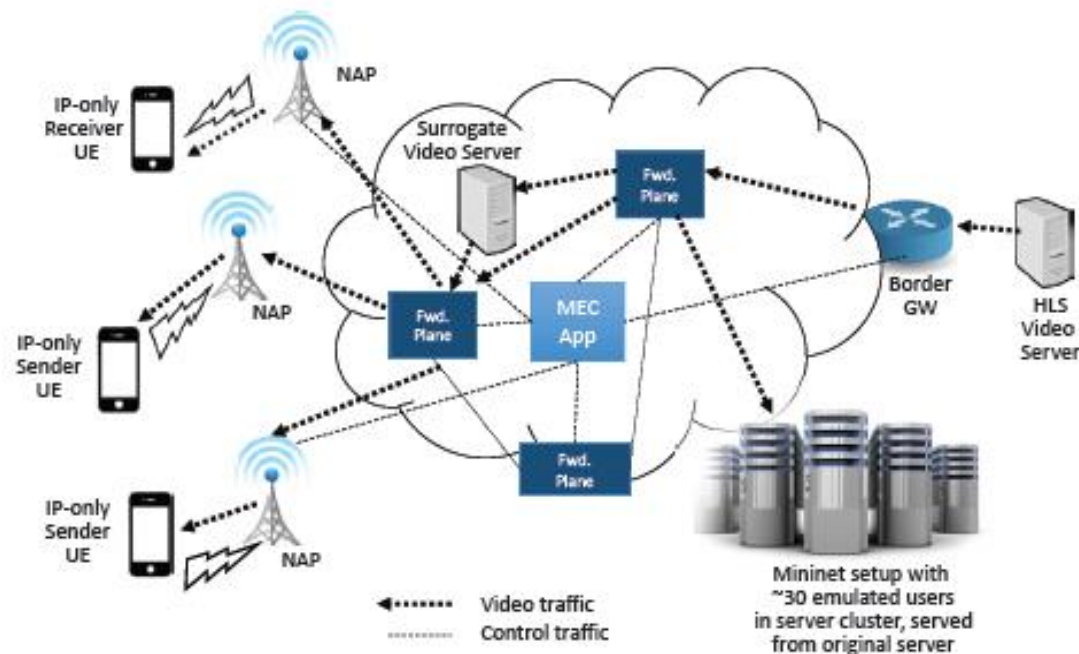

This diagram demonstrates improved latency and video quality for mobile users through establishing surrogate server nearby mobile users, while emulated users continue to receive video from original server.

PoC#5 - Enterprise Services

This PoC provides a local, direct connection from a mobile radio base station to the enterprise LAN. Located at the enterprise cell site, the MEC platform can host enterprise appliances and break-out traffic to the co-located IT infrastructure. This approach significantly reduces latency, opening a seamless path towards a truly mobile workforce with fast access to enterprise IT resources. It also minimizes traffic in the backhaul network.
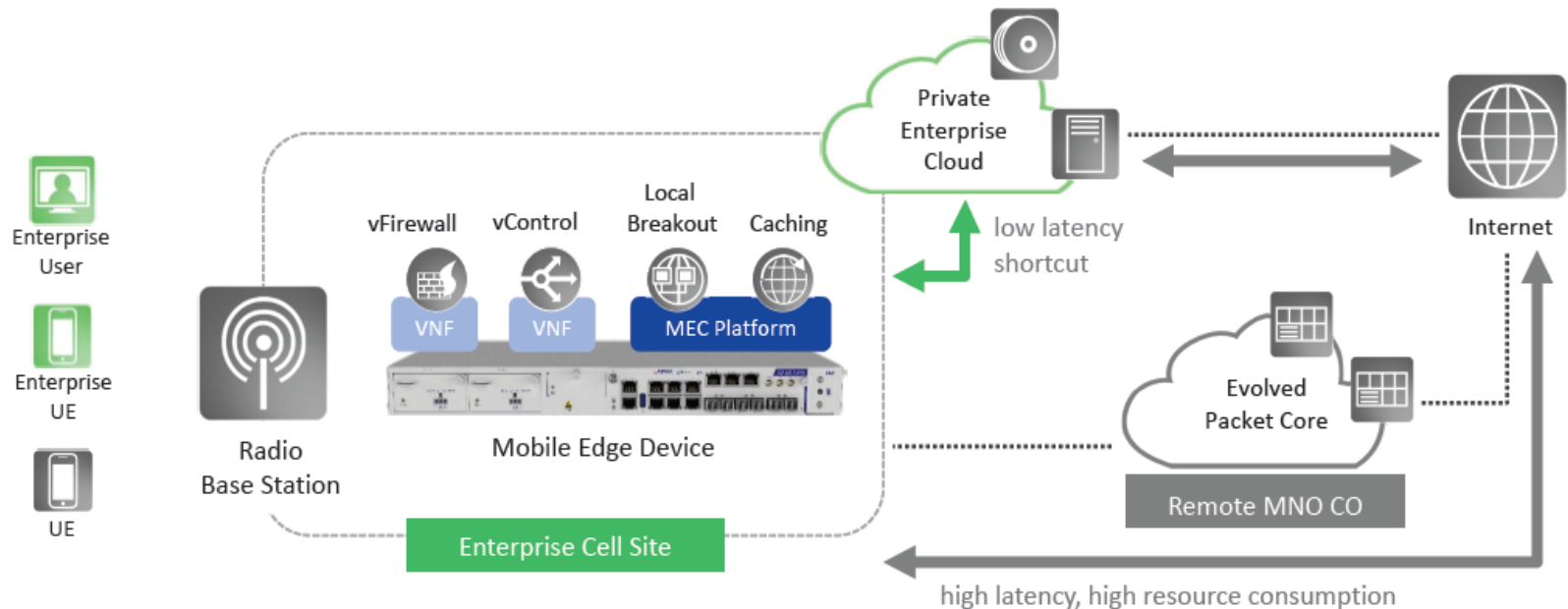
The demonstration is based on the ETSI MEC architecture and verifies the applicability of MEC with this advantageous enterprise services use-case.

This PoC considers a typical healthcare use-case, delivering optimized communication services in a hospital environment.

The hospital can assign a cellular access hierarchy and open access to local systems depending on managed access rights.

The PoC also demonstrates the wider potential of MEC, introducing 5G-aligned network slicing, software defined networking (SDN) and control/user plane separation (CUPS) capabilities.

The ability to manage service based on hospital 'alert' status, provision of local voice and breakout services, dynamic prioritization and radio resource slicing/allocation for different user categories, all illustrate how underlying MEC concepts can be applied to a broad range of use-cases.
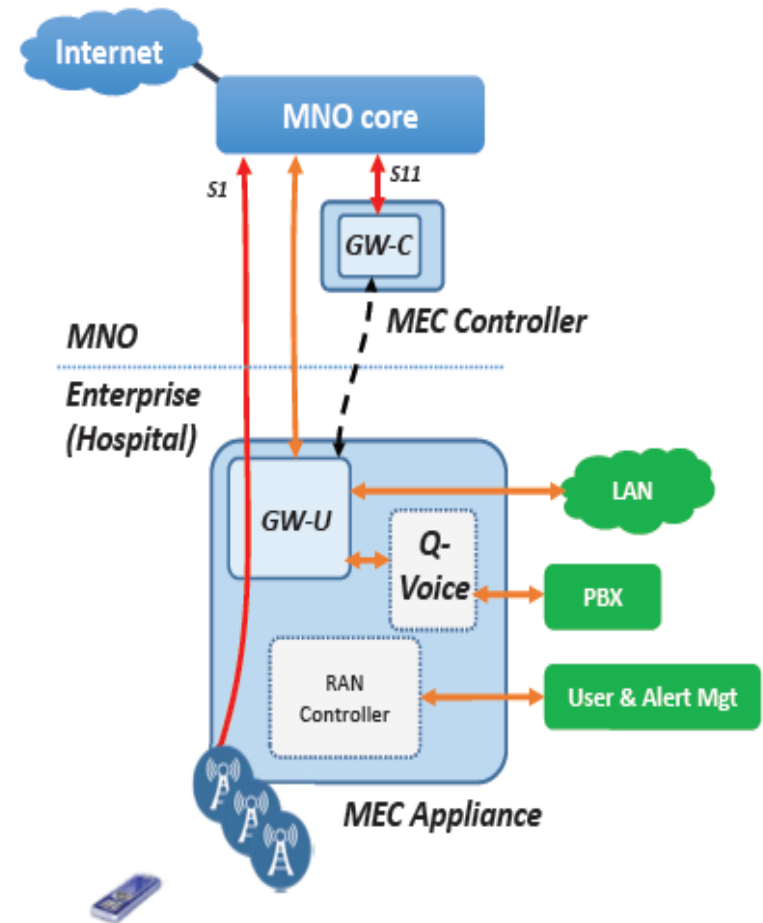
PoC#7 - Multi-Service MEC Platform for Advanced Service Delivery

[Brocade - Gigaspaces - Advantech - Saguna - Vasona - Vodafone]

Through a single, unified infrastructure, NFV-O, and cloud orchestration system, this MEC PoC demonstrates the ability to support multiple MEC platforms and applications residing on shared and common computing infrastructure, each providing a unique value add on the traffic traversing platform.
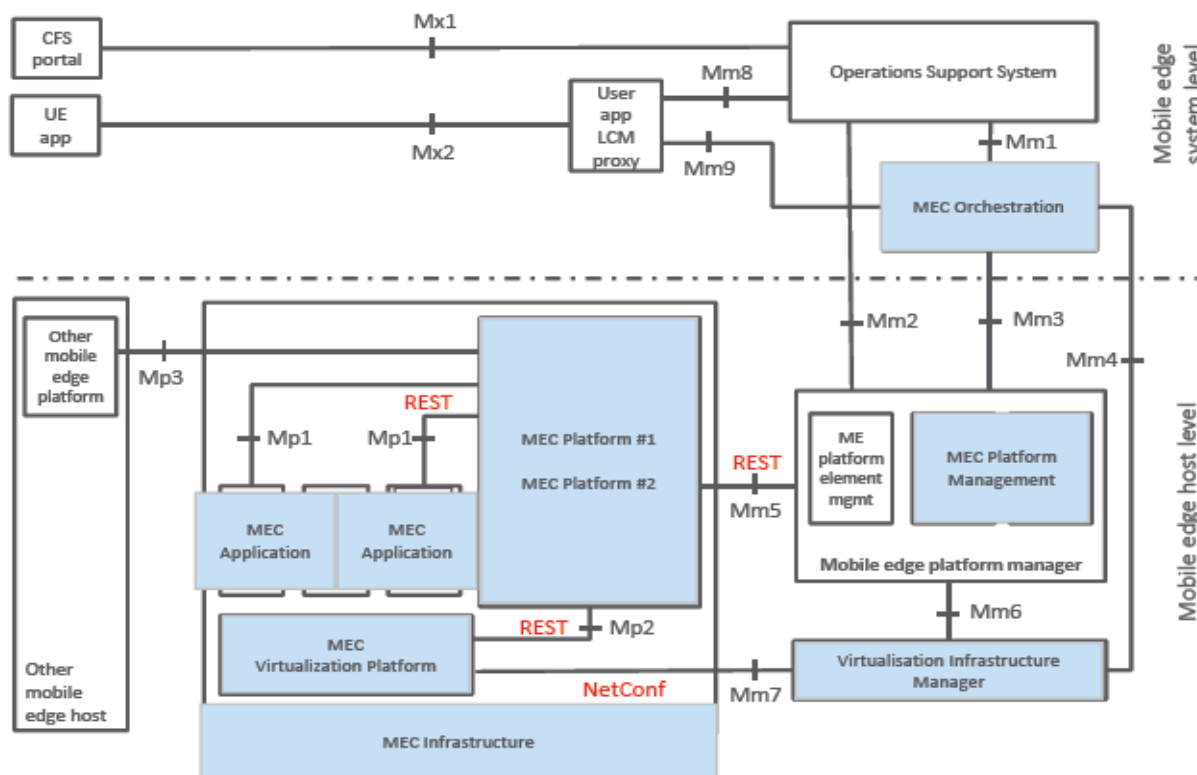
Traffic, by APN or IP address range, is dynamically routed to select MEC platforms, which then introduce unique sets of data analytics, traffic optimization and network applications, leveraging service function chaining, that enhance subscriber experience and operator visibility into network characteristics.

PoC#8 - Video Analytics

[Nokia – SeeTec – Vodafone Hutchison Australia]

Video Analytics is an end-to-end use-case for providing video surveillance to cities, municipalities, and enterprises over an LTE network. MEC is used for analysing raw video streams from surveillance cameras connected over LTE, and for forwarding the relevant incidents to the city command center. In the case of specific event venues, the camera streams can be broken out to the local control room to reduce latency and to relieve the burden on backhaul.