Mobile Edge Computing

Presented by Rolf Schuster (Vodafone Group)
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This environment is characterized by:

- Proximity
- Ultra-low latency
- High bandwidth
- Real-time access to radio network information
- Location awareness

Can be leveraged by applications to create value

Offers application and content providers **cloud-computing capabilities** and an **IT service environment at the edge of the mobile network**
A Radio Analytics application provides the video server with an indication on the throughput estimated to be available at the radio downlink interface.

The information can be used to assist TCP congestion control decisions and also to ensure that the application-level coding matches the estimated capacity at the radio downlink.

Enables improved video quality and throughput.
The MEC application analyses the output from a device’s camera and the precise location; objects viewed on the device camera are overlaid with local augmented reality content.

- Enables unique experience of a visitor to a museum or other (indoors or outdoors) points of interest
- Ensures low latency and high rate of data processing
The ISG MEC work to produce normative Group Specifications that will allow the efficient and seamless integration of applications from vendors, service providers, and third-parties across multi-vendor MEC platforms.

The MEC architectural blueprint and the scope of the work of the first release are described in the [MEC Introductory Technical White Paper](#).
A multi-stakeholder industry initiative:

A NEW VALUE CHAIN:  MOBILE OPERATORS *** BASE STATION VENDORS *** TECHNOLOGY PROVIDERS *** APPLICATION AND CONTENT PROVIDERS
The ISG MEC is responsible for producing the technical specifications.

An industry-enabling Working Group (IEG WG) is tasked with advancing Mobile-edge Computing in the industry and accelerating the adoption of the concept and the specifications.

The dissemination of the ISG MEC deliverables will foster the development of favorable market conditions which can create sustainable business for all players in the value chain, and facilitate global market growth.
ETSI ISG MEC: Expected Deliverables
First phase – lifetime spanning 24 months

Note: The Technical requirements draft GS is available via the MEC Open Area. Feedback and comments are welcomed.
ETSI ISG MEC has called for PoCs to demonstrate the viability of MEC implementations.

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

MEC PoCs address at least one of the PoC Topics listed on the ETSI MEC WIKI page: [http://mecwiki.etsi.org/](http://mecwiki.etsi.org/)

The results and lessons learnt by the MEC PoCs are fed back to the ISG MEC specification activities.
Mobile Edge Computing (MEC) Technology
A key technology for enabling the transformation to 5G

5G Use Cases Families and Related Examples

- Broadband access everywhere
  - 50+ MBPS EVERYWHERE
  - PERVERSIVE VIDEO
- Broadband access in dense areas
  - HIGH SPEED TRAIN
- Higher user mobility
  - SENSOR NETWORKS
- Massive Internet of Things
- Extreme real-time communications
  - TACTILE INTERNET
- Lifeline communications
  - NATURAL DISASTER
- Ultra-reliable communications
  - E-HEALTH SERVICES
- Broadcast-like services
  - BROADCAST SERVICES

Complements SDN and NFV and advances the transformation of the mobile-broadband network into a programmable world.

Programmability
- Ensures highly **efficient** network operation and service delivery, and **ultimate** personal experience
- **TCO and QoE**

Mobile Edge Computing
Help satisfying the demanding requirements for the 5G era in terms of expected throughput, latency, scalability and automation.

Enables a myriad of **new** use cases across multiple sectors
Enables a **fresh** value-chain,

**Business segments**
Mobile Edge Computing can complement SDN and NFV and advance the transformation of the mobile-broadband network into a programmable world, ensuring

1) highly efficient network operation and service delivery,
2) ultimate personal experience, and
3) new business opportunities.

Mobile Edge Computing will evolve into one of the key technologies for enabling the transformation to 5G architecture, helping to satisfy the demanding requirements for the 5G era in terms of expected throughput, latency, scalability and automation.

The different players in the value chain are welcome to join the ISG effort, contribute to the development of the specifications and demonstrate MEC Proofs of Concepts (PoCs).
THANK YOU

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Thank you!
Trends and market drivers

- Growth in mobile traffic driven by smart devices, HD video/audio, enterprise business process extension, vertical industries, IoT, wireless sensors, etc.
- Demand of end users for personalised services, better performance and user experience
- Demand of businesses for enhanced and secured interaction with consumers
- Enablement of connectivity between sensors, machines and other devices
- Convergence of IT and Telco networks
Why Mobile Edge Computing?

- Unparalleled Quality of Experience
- Contextualized services, tailored to individual needs and preferences
- Efficient utilization of the Radio and the network resources
- Innovative applications and services towards mobile subscribers, enterprises and vertical segments
Flexibility and agility

New Market Segments

A new value chain and an energized ecosystem, based on Innovation and business value

Mobile operators, application developers, content providers, OTT players, network equipment vendors, IT and middleware providers can benefit from greater cooperation

Operators can open their Radio Access Network (RAN) edge to authorized third-parties, allowing them to flexibly and rapidly deploy innovative applications and services

New innovative applications and services towards mobile subscribers, enterprises and vertical segments

**Translates local context, agility, rapid response time and speed into value**
Mobile Edge Computing
Service Scenario Categories

- Consumer-oriented Services
- Internet of Thing (IoT) Services
- Operator Services
- Third-party Services
- Network-performance Services
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Distributed live video streams analytics at the mobile edge
- Events are triggered automatically (e.g. movement, missing objects, crowd, etc.); enables fast detection and action triggering
- Optimizes backhaul and transport capacity
- Applicable to public safety, smart cities
Third-party Service Scenarios
Location Based Services

Active device real time location is tracked and provided in a passive way (independent of GPS information)

- Helps to locate specific users and understand how the crowd is distributed
- Applicable to Smart City, Geo-Fencing, Retail, and advertising
Existing cloud services are extended into the highly distributed mobile base station environment, leveraging the existing LTE connectivity.

The MEC application operates as a roadside unit for vehicle-to-infrastructure (V2I).

Road hazards can be recognized and warnings can be sent to nearby cars with extremely low latency.

Enables a nearby car to receive data in a matter of milliseconds, and the driver to react instantly.
Mobile Edge Computing and 5G

• **Mobile Edge Computing** is a natural development in the evolution of mobile base stations and the **convergence** of IT and telecommunication networking.

• MEC is recognized by 5G PPP* as one of the key emerging technologies for **5G systems** (as well as NFV and SDN).

• **5G** will be mainly driven by **software** and by the usage of IT **virtualization technology** for the telecommunication infrastructure, functions and applications.

<table>
<thead>
<tr>
<th>Founding members</th>
<th>Creates an open and standardized IT service environment</th>
<th>Hosts third-party applications that can serve the vast majority of the population</th>
<th>Compliance with regulatory and legal requirements</th>
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<tbody>
<tr>
<td>Vodafone, NOKIA, DOCOMO, Huawei, IBM</td>
<td>Exposes real-time radio network and context information</td>
<td>Enables a new value-chain, fresh business segments</td>
<td>Stimulates innovation</td>
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</table>
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The dissemination of the ISG MEC deliverables will foster the development of favorable market conditions which can create sustainable business for all players in the value chain, and facilitate global market growth.
The ETSI ISG allows ISG Members (ETSI Members) and ISG Participants (ETSI non-members) to participate and contribute to this innovative foundation of MEC.

The ISG MEC Members/Participants Agreements can be found at the ISG MEC portal (http://portal.etsi.org/mec).

The different players in the value chain are invited to actively participate and contribute to the development of the Mobile Edge Computing specifications.

The Industry players are also invited to take part in the PoC activities.
The multi-technology (LTE/3G) cell aggregation site can be located **indoor** or **outdoor**, for example:

- within an enterprise (e.g. hospital, large corporate HQ);
- for a special public scenario (e.g. stadium, shopping mall) to control a number of local, multi-technology (3G/LTE) access points, providing radio coverage to the premises.
Relationship to NFV
Complementary concepts which can exist independently

- Focused on porting network functions to virtual environments
- Enables the migration from a proprietary appliance-based setup to a standard, hardware and cloud-based infrastructure
- Virtual functions can be connected or chained together to create communication services.

RAN Virtualization

- Focused on creating an open environment in the RAN, allowing 3rd-party application/service integration (application-level enablers and APIs)
- Creates a new value chain and an energized ecosystem, based on innovation and business value
- Enables a myriad of new use cases across multiple sectors

MEC

- MEC MEC will reuse the NFV virtualisation infrastructure and the NFV infrastructure management to the largest extent possible.
- The scope of MEC is focused and its business objective differs from that of NFV.