



“India EU Stakeholders’ Workshop on 5G Technology Landscape”

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(India Habitat Centre, New Delhi– Feb 5-6, 2019)

Outline

- ETSI overviews on 5G Standardization
- ETSI Building Blocks for 5G Standardization
 - ✓ Network Functions Virtualisation (NFV)
 - ✓ Multi-access Edge Computing (MEC)
 - ✓ Millimetre Wave Transmission (mWT)
 - ✓ Next Generation Protocols (NGP)
 - ✓ Zero touch network and Service Management (ZSM)

ETSI overviews on 5G Standardization



- Much of the **5G standardization work will be done in 3GPP**
 - Radio access technology for submission to IMT2020 including
 - 4G/5G radio integration
 - Spectrum bands covering <6Ghz and >6Ghz
 - Core network technology for submission to IMT2020 including
 - Network Slicing & Fixed-Mobile Integration
- 5G is also expected to **integrate non-3GPP access technologies**, e.g. Wi-Fi, wireline, non-terrestrial networks (e.g. satellite, HAPS)
- ETSI has several activities that are developing requirements and potential enablers/building blocks for a 5G system
 - For example, Network Functional Virtualisation, Multi-Access Edge Computing, mWT, Next Generation Protocols (NGP), Zero touch network and Service Management (ZSM)



CENELEC



SESEI | Seconded European
Standardisation
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Enabling Europe-India Cooperation on Standards

Network Functions Virtualisation (NFV)

- Nov 2012 - Service providers came together and formed **ETSI NFV ISG**
 - NFV Major Benefits: Network on demand, “network elasticity”
 - develops NFV standards and proofs-of-concept and conducts its research in two-year phases.
 - More than 100 publications have been produced since its formation.
 - Six working groups: [TST](#), [SOL](#), [REL](#), [IFA](#), [EVE](#), and [SEC](#)
- **Scope of the 5G-related activity**
 - ETSI ISG NFV has defined the reference architecture which is used as baseline architecture for 5G*
 - The ISG acts as a focal point for network virtualization technologies
 - Strong collaboration with other SDOs, open-source projects, and industry forums to ensure NFV delivers deployable solutions for 5G

What NFV has achieved



- **Release 1 (2013 – 2014)**

- Focused on use cases, requirements, and architectural framework and Published Proof of Concept on NFV
- Released 11 documents covering NFV infrastructure, [NFV Management and Orchestration, Security](#), and [Virtual Network Function \(VNF\) Architecture](#).

- **Release 2 (2015 – 2016)**

- Management of virtualized resources, Performance Management, VNF Lifecycle Management, Network Services Lifecycle Management, UML Information Model, Guidelines for Information Modeling



- In Feb 2017, network operators published a white paper to guide the industry on priorities for NFV to deliver the industry vision for 5G systems: “[Network Operator Perspectives on NFV priorities for 5G](#)”.

- **Release 3 (2017-18)**

- 18 New Work Items: Information modelling ([IFA 016](#), [IFA 017](#) and [IFA 024](#)), End-to-end multi-site services management ([IFA 022](#)), Charging, billing and accounting ([EVE 008](#)), License management ([EVE 010](#)), Security analysis and management ([SEC 013](#), [SEC 014](#)), DevOps and continuous integration ([TST 006](#)) etc.

[Published NFV specifications are available here>>](#)

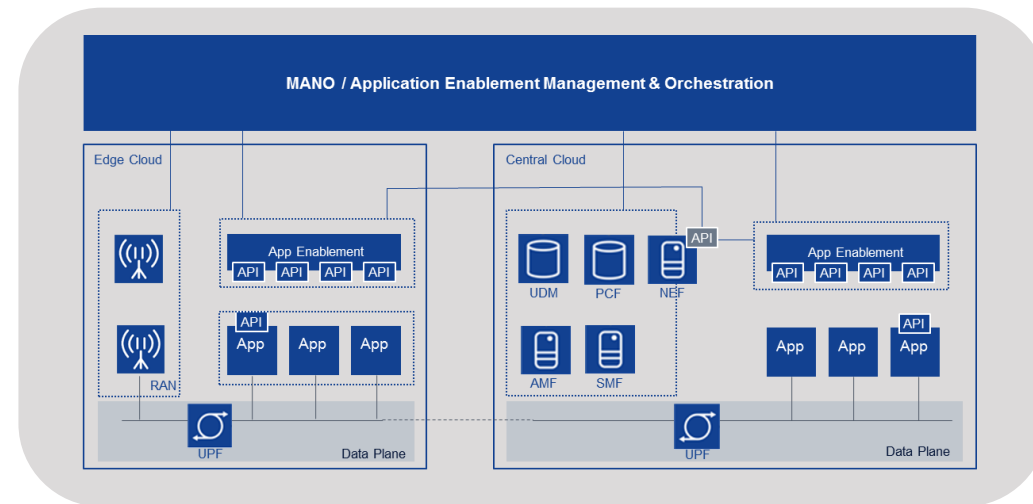
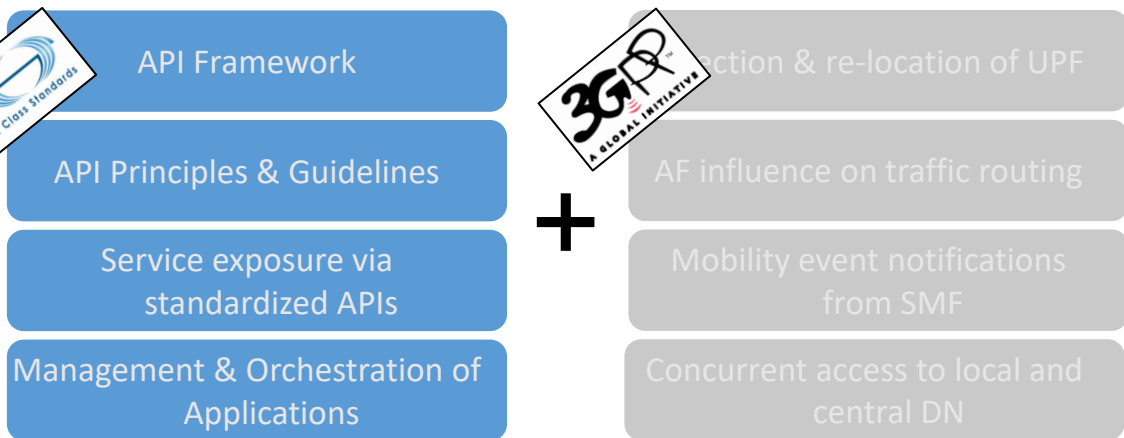
Multi-access Edge Computing (MEC)

- MEC offers application developers and content providers cloud-computing capabilities and an IT service environment at the edge of the network.
- **Scope of the 5G-related activity:**
 - MEC is a key enabler for a significant number of 5G use cases especially as defined by NGMN and 3GPP SA
 - Moreover, with a scope now expanded to consider multi-access edge computing, MEC is well positioned as a key contributor to fixed-mobile integration
 - Like NFV, MEC also defines architecture and APIs for management of MEC compute infrastructure.
 - Additionally, MEC also defines APIs for several services such as Radio Network Information Service (RNIS) and Location Service

What ETSI MEC has achieved



Foundation for Edge Computing created – Fully standardized solution to enable applications in distributed cloud created by ETSI MEC + 3GPP



82 members - Operators – Technology Vendors – IT players – Application developers



[ETSI MEC published related specifications are available here>>](#)

MEC White Papers



- MEC White Papers

- **MEC in an Enterprise Setting**

- https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp30_MEC_Enterprise_FINAL.pdf

- **MEC deployment in 4G and towards 5G:**

- http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp24_MEC_deployment_in_4G_5G_FINAL.pdf

- **CRAN and MEC: A Perfect Pairing:**

- http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp23_MEC_and_CRAN_ed1_FINAL.pdf

- **Developing SW for MEC**

- http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp20_MEC_SoftwareDevelopment_FINAL.pdf

- **MEC in 5G Networks:**

- http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp28_mec_in_5G_FINAL.pdf



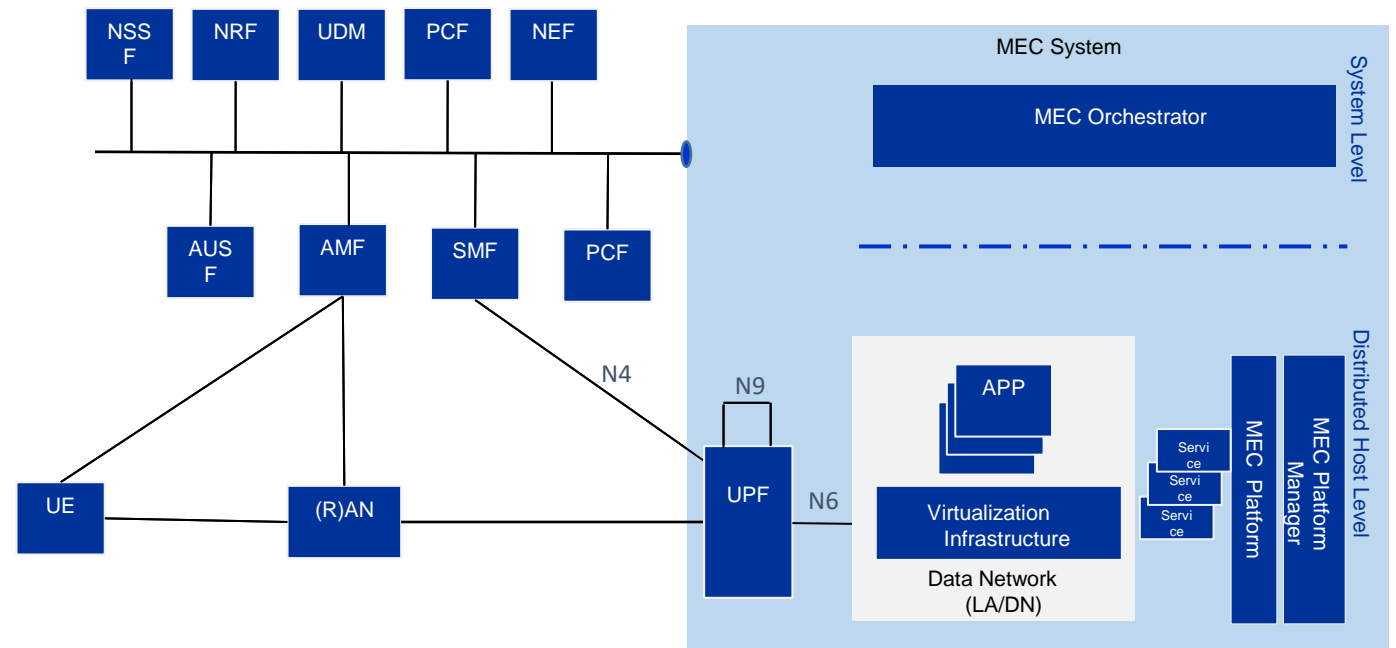
ETSI MEC work (Phase 2)

- **MEC Phase 2 – Study Item MEC in 5G (MEC 031)**

- **The ETSI MEC white paper on MEC in 5G networks** sets the scene for this new study item - investigate the opportunities offered to MEC by the 5G system and its edge computing enablers

- **The scope includes:**

1. C-plane interactions with 5GC,
2. functional split between MEC and 5GC wrt. API framework,
3. organization of MEC as an AF,
4. pertinent interactions of MEC with (R)AN



Millimetre Wave Transmission (mWT)



- **mWT** concerns the use of millimetre wave spectrum for radio transmission, which lies in the 30GHz to 300GHz range (with wavelengths from 10mm to 1mm).
- ETSI established **mWT ISG** to provide a platform and opportunity for companies and organizations involved in the microwave and millimetre-wave industry to address the challenges involved in using this spectrum.
- **Scope of the 5G-related activity:**
 - Facilitate the use of the V-band (57-66 GHz), E-band (71-76 & 81-86 GHz) and in the future higher frequency bands (from 50 GHz up to 300 GHz) for large volume applications in the back-hauling and front-hauling to support mobile network implementation.
 - Wireless backhaul and front-haul serving the requirements of 5G in terms of capacity, topology, latency and any other technical or network feature



What ISG mWT has achieved

- **ETSI's mWT ISG released Reports:**
 - **ETSI GR mWT 012**: addresses the prominent 5G backhaul/X-Haul scenarios.
 - **mmWave Semiconductor Industry Technologies: Status and Evolution** which provides information on semiconductor technologies applicable to mWT systems operating in the frequency bands of 57 to 66GHz (V-Band) and 71 to 86GHz (E-band).
- **Latest publications** are available [here](#)



NGP - Next Generation Protocols

- **ISG NGP** is established to **standardize a digital communications technology**.
- **Scope of the 5G-related activity:**
 - Study protocols in LTE to identify issues which need to be addressed in support of 5G systems development and standardization.
 - Review and identify opportunities for an evolution of networking architectures and protocols to enhance 5G network
 - Implementation and performance.
 - ISG NGP is studying the implementation of the TCP/IP protocol suite and 3GPP
 - Identification of opportunities for improved throughput, reduced latency, enhanced security, reduced power consumption
 - To stimulate action in Internet and Telecoms SDOs to develop network protocols that can sustain 5G scenarios.

What ISG NGP has achieved



- May 2016 white paper on [Next Generation Protocols –Market Drivers and Key Scenarios](#)
- Recently, ISG NGP released **specification and reports on next generation IP Protocols to optimize the performance, efficiency, and scalability of new services proposed for 5G** such as network slicing or ultra-reliable low latency communication (URLLC).
 - [GR NGP 010](#) entitled "**Recommendation for New Transport Technologies**" provides an analysis of current transport technologies such as TCP and their limitations.
 - [GR NGP 011](#) addresses "**End-to-end Network Slicing Reference Framework and Information Model**".
 - [GS NGP 013](#) describes "**Flexilink: an efficient deterministic packet forwarding** in user plane as well as packet formats and forwarding mechanisms".
 - It specifies user plane packet formats and routing mechanisms that allow core and access networks **to support the new services proposed for 5G**.
- A full list of Group Specification (GS)/Group Report(GR) are available [here>>](#)



Zero touch network and Service Management (ZSM)



- The disruptive deployment of 5G will trigger the need for network transformation and radical changes in the way **networks and services are managed and orchestrated.**



Full end-to-end automation of network and service management becomes an urgent necessity.

- Currently there are multiple inconsistent management frameworks in the industry, many silos, lack of alignment and interoperability.



It is essential to move to an environment that leverages synergies and achieves alignment through convergence on a single end-to-end network and service management architecture.

14 founding members



Key objective

Enable future operational processes and tasks to be executed automatically, end-to-end

Goal

Accelerate the definition of the end-to-end service management architecture, spanning both legacy and virtualized network infrastructures

Formed under the auspices of the ETSI ISG


Industry convergence

Facilitate collaboration with the relevant open-source projects, standardization bodies and fora

Interoperability

Provide a common foundation to enable a diverse ecosystem of open source groups to produce interoperable solutions

Work status

- ✓ The ISG ZSM work is in progress with following seven Work Items (WIs):
 - ✓ [ZSM 001](#): Requirements based on documented scenarios (specification)
 - ✓ [ZSM 002](#): Reference Architecture (specification)
 - ✓ [ZSM 003](#): End to end management and orchestration of network slicing (specification)
 - ✓ [ZSM 004](#): ZSM Landscape (report)
 - ✓ [ZSM 005](#): Means for Automation (report)
 - ✓ [ZSM 006](#): Proof of Concept Framework (specification) 
 - ✓ [ZSM 007](#): Terminology

Note: the ZSM DRAFT specifications are publicly available via the ZSM open area ([Link](#)).

conclusion

- ✓ Whilst there is a wide variety of use cases driving 5G, and a variety of priorities and timescales across various industrial and governmental stakeholders, **standardization is primarily industry-driven, reflecting business opportunities.**
- ✓ ICT Standards need to be global considering the fact of **interoperability, Avoid fragmentation, develop together** or adopt Standards/Specification
 - Several Standards organizations (including ETSI) are developing potential building blocks of an overall 5G system
 - ETSI interacts with many of these, and with TSDSI it has a Cooperation Agreement
 - 5G Standardisation is and will be done at 3GPP
 - Building Blocks/local requirement shall be tabled at 3GPP as it is the place for SDOs to work together and table their requirements

Thank you!

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