

#### "Programmable edge to cloud Virtualization Fabric for the 5G Media Industry – The case of the 5G-MEDIA project"

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# Motivation

- The focus of 5G research so far has been largely on the required advances in network technologies: Spectrum, radio access, SDN, NFV and cloud infrastructure, flexible management and control architectures and development and operations systems
- ? to investigate on how to implement 5G networks and how they can be exploited by advanced media applications to realise the benefits of low latency, high bandwidth and flexible dynamic configuration.



# Technical challenges for advanced apps



 Application of SDN and NFV concepts to media applications to flexibly and dynamically embed them as virtual network functions (in the form of virtual machines, containers or unikernels) within the 5G network and cloud infrastructure

by using a serverless computing paradigm, close to traffic sources and sinks, and by configuring network paths and virtual slices to deliver the required network capacity and performance levels at the network edge.

SDK and DevOps environment for Media Application to hide the complexity of service development and deployment on the underlying 5G network and distributed cloud infrastructure

service virtualisation platform to orchestrate the deployment and scaling of the media applications, interacting with the underlying network for the dynamic control of the network by applying machine learning and cognitive optimisation techniques



## Media apps in the 5G arena (1/3)



#### **Immersive applications and Virtual Reality**

 Quality of Service (QoS) and Quality of Experience (QoE) are top priorities in immersive media, whereas availability and interaction between users are considered as critical challenges that need to be "met" as they ensure a smooth user experience.



Tele-immersive media scenario



## Media apps in the 5G arena (2/3)



Mobile contribution, remote and smart production using user-generated content

 vEncoding and vCompression engines have the potential to replace dedicated encoder hardware and the Cognitive Network Optimization together with the QoS-monitoring can help to overcome the current internet best-effort principle and ensure the required performance needs.



### Media apps in the 5G arena (3/3)



Mobile Dynamic and flexible UHD content distribution over Open CDN (Content Delivery Networks)

 Prioritizing a new NFV flexible network architecture, which can accommodate flexible resources and dynamicity in the allocation of computing resources and cloud-distributed functionalities. RTVE sport events are planned to be used as trials.







#### Aspects to be considered for advanced apps delivery

- Requirement x 1000 increased capacity, which corresponds to x10 or x100 increased user data rates.
- Large number of antenna elements at small coverage cells, require large BW at front-haul.
- Recent technologies are able to provide higher capacity at long-haul networks.
- Need for higher capacity at front-haul networks.
- The trend is the segment closest to the user to be supported by 5G wireless communications, while the segment connecting at the RAN and Central Office (CO) will be supported by Fiber Optic.





