



# 5G-MEDIA

*Programmable edge-to-cloud virtualization  
fabric for the 5G Media industry*

*5G-PPP Phase 2 Kick-Off*



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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
- 5G-MEDIA plans to investigate on how **5G networks can be exploited by advanced media applications** to realise the benefits of low latency, high bandwidth and flexible dynamic configuration.



# Technical challenges & Vision

- This will be achieved by applying **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 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

Streaming as a Service



# Use cases

## Mobile Dynamic and flexible UHD content distribution over Open CDN

- 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.

## 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.

## 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 critical challenges that need to be met as they ensure a smooth user experience.



# Collaboration within 5G-PPP: peer projects

- 5G-MEDIA partners are participating in 14 (out of 19) 5G-PPP Phase I projects and the following results will be evaluated for adoption and extension:
  - **Management and Orchestration framework** provided by a number of phase 1 projects (e.g. SELFNET, 5G-CROSSHAUL, SONATA)
  - **SLA and QoS/QoE monitoring components**: SONATA phase 1 project and the solution implemented in the COHERENT phase 1 project
  - **Cognitive Network Optimizer** from COGNET phase 1 project
  - **Caching Policies** by capitalising the unified control and coordination mechanism provided by COHERENT
  - **Heterogeneous resources management** and **fast placement of microservices**: SESAME and 5GEx
  - **VNF Repository & Catalogue** will be based on the innovation mechanisms achieved within SELFNET phase 1 project simplifying the service deployment



# Collaboration within 5G-PPP: working groups

- Planned participation first assessment:

High

- 5G Architecture WG
- SDN / NDF WG
- NetMgmt & QoS WG

Medium

- Vision and Societal Challenges WG
- Security WG
- SME WG
- Trials WG





# Abstract

The focus of 5G PPP H2020 remarkable research so far has been largely on the required advances in network architectures, technologies and infrastructures. Less attention has been put on the applications and services that will make use of and exploit advanced 5G network capabilities. 5G-MEDIA aims at innovating media-related applications by investigating how these applications and the underlying 5G network should be coupled and interwork to the benefit of both. In this respect, 5G-MEDIA addresses the objectives of 1) capitalizing and properly extending the valuable outcomes of the running 5G PPP projects to offer an agile programming, verification and orchestration platform for services, and 2) developing network functions and applications to be demonstrated in large-scale deployments, based on 3 well-defined use cases (in the areas of immersive media and VR, smart production and user-generated content, and UHD over CDN) of diverse requirements and particular interest for the consortium partners.

Based on the adoption of the open innovation approach, 5G-MEDIA platform will be offered to third parties to develop, combine, verify, deploy and validate media applications by utilizing the SDK capabilities and Service Platform offerings. Finally, 5G-MEDIA plans to create an ambitious business impact with the introduction of Streaming as a Service concept, built on top of a well-defined, consortium-wide exploitation plan and supported by the complementarity of expertise of its consortium, representing key industrial sectors in the network and media domains: telecom operators (OTE, TID), cloud providers (SILO), PaaS/SaaS vendors (IBM), service providers (ENG), application developers (NETAS), broadcasters (RTVE), SMEs (IINV, NXW, IRT, BIT) and research centers (UCL, UPM, CERTH). It is highlighted that the consortium includes partners with strong and active participation in 5G-PPP programme, complemented by new but important players on the media & entertainment industry sector.





# Consortium

No.	Name	Short name	Country
1	ENGINEERING - INGEGNERIA INFORMATICA SPA	ENG	Italy
2	IBM ISRAEL - SCIENCE AND TECHNOLOGY LTD	IBM-IL	Israel
3	SINGULARLOGIC ANONYMI ETAIREIA PLIROFORIAKON SYSTIMATON KAI EFARMOGON PLIROFORIKIS	SiLO	Greece
4	HELLENIC TELECOMMUNICATIONS ORGANIZATION S.A. - OTE AE	OTE	Greece
5	CORPORACION DE RADIO Y TELEVISION ESPANOLA SA	RTVE	Spain
6	UNIVERSITY COLLEGE LONDON	UCL	United Kingdom
7	TELEFONICA INVESTIGACION Y DESARROLLO SA	TID	Spain
8	UNIVERSIDAD POLITECNICA DE MADRID	UPM	Spain
9	INSTITUT FUER RUNDFUNKTECHNIK GMBH	IRT	Germany
10	NEXTWORKS	NXW	Italy
11	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Greece
12	NETAS TELECOMMUNICATION ANONIM SIRKETI	NET	Turkey
13	INTERINNOV SAS	IINV	France
14	BITTUBES GMBH	BIT	Germany



# Work packages

WP Number	WP Title	Lead beneficiary
WP1	Management and Coordination	ENG
WP2	Architecture, Analysis and Tools	SiLO
WP3	Operations and Configuration Framework	UCL
WP4	5G-MEDIA Open Repository of Network Apps	UPM
WP5	5G-MEDIA APIs and SDK Tools	NET
WP6	5G-MEDIA Use Cases, Scenarios and Validation	OTE
WP7	Impact, Dissemination and Exploitation	IINV