



Embedded Network Services for 5G Experiences

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Integrated Pilot and Evaluation Report for Use Case 1

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Abstract

This deliverable assesses the performance of 5G ESSENCE platform for edge network acceleration at the venue of the demonstration both from the user and the network/infrastructure provider points of view.

It presents the setup, the demo configuration and the integration of 5G ESSENCE specific tools to the adjusted testbed deployed at the football stadium. An ultra-dense network of Cloud Enabled Small Cells (CESCs) and Edge Data Centre (DC) is deployed for providing 5G mobile broadband experiences and the Network Function Virtualisation Infrastructure (NFVI) introduced by 5G ESSENCE, thus bringing several benefits regarding the video latency and quality.

Moreover, the deliverable includes the validation and demonstration activities in the realistic environment of the football stadium provided by Municipality of Egaleo (MoE) in Athens, Greece. The assessment was carried out by taking into account the detailed specifications of the system validation plan from WP2 approach and the technical recommendations from Tasks 5.1 – 5.3.

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Conclusions

The 5G ESSENCE project delivers benefits to media producers and mobile operators as it enables them offering a highly interactive fan experience and optimizes operations by deploying key functionalities at the edge (i.e., eMBMS or local network services like real-time analytics together with multitenancy support by small cells).

A large-scale facility as the Municipal Football Stadium “Stavros Mavrothalasitis” was used for the validation of the respective 5G ESSENCE use case (i.e: UC1). The coverage in this facility was provided by a cluster of multitenant, eMBMS-enabled SC and a main DC connected to the core networks of one or more telecom operators. The Edge DC was processing video content from cameras deployed on-site, which was broadcasted locally without affecting the backhaul. The video content from cameras was sent for processing locally at the Edge DC. The video streams were broadcasted locally, by using the CESC. Spectators were able to dynamically select between different offered broadcast streams.

In this deliverable we presented the setup, the demo configuration and the integration of the 5G ESSENCE specific tools to the adjusted testbed deployed at the football stadium. An ultra-dense network of CESC and Edge DC was deployed for providing 5G mobile broadband experience and the NFVI introduced by 5G ESSENCE, bringing several benefits regarding the video latency and quality. Furthermore, we presented the validation and demonstration activities in the realistic environment of the football stadium provided by Municipality of Egaleo.

Two successful demos took already place in the stadium. The first demo took place in July 2019, during Egaleo team’s training. The second one took place in October 2019, where two football teams had a typical 90-minutes match. The event was broadcasted via the 360° camera to the eMBMS-enabled end-devices of the viewers.

Apart from the 5G ESSENCE partners, many external viewers also attended this event, including two members of the Greek Parliament, three Mayors, as well as the Deputy Minister of Digital Governance.

With respect to evaluation results, it can be concluded that the trade-off between eMBMS and unicast media delivery for multiple users is between bitrate saving and latency. The latency introduced by eMBMS can be characterized as minor, as it adds to the whole process a mere delay (150 ms), both for normal HD and 360 streaming. The eMBMS proves to be extremely efficient in terms of resource usage for a large number of users.

In order to “address” the needs and requirements of a robust and agile network management, and building upon the pillars of network functions virtualization, mobile-edge computing and cognitive management, the 5G ESSENCE project enables new business models and revenue streams in the real-life use case associated to the vertical industry of entertainment, i.e., edge network acceleration in a crowded event.

In this sense, the 5G ESSENCE context “opens the door” to venue owners, (e.g., municipalities, stadiums, site owners, and virtually anyone who manages a property and can install and run a local Small Cell network), to deploy a low cost infrastructure and to act as neutral host network and service provider. Although probably none of such entities would offer static network coverage, many of them could foresee adequate chances for profits generated by exploiting the 5G ESSENCE concepts of multitenant small cells, able to provide wireless network coverage coupled with added value services in close proximity to customers and visitors that belong to multiple network operators and vertical industries.