Chapter 11
PriorityQoE:
A Tool for Improving the QoE in Video Streaming

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ABSTRACT

In the next generation of mobile network services, there will be the provision of multimedia services with the desired quality for wireless networks. In the future Internet, an integrated platform of cloud services will be made available within the XaaS (X-as-a-Service) paradigm. In the light of this evidence, the focal point of this study is an area that is very important to analyze, which is how to ensure a satisfactory Quality of Experience (QoE) for applications with video streaming. This chapter shows the PriorityQoE tool, which employs a methodology to establish a hierarchy for video streaming packets that are based on QoE objective metrics. It also outlines an intelligent mechanism for packet discard together with the PriorityQoE. The results of the performance evaluation of the tools showed that the effects of congestion on the network through the QoE of the video streaming were reduced. The QoE mediations were carried out by considering the knowledge of three QoE objective metrics (SSIM, VQM, and PSNR). The evaluation was conducted by means of a simulation of the transmission of multimedia content in IEEE 802.11 networking standards. The tools showed a better buffer handling and discarded the packet that least degrades the QoE of the video streaming.

INTRODUCTION

Recent research has shown that the Internet was not devised to support the required functions and performance that are needed by the increasingly wide range of real-time multimedia communication services. The increase in demand for services and multimedia applications together with the popularity of mobile equipment with access to the Internet have transformed the international network into a multimedia mobile network. This situation makes it a real challenge to ensure the efficiency of the multimedia network. The perceptions and satisfaction of the end-users are two factors of great importance. Other factors, like the robustness of the network, platform, and software, are needed to offer handling operations of quality and low cost. Thus, in so far as existing services are constantly evolving, new demands and services are also being introduced since it is necessary for the current networks to allow and provide flexibility, integration and re-usability. Solutions such as cloud computation and service platforms are key terms that are currently attracting the interest of the academic world, industry and government departments throughout the world. Owing to its huge potential for realizing what is desired, cloud computation has the capacity to completely change the models for providing services for the current IT industry. These solutions set out a new criterion for rendering services that start from scratch, with a reduced initial investment, expected performance, high availability, a tolerance capacity for failure and infinite scalability. It opens up a new era where new businesses can create or provide services that are in accordance with this new concept (Zhou, et al., 2010).

There is an important trend in the increase of the cooperativeness and flexibility of digital systems. This trend is the introduction of *X-as-a-Service* (XaaS) *paradigms* such as *Software as a Service* (SaaS), together with the PaaS platform and infra-structure like the IaaS service (Zhou, et al., 2010). These paradigms are already being implemented by employing the virtualization of computational resources as virtual machines. This approach allows innovations like computational grade, which can enable the computational capacity of a range of equipment to be used at times of idleness in an efficient and distributed way. Studies aimed at ensuring the quality of the multimedia network have shown results that have disputed the efficiency of the traditional *Quality of Service* (QoS) metrics, as a means of measuring the quality perceived by the user with regard to the use of multimedia services and applications. For this reason, efficient metrics that can allow the multimedia content perceived by the user to be evaluated is of crucial importance. These metrics can be regarded as *Quality of Experience* (QoE) metrics. It is necessary to consider QoE metrics in solutions for handling the multimedia network to ensure its quality. The Forward Error Correction (FEC) mechanisms and the packet discards are examples of mechanisms for the handling of the network that become more efficient when the QoE is taken into account. These handling tools seek to undertake a more in-depth study of the video streaming by considering specific features, such as the coding parameters of the video. These also include the Group of Pictures (GOP) framework, Codifiers and De-Codifiers (CODECs), the average and maximum bit rate of the video, types of charts and the respective degrees of dependence etc.

In this chapter, we provide a tool called *PriorityQoE*, which employs a methodology to ensure the QoE of video streaming transmitted by the network. PriorityQoE allows an evaluation of the packets transmitted with the video streaming. This is carried out through the hierachization of the video frames on the basis of objective QoE metrics. In the context of the platform services, PriorityQoE can be easily made available to the multimedia service providers. By employing this tool, the providers will economize on bandwidth by conserving and sharing network resources. The performance evaluation of PriorityQoE

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