Quality of Experience for IPTV

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Abstract - **This paper reviews the importance of quality of experience for IPTV technologies.**

Keywords - **QoS, QoE, Quality of Experience, IPTV.**

I. INTRODUCTION

The integration of new multimedia services, such as video on demand (VoD) and IPTV, by operators and service providers in a network infrastructure and support existing with a given quality of service (QoS) requires the growth of related network resources and their effective use for provision of appropriate service quality levels. The QoS measurements are purely based on networking parameters such as jitter, packet loss and delays. Although the most suitable criterion for evaluating the video quality is the human eye, but this method is quite subjective.

II. QOE VS QOS

Successful deployment of IPTV services require excellent video quality. QoS parameters (i.e. bandwidth, latency, jitter, packet loss) are easier, less costly, quicker to measure. A properly implemented QoS will help to ensure that videostreams travel from source server to the destination end-user device in an appropriate manner. The IPTV providers needs to monitor how end users perceive the quality of the IPTV experience. And role of subjective estimates increased so much that needed a new quality metric. Recently the new term of "QoE" has been introduced to make quality more clearly captures the experience of the consumers.

The term Quality of Experience (QoE) defines in [1] and commonly used to describe the application and user oriented quality of multimedia services. QoE cover many different aspects. Some of the numerous factors are: media (video and audio) quality, VOD delay, interaction with the service or display device (channel zapping delay, remote control, electronic program guide), contents (individual interests of the viewer, popularity), reliability (availability, consistency), quality expectations of the viewer (feature film screened in a cinema vs. on a mobile device), video experience of the viewer, which also determines quality expectations (once you have seen high-definition content it's hard to go back), display or TV type and properties (size, resolution, brightness, contrast, color, response time), security (contents, privacy). QoE parameters are more difficult, expensive, lengthy to measure, not for monitoring.

We can look at quality in two different types:
1. Perceptual subjective quality. In subjective experiments, a number of expert (15 or more) are asked to watch a set of video and rate their quality. The average rating over all viewers for a given video is also known as the Mean Opinion Score (MOS). There are various subjective testing methods.

Although the main imperfection is the requirement for a large number of experts, which limits the amount of video material that can be rated in a reasonable amount of time subjective experiments are benchmark for any objective metric[2].

2. Objective quality assessment (numerical). The objective parameters are a category of metrics that can predict perceived video quality automatically and can be divided into three categories: fullreference (FR) metrics, reduced-reference (RR) metrics and no-reference (NR) metrics.

Mean squared error (MSE) and peak signal-to-noise ratio (PSNR) are the most widely used objective video quality FR metrics because of their simplicity. However, their values don't correlating well with perceived visual quality with a due to non-linear behavior of human visual system. They are defined as:

$$MSE = \frac{1}{w \cdot h} \cdot \sum_{i=1}^{w} \sum_{j=1}^{h} \left(x_{i,j} - y_{i,j} \right)^2 \qquad (1)$$

$$PSNR = 10 \cdot \log_{10} \frac{I_{max}^{\,2}}{MSE} \qquad (2)$$

where I_{max} - is the maximum possible pixel value; x, y – pixel of original and reconstructed image; w,h – size of image.

The RR metrics is measuring the image quality based on the partial information of the images which provide the just enough image information to quality assessment. The quality assessment is performed based on the comparison of these two sets of partial information: extracted from the original image and the received image at the evaluating point.

The NR metrics only requires access to the received video stream to make a measurement and have acceptable performance only with prior known of the type of image distortion and the components in the transmission system. The RR and NR metrics are much more flexible than FR metrics, but are more difficult to develop.

III. CONCLUSION

QoS is an important consideration for the network operator and QoE is more important to the end user.One of the core requirements of achieving high consumer satisfaction levels is to implement a QoE measurement system that will monitor the IPTV service. The term QoE not only relates to video quality but can also cover other areas. An increased understanding by servise providers of QoE is critical to ensuring that IPTV system operates effectively and will unleash the potential of IPTV technologies.

REFERENCES

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