DTG Mobile Video Alliance

Video quality of experience key performance indicators

About the DTG Mobile Video Alliance

The Mobile Video Alliance was formed in 2013 to bring together companies from across the industry and establish a forum for exchanging knowledge.

It is chaired by Matt Stagg, Head of Mobile Video & Content at EE, and Matt George, Senior Field Development Manager Content & Digital Media at Equinix. The DTG lead is George Robertson, Principal IP Engineer.

Introduction

In order to improve the quality of mobile video, the Mobile Video Alliance (MVA) recommends that the industry monitors Key Performance Indicator (KPI) data in core areas.

These recommendations from the MVA cover 'Failure to start', 'Time to start', 'Stalling Rate' and 'Video session abandonment rate'.

The Mobile Video Alliance believes that these are the main areas that can help identify mobile video issues, and that further analysis of them would lead to a much enhanced video quality of experience.

Contents

Video quality of experience key performance indicators

This document reports on the work of the Mobile Video Alliance (MVA) on quality of experience (QoE) Key Performance Indicators (KPIs) for mobile video.

The work has identified several measurable factors that indicate the likelihood of QoE problems for consumers. Operators collecting these data can then analyse where and when video delivery is going awry.

Clearly, high engagement with content and a low rate of abandonment of content is the main objective of broadcasting, and therefore mobile video delivery. The measurement and collection of the KPIs we outline is intended to provide a means to maximise and understand engagement with content.

Abandonment of content by the viewer, where they simply switch off or give up on the item, can be assessed (and often is). However, we have excluded it as a KPI, as it is not indicative of a problem in the network. Of course, if you also collect statistics on abandonment you could correlate with KPI data to perhaps reveal why people switch off.

How the KPIs work:

This model (figure 1) is purely illustrative, to show how KPIs can be used to identify a problem in the network, and should not be taken as accurately representative of any deployed architecture.

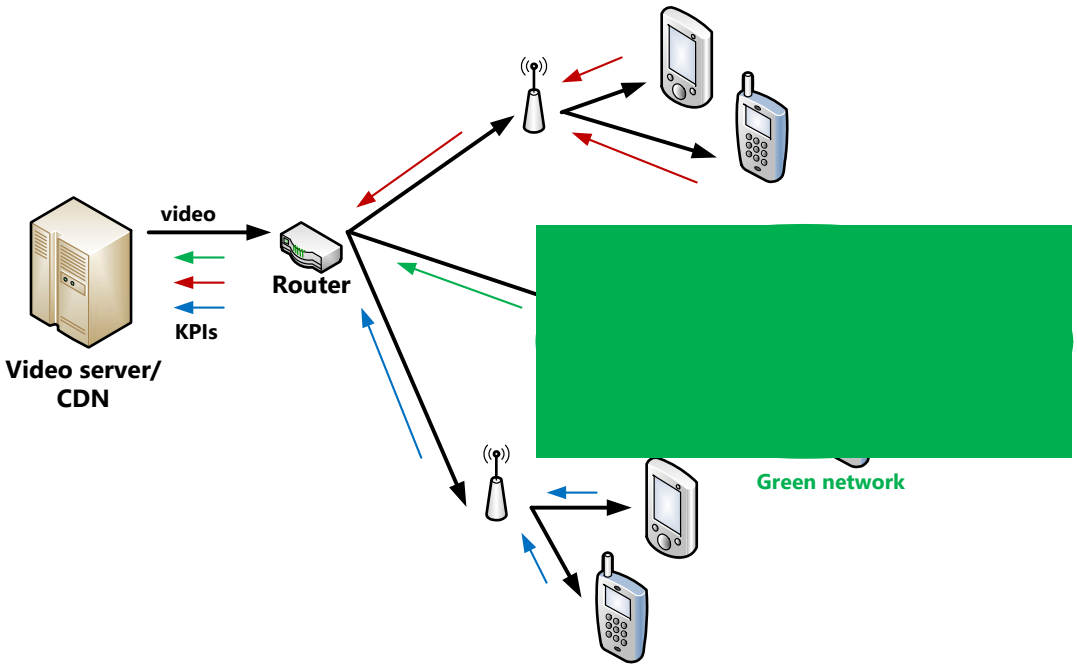

Figure 1 - Video delivery and collection of KPI data

The diagram shows, in a very simplified view, the flow of video content (black lines) from video server or CDN to the mobile access networks and then to the consumers' handsets.

The handsets send back the KPI data which, as is shown later, is a compact data set that can be succinctly expressed. The KPI data will be collected at the network operators' equipment, and aggregated to form bulk statistics reporting network performance and highlighting any QoE problems. The data can then be analysed to reveal problems in any part of the network; for example, the green access network as highlighted.

KPI data to collect

Mobile video quality is extremely subjective and potential performance indicators differ between organisations and technology areas. However, the MVA has overlaid all of the factors that go into QoE, with this set of agreed KPIs emerging. The intent of this work is to bring alignment across the value chain.

Having agreed these KPI measures, we do not define specific targets for the KPI values, or apply a 'RAG' (Red, Amber, and Green) rating. There are too many reasons why different operators may have different target values for these KPIs. It was suggested that target values would be agreed between the content provider and the mobile operator, perhaps as part of their contractual agreement. For example, assume that a mobile network operator decides, due to internal strategy, to configure its network so that all videos start 10 seconds after a client request. It would then be meaningless for every content provider to flag this operator as 'red', simply because the MVA recommendation has 'RAG rated' a 10 second start-up time as 'red'. The parameters of individual operations will vary.

The MVA recommends collecting the following KPI data set:

Failure to start

Failure to start results in a very poor QoE, so measuring the number of video requests that do not result in a viable video stream is a very important metric.

Our recommendation is that mobile video terminal devices, and/or the video applications they run, are capable of reporting back instances of failure to start.

It is anticipated that this data would be collected and expressed, for example, as a percentage of all videos requested, across a particular network. Content providers and network operators could then agree and apply a RAG rating to this: however, this would likely be a purely private and bilateral agreement.

Time to start

How long did it take for videos to start, and what it the distribution of those start times?

Time to start is defined as the time period from pressing play on a device until moving images are shown on the device screen. Moving is defined as a frame rate of at least 5 per second. Some 64kbps streams show one frame per second along with the audio: this is not considered a video start.

The KPI data for this will be in seconds, and our recommendation is that mobile video terminal devices, and/or the video applications they run, are capable of reporting back time to start.

Again this datum could be collected, analysed and RAG-rated.

Stalling rate

This is the number of streamed videos that experience some stalling, i.e. the spinning wheel.

Our recommendation is that mobile video terminal devices, and/or the video applications they run, are capable of reporting back instances of stalled video.

Stalling rate could then be expressed as either the absolute number of videos experiencing stalling, or the percentage of all videos requested that experience stalling.

Stalling percentage

We decided to separate this out from the above because the extra detail is very useful. For a single video this would be the percentage of that video spent stalled or buffering. For bulk statistics this would be the overall percentage time that users spent in a stalled or buffering state.

This statistic can also be arrived at if mobile video terminal devices, and/or the video applications they run, are capable of reporting back instances of stalled video.

Video session 'abandonment' rate

Session ended by the network

Here the video session is not just interrupted but comes to an end, the reason for the termination being either the failure or lack of availability of the radio network.

Our recommendation is that mobile video terminal devices, and/or the video applications they run, are capable of reporting back instances of this.

Abandonment by the server

Here the video session is not just interrupted but comes to an end, the reason for the termination being either the failure or lack of availability of the video server or CDN.

Our recommendation is that mobile video terminal devices, and/or the video applications they run, are capable of reporting back instances of this.

Other KPI data considered

We also considered two other KPI measures, which we are not recommending:

Time to reach watchable quality (TTWQ)

The time period from video start (as indicated by moving images on the device screen, even if very blurry) until the video is clear enough that it can be comfortably watched for an extended period without viewer dissatisfaction. As a guide, this is typically found at around 500kbps for a smartphone. The time can be zero if the video starts at watchable quality.

The notion of 'watchable quality' is subjective, and may vary according to target video bitrate, screen size and device type.

Time to reach maximum bitrate (TTMB)

The time period from watchable quality until the video is displayed at the maximum available bitrate and image quality, for that combination of device, app and content. This will usually be sharper and clearer than watchable quality. The time can be zero if the first watchable video shown is already at the maximum rate.