OTT – VIDEO STREAMING CONSIDERATIONS FOR BETTER QOE

Rakhil Kalarithottathil, SME & Solution Architect, Tata Elxsi

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ABSTRACT

The quick acceptance of Over the Top (OTT) video services across the globe has taken many by surprise. It now plays a significant role in defining the current media landscape. While the content freshness and catalog uniqueness still drive the subscriber footprint of OTT streaming services, it is high time to have a retrospective on customer satisfaction related to video streaming performance. Quality of Experience (QoE) of video streaming services has been attracting more and more attention recently and is found to be a significant factor deciding the customer churn in the current competitive OTT market. OTT has created customer expectations that are significantly different from the past.

This whitepaper explains the practical factors affecting the streaming performance on a subscriber perspective and the considerations a service provider needs to follow for a better QoE KPIs. The paper also touches on the industry automation techniques to make sure the quality streaming service and performance are guaranteed before it is delivered to the subscribers.

INTRODUCTION: 'GOOD' VIDEO STREAMING IN OTT

OTT is a channel through which video content (and related display or a video advertisement) is delivered to end-users via the internet. The video can be delivered and viewed across devices, including mobiles, computers, smart televisions, gaming consoles, and streaming devices like Roku, Amazon Fire, Chromecast, Apple TVs, etc.

Before the video reaches the subscriber, it is prepared and conditioned for OTT delivery by different video delivery components. Concisely, the source video is encoded, packaged, published to the origin, and gets stored permanently or temporarily in the Content Delivery Network (CDN) before it is accessed by different OTT device client applications or players. The packaging can be of any streaming technology like HTTP Linear Streaming, HTTP Dynamic Streaming, HTTP Smooth Streaming, or DASH Streaming, depending on the platform or devices to which the streams are targeted. Apart from all these, other headend operations like entitlement, license verification, subscription, content discovery, etc. are also inevitable for successful playback.

The main components or process that has a very high probability of impacting video streaming and quality of experience are Encoding, Packaging, and Client players. Defining correct QoE KPIs and benchmarking the performance for streaming for changes in these components or is necessary for a qualitative video service delivery. With permutation of devices, diversified player behavior, fast and frequent changes in the applications (caused by headend changes and application features), and unpredictable network conditions, this has become a complex problem to define and solve for service providers.

Considering the competitive market, it is essential for video service streaming providers to cope with the fast-evolving technology and market trends and pioneer in the industry. Time to market for these exciting technological advancements in OTT is still a challenge for the service providers. With the advent of OTT & streaming, many new metrics which has a better correlation with the customer viewing experience have found its position along with some of the conventional video quality of experience matrices. Thus, it is imperative to measure the correct QoE KPIs, at the right time, under the and understand how 'Good' your OTT video streaming is.
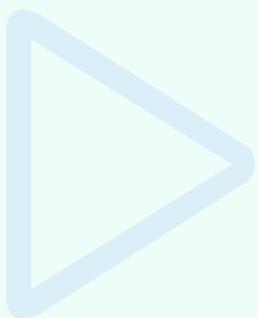
OTT CHURN AND QOE ASSURANCE STRATEGY

Worldwide OTT revenue was roughly $46.5 billion in 2017, which is expected to rise to $83.4 billion by 2022. Practicing churn management from Day 1 is necessary to win this streaming war. The significant reasons for voluntary churn in OTT are Poor User Experience, Lack of Unique and fresh content, high subscription fee, and payment related issues. Video Quality of Experience, while streaming is a major contributing factor for poor user experience and thus, engagement. Most of the subscribers get used to the UI and UX after using it for some time but expect the video streaming to be stable and reliable.
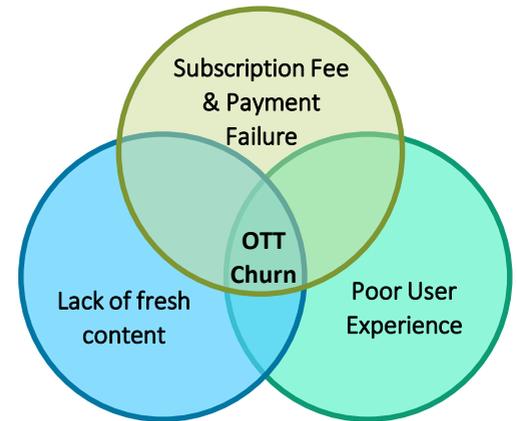

Figure 1: OTT Churn Issues

Issues like long video start-up time, buffering of the videos, and failures in the video cause the customer experience index to go down. As a result, QoE analytics reporting has become a default component in all the streaming application. With the capability of big data analysis, this is going to be a market of $ 1.67bn.

The state of streaming 2017, a survey created by IBM cloud Video, identifies 63% of live stream viewers in 2017 cited buffering issues as the most serious issue they experience. This number represents an increase from the previous year.

"25% of viewers claim that startup buffering is the most irritating aspect of internet video consumption."

The data from one of the pioneers of QoE Video Analytics shows that in 2017 a 0.2% increase in re-buffering ratio (of global video analytics of a streaming application) can reduce play duration by nearly eight minutes! Furthermore, consequent increases can continue to drive down engagement by more than 50%.

Gathering of QoE metrics as a global view is a must and excellent way of monitoring the service delivery across billions of customer base. This was the first generation or Phase 1 focus in OTT video analytics.

Currently, most of the service providers only rely on post deployed video QoE performance analytics. The drawback of this approach is any QoE issues will be identified post-release to the customer base. If the resolution time is not quick, this can also be a factor that caused increased voluntary churn.

Inspired by the agile methodology, the next phase or current attempts of video QoE analytics is to reduce the turnaround time of and first time quality delivery. This helps define a left shift strategy for video QoE assurance and makes sure the system is QoE benchmarked and tested before it is released to the customer. This process involves a non-eye ball test mechanism and powerful QoE test automation capability.

Figure 2: Global QoE Analytics Revenue, Rethink research, March 2018

CONSIDERATION FOR BETTER QOE

Quality of Experience KPIs

As in like any unmanaged network, the OTT comes with its complexity: ever-evolving technologies, third party client integration components, third party network, multiple headend components, etc. It is necessary to understand the influence of these complexities in the real user experience for which definitive and actionable QoE KPIs are a must. The QoE KPIs will have a high correlation if it replicates the real user action and the events in a user journey of any OTT application and streaming.
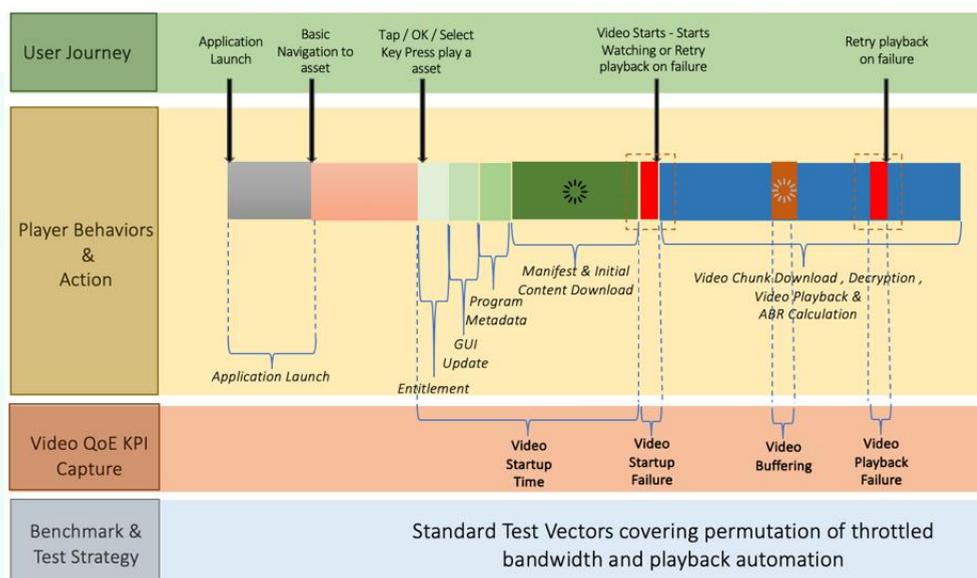

Figure 3: User Journey & QoE KPIs

The following table explains the QoE KPIs that helps in testing, benchmarking & monitoring any OTT application:

QoE Metrics	Definition & KPIs derived
Video Startup Time (VST)	The time between the user request a playback (OK / Select / Tap), and the first video frame comes in the output. VST (sec) = Time of Video play– Time of First Video Frame Appearance
Video Startup Failure (VSF)	The failure invent or error screen soon after a video startup request VSF % = No. of start fail / Total number of playbacks.
Video Buffering (VB)	In between the video playback, the screen is stuck, or an icon representing the non-availability of the video frame appears in the output. Video Buffering % = Duration of Buffering / Total Playback Duration
Video Playback Failures (VPF)	While the video is played, an error screen pop-up, results in the termination of the video playback. VSF % = No. of play fail / Total number of playbacks
Average Audio & Video Bitrate (Bitrate)	The video bitrate and audio bitrate accessed by the application or client Average Video or Audio Bitrate (kbps) = Sum of all video or audio chunk bitrate requested / Total number for video or audio chunks downloaded
Video Restart Time (VRT)	Time is taken to resume the playback from a pause sate of the video without exiting the player. VRT (sec) = Time of Video play – Time of Video Resume

Table 1: QoE KPI's For Benchmarking& monitoring OTT Applications

From an OTT perspective, all these KPIs become meaningful when captured at different bandwidth or network conditions. This helps understand the player performance in varied conditions and thus benchmark the performance for streaming QoE improvements. These can be represented in any statistical form based on the aggregation needed. For example, based on the required aggregation, the Video buffering metric can be represented by the duration of Video Buffering, Frequency of buffering occurrence, or Percentage of Video Buffering.

QoE Optimization Areas

Two areas that have direct affect QoE are:

▶ Video Player Framework in Client Application

▶ Video Stream Delivery

There are different factors and configuration that brings in better user experience. Few of them include the ABR algorithm used, the effectiveness of ABR logics, video playback buffer, read ahead of the streams from the live point, and integration with native players of the platform (if the application is utilizing platforms' indigenous players). The integration of generic video player with multiple platforms also brings in a platform-specific difference in performance. The player needs to be tuned for the streaming technology used (HLS, HSS, HDS, DASH, etc..)

As most of the player framework is tuned and configured for specific streaming configuration, any change in a streaming configuration, including the encoding, packaging, and distribution, will have possible effects on QoE. The target is to see if those chances are accepted by the players across multiple platforms and then in detail on how the stream during playback.

Any of the QoE optimizations is ideal when it is done in the bandwidth throttle scenarios. It can be a happy path in which constant network conditions with surplus but not infinite bandwidth is provided to the player or an unhappy path where we stress the OTT player or device that varied network conditions and bandwidth throttled patterns. There can be an intermediate path of network-controlled tests, which every player needs to adjust and stream optimally.

QoE Test Strategy

Apart from the recent prioritizations by the OTT market leaders, OTT QoE KPIs were just a monitored parameter to see global video QoE analytics. The rectification curve for any issues identified is very high in this approach. Also, the satisfaction and experience of the user are already hindered. The focus needs to be how we prevent this and bringing in a shift left approach QoE testing and benchmarking on the early stages of development.
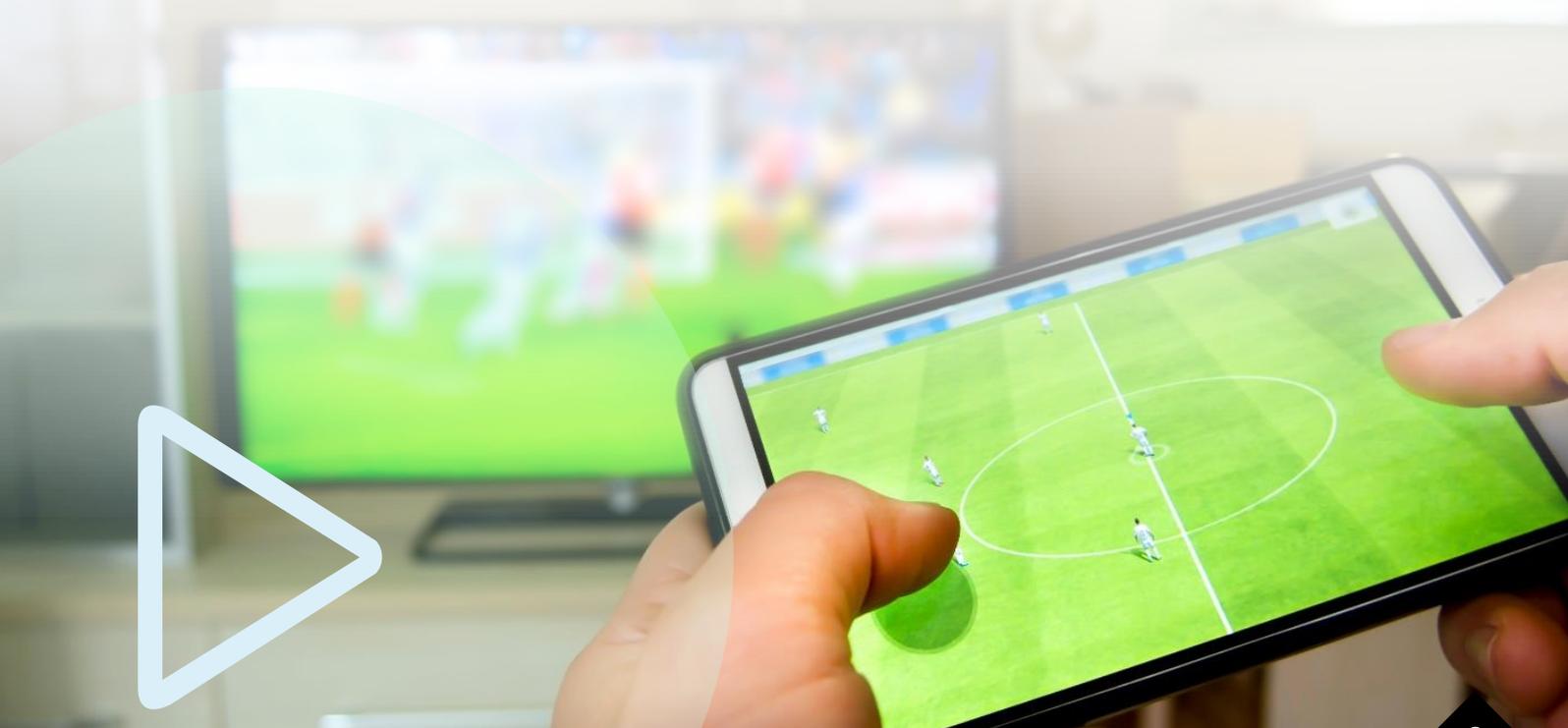
CONCLUSION

The rapid growth of OTT video streaming offers streaming service providers an excellent opportunity to increase their revenues and presents challenges and opportunities in testing and monitoring QoE.

Tata Elxsi helps to the streaming industry to formulate a QoE Test strategy, deliver better streaming products and user experience through FalconEye.

The definition of Good Video Service is rewritten with the advent of OTT. Understanding it in a much early stage is necessary to guarantee a better user experience for the streaming subscribers. Churn must be a high priority for any large organization to tackle. There is no hard or fast rule to manage churn rate; all we need is to test, monitor, innovate and refine the streaming components and algorithms to deliver better video QoE and allied features.

Tata Elxsi's Solution for Quality OF Experience Test Automation

Tata Elxsi's have a strong presence in the OTT world with its unique prepositions and solutions. Tata Elxsi's FalonEye is an automation framework that helps to automate and capture the significant QoE KPIs on a user perspective on pre and post deployments. Covering the automation of all OTT customer premises equipment including mobiles, Smart TVs, gaming consoles, STBs, OTT Streaming devices FalconEye provides a unique way of automating the QoE Tests. Powered with high precision APIs to calculate the QoE matrices FalconEye is the only solution in the market to induce in-home network scenarios and test the OTT device or application in various bandwidth and network conditions. The unique dashboards allow seamless comparison and aggregation of data from multiple deployments of FalconEye across the globe.

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ABOUT TATA ELXSI

Tata Elxsi is a global design and technology services Company. Tata Elxsi works with leading MSOs, content providers and studios to develop innovative services and applications that create subscriber stickiness and drive revenue growth.

This is backed by over 25 years of design and engineering experience and deep specialization in video and OTT engineering and service delivery, a global delivery presence, and offshore development centers in India. TEPlay is an all-in-one platform that relies on fully integrated technological building blocks, thus accelerating the launch of a next-generation OTT platform for Content Owners. It offers SaaS-based pre-integrated OTT Backend components (CMS, SMS, OTT Middleware, Usage Analytics, Content Discovery, UI Composer, Ad Tech Solutions, White labelled Apps) for faster deployment of OTT Services. TEPlay is backed with powerful analytics to improve engagement and make content more discoverable.

For more information, please visit www.tataelxsi.com click here

ITPB Road Whitefield Bangalore 560048 India | Tel +91 80 2297 9123 | Fax +91 80 2841 1474

info@tataelxsi.com | www.tataelxsi.com

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