



# Video QoE Analysis

Analyze user perception of video performance based on video-centric QoE metrics

## VIDEO QOE ANALYSIS DELIVERS:

### Accurate Classification

Sandvine's unique traffic classification and measurement technology delivers rich visibility into QoE and video service usage, regardless of video application encryption status

### Actionable Intelligence

Intelligence can be actioned with a network optimization solution to manage video quality based on the root cause of degraded video QoE

### Holistic View

Sandvine's Active Network Intelligence Portal (ANI) displays a comprehensive view of video content usage in the operator's network, including usage statistics, video quality from both a client and device perspective, delivery performance and quality for hosting services and CDNs, and location-specific quality metrics

### Augmented QoE key performance indicators (KPI)

Standard QoE KPIs – throughput, packet loss, and latency – are augmented with additional KPIs to determine the true viewing quality experienced by customers

## MARKET OVERVIEW

Video accounts for over 60% of total global downstream internet traffic, and is often the acid test when consumers gauge their operator's network quality. In order for network operators to meet customer expectations, they need to ensure popular video streaming services are delivered at the highest quality level with metrics that accurately reflect the true user experience.

Over the last few years, operators have been making efforts to move towards more service-centric monitoring, which requires a contextual view of video quality of experience (QoE), including individual locations, service plans, device types, and other key attributes.

With the wrong analytics solution — one without end user experience visibility or one relying on sampling — every video playback is a missed opportunity. In fact, with the right solution in place, every single video playback is a chance to measure and monitor the end user experience on the network. By truly measuring video QoE from the viewer's perspective, operators will be in a position to make an informed decision and choose the best actions to improve QoE, minimizing churn risk.

## The popularity of video, especially OTT video, creates significant challenges for operators:

- **Higher peak bandwidth levels:** OTT video (or video on demand) is consumed in real-time, instantly driving up traffic. Collectively, the daily demand for video typically peaks from 8PM to 11PM, and more of that video is attempting to stream in HD and 4K, driving up usage even without customer or ARPU growth.
- **Heightened quality sensitivity:** Video is a sensory experience with rapidly changing sights and sounds, so shifts in quality (e.g., stalls, pixelization, compression artifacts, shifts up or down in resolution, changes in frame rate) are instantly recognized by the viewer. These quality failures introduce a risk of churn and, if persistent, significantly impact network quality perception.

To truly measure video QoE, a solution must be able to detect and measure user actions and the behavioral characteristics of the video itself. Also, the solution must do so in an environment where most (likely to become all) video streaming traffic is encrypted, content associated with any individual stream can be split across multiple flows, and an individual household (or mobile hotspot, or other analogous point) can have multiple concurrent video streams in play.



## Sandvine's Video QoE KPIs

- **Throughput:** Also known as bitrate – calculated every 256 milliseconds (captures spikes and sudden bursts needed to download chunks of video) and aggregated over five minutes
- **Latency:** Internet and user side – calculated every five seconds and aggregated over five minutes
- **Packet Loss:** Internet and user side – calculated every five seconds and aggregated over five minutes
- **Video Resolution:** Possible values are SD, HD, FHD, and UHD
- **Streaming Health:** Indication of video stalls (measured on a scale of one to five, with one indicating high likelihood of stalls/longer stall occurrences and five indicating no stall occurrences)

### Video Solution Requirements:

- **Measure True QoE:** To support an operator's customer experience management initiatives, video QoE solutions must measure the video experience quality from the perspective of the end user.
- **Classify and Measure Encrypted Video:** To be effective, video QoE solutions must be able to accurately classify and measure encrypted video. Meaning, legacy solutions that rely on video header fields (e.g., container type, codec, resolution, etc.) are already inadequate and have a very limited remaining operational life. Heuristics is required to not only recognize encrypted video traffic, but also to determine the resolution dynamically to detect overall video streaming health.
- **Support Adaptive Bitrate Streaming:** To measure all contributing QoE factors, the video QoE solution needs to go beyond application identification and be able to determine the streaming technique, as the vast majority of video streaming consists of adaptive bitrate streaming, which is more challenging to accurately measure QoE.

## SOLUTION OVERVIEW

Sandvine's Video QoE Analysis enables network operators to measure the right video QoE metrics and KPIs for specific video applications and services in their network. The average streamer has higher expectations for quality, and this use case allows operators to closely monitor, report, and analyze encrypted and unencrypted video quality metrics to understand performance trends.

The video metrics and scores are calculated per subscriber, per application, per location, and per device every five minutes. With these KPIs (shown on the left), Sandvine provides operators a more comprehensive picture of the quality, which is necessary for conducting root cause analysis within customer care and planning systems.

The OTT video metrics that are collected include per video session, per subscriber, per application, per location, and per device on an hourly basis, and a video score is calculated using machine learning algorithms that are easy to understand by operational planning teams.

The solution not only uses key metrics to calculate video score, it also exposes the following metrics individually to provide a more comprehensive picture of the quality, in order for the operator to conduct proper root cause analysis within their customer care and planning systems.

This use case is offered with a dashboard via the ANI Portal, which includes both a usage overview (Figure 1) and a trends and outliers analysis (Figure 2).

Figure 1

### Usage Overview

In a single pane, view the number of users by video service, device, and network location

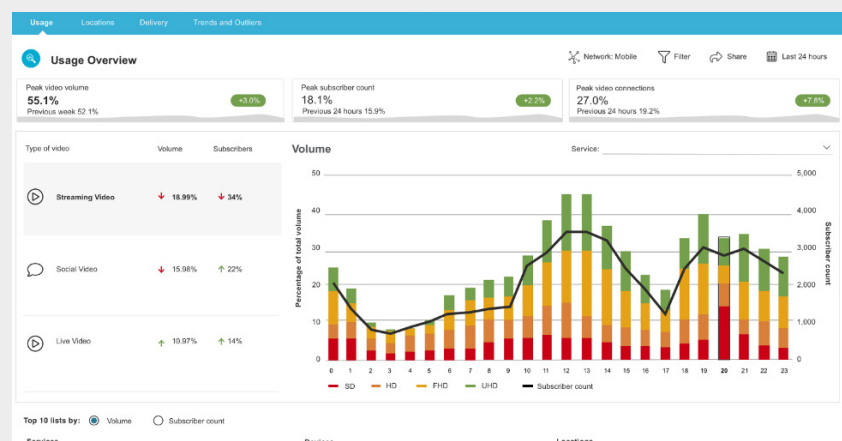




Figure 2

Trends and Outliers

Perform outlier analysis to understand which network locations and service require deep dives to understand impact on individual subscribers

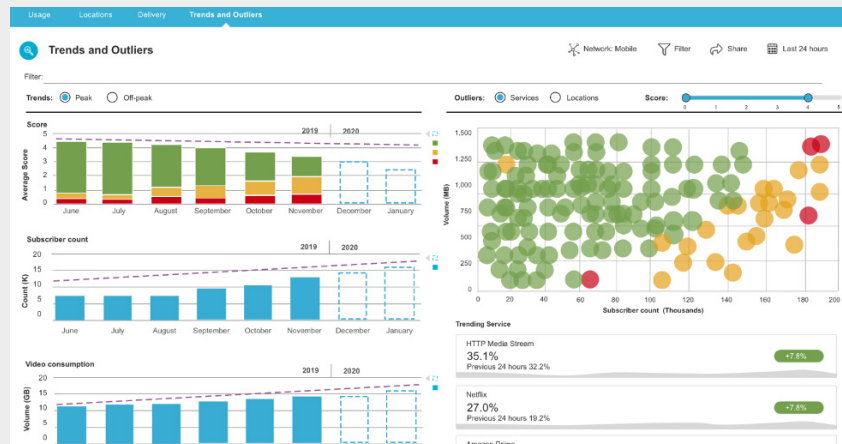


Table 1: Sandvine's Video QoE Analysis benefits a variety of different teams by providing comprehensive stats on video consumption and quality in the network

Network Planning	Network capacity planning (based on video consumption and forecast)
Customer Care	Determines proactive, actionable insights for potential root causes and remedies (especially where video performance is poor)
Peering Operations	Cache/CDN performance and efficiency analysis (amount of video traffic coming from CDN or Cache vs. total video traffic)
Product Management	Insights and churn prediction based on experience and consumption of video traffic

Sandvine's Video QoE Analysis addresses the needs of operators, helping them understand video QoE by combining existing KPIs (e.g., throughput, packet loss, and latency) with video-centric quality indicators: streaming health (likelihood of video stalls), video resolution, video application, and video engagement.

ABOUT SANDVINE

Sandvine helps organizations run world-class networks with Active Network Intelligence, leveraging machine learning analytics and closed-loop automation to identify and adapt to network behavior in real-time. With Sandvine, organizations have the power of a highly automated platform from a single vendor that delivers a deep understanding of their network data to drive faster, better decisions. For more information, visit [sandvine.com](http://sandvine.com) or follow Sandvine on Twitter at [@Sandvine](https://twitter.com/Sandvine).



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