



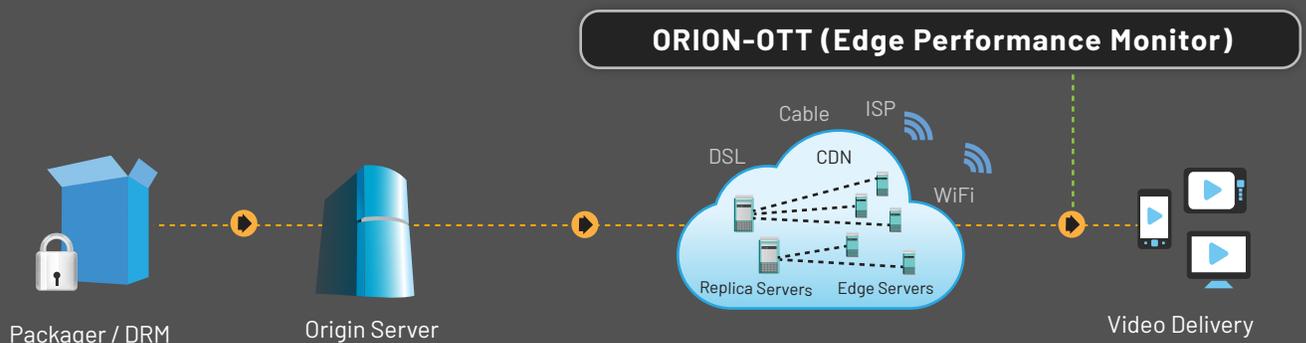
ORION[®] – OTT

Edge Performance Monitor

Measuring the Quality of Experience (QoE) on client devices is an important component of the entire monitoring workflow. QoE provides useful information about real user experience on client devices and also provides insights on data consumption trends. However, QoE issues observed on client devices can be isolated and their root cause can be ascertained only when this information is correlated with the monitoring data available upstream at Origin Server or CDN level.

ORION[®]-OTT Edge Performance Monitor performs client device monitoring and passes on the monitoring information to the centralized monitoring platform for a complete picture of your OTT workflow.

Client Device Monitoring



Client Device Monitoring using ORION-OTT Edge Performance Monitor

ORION-OTT Edge Performance Monitor (ORION-OTT EPM) is a passive monitoring probe that can be used to monitor service performance on end-devices to understand recurrent issues and their causes. It is designed to integrate with any Video Analytics tool. Currently, it supports NPAW's Youbora. This allows to collect and extract vital video performance metrics such as startup time, buffering ratio, number of stalls, play failures etc. across real user sessions.

The collected metrics are analyzed to isolate performance issues across various dimensions such as CDNs, ISPs, Country, City, Video titles etc. and drilled down to the root cause of performance issues. This solution extends to ORION Central Manager, an advanced centralized monitoring platform that collects data from multiple points and builds a complete end-to-end picture with meaningful insights.

Intuitive UI with Drill Down Capabilities

ORION-OTT EPM has a rich user interface with real-time views of all quality metrics. The quality metrics are segregated across various dimensions to help identify

anomalies. For example, the figure below displays the relative performance of all CDNs based on quality metrics, wherein values above a threshold are highlighted.

| CDN | Type | Happiness Score Δ | Alerts | Plays | Join Time (Seconds) | Avg. Bitrate (Mbps) | Buffer Ratio | Interruptions | Interruptions Ratio | In-Stream Failures (#) | In-Stream Failures (%) | Play Failures (#) | Play Failures (%) | EBVS (#) | EBVS (%) | Avg. Playtime (Minutes) |
|---------------|------|--------------------------|--------|-------|---------------------|---------------------|--------------|---------------|---------------------|------------------------|------------------------|-------------------|-------------------|----------|-----------|-------------------------|
| Akamai | LIVE | 🔴 | 🔴 | 33 | 0.002 | 1.003 | 0.131% | 3 | 0% | 0 | 0% | 0 | 0% | 19 | ▲ 57.576% | 0.902 |
| Unknown | LIVE | 🟡 | 🔴 | 830 | ▲ 7.196 | 0.918 | 0% | 0 | 0% | 22 | 0.148% | 6 | 0.723% | 466 | ▲ 56.145% | 6.459 |
| Cabovisao, SA | VOD | 🟡 | 🔴 | 61 | ▲ 9.82 | 0.522 | 1.002% | 49 | 0.119% | 0 | 0% | 2 | ▲ 3.279% | 11 | ▲ 18.033% | 2.246 |
| Unknown | VOD | 🟡 | 🔴 | 825 | ▲ 6.067 | 2.336 | 0.105% | 90 | 0.009% | 24 | 0.237% | 8 | 0.97% | 261 | ▲ 31.636% | 3.995 |
| Not Reported | VOD | 🟡 | 🔴 | 57 | 2.069 | 0.639 | 0.072% | 1 | 0.001% | 1 | 0.148% | 3 | ▲ 5.263% | 2 | ▲ 3.509% | 4.169 |

Fault Correlation and Isolation using Centralized Monitoring Platform

Client device issues in isolation do not provide enough information to perform root cause analysis. Therefore, it is important to correlate the findings at different points in a monitoring workflow and derive meaningful information out of it. This requires an advanced centralized monitoring platform like ORION Central Manager, to gather data from multiple points in the workflow and frame a complete end-to-end picture with relevant perception.

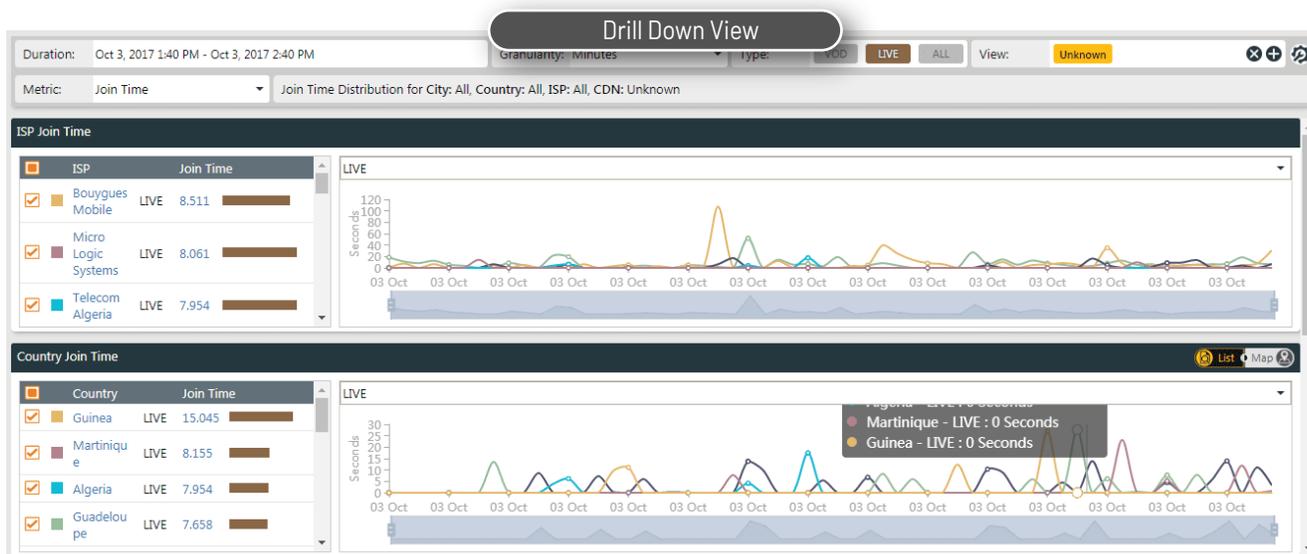
For example, consider a scenario where buffering is observed on client devices. Response times reported by probes at Origin / CDN are found to be normal during this period, which signifies that the ISP connection at client level could be faulty. Using the workflow monitoring capabilities in ORION Central Manager, you may draw such inferences across issues in your complete workflow.

The figure below displays unusually high “Join time” that can be attributed to a single ISP, thus, isolating the fault source.

Similarly, using the Service Lineup view in ORION Central Manager, you can view the issues specific to a video title at different points in the

workflow – covering the active monitoring at Origin as well as CDN, and the passive monitoring at client device level.

There may be cases where a low Happiness score at client device level can be attributed to content issues reported by active probes upstream.



Configurable Alerts

Using ORION-OTT EPM, you can setup alerts for different quality metrics and receive notifications for these metrics. For example, you can setup an alert

for cases where Join Time is greater than a threshold for a persistent duration. Such real-time alerts help you identify and resolve issues at the earliest.

Video Performance Metrics *

The following list of video performance metrics is available in the ORION-OTT EPM tool:

Join Time

This refers to time in seconds taken by player to establish connection with the stream and play the first frame after the play button is hit or player initiates the play sequence on auto-play mode. The data displayed is an average of all end-user connections.

Buffer Ratio

This ratio represents the amount of time users experience buffering during a video session. The ratio is obtained by dividing buffering time by total playtime. In the ratio, initial stream-join buffer is excluded. A buffer event occurs when the player is trying to play video segments that are still awaiting download. The player then requests more data for playback, and stores enough video data to enable the playback.

* The metrics' description is referred from Youbora

Interruptions

This metric displays total aggregated number of buffer events affecting initiated plays.

Interruption Ratio

This ratio displays the average rate of interruption affecting all sessions over a given time. It is obtained by dividing the number of buffering events by concurrent plays. Interruptions Ratio is a good measure of the frequency of buffers affecting users.

In-stream Failures

This metric refers to absolute number of in-stream failures in the period observed. In-stream failures are errors reported by the player during successfully initiated plays.

In-stream Failure Ratio

This ratio provides an idea of how many errors are reported in-flight for concurrent plays. In-stream failures are errors reported by the player on successfully initiated plays.

Play Failures

This metric refers to absolute number of Play Failures in the period observed. Play Failures are registered upon player initialization, before being able to join the stream.

Play Failure Ratio

This metric indicates a ratio of failed plays to attempted plays. Play Failures are registered upon player initialization, before being able to join the stream.

Average Bitrate

This metric indicates average bitrate in Mbps consumed by players during playback session.

Happiness Score

This metric depicts average Happiness Score of all plays of the platform. The score is an algorithm extracted from every view based on quality parameters and view duration. Happiness Scores range between 0 and 10, where 10 denotes Excellent and 0 denotes Not Ranked.

Plays

This refers to the aggregate of all play attempts initiated during a given time frame regardless of whether the play continued or stopped after sometime.

Exit Before Video Start "EBVS" (Total)

This metric reports the number of EBVS occurrences in a given interval. EBVS represents video connection attempts without registered errors that terminated before the first frame of video is displayed.

Exit Before Video Start "EBVS" (Ratio)

This metric reports the ratio of EBVS to play attempts for a given interval. This ratio is of EBVS from all users attempting a play. EBVS represents video connection attempts without registered errors that have terminated before the first frame of the video is displayed.

Average Playtime

This metric reports the average playtime for all views registered on the platform.

* *The metrics' description is referred from Youbora*