

Video AI Alerts

An Artificial Intelligence-Based Approach to Anomaly Detection and Root Cause Analysis for OTT Video Publishers

Live and on-demand programming delivered by over-the-top (OTT) will soon be the preferred method for consuming video content across all demographics. OTT's popularity is driving new and traditional TV providers into the streaming market with competitive service offerings and content. With multiple streaming services to choose from, quality of experience (QoE) is becoming the key differentiator and driver of subscriber satisfaction and loyalty. And, with increased adoption, viewers are starting to demand the broadcast quality from OTT that they get from cable or satellite across every screen.

In this short paper, we'll look at the factors driving complexity in OTT video delivery, how those make it more difficult and expensive to maintain viewer engagement, and what publishers have done up to now to identify, diagnose and solve the quality issues affecting the viewer experience. Then we'll introduce the new Video Artificial Intelligence (AI) Alerts technology from Conviva, examine how it works and demonstrate through examples and use cases why it's changing the game for publishers looking to differentiate themselves by continually increasing video delivery quality across all devices.

MANAGING THE COMPLEXITY OF OTT MANUALLY

Delivering streaming video content over the internet is complicated, and the addition of factors like utilization of multiple content delivery networks (CDNs) and device proliferation is making it more complex. Up until now, one of the most effective QoE tools for publishers to uncover issues and find root causes and potential solutions to fix viewer interruptions has been the manually configured alerts. These alerts are a feature of the QoE measurement and analytics services like those provided by Conviva and can be manually configured by the publisher to push a notification when an experience metric is being monitored – such as bitrate, rebuffering ratio or video start time – reaches a specified threshold.

Clearly, manual alerts have been an effective tool for OTT providers. Without them, viewers would be stuck in an endless cycle of poor video quality, and publishers would be left groping about in the dark to fix it. With the alerts, a provider, for example, that is having issues with a specific CDN can set an alert to fire when a high rebuffering rate is detected. Then it can assign an operations team to dig into the related logs to diagnose and take corrective action. But manual alerts rely on human intervention and require a deep expertise and experience with network engineering (and knowledge of and insight into multidimensional thresholds) to configure. That combined with the massive spike in the volume and variability of QoE data that publishers now have to monitor makes it increasingly difficult for technical operations teams to manage QoE issues manually.

OTT QUALITY IS ONLY GOING TO GET MORE DIFFICULT TO MAINTAIN

The factors involved with streaming internet video have increased exponentially over the last few years. Where publishers once had a few hundred assets, they now have thousands. The same multiplication has taken place across content management systems (CMS), origin servers, internet service providers (ISPs), devices and metrics so that today there are hundreds of millions of possible combinations of dimensional issues that can affect video quality (see Figure 1).

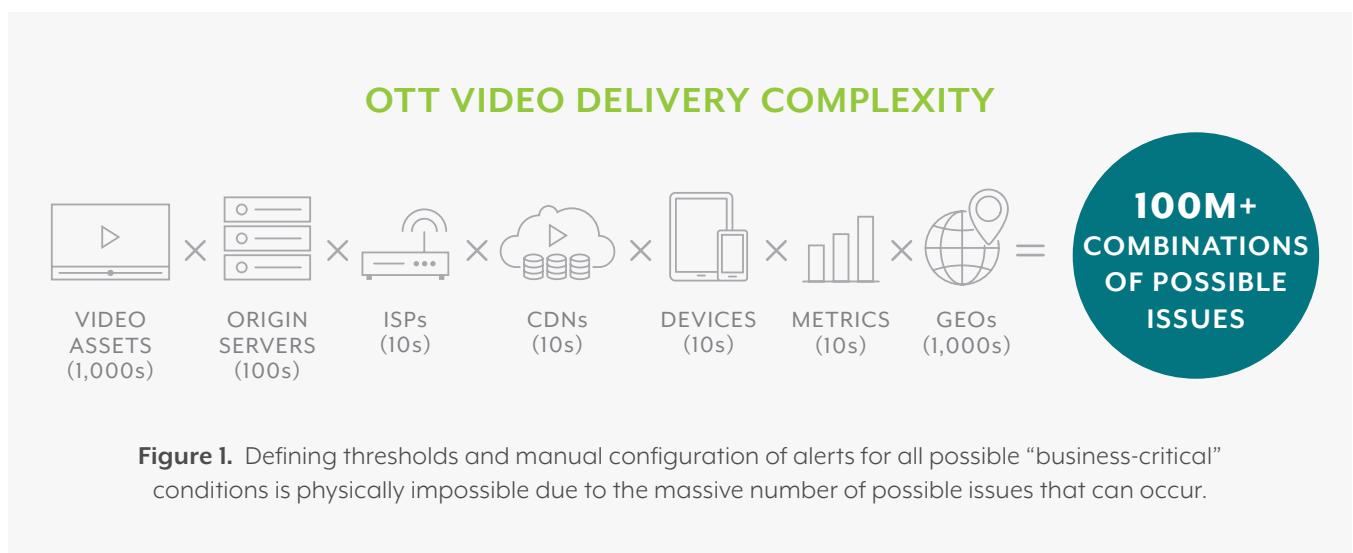


Figure 1. Defining thresholds and manual configuration of alerts for all possible “business-critical” conditions is physically impossible due to the massive number of possible issues that can occur.

TOWARD A DATA-DRIVEN SOLUTION

The problem of how to deal effectively with the torrent of data flooding business systems is not unique to OTT, nor is it necessarily negative. Other industries, like network security, are finding ways to use big data algorithms, automation and machine learning to turn it into an advantage, and video providers are starting to follow their lead. Conviva has been leading the way and recently launched its new Video AI Alerts technology powered by machine learning to better leverage the QoE data it captures and enhance the discovery and diagnostic capabilities of its Experience Insights product.

SEEING THE FOREST FOR THE TREES

Through the continual measurement of its customers’ video streams, Conviva captures millions of QoE and engagement events from millions of devices. That gives it an unprecedented amount of data about OTT (see Figure 2). To leverage that data, Conviva began to develop technology that could model all the possible QoE dimensions that make up the viewing experience. The result is its proprietary machine learning algorithm, which uses its understanding of the factors affecting quality to help customers improve their streams.

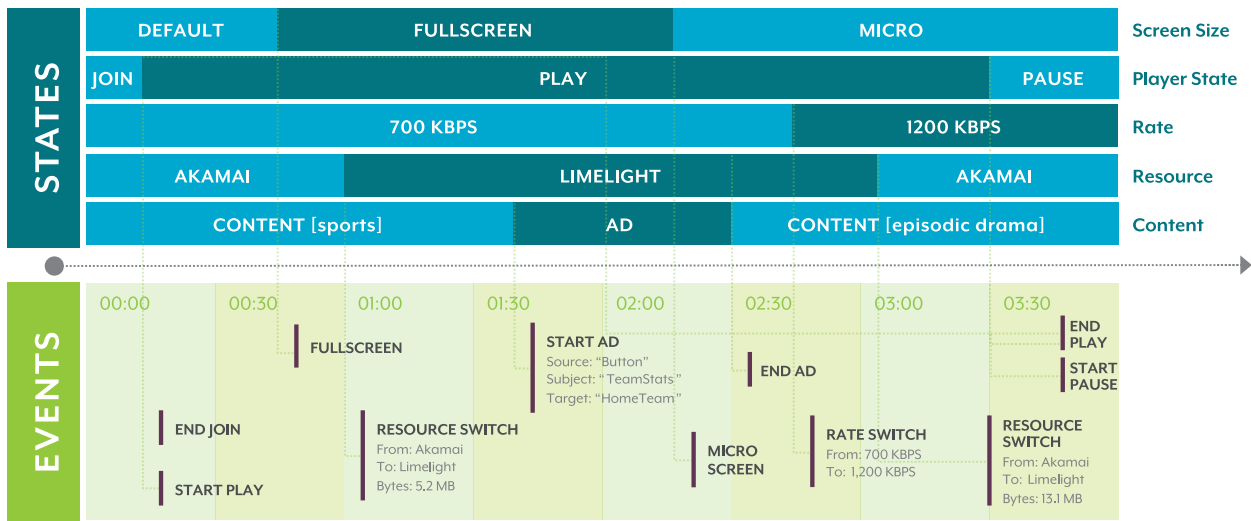


Figure 2. Granular data captured by Conviva's platform.

INTRODUCING THE VIDEO AI ALERTS

Conviva's machine learning algorithm discovers patterns within individual metrics like rebuffering ratio and video start failures (VSF), recognizing similarities and anomalies that could be applied to all of a publisher's streams. That gives Conviva the ability to drill down into each event and unpack all of the dimensional factors affecting quality as well as provide data intelligence to take it a step further and proactively scan the data and uncover issues not even on the publisher's radar (see Figure 3).

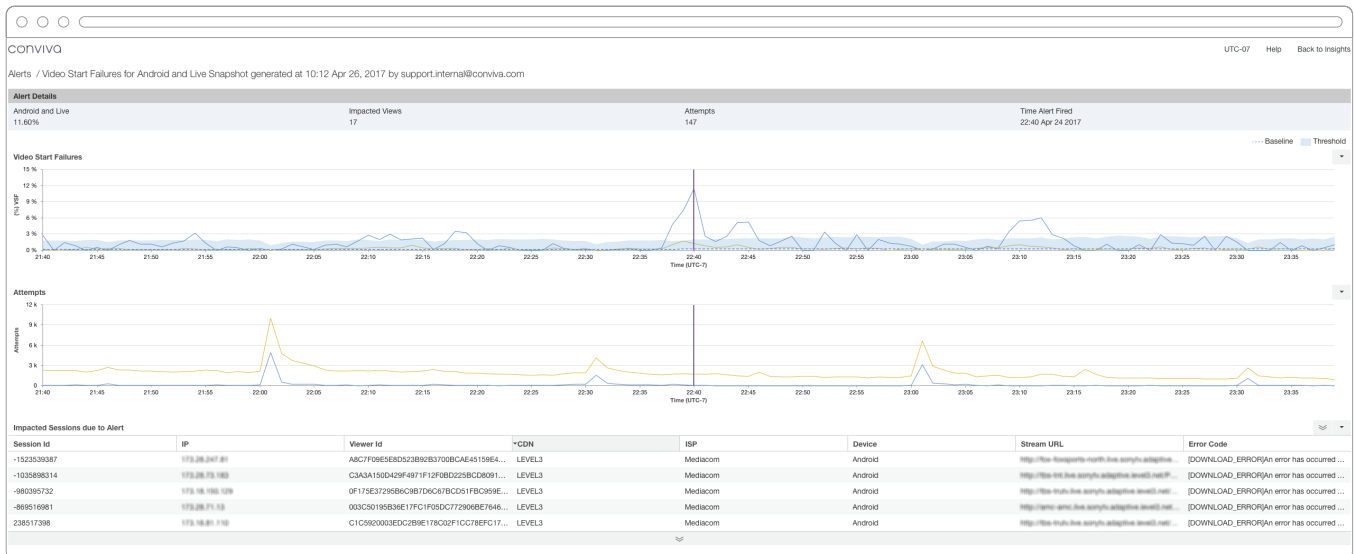


Figure 3. Video AI Alerts: True data-driven problem detection and diagnosis of the root cause for video delivery interruptions.

AUTOMATICALLY DIAGNOSE PROBLEMS IN REAL TIME AS THEY OCCUR

The data-driven algorithms behind Video AI Alerts scan continuously in real time through the millions of data points that make up each provider’s video streams, building a profile of dynamic thresholds and statistics for the many different combinations of dimensions and metrics. Now, when an issue or anomaly occurs, it is immediately detected by the algorithm and an alert with a detailed analysis of the root cause and those affected – including impacted views, session ID, IP address and asset information – is automatically generated and sent to the provider’s operations team. The technology behind the alerts is continuously learning and being fine-tuned by Conviva’s data, giving it an unlimited capacity to find new anomalies and increase accuracy and precision.

MANUAL VS. AI ALERTS

Video AI Alerts discover and diagnose interruptions that would be otherwise impossible to detect and proactively improve viewer experience.

MANUAL ALERTS	VIDEO AI ALERTS
Operations needs to know and specify the thresholds	Machine learning-defined thresholds
Manual configuration of alerts	Automated configuration of unlimited alerts
Displays only what the issues are	Automatically displays issues and diagnosis
Analysis required to uncover root cause	Eliminates the time required for analysis
Time to resolution can be long and costly	Accelerates issue resolution and trims costs

ADJUST THRESHOLD SENSITIVITY UP OR DOWN AS CONDITIONS DEMAND

The Video AI Alerts are configurable, which means each threshold can be manually adjusted for every metric and duration. For example, an alert must persist for X amount of time and impact Y% of traffic before it triggers a notification. That is especially important at the device level, where baselines can vary greatly and a normal condition for one device can be anomalous for another (see Figure 4).

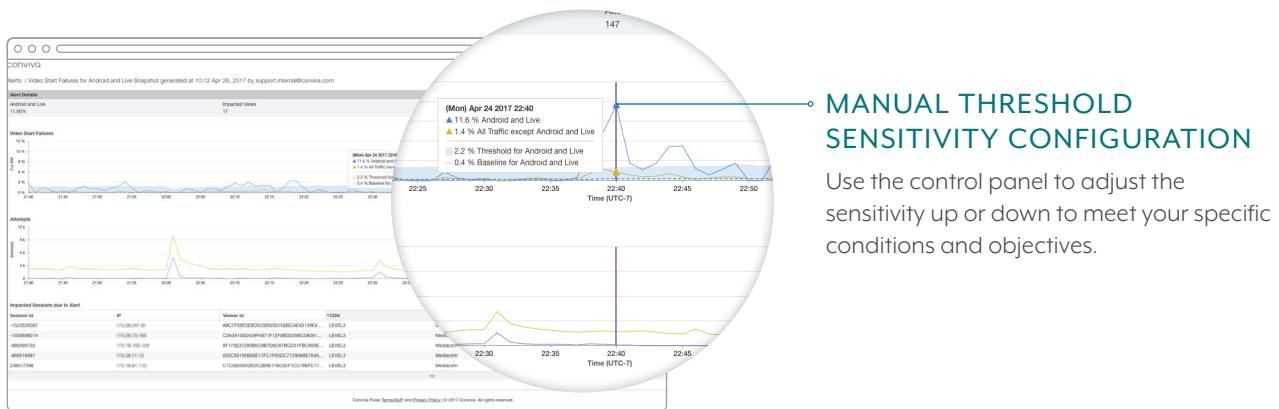


Figure 4. Video AI Alerts can be configured to trigger notifications based on metrics and thresholds that are critical for your business thanks to its sensitivity management capability.

EVERY PUBLISHER BENEFITS

The Video AI Alerts are an important strategic tool, helping the publishers using them to refine existing (and define new) goals and do more with less to achieve them. OTT providers come in different shapes and sizes, all with different audiences, business operations and objectives. The alerts support the strategies of large publishers, which need to maintain the quality of their mass broadcasts reaching hundreds of thousands of subscribers, and smaller providers, which look to build audiences with a variety of quality streams targeting multiple niche viewers.

The configurability of the alerts allows each publisher to align the settings with the specific needs of their business strategy.

LARGE PUBLISHERS

with massive operations teams can leave the threshold and duration settings relatively low, allowing them to pick up and respond to every event.

SMALL PROVIDERS

with minimal operational staff and effort can set the thresholds and/or durations higher, leaving their engineers to tackle the major problems affecting the majority of viewers.

NICHE STREAMERS OF LIVE EVENTS,

like regional or non-major sports, can monitor every camera angle and stream without having to set up manual alerts for each feed.

DO MORE WITH LESS

In every case, the Video AI Alerts reduce operational costs by giving publishers the ability to do more with less.

Detailed root cause analyses – included with every alert – dramatically reduce the time and manpower needed to solve video stream quality issues.

Understand and quantify audience impact, showing exactly why and how many viewers are affected to promote better cost-benefit-based analyses.

Threshold sensitivity configuration, allowing for the dialing up and down of thresholds and duration, provides scalability.

And the built-in integration with other line-of-business systems makes it easy to correlate the alerts with engagement data, facilitating better overall decision-making.

THE VIDEO AI ALERT IN ACTION

THE SITUATION

A small OTT provider with limited operational staff was having trouble maintaining the quality of its live broadcasts. In one case, a manual alert had identified an issue with the video start time for a particular feed, but, with so many dimensions possibly affecting it, the team was having trouble diagnosing exactly what was causing it.

THE SOLUTION

The Conviva Video AI Alert monitoring and diagnostic tool was enabled for its live feeds. Now, when an alert is fired, members of the network operations team receive a detailed report identifying not only the issue but also stats on those affected and the root problems causing it. In the case of the live feed with the delayed start time, the team was able to quickly pinpoint the issue to a faulty router that was acting as a proxy server for users with iPhone devices.

THE RESULTS

With the Video AI Alerts, the provider now has what it needs to quickly run down problems, assess whether or not responses are needed and scale team assignments to manage them. Time to resolution is critical for live broadcasts, and the Video AI Alerts allow the provider to quickly diagnose and repair issues, like the one with the faulty router, before the viewer is even aware there is a problem.

Understanding the Relationship Between Experience and Engagement Is the Key to Improving Both

With millions of eyeballs up for grabs, improving viewer experience is critically important for publishers looking to separate themselves from the competition. Through its platform, Conviva measures more than 25B video streams per year and uses its machine learning algorithm to instantly process engagement and experience data for over 2.5B video applications across more than 180 countries. Because timing is critically important to viewer engagement, all calculations are completed in real time within seconds of the event data being collected, ingested and processed (see Figure 5). That gives Conviva an extraordinary ability to understand viewer behavior and use predictive analytics to help publishers quickly identify and troubleshoot problems affecting video quality.

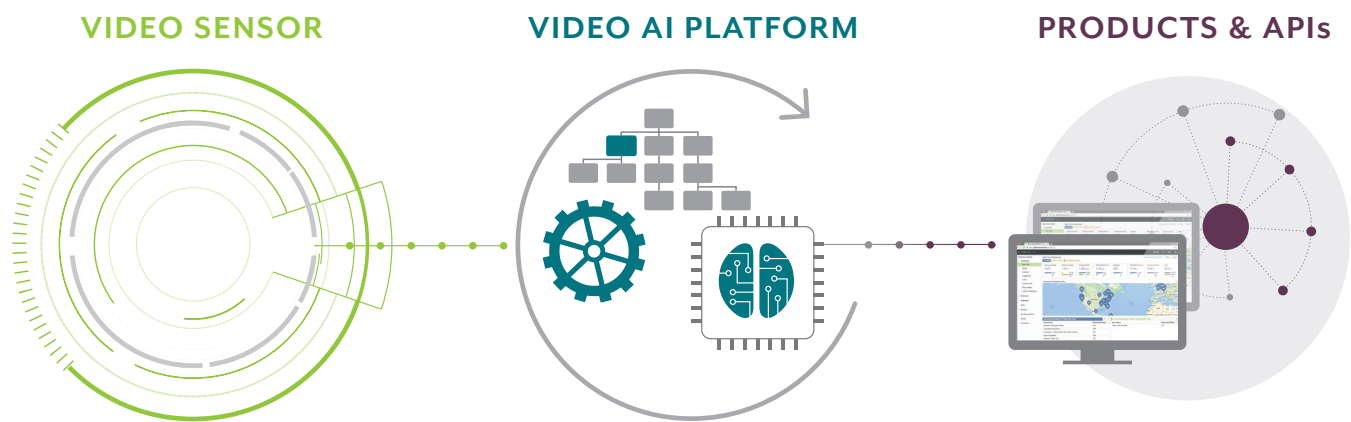


Figure 5. Conviva Real-Time Data Platform.

The Video AI Alerts take the technology a step further, using the multi-dimensional analytic capabilities of the platform to automatically detect and diagnose video playback problems. By abstracting the complexity away from maintaining quality, publishers are now free to focus the manual alerts on engagement and other customer experience metrics. Together, the Video AI Alerts and manual alerts provide publishers with greater visibility into all of their operations and a powerful tool for understanding the interaction between experience and engagement and how to optimize both across every platform and video-viewing device.

ABOUT CONVIVA

Conviva powers every internet-connected screen with the most engaging viewing experiences imaginable by elevating the way OTT businesses use data-driven intelligence. For years, HBO, Sky, ESPN and the like have been using the Conviva Video AI Platform to enlighten, reveal and inform with important insights around the consumer in-screen viewing experience, allowing them to connect those metrics to important business outcomes. This allows customers to not only maximize subscriber retention and growth but also understand content and viewing trends so that they can deliver more personalized viewing experiences. We make engagement a data-driven outcome based on actionable quality of experience (QoE) analytics.