

## STREAMPILOT

Unique multi-CDN control with real-time, in-session and per segment-based delivery of streamed media independent of CDN, client or video format!

# DELIVERY CONTROL FOR MULTI-CDN ENVIRONMENTS!

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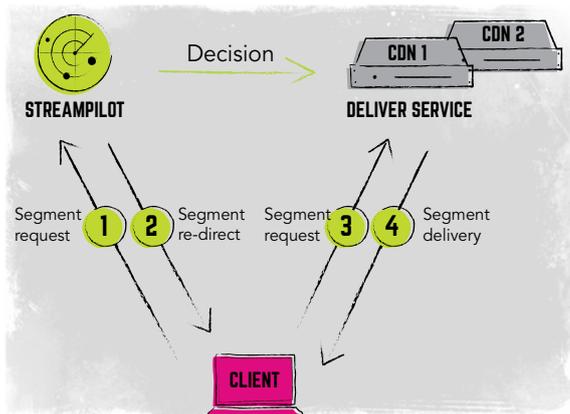
You have invested in TV content and are delivering it over the Internet from one or multiple CDNs. Your customers are watching on the client device of their choice and you want to make sure they view it with the best possible quality of experience (QoE).

But when streaming from a third party CDN service you don't have the same level of visibility into how your content is being viewed as you have when delivering from your own CDN infrastructure. And, without this visibility you lose sight of how the customer is experiencing the content, or if they even receive it.

Lacking both the visibility and the means to affect the individual sessions makes it hard to optimize the QoE when problems occur. Actions could be to move the session to another CDN to fix the problem, or to quickly identify the common denominator for the sessions experiencing the problem, and act upon the findings. Problems could be source, client, geography or content related.

There are solutions available to get visibility of viewers' QoE. For example, you can use client-side measurement to gain insight into how viewers are experiencing content. But today's client landscape is a fragmented and constantly growing mix of device brands, models and versions. Therefore, integrating with client devices quickly becomes complex, time-consuming and costly and you often end up with only a sample subset of your subscribers' clients.

So, is there a way to gain visibility and insights into viewers' QoE without having to integrate with your users' numerous client devices? And is there a solution available to proactively act on that information in real time?



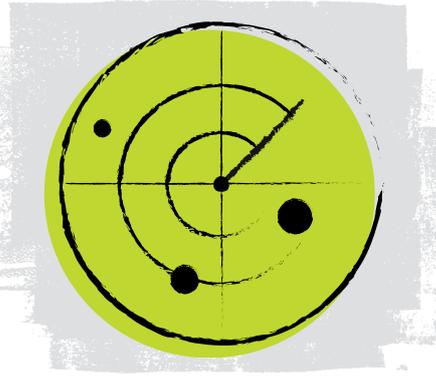
StreamPilot re-directs every segment request to the CDN most optimized for the delivery - independent of CDN, client and video format!

Yes, there is! StreamPilot by Edgware inserts itself in the control plane between the client and the CDN which is the sweet spot to be in when controlling the delivery of streamed media in multi-CDN environments. Once in the control plane you can control the delivery, totally independently of the CDN, client and video format.

StreamPilot's approach is based on deciding the delivery for each segment while keeping the session tied to itself, utilizing http re-direct for every segment being requested by the client.

This Solution Brief outlines Edgware's session control platform, StreamPilot, which is pioneering client-agnostic visibility of QoE information and providing fine-granular capabilities for OTT TV delivery control.

But, before digging into what StreamPilot is and can do, let's quickly talk about why QoE measurements and delivery control is such a challenge in multi-CDN environments.



StreamPilot is like a pilot on the sea, it discovers and monitors all elements that are difficult to get visibility of in order to gain important information that helps you to navigate and maneuver to a better QoE!

## WHY IS VISIBILITY AND CONTROL SO IMPORTANT IN MULTI-CDNS?

Multi-CDNs provide key means to optimize reach, manage redundancy and resiliency and to overcome traffic peaks by using a second and third source – such as during high profile live events, sports tournaments etc. But relying on multiple third party CDN services for your OTT delivery means that there is no overall control over the delivery. The control is shared between the CDN and the client, leaving the OTT TV service outside the decision loop. This creates some challenges which require specific attention and understanding:

- ✓ The stream control and measurement options that are available server-side are proprietary per CDN. This goes against the whole idea of having multiple delivery options where you don't want to be locked into anything proprietary to the CDN.
- ✓ The ability to impact the service regarding QoE is very restricted and in the hands of the individual CDN provider. If there is a service complaint it could end up in a monthly or annual SLA review, far from being addressable in real time.

## WHAT IS STREAMPILOT AND WHAT MAKES IT DIFFERENT?

StreamPilot is Edgeware's client-agnostic session control platform for delivery orchestration and control of streamed media across multiple CDNs. It inserts itself in the control plane between client and CDN to manage and supervise the session. Because it is in the control plane (i.e. outside the data path), it works totally independently of the client device and the CDN, making it ideal in a multi-CDN environment.

StreamPilot is a platform that provides a new level of granularity in the control of TV delivery, and provides:

- ✓ CDN switching in real time, in-session and per segment
- ✓ A client-agnostic platform, eliminating the need for client integration
- ✓ Independence from all CDN providers
- ✓ Independent QoE metrics based on all traffic, not subsets
- ✓ Open API-based session control

## TAKE CONTROL WITH STREAMPILOT!

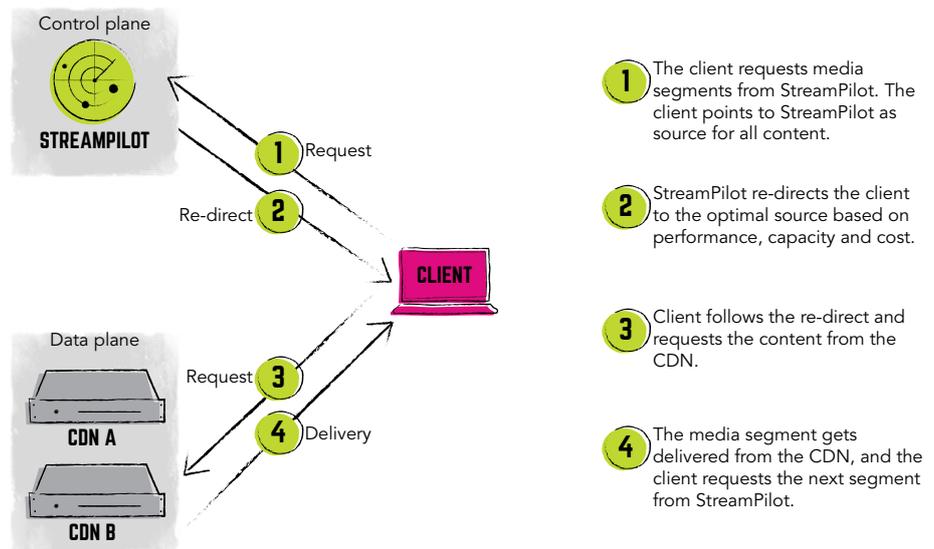
StreamPilot brings a set of key opportunities for you as a provider of OTT TV content. We have divided them into three categories:

- ✓ **MEASURE** – StreamPilot provides client-agnostic, unbiased and real time QoE measurements
- ✓ **MANAGE** – StreamPilot provides in-session switching/modifying/termination to optimize QoE, minimize cost and enforce distribution policies
- ✓ **MONETIZE** – StreamPilot provides valuable insights from session data on which new innovative campaigns and offerings can be based

## HOW DOES STREAMPILOT WORK?

Inserted in the control plane, StreamPilot has the ability to control sessions on a per-segment basis in real time. StreamPilot measures all client sessions and CDN performance, thereby enabling it to optimize the delivery to provide the best possible viewing experience.

StreamPilot builds on a per-segment http re-redirect functionality supported by all clients, see the illustration below.



## CLIENT AND CDN AGNOSTIC QOE MEASUREMENT

StreamPilot measures a number of key metrics from the client requests. Examples of metrics include:

- ✓ The bitrate that the client device is currently requesting. This metric is compared to what is available in the manifest and what the client device is capable of showing
- ✓ The type of device used
- ✓ The type of content
- ✓ Which video format (HLS, DASH, LIVE, VoD, versions and variants)
- ✓ The geographical location of the client
- ✓ Which ISP the connection is running over
- ✓ Which CDN is delivering the content
- ✓ The timing of the requests

All data is available through an open-API dashboard for easy integration into other systems.

While being in the control plane StreamPilot monitors every segment between the client and the CDN, not just subsets of sessions or subsets of clients.



StreamPilot also allows you to set up classifiers using fine-granular metrics to define and identify groups based on users, networks or content properties. These classifiers can be defined by the customer and grouped together to supervise and control subsets of sessions.

The monitoring of user-defined groups also makes it possible to evaluate changes in behavior when trying out new video formats. Potential problems are not only quickly identified, they can also immediately be fixed. This provides a quick and easy way of illustrating problems with quality and identifying possible patterns to explore further.

#### **IN-SESSION MANAGEMENT TO OPTIMIZE QOE AND ENFORCE DISTRIBUTION POLICIES**

StreamPilot provides in-session switching to the CDN most optimized to handle the segment delivery at the time of the request. The decision is made based on your definition of CDN Key Performance Indicators (KPIs) such as performance, load level and cost.

Should the client experience a drop in quality, StreamPilot will – in-real time and in an ongoing session – move the session to another CDN that provides better delivery performance.

Similarly, StreamPilot can modify an on-going session by re-mapping segments in real time to a different bit-rate in order to avoid exceeding capacity, which in turn could lead to buffering or streaming failures. With the knowledge of which bitrate the client supports, and what performance the CDN can deliver, StreamPilot can override a client's request for better quality in case it exceeds the current subscription level. Furthermore, StreamPilot can limit the number of viewers to avoid overload.

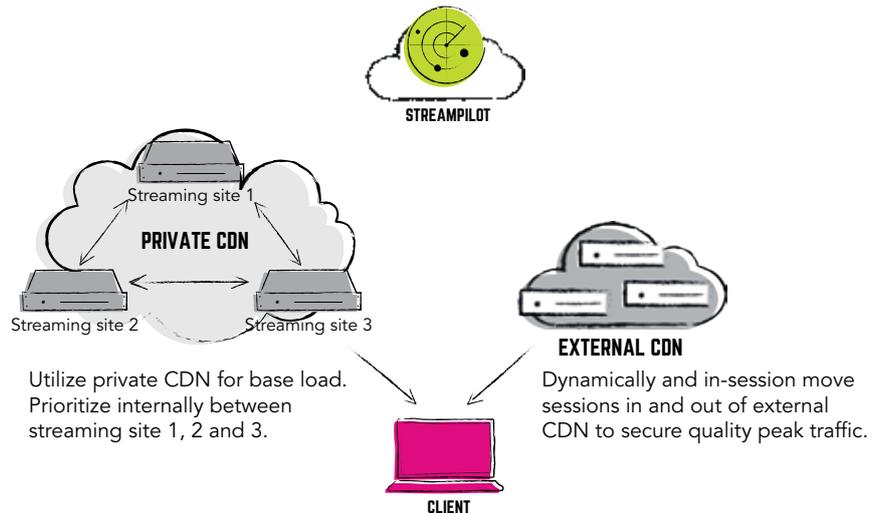
Another example of StreamPilot's control granularity is that it can terminate sessions to enforce distribution policies. Scenarios include preventing simultaneous streaming and account sharing, and the implementation of geo-restrictions. For example, if one subscriber is only allowed two concurrent sessions for his/her subscription level then StreamPilot can enforce this policy.

## IN-SESSION MANAGEMENT TO MINIMIZE DELIVERY COST

StreamPilot's granular control capabilities can also be used to optimize your delivery cost through switching in-session to a CDN that offers lower rates.

Or — in case you have your own CDN infrastructure — you can let the majority of the traffic pass through it, and only use third party CDNs for peak traffic utilizing your own CDN infrastructure with maximum efficiency.

See illustration below that explains this scenario further.

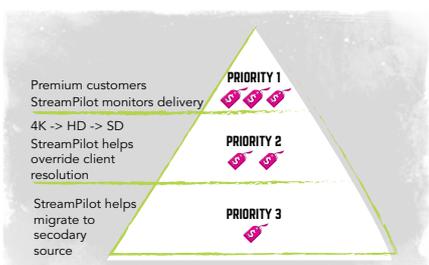


## AI ANALYSIS FOR QUICK AND EASY TROUBLESHOOTING

With the metrics collected by StreamPilot, AI can be used to characterize and recognize patterns for when problems may appear, spotting them before they happen. This is a valuable tool to identify the common denominator, root cause and/or to eliminate potential areas causing the problem.

Through classifiers set up within the dashboard, or via the API, you can filter out regions, types of clients, ISPs etc. and use this process to help identify why a problem has occurred or pinpoint its location. StreamPilot can also be integrated with your existing data lake solution to store all data in one place and to run rule engines using data provided from several different systems.

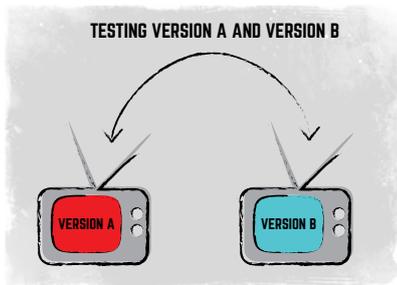
## MONETIZE YOUR QOE INSIGHTS AND DELIVERY CONTROL ABILITIES



With StreamPilot, you will get visibility and insights into how your viewers consume your TV content. For example, you will learn which bitrate they are requesting, which clients they are using and which TV content they are viewing. From this, you can draw conclusions providing useful insight when planning new services and campaigns. By overriding the client bitrate you can, in-real time, limit the resolution for subscribers with different priority levels, thus protecting

and prioritizing important customers or content if resources are limited. The ability to do this not only for new sessions but also for current sessions is an important tool, for example during peak hours or at the start of large sports events.

#### ACTIVE A/B TESTING FOR CONTROLLED ROLL-OUT OF NEW CODECS AND FORMATS



For many OTT TV providers, the ability to test and experiment with new formats and features in a controlled manner is absolutely essential before a new offering or service can be rolled out to a broader audience. Here, the ability to carry out A/B testing is key. StreamPilot's extensive measurement capabilities allows monitoring changes in user behavior and quality delivered on a subset of the subscribers prior to rolling out new audio codecs or video formats.

Sessions can be selected and defined to include control groups based on device type, geography or profile. The roll-out can then be scaled up in a controlled manner, with customers dynamically being moved from version A to version B or vice versa. The test also includes an option to immediately scale back if the introduction is not successful or shows unexpected consequences on the quality of experience.

#### CONTENT CUSTOMIZATION AND PERSONALIZATION

With the current trend towards theme-based viewing and personalized channels, StreamPilot provides a platform for individualization.

StreamPilot has a unique position in the network that enables it to select and replace segments, thus creating channels with personalized content defined by the interests or geographical location of customer groups. Examples include local weather/news channels or "fan-channels" that can be created in association with major live sports or music events. Content relevant for the specific user group can be inserted into the stream by StreamPilot and new service offerings can be launched to attract that specific group of viewers.

Another example includes a regulatory feature that some state-owned public broadcasters need to support in order to comply with their remit or responsibilities. This includes the vital role public TV channels can play in providing important information to viewers in the case of an emergency situation such as a fire, gas leak or serious incident. In this example, StreamPilot can insert the emergency information into the stream that is delivered to the clients in the relevant region.

## HIGH AVAILABILITY SOLUTION

StreamPilot is offered as a cloud service hosted by Edgware on any major public cloud platform. The high availability delivered by cloud providers, coupled with the redundant internal structure of the StreamPilot system itself, results in a highly reliable and available solution<sup>1</sup> for your TV delivery control.

Customers can benefit from the unique functionality of StreamPilot, combined with the advantages that a managed service model brings, such as easy deployment, speed of change and elimination of system operation tasks (e.g. scalability issues and software upgrades).

Finally, thanks to the built-in fail over mechanisms of the Internet, your StreamPilot service will be configured so that your TV streams will be delivered directly from the CDNs in the unlikely scenario of StreamPilot not working. This means that your customers can enjoy their requested TV content as expected. The screens will never go black!

## CONCLUSIONS

Edgware's StreamPilot brings client agnostic QoE visibility and a whole new level of control when it comes to delivering OTT TV content in multi-CDN environments.

By locating it within the control plane, content providers can optimize viewers' QoE, and minimize delivery costs. This is done by enabling users to:

- ✔ Switch, modify and terminate sessions in real time, in-session and per segment totally independent of CDN
- ✔ Get visibility into client metrics without any client integration
- ✔ Avoid dependency to clients, CDN or video formats

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<sup>1</sup> Tests shows that the availability of the StreamPilot system itself is higher than the availability of the cloud, meaning that a cloud-based StreamPilot total solution has higher availability than the cloud.