White Paper

Scaling Video Delivery to Reach Massive Audiences

IBM Watson Media

Introduction

Scalability can be a major hurdle when it comes to delivering video assets, be it live or on-demand content. For many organizations, the epitome of success for their video project can be going viral, reaching mass eyeballs along with potential leads or stakeholders.

Consequently, an organization's video delivery needs to be both reliable enough to depend on, while scalable enough to support company-wide endeavors or public facing content. Issues with reliability can hit organizations big and small. For example, scheduling a streaming shareholder meeting only to have the video solution buckle due to congestion can be a disaster. Video streaming has become such a hot commodity that stories of failures can even make the news.

In order to meet this need, robust solutions are available for delivering video assets. Part of the solution is having an effective CDN (Content Delivery Network) strategy. IBM Watson Media goes a step beyond this, however, through offering a more robust approach than the average user might realize. Called SD-CDN (Software Defined Content Delivery Network), this paper explains the advantages of using SD-CDN over a traditional content delivery approach.

This paper assumes you are already familiar with CDNs and the basics of content delivery over the Internet. If you want to learn more about this process and how things like edge servers work, please feel free to read our What Is A Content Delivery Network piece.

The Challenge With Video Streaming

Streaming video requires that a continuous stream of data is able to be received by the viewer. This is especially true for high definition (HD) assets, assuming bitrates are scaling accordingly. As part of the delivery process, the streaming content is broken into video chunks. These chunks are fragments of information, each of which has a header that indicates some parameters such as the type of chunk and the size.
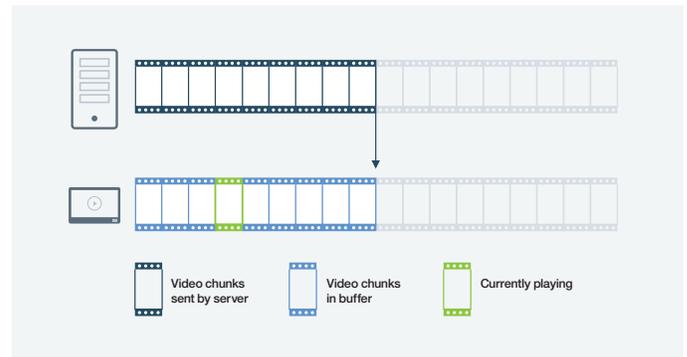

Figure: Receiving of video chunks

Because so many video chunks can be tied to delivering streaming content, chunks are preloaded before playback begins. This process is called buffering, and is even deployed on live streams which will have a few seconds of delay to allow for this technique. Buffering is meant to minimize disruptions, so that instead of the video stopping each time the connection is interrupted it can play from the preloaded chunks.

Despite the benefits of buffering, the term itself has taken on a negative association by end users. Viewers don't like to see that spinning wheel that disrupts their playback. Consequently, any methods that allow for reducing latency is considered a major benefit. Being able to speed up delivery to avoid the video player reaching that missing chunk before the preloaded chunks are used is at the essence of providing a better viewer experience.

Consequently, CDNs (content delivery networks) are highly recommended for an effective video streaming strategy. With multiple servers, the CDN will reduce the distance between an edge server and a viewer. It also lowers the probability that a server in the deliver process will become overtaxed from receiving so many requests to access the video asset.

IBM Watson Media
Enterprise Video Security Components & Services

Is a CDN Connection Enough?

Through being able to use a CDN, organizations get access to a highly scalable solution that offers lower network latency and lower packet loss. This also removes the strain from internal networks as a delivery source, avoiding the astronomical cost of having to upgrade an internal network to support the high bandwidth consumption of streaming video delivery.

However, sometimes a CDN connection is not enough. Although this delivery method is intended for global and massive audiences, issues can still arise.

One solution is to not rely on a single CDN, but rather utilize multiple CDNs in a workflow. Called SD-CDN, this is an approach taken by IBM Watson Media to aid in global delivery of content to virtually avoid congestion at any point in the delivery chain.

Multiple CDNs: SD-CDN

Called SD-CDN (Software Defined Content Delivery Network), this approach is an intelligent software orchestration layer. It manages the interactions between the various content delivery services and receiving viewing devices. This technology utilizes over half a dozen different CDNs, a number that has been gradually increasing.

The SD-CDN approach allows broadcasters to tap into multiple CDNs based on their needs without having to worry about configuring or paying for backup sources.

SD-CDN: Switching CDN Process

IBM Watson Media utilizes several CDNs in a process that picks the optimal network on a viewer-by-viewer basis. The process of selecting the optimal network includes multiple checks that vary in severity. These checks include mission critical checks, such as if a consistent 404 is being delivered by a provider. These can also be preemptive measures such as if the lowest bitrate option is being delivered, which can occur naturally if for example someone is on a mobile device with an unreliable signal, but the connection is struggling to receive the content in an adequate time frame which might point to an actual issue at the delivery level. As of January 1, 2017, IBM Watson Media's SD-CDN is leveraging nine different CDNs. However, the number of CDNs is under continual review and is updated frequently as additional providers become available.
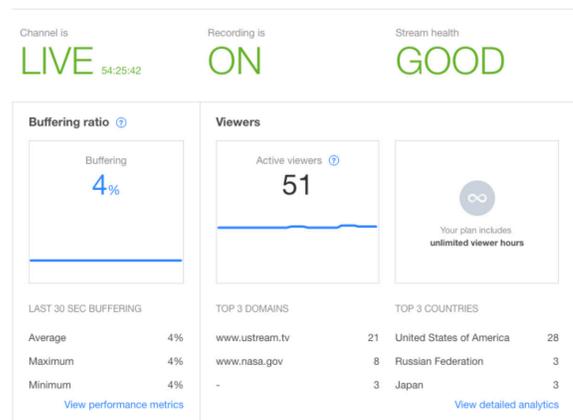

Figure: Live Monitoring Console

SD-CDN Advantage: Improved Global Reach

The primary advantage of using a multi-CDN approach is that different CDNs tend to have different strengths. For example, a CDN might have a stronger edge server presence in Asia and a weaker edge server presence in North America. This approach can offer long-term advantages. For example, an organization might be focused solely in North America, but if it adds a sizeable stakeholder base in another continent the multi-CDN approach would be able to support it without additional resources being committed.
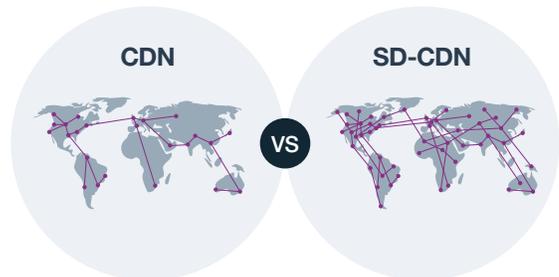

Figure: Edge server presence of one CDN versus the multiple CDN approach of SD-CDN

SD-CDN Advantage: Intelligent Traffic Management

A core benefit of the SD-CDN approach is that the technology scales automatically, dynamically adding or removing edges from the delivery process. The approach is perfect for a broadcast that starts quickly and accelerates quickly, going viral almost instantly. Through switching CDNs, as previously mentioned, and navigating various edge servers, the process rapidly and flexibly is able to route traffic without requiring any additional effort from the broadcaster. There is no extra step where a broadcaster has to select a backup source or state what publishing point they plan to utilize. The service is setup to simply and quickly go-live while letting the SD-CDN process scale accordingly.

SD-CDN Advantage: Increased Reliability

Another advantage, and arguably the primary benefit, is simply improved reliability. Despite reputation, no CDN is infallible. So while a CDN might be stronger in a particular geographic region, the possibility exists that something unforeseen might happen. For example, an edge server may become unstable and start to respond more slowly, or the path between the client and the edge may get congested, leading to packet loss, jitter, or other issues that can negatively affect performance. Most broadcasters realize this risk. Using a primary CDN and a backup CDN is one approach to navigate this concern, even though it is time consuming and costly for production.

IBM Watson Media, however, removes the unnecessary legwork for broadcasters of having to setup another CDN for backup. This is done through a built-in process, allowing streams to tap into many different delivery sources. Without a comprehensive multi-CDN strategy and the ability of making real-time CDN switches based on actual quality measurements from the client, the end user is exposed to the speed of how fast a problem will take to get solved by the CDN or other service providers in the delivery chain.

Delivering Internal Video At Scale

The SD-CDN solution will deliver content at scale globally. However, issues can still arise at the local level. For example, trying to service 90 employees with the same live stream on a 12 mbps download speed connection is a recipe for network bottlenecks. For issues of this nature, IBM Watson Media developed a solution called eCDN (enterprise content delivery network). Check here for more information if you need to scale video internally.
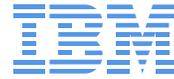
Deliver Global, Scalable Video Assets

CDNs help organizations reduce latency and deliver video assets more efficiently with less probability of playback disruption from buffering. IBM Watson Media's SD-CDN takes it a step further, adding increased reliability and improved global reach to a video distribution strategy.

Want to begin reliably streaming content to large audiences? Try out IBM Video Streaming and take full advantage of the SD-CDN capabilities.

About IBM Watson Media

IBM Watson Media delivers reliable and scalable video streaming services globally. Combining robust video functionality and exceptional cognitive abilities, IBM Watson Media provides oneof the most comprehensive video offerings available today.

For more information on IBM Watson Media, please visit www.ibm.com/watson/media.