mediaplatform

Solving Network Issues with Video on Demand (VOD) in the Cloud

Technical Brief

The Issue

As organizations create more video content, they are increasingly looking to cloud-based solutions for storage and management of these media assets. For example, one of MediaPlatform's clients is setting up a video content management system using MediaPlatform's PrimeTime media management solution hosted on the Amazon EC2 Cloud. This solution enables video on demand (VOD) access to the media content for the client's personnel. There are a number of technical and financial advantages to this cloud-based approach. These include avoiding a costly on-premise server setup and the diversion of IT resources to manage the solution in the data center. However, while VOD in the cloud is appealing, it does create a potential problem in bandwidth utilization.

VOD in the cloud can create significant load on an organization's link to the Internet, as shown in the figure to the right. Typically, an enterprise will have a connection to the Internet that it maintains through its datacenter. As users request videos from the cloud VOD solution, the media file will stream from the cloud to the viewer through that Internet connection. There are two potentially problematic scenarios that emerge from this process:
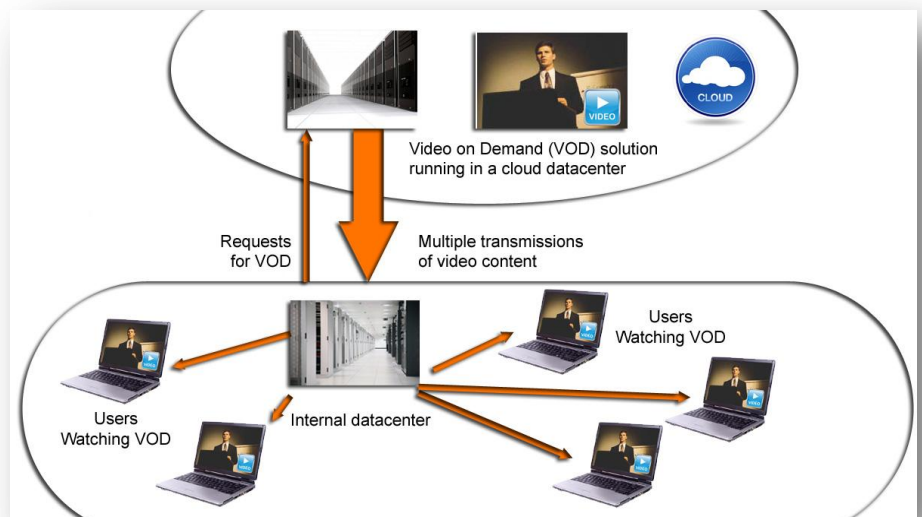
- Many people (employees behind the firewall) try to watch the same video at the same time.
- Many people (employees behind the firewall) try to watch different videos at the same time.

These scenarios may result one or more of the following network-related problems:

- The Internet connection can't handle the bandwidth.
- The network connections between offices can't handle the bandwidth.
- Performance of playing a video through your Internet connection from the Cloud versus from a local edge cache might not be as good.

Possible solutions to these VOD network problems include:

- Putting limits on the number of simultaneous videos (or another measure like bandwidth total) and give a message "system over capacity please try again soon". This is probably always needed anyway as you generally need to take measures to protect against having too much bandwidth ever being used by the same incoming Internet connection.
- WAN Optimization Solutions (i.e. Riverbed) that are combined with Riverbed Steelhead in the cloud. This solution leverages HTTP streaming through HTTP optimization platforms.
- WAN Optimization Solutions (i.e. Riverbed) not combined with Steelhead in the cloud means you might still have the problem of the main Internet connection getting overloaded. In that case, you need to combine limits or rsync to an internal origin server and then let the WAN Optimization (or eCDN) system take over.
- Traditional eCDN's: Cisco ACNS (now CDS) and RSync from Cloud to Origin. The content ends up living on an internal server and is then either deleted or duplicated in the Cloud.
- A hybrid solution in which encoders and server farms are behind the firewall. Server farms behind the firewall remove the problem of the Internet connection becoming overloaded. Encoders behind the firewall are simply for efficiency since uploading videos to the cloud, encoding them and then downloading them is slow and inefficient. However, this may also be desirable to minimize what a company needs to manage.
- Stagger email invites to "hot" videos.
- All videos can exist in multiple bit rates and leverage Adaptive Bit-Rate streaming.
- Define rules to force a lower bandwidth stream based on location (and therefore a particular sites bandwidth) or based on how busy things are at that moment.
- Increase the buffer-time. This will result in longer startup but might be worth it for less breakup.

Another consideration when discussing networks and cloud-based options with Primetime includes: Firewalls and proxies might prevent users from recording straight to an FMS server or from uploading content. If this is the case a company needs to open up rtmp port 1935 to allow live streaming up to the server (or maybe it tunnels using rtmpt, not sure on this). They would also need to allow uploading of content (port 80).

More about the Riverbed Solution Approach

MediaPlatform and Riverbed have developed a solution for the cloud VOD bandwidth problem. By integrating PrimeTime with Riverbed's Steelhead WAN optimization appliance in the cloud, it is possible to affect a significant reduction in bandwidth usage for cloud VOD. The integrated solution, which spans the cloud and on-premises instances of Steelhead, enables optimization of the streaming across the enterprise and its Internet connection.

How does it work? Basically, as depicted in the figure, the combined solution optimizes the streaming of on-demand videos inside the enterprise as a first step. Then, as users request videos from PrimeTime in the cloud, the internal Steelhead appliances check with the cloud instance of Steelhead to see if the video already exists inside the firewall. If the video has already streamed from the cloud and has been optimized by Steelhead inside the firewall, PrimeTime will not stream it from the cloud a second time. Instead, the requesting user will receive the video stream from an internal Steelhead instance.
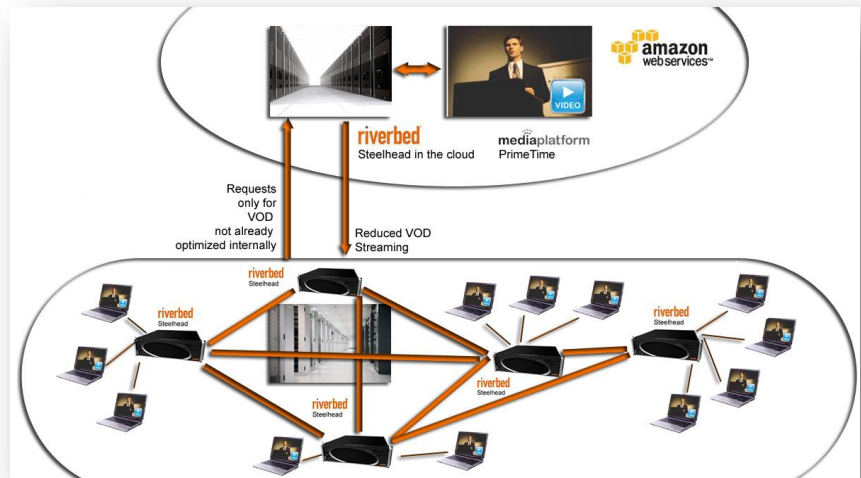
Results

The combined Riverbed-MediaPlatform solution produces results that can be easily measured. Tests of the solution show a striking result: When the PrimeTime cloud VOD solution is integrated with Riverbed Steelhead in the cloud, as well as on-premise Steelhead appliances, enterprises see an 80% drop in Internet bandwidth use related to VOD.

The Bigger Picture

The combined Riverbed-MediaPlatform solution also addresses a bigger economic issue at many large organizations. Solutions for VOD delivery are typically dedicated and quite expensive to purchase, setup, maintain and expand. Riverbed is a system that used for many business purposes and MediaPlatform has found a way to leverage it for VOD. The combined solution enables an enterprise to utilize their existing investment in Riverbed for VOD, avoiding a costly dedicated solution.