

Service Assurance for the Next Generation of Video

By Paul Casinelli

Today's consumers can't get enough video. As traditional broadcast TV viewership continues to grow, consumption of Internet and mobile video is rising at an outstanding rate. Over 75% of global consumers watch video content over the Internet via connected devices such as computers, smartphones, tablets, and connected TVs. Furthermore, the growth rate of video traffic over the Internet is truly explosive, estimates state it will reach 58% percent of total Internet traffic in 2015. With internet and mobile traffic increasing at such an impressive rate, multiscreen video and Adaptive Bitrate (ABR) streaming technologies are firmly placed at the center of this video everywhere transformation.



Assuring Video Quality is Different

Today, most service providers realize that they must assure the quality of their linear broadcast video services separately from voice and data. This realization is due to the fact that subscribers are more sensitive to video issues. With the network complexities and higher transmission rates, video is more prone to error than voice or data. It requires an entirely unique set of tools, strategies and analysis to be properly managed and delivered with high quality.

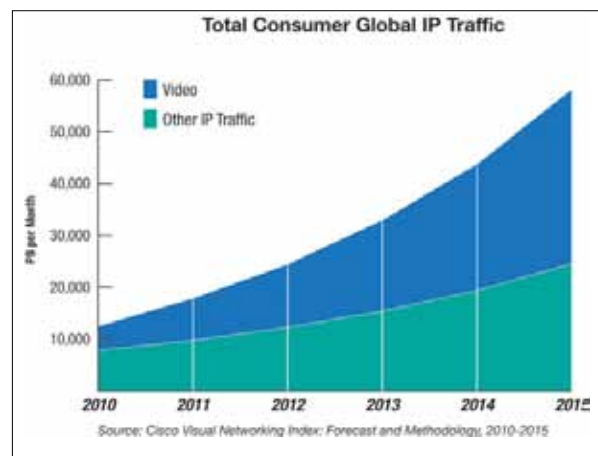
With a comprehensive video service assurance solution, providers gain real-time insight into the performance and quality of the video services within their networks. Providers can proactively pinpoint issues in the network and fix them even before the customer experience is negatively impacted. Not only does this reduce OPEX by decreasing truck-rolls, mean time to repair (MTTR), and call volume, it also improves the subscriber's experience. Reducing churn and increasing revenues places video service assurance at the foundation of their business model.

The ABR Technological Revolution

The main challenge for Internet and mobile video arises in keeping constant video play-out at the



end-client device because of the varying nature of bandwidth limitations in an unmanaged network. Adaptive bitrate streaming technology and the ABR techniques, such as Adobe HDS, Apple HLS, and Microsoft Smooth Streaming, address this challenge, allowing providers to offer their subscribers video services anywhere, anytime. Adaptive Streaming video employs an entirely new set of technologies, methods and strategies that require a new suite of tools to assure a high quality viewer experience. Adaptive Bitrate technology provides a method to encode a video asset (live or on-demand) into several files of varying quality and bitrate. From there, each video file is segmented in smaller file chunks. When enough bandwidth is available, the highest quality video asset will be delivered. The file chunking provides the ability to switch to a lower bitrate file as the bandwidth diminishes. By adapting to the available bandwidth, this process, along with protocol communications, allows the video to constantly stream uninterrupted by buffering instances.



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Successfully delivering the video to the consumer requires unimpaired communications between the components of the CDN through the last mile to the client device. Encoders publish their variant bitrate video segments to the origin servers and these origin servers must deliver the assets through the caching servers quickly and without error upon request from the device. Client devices must both request chunks quickly enough from the CDN and queue up the subsequent files for viewing before the current one is played out. Simply put, the complexity of these operations pose many new challenges to service and content providers, which will only grow as ABR video continues its current growth trajectory.

Improving Customer Experience for the Next Generation of Video

As video network architectures evolve and video travels over unmanaged networks to millions of devices, delivering high quality video experience is a major challenge. This is largely because consumers are empowered: they can get any video from anyone, anywhere and anytime. The consumer now has an abundance of video providers to choose from, and thus little loyalty to any one video provider. The effects of this empowerment are quite staggering. Industry research shows that 60 percent of consumers who experience poor quality Internet video will be less likely to return to that video provider in the future. In addition, 43 percent of consumers said that they would get their video from a competing provider. Finally, 27 percent say they will be less likely to ever come back to that site again for video services. With

Providers must assure the quality of their ABR, or HTTP Adaptive Streaming, video services in a brand new way because the technology and delivery methods are entirely different.

Internet and mobile video, the correlation between customer experience and churn is even more pronounced than with traditional video services, making assuring a high quality experience a key driver of their business model.

There are three components to a successful quality and service assurance solution for multiscreen and Over-the-Top (OTT) video. First, providers need to be able to gather the appropriate data and metrics about the performance and quality of their video delivery network. This includes information about control communications between network components, information about the end client device, and insight into both QoE and QoS throughout the entire network. VeriStream, the industry's first QoS metric designed specifically for ABR technology, is one such metric that will be essential for providers. A QoS metric like VeriStream can be used in many places across the ABR delivery chain: from the origin server, to the caching servers and the end client device. Using QoS metrics empowers providers locate where in the network issues are occurring. This is especially

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helpful when the video provider has no visibility into the CDN and the last mile. QoS metrics aid in Service Level Agreements (SLA) compliance in an effective, objective manner. In addition, providers should monitor video content QoE wherever the video is modified. One key place to monitor for content quality is at the source: before and after the segment encoder. By encoding the video into variant bitrates, the encoders are also modifying the video quality. Monitoring for QoE ensures that content degradation is immediately identified and addressed.

Secondly, providers should also adopt a true end-to-end video service assurance solution. With such a solution, providers can aggregate real-time quality monitoring data and metrics from the network in an intuitive interface, allowing them to identify issues across the entire network. A true end-to-end solution is only achieved when monitoring both the fixed network (the head-end and CDN's) and, the most revolutionary monitoring point, the end client device itself. Monitoring in the connected device is best accomplished by gathering end client statistics and quality and performance data from within the video application. For example, providers can build in a free software library that gathers and reports this data to a real-time monitoring engine, providing single view of the health of the entire delivery chain.

Finally, the solution should provide long-term analytics of the statistics and quality and performance data. By reporting and trending this long-term data, providers can see if issues are a one-time occurrence or systemic issues that will affect the network over time. This business intelligence enables providers to prioritize investments and make informed decisions about the services they will roll out to customers.

Case Studies

By following this model, early adopters are already successfully identifying and solving major network problems that would negatively impact customer experience. In one instance, a major service provider's CDN was redirecting client device requests directly to the origin server, instead of to the caching servers. Origin servers are meant only to feed a limited number of caching servers at any one time. Instead of sending the expected few hundred megabits of video, advanced probing technologies saw that the origin servers were in fact sending multiple gigabits to client devices. This caused the origin server to fail due to overloading. The provider was able to prove that the CDN was misconfigured and determined that the exact cause of failure was the origin server. Once the reconfiguration was

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implemented in the caching servers, the provider saw both the available bandwidth increase and the QoS scores normalize.

In another example, by collecting end client quality and performance data, a service provider discovered that a third-party CDN was directing all nation-wide clients to only four edge servers. Further analysis discovered conflicts in the geo-IP databases concerning the location of the servers. Ultimately, the provider was able to determine that all four servers were located in the same building. The provider was now able to hold their CDN provider accountable for not using the agreed upon distribution model.

Opportunities and Challenges

Delivering Internet and Mobile video presents many opportunities for service and content providers, who can now offer their services to their customers anywhere. It also empowers the consumer, who is able to get video from any provider as well as the exact type and quality of video they desire. The major challenge facing providers will be assuring a high quality customer experience. Because these services are just now being widely implemented, providers have the opportunity to incorporate quality and service assurance solutions into their operations from the beginning in order to improve quality, control OPEX, reduce churn, and secure their business. Not planning for the quality challenges of Internet and Mobile video is a risk no provider can afford to make.

¹ Nielsen, State of the Media, The Cross-Platform Report, Q1 2011, p. 5

² Accenture, Consumers of all ages are going over-the-top, Results of the 2011 Accenture Video-Over-Internet Consumer Usage Survey, p. 4

³ Cisco Visual Networking Index: Forecast and Methodology, 2010-2015

⁴ The Importance of Delivering a Great Online Video Experience, Akamai and Jupiter Research, p. 2