

Maximizing Audience Engagement:

How online video performance impacts viewer behavior

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Executive Summary

Online video's explosive growth has created tremendous new opportunities for engaging customers and developing new revenue streams. But despite the fact that video is becoming increasingly central to many online business strategies, many publishers still lack the tools and data to understand what factors are important in keeping their audiences engaged.

In this whitepaper, we present data from the first ever large-scale scientific study that shows how video performance quality affects viewer behavior. The results help to shed light on important considerations that can help businesses craft a successful online video strategy – boosting their business bottom line and ultimately reaping the rewards of online video's vast potential.

Introduction

In the U.S., roughly 87% of Internet users now watch video online, consuming nearly 40 billion content videos and 10 billion video ads per month – totaling nearly 23 hours of video per viewer each month.¹ Globally, Cisco forecasts that video will represent 86% of all consumer Internet traffic by 2016.² These staggering numbers underscore the vast potential that online video offers, and media and entertainment companies currently have a prime opportunity to leverage this potential to build new audiences and better engage existing ones, to explore new distribution channels, and to develop new revenue streams.

In order to successfully do so, however, organizations need a stronger, data-driven understanding of how to keep audiences watching. Unfortunately, most video analytics tools provide only basic information, such as which content clips were viewed most often. This gives publishers very little insight into how to improve their offerings. Beyond providing compelling content, for example, what key factors drive viewer engagement and loyalty? How important is video quality and performance? What types of issues cause audiences to abandon? How long lasting are these detrimental effects?

Intuition tells us that the user experience is critical: in a world where iPads, HDTVs, and broadband connectivity have all become ubiquitous, consumers have high expectations for video speed and performance. But until a recent study undertaken by researchers Shunmuga Krishnan and Ramesh Sitaraman at Akamai and the University of Massachusetts at Amherst, the industry has not had the hard data to show whether better video performance truly causes users to engage more and abandon less.³ This ground-breaking study provides useful, quantitative answers that illustrate how failing to meet user performance expectations can directly translate into lost business dollars.

U.S. viewers consume 40 billion content videos and 10 billion video ads online each month

¹ <http://techcrunch.com/2012/10/29/comscore-u-s-internet-users-watched-39-billion-online-videos-in-september-number-of-viewers-down-slightly-from-august/>

² http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html

Methodology

The study analyzes an extensive data set of unprecedented breadth and depth, encompassing a broad, representative sample of 23 million online video views totaling over 216 million minutes of video watched. The data includes both performance characteristics – such as startup time, rebuffering delays, and failure rates – and viewer engagement metrics – such as play time, abandonment, and return visits.

By adapting research techniques from medical science, the study looks past simple correlations between video performance and user engagement to find scientific evidence on whether good video performance actually causes better user engagement. Most studies look only at correlations between these factors, but finding a causal link helps video publishers better understand what factors actually contribute to the business metrics they are looking for.

For example, suppose a study finds that viewers who did not experience any video rebuffering delays watched videos for longer than viewers who did face delays. Intuition may tell us that it is the delays that cause the longer viewing time, but without further information, one can't say this for sure. It is possible, for instance, that those viewers who are wealthier can afford better Internet connections and therefore experience less rebuffering, and those same wealthy viewers can afford higher-quality content that keeps them watching for longer. In this case, it is the higher-quality content that may be causing the longer viewing time, rather than the lack of delays.

Without an understanding of causation, the data analysis in this hypothetical example may look like a recommendation that resources be spent on reducing rebuffering delays when in fact the delays themselves may not have an effect on viewing time.

By factoring out other potential causes of viewership behaviors, Krishnan and Sitaraman's study examines whether video performance causes significant changes in audience behavior, with a particular focus on answering three questions:

- Do longer start-up delays cause more viewers to abandon a video?
- Do rebuffering delays cause viewers to watch less video?
- Do video failures make a user less likely to return to a site?

The results, while intuitive, help quantify for the first time the effects of poor video performance and provide hard evidence of consumer expectations and the business impacts of failing to meet them.

The Data

- 6.7 million unique viewers
- 23 million views
- 216 million minutes of video
- 102,000 unique videos
- Mostly viewers were from North America, Europe, and Asia
- Representative slice of videos from a variety of media and entertainment companies

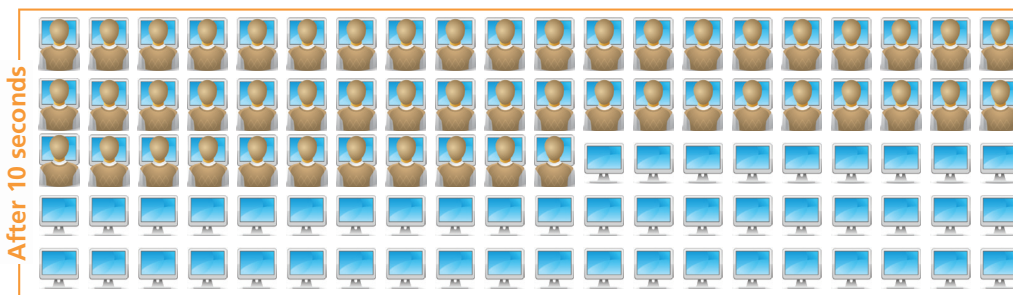
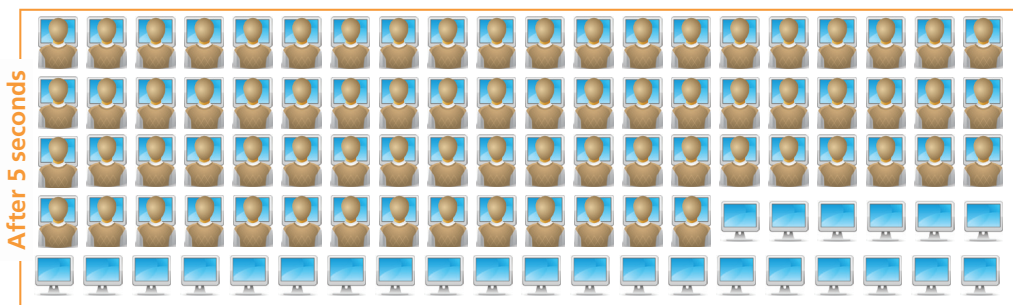
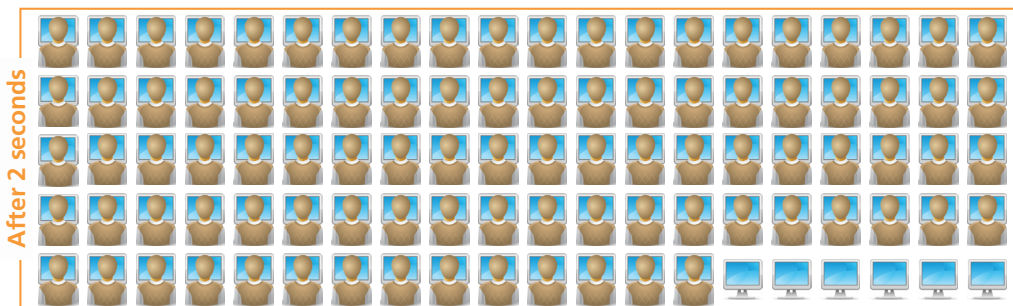
The Two-Second Rule: Preventing Abandonment

In an always-on world where users have been primed for instant gratification, speed matters. For websites, the impact of site performance on business metrics such as page views, conversion rates, and even user satisfaction has been well-documented. Over the past decade, we've seen the "eight-second rule" – meaning users would abandon sites taking longer than 8 seconds to download – get slashed to the four seconds and then two, as user expectations have risen over time. Now, studies show that even 200 to 400 milliseconds can make a significant difference in Web applications.⁴ That difference has clear business implications: for e-commerce sites, for example, one extra second of page-load delay can translate into millions of dollars of lost sales revenue each year.⁵

One might expect that start up delays have a similar impact on abandonment of videos, and, indeed, the quantitative data shows that a similar two second threshold applies. Specifically, viewers will start abandoning a video if startup takes longer than two seconds to begin playing, and for every additional second of delay, roughly an additional 6% of the audience leaves.⁶

This means having a fast startup time is critical for video. With a 5 second delay, a publisher may have lost a quarter of its audience, and with a 10 second delay, nearly half the audience has left. This means a few seconds of delay can cost a publisher millions in potential revenue, not to mention irreparable harm to the brand.

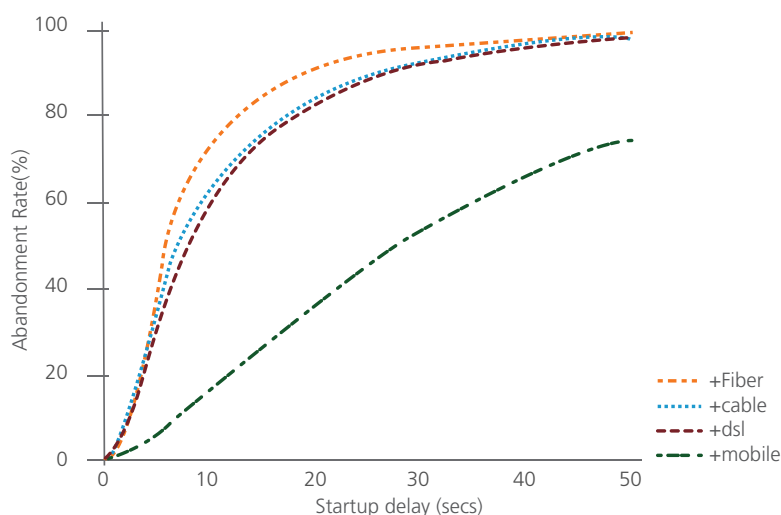
For every additional second of startup delay, another 5.8% of your audience leaves



Digging a little deeper, the data reveals that the length of a video plays a role in determining viewer patience for these startup delays. As might be expected, viewers are willing to wait longer for lengthier videos like movies or full TV episodes, but are less tolerant of delay when watching shorter videos like news clips or episode highlights. When looking at videos that are less than 30 minutes long versus those that are more than 30 minutes long, the difference in abandonment rates is substantial.⁷ With a two second startup delay, for example, the abandonment rate is roughly 3% for long videos and almost double that for short videos. Similarly, with a five second delay, the abandonment rate is nearly 13% for long videos, and, again, roughly twice that for short videos.

The data also reflect the human psychology that, as users get used to speed, their expectations grow – as do their frustrations when those expectations aren't met. Thus, viewers with faster Internet connections have less patience and abandon delayed videos sooner, while users on slower, mobile connections are willing to wait a bit longer. This may come as a relief to businesses catering to mobile audiences, but for those serving broadband viewers, it sets an even higher bar.

Viewers with better connections abandon delayed videos sooner



For example, with a three second startup delay, a content provider can expect to lose 13% of its viewers on broadband cable connections and 15% of those on fiber optic connections. If a video takes more than eight seconds to start up, more than 50% of those on cable connections and 60% of those using fiber optic broadband will likely abandon. Moreover, these findings also indicate that as connectivity speeds continue to improve, user expectations will continue to rise, so video publishers cannot afford to become complacent.

While it's hardly surprising that users don't like waiting for videos to start, these numbers are somewhat startling in their magnitude. They show a few seconds is likely to have a tremendous impact on audience sizes and, therefore, on video-related revenues. As we've seen, a single second of additional delay can translate into a nearly 6% impact on revenues in the general case – with an even greater potential impact in the case of short videos or videos shown to users with fast connections.

If a video takes more than 8 seconds to start up, a publisher may lose more half of their audience on broadband cable connections and more than 60% of those using fiber optic broadband.

The No-Buffer Zone: Boosting Engagement

Once a person starts watching a video, many factors impact how long they will continue to watch. The quality of the content, the video bitrate, and playback performance all affect the user experience and therefore impact playback metrics. In order to know how to truly optimize engagement, publishers need to be able to isolate and identify the effects of individual factors on the outcomes they are looking for.

Krishnan and Sitaraman's study looks specifically at how rebuffering delays, which cause videos to freeze or stall midstream, affect how long a viewer watches a video. To understand causation, the study needed to rule out other factors that may affect viewer engagement. For example, a British viewer may watch videos on a British news site for longer than an American viewer – but is this because the American viewer is experiencing more connectivity problems and rebuffering due to the site being hosted in London, or is it simply because the American viewer is less interested in British news?

To isolate the effect of the rebuffering, the study examined pairs of viewers who were as similar as possible, except for the presence (or not) of a rebuffering delay. In other words, they compared viewers within the same geography, watching the same video on the same type of connection, and then looked at the viewing time of users who experienced rebuffering delays versus those who did not.

With even small delays, lasting only 1% of the total length of the video, viewers watched 5% less video compared to viewers who experienced no delays. This means that for a two minute video, even a single second of frozen video can decrease the viewer's engagement significantly.

In addition to affecting softer metrics like engagement, the decreased viewing time can translate into hard dollars: for ad-supported business models, for instance, a 5% reduction in time watched can mean a similar decrease in advertising watched. For publishers earning \$100,000 per day in advertising, this can total nearly \$2 million in lost annual revenue.

Even rebuffering for 1% of the video duration can decrease watch time by 5%.

⁴ <http://www.nytimes.com/2012/03/01/technology/impatient-web-users-flee-slow-loading-sites.html?pagewanted=all&r=0>

⁵ http://www.gomez.com/pdfs/wp_why_web_performance_matters.pdf

⁶ For startup delays between 2 and 10 seconds, approximately 4 to 7% (averaging to around 5.8%) of the audience leaves for every additional second of delay. Around 10 seconds, the effect begins to taper off, as the remaining 50% of the audience represents “die-hard” viewers—those who really want to see the video and are willing to wait at all costs. See the original paper at http://people.cs.umass.edu/~ramesh/Site/HOME_files/imc208-krishnan.pdf for more details.

⁷ In this study, the median length of a short video is 1.8 minutes, while the median length of a long video is 43.2 minutes.

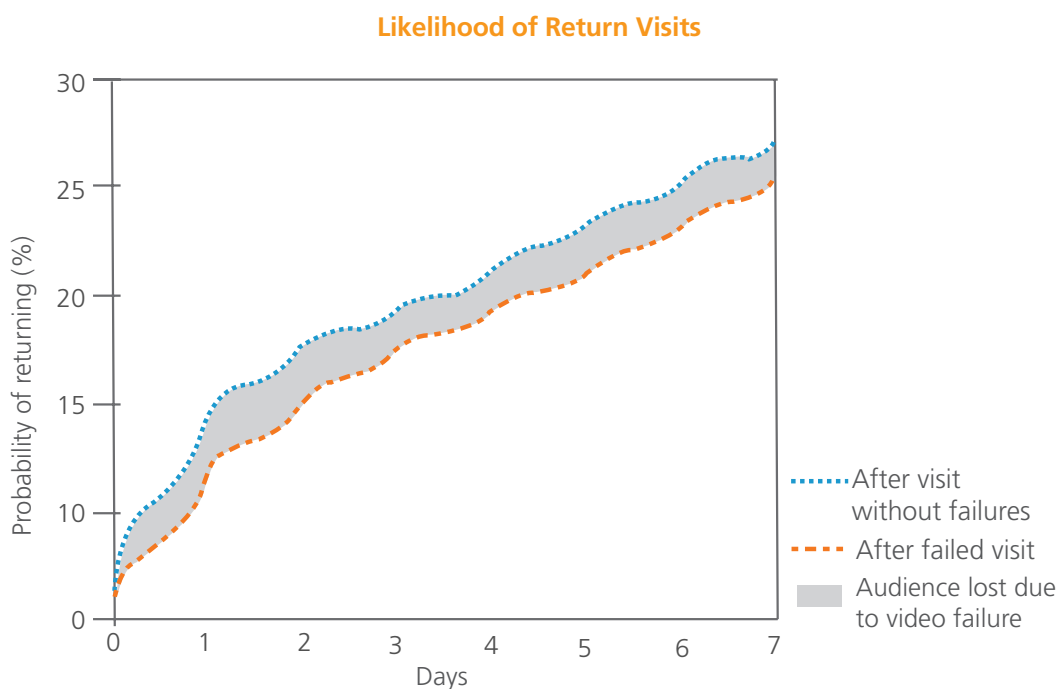
The Lasting Effect of Video Failure

For e-commerce and other transactional web applications, site failures can be directly linked to loss of revenue: when the site is down, purchases cannot be made. For video failures, this connection may not be as direct in many cases, but the impact can still be significant. When a user experiences a video failure – that is, when a user clicks on the video but the video does not play, there is a negative impact to the brand that can be quantified by looking at how those failures affect future visits to the site.

Unsurprisingly, viewers who experience a video failure are significantly less likely to return to a site. Specifically, only 8.2% of viewers will return to a site within the first day after experiencing a video failure, compared to 11.2% who return after a normal, non-failure visit. This means, a visitor is 37% more likely to return to a site within the first day if they do not experience a video failure.

Again, to understand causation rather than just correlation, Krishnan and Sitaraman's study aims to rule out other potential causes for this drop in return visit likelihood. They do this by comparing behaviors from users who are otherwise very similar – those with a similar history of visits and viewing time with the given content provider, as well as similar connectivity and geography characteristics.

Looking at return visits that occurred up to a week later, the data show that the probability of returning is consistently two to three percentage points lower after a failed visit, meaning that publishers could lose 2 to 3% of their audience due to a video failure. Moreover, the effects of these failures are likely persistent and cumulative, with the potential to cost content providers millions of dollars, whether through lost ad revenues, pay-per-view fees, or subscription renewals, not to mention increased support costs.



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Improving Video Performance to Maximize Engagement

As the data in Krishnan and Sitaraman's study has shown, good video performance plays a critical, causal role in decreasing abandonment, improving engagement, and increasing return viewership. Thus, video publishers that are looking to successfully build audiences and monetize their content need to look for a video delivery solution that helps them consistently achieve the performance quality and end user experience their viewers demand. When evaluating such solutions, there are several key factors to look for that are particularly relevant to achieving strong performance and a compelling user experience.

Highly Distributed Network

Two primary causes of poor video performance are network congestion and network latency occurring between the end user and the video's origin server. Both factors increase as the distance and number of networks traversed increase. A highly distributed network minimizes these delays by delivering video streams from as close to the end user as possible – often from right within the user's own ISP. This greatly reduces errors, packet loss, and other delays, allowing for fast video startup and the best possible playback quality.

A highly distributed network also offers the greatest scalability and reliability. Distributed nodes provide tremendous fault tolerance even in the face of large-scale network failures, and they provide the ability to easily absorb demand from flash crowds and large-scale events without performance degradation. These factors are critical to preventing video failures and the loss of repeat viewership that results from those failures – instead allowing publishers to capitalize on successful promotions and viral content, rather than buckling under the weight of their own success.

Adaptive Bitrate Streaming

Adaptive bitrate streaming enables end users to experience faster video startup times and reduced or eliminated rebuffering delays while enjoying the highest-quality video viewing experience possible. In essence, each viewer's video stream bitrate adapts in real time to performance conditions like network latency, available bandwidth, and even local device processing capability. If packet loss occurs midstream, the video stream drops to a lower bitrate until conditions improve, avoiding a video freeze up or rebuffering delay. In addition, videos can start up faster and seek faster, by starting at lower bitrates and smoothly transitioning to higher bitrates, delivering the best quality video while preventing abandonment from impatient viewers.

Sophisticated Media Analytics

Just as important as the delivery infrastructure itself is the ability to measure and understand video performance metrics. Effective analytics solutions not only help content providers monitor their user experience and troubleshoot problem areas, but also optimize product portfolios, manage distribution strategies, and most importantly, understand the key factors in maximizing their online revenues.

Solutions should provide real time and historic quality of service data such as the number of successful and unsuccessful viewing attempts, video availability metrics, rebuffering ratios, average bitrates, and numbers of errors. In addition, they should offer in-depth audience behavior metrics, including playback duration and abandonment rates, as well as content usage statistics broken down by geography, device, and connection speed. The most advanced solutions can even track behavior across multiple devices and provide diagnostics down to the level of an individual user.

Business-Driven Features

Of course, performance is not the only consideration in evaluating media delivery solutions. There are many other important factors as well, including:

- Seamless support for a broad variety of devices, protocols, and platforms;
- Secure streaming and content protection capabilities to defend against unauthorized users without creating barriers for legitimate viewers;
- Advanced capabilities for enhancing the user experience, like DVR-enabled live streams, feature-rich players, and cross-platform viewing continuity;
- Integrated services to facilitate industry initiatives like TV Everywhere and UltraViolet; and
- Simple workflow and easy integration.

Conclusion

In order for publishers to maximize key business metrics like audience size and total viewing time, they need a more precise understanding of the wide variety of factors that drive different viewer behaviors. While most data and analytics tools for online video have been somewhat lacking to date, Krishnan and Sitaraman's recent study provides rigorous, data-backed analysis to reinforce our intuition that performance does indeed have a significant, measurable impact on those behaviors: that slow startup times increase abandonment, rebuffering delays decrease viewing time, and video failures cause viewers to be less likely to return to a site.

This means that content providers that consistently offer a high-quality, high-performance end user experience enjoy a competitive advantage, and those that make performance improvements can generate measurable improvements in business metrics that matter. Moreover, as today's online video audiences continue to explode, even small improvements in those metrics can lead to large changes in revenues, whether they are pay-per-view, subscription, or ad-based.

In terms of truly understanding online video users, we are still at the tip of the iceberg. But as this study demonstrates, those that continue to improve their ability to measure, analyze and understand their audience's behaviors and preferences are the same ones that will be able to truly harness the vast potential of online video.

For more information on the how to deliver the highest quality media to influence positive online audience behavior, [Download the Media Delivery eBook](#) today.



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