2013 Viewer Experience Report

CONVIVA® watch more™

Video quality impacts the profitability of every digital media business and affects every single viewer at some point in time.

In 2012, global premium content brands lost $2.16 billion of revenue due to poor quality video streams and are expected to miss out on an astounding $20 billion through 2017.[1]

The Viewer Experience Report reveals how video quality impacts viewer behavior and drives profitability.

The Conviva Viewer Experience Report 

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1 Market value according to Digital TV Research, "Online TV and Video Forecast."
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An Elevated Perspective

During 2012, Conviva analyzed in real time, 22.6 billion video streams from viewers in more than 190 countries watching content on more than 150 of the most recognizable video sites in the world. Conviva records detailed, up-to-the-second information on each and every viewer's experience during every viewing session. This data provides an unprecedented view into the trends and habits of today's online video viewer and more importantly, the direct correlation between quality, viewer engagement and profitability.

Poor video quality remains the core threat to the viewer experience

In 2012, roughly 60% of all streams experienced quality degradation. Viewer interruption from re-buffering affected 20.6% of streams, 19.5% were impacted by slow video startup and 40% were plagued by grainy or low-resolution picture quality caused by low bitrates.

I. Viewers are less patient with poor quality. In 2011 a 1% increase in buffering resulted in 3 minutes less of viewing time per view of long form content. In 2012, that identical 1% increase led to 8 minutes lost in viewing time per view for similar content.[2]

II. The start time for a video to launch is critical. If video start time exceeds 2 seconds, the number of people that abandon viewing dramatically increases—400% for long form VOD and for live content, abandoned views increase 140%.

Improving engagement is critical to the business of online delivery

Obtaining an optimal video experience (free of buffering with fast start-up and higher sustained resolution) continued to be an escalating challenge in 2012. Only 39% of video views were optimal in that period. Addressing this phenomenon is challenging, yet the benefits are substantial.

I. Picture quality, start time and buffering are key engagement drivers

- Viewers with a buffer-free experience watch 226% more*
- Viewers are four times more likely to stay and watch if video starts in 2 seconds or less
- Viewers receiving higher bitrates (better picture quality) watch 25% longer*

II. The benefit of fixing all three:

- Viewers with a buffer-free experience, short startup and higher definition watch 250% more*
- Few initiatives can deliver this magnitude of audience growth

2. For a 90-minute viewing session of long form VOD content
* Increase in engagement during a one month period

Driving stronger engagement

Improving the viewer experience has a direct impact on increased engagement.

I. Best-of-Breed long form VOD[3] sites maintain a low video start-up failure rate (0.02%), high average bitrate (2516 Kbps) and low buffering (buffering ratio less than 0.5%).

II. For Best-of-Breed long form VOD sites, viewers watch an average of 31.5 minutes. In contrast, viewers on average quality long form VOD sites, watch only 19.5 minutes—62% less.

III. For live video streams, viewers not impacted by buffering watch 10 times longer.

Best-of-Breed:
- *Start up failure rate less than 0.02%*
- *Buffering ratios less than 0.5%*
- *Sustainable resolution higher than 2 Mbps*

Buffering Ratio:
- *Percent of viewing time spent rebuffering*

The economics of a quality experience

Unless video providers improve the viewing experience, they will lose viewers. In 2012, 124.8 billion minutes (the equivalent to 89 human lifetimes) were spent in buffering. The cost of this 'lost time' to the streaming industry will be $20 billion through 2017.

I. Improving the viewer experience will increase revenue by as much as 20% for a live video provider

II. By improving buffering performance and video quality, a typical long form VOD provider, (with 10 million views per month) will increase revenue by as much as $1.4 million monthly.

3 steps to quality

Sites with best in class viewer engagement have implemented the following:

I. Viewer measurement: Continuous, real time, in browser viewer monitoring across platforms

II. Dynamic stream adjustment: Per viewer quality decision making in real time, based on multi-bitrate and multi-CDN optimization

III. Network quality mapping: Preemptive intelligence, based on local and global data identifies congestion and drives preventative stream adjustments

ABOUT CONVIVA DATA

Conviva's Viewer Experience Report is compiled from 22.6 billion streams and more than 150 video sites during 2012.

Conviva utilizes its viewer-side intelligence to measure the impact of video quality on viewer engagement and assess the ramifications to the video business. Conviva partners with hundreds of customers around the globe including ESPN, HBO Go, Turner, Disney/ABC and Vevo. Data spans every connected device including tablets, smart phones, smart TVs, game consoles, set top boxes and PCs.

The Conviva dataset is superior in two respects:

I. Each and Every Viewer: Video quality metrics are collected directly from the video player. Conviva gathers critical insights at the viewing devices level that cannot be observed from the server or network layers alone. This provides a real time view into each and every viewer's experience.

II. Scale: The dataset spanned 22.6 billion streams, which is the largest recorded window into actual viewers on mainstream content providers. It is the only cross-device, cross-content type, cross-ISP dataset of its kind.

To determine quality's impact on engagement, Conviva examines data that covers multiple content types, including short form VOD, long form VOD, and live content from popular video content providers. Quality metrics are measured including start failure, user abandonment before video starts, start time, time spent buffering, average bitrate, and frequency of buffering events.

3. Long form VOD is defined as being any video over 15 minutes in length, short form VOD is defined as any video under 15 minutes

Poor Quality is Pervasive

Today's connected devices are changing the expectations of online video viewers around the world. New technologies such as Apple's retina display and smart 1080p televisions create increased demand for high quality streaming video. Consumers expect a quality experience—one unsullied by interruption or poor video quality. Today, unfortunately, viewers are often disappointed. Conviva makes clear that although high quality video sources are available, the current online viewing experience is fraught with errors.

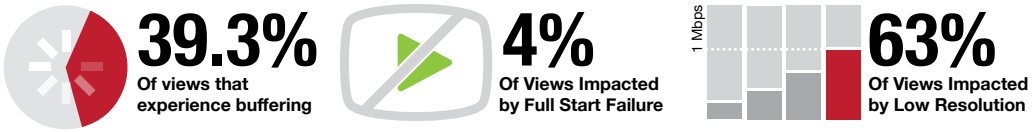
Regardless of content type and viewing platform, Conviva global data shows that every viewer suffers from poor quality at some point. 162 million unique online viewers were acutely aware of these issues—frozen playback, video distortion and buffering.[4]

Conviva has identified three broad categories impacting video quality:

I. Buffering or interruptions to smooth playback

II. Play failures, long video start times and abandonment before video starts

III. Low bitrate, poor resolution and picture quality



A staggering 60% of views are impacted by stalls, low resolution or buffering. 39.3% of streams are impacted by buffering and 4% never start. Ironically, many consumers are watching on a screen capable of displaying high-quality (HQ) video, yet 63% are viewing below HQ resolution.[5]

4. In the U.S. for 2012
5. Highest value across all Conviva monitored sites in a single month in 2012

Buffering is rampant

Of all the quality problems experienced online, perhaps the most pervasive and infuriating is buffering. Everyone that has watched a video online, whether it's a short video clip, a live sporting or news event, a popular sit-com episode available on-demand, or a full-length movie, has experienced the spinning wheel.

Buffering – *When you select a movie or program to play, the video is initially delivered to the playback device's buffer. However, if the video rate is too high, the buffer empties and causes viewing interruption (rebuffering).*

Views with Buffering

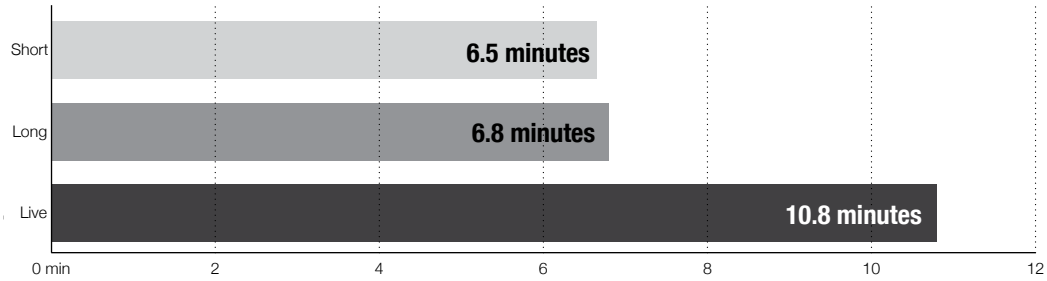
Severe buffering

To understand the full implication of severe buffering, Conviva has established a critical threshold at which viewers react the most negatively. When buffering exceeds 2% of the total length of the viewing session, Conviva defines it as a Buffering Impacted View (BIV). For example, a 3 minute YouTube video that buffers more than 3.6 seconds would be tagged as a BIV.

Live streams were most subject to BIVs in 2012 with 12.3% buffering above the 2% threshold. Although buffering impact in live streams is surprisingly large, it is not a surprise that they are most affected by BIVs. Live streaming is particularly difficult to deliver. For popular events, such as the 2012 Olympics, many people tune in to a stream causing Internet and server congestion and streams to stall.

Short and long form VOD streams are not immune to this problem. They experience high BIV rates, approximately 8%.

Average engagement for each 90 minutes of viewing



More revealing than BIV, is the time spent buffering in 90 minutes of viewing:

- Short form VOD—Eighteen 5 minute sessions, 6.5 minutes lost to buffering
- Long form VOD—90 minute session, 6.8 minutes lost to buffering
- Live—90 minute viewing session, a staggering 10.8 minutes lost to buffering

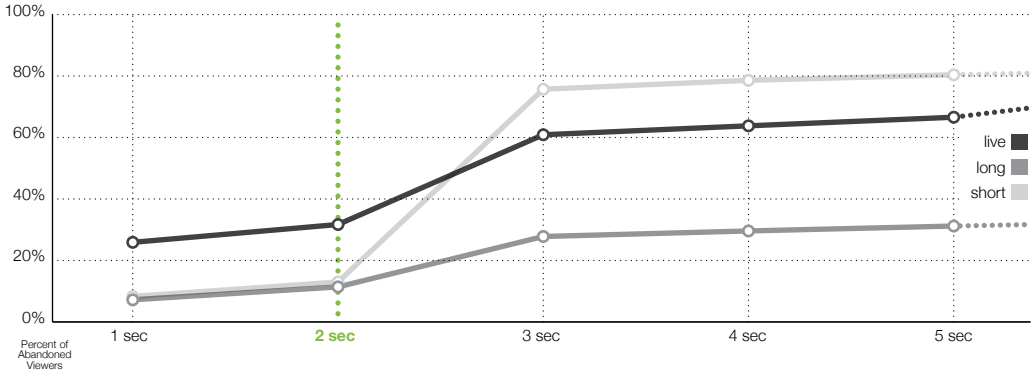
Exceeding two seconds is deadly

An obvious way to lose a viewer is forcing them to wait for the video they selected to start.

Conviva is able to track when viewers select a video but abandon before play begins. For that subset of data, Conviva tracked how long viewers waited before abandoning the stream (closing the video screen or moving to alternative tasks).

A wait time of 2 seconds or less does not have a large effect. A wait that exceeds 3 seconds, is deadly. Viewers who abandon a stream do so most of the time between 2 and 3 seconds of waiting. For the views abandoned in short form content, approximately 60% of them abandon between 2 and 3 seconds.

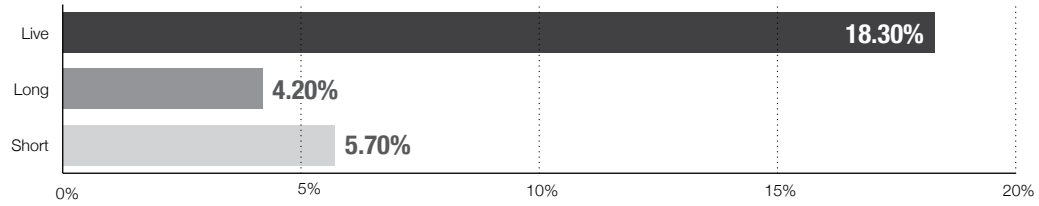
Viewer Abandonment — When viewers abandon



Forcing a user to wait more than 2 seconds will result in losing the audience.

Consumers are less tolerant of slow starts in live streams. More than18% of viewers requesting a live stream abandoned before the video started—more than 4 times higher than long-form VOD.

Viewers that abandon before play begins — How many viewers abandon

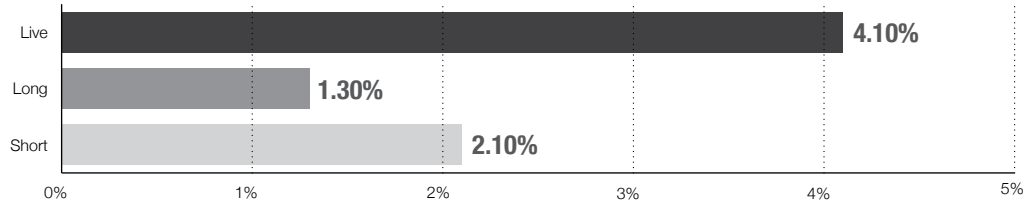


There are many contributing factors for higher abandonment in live content, including startup failures and delay (latency) from the actual event.

Why streams fail to start

Many factors can affect a clean start including video player load, content delivery networks, cache refresh, content publishing systems, home networks, multiple applications on playback devices, video format capability, ISP saturation, etc. All content types and viewers are susceptible to these failures. Given the basic nature of the Internet, as a shared open public network, these issues escalate with increased traffic.

Streams that never start



Where live fails

Live streams show the highest occurrence of failure. 4.1% of live streams fail to start—that's 2x as often as short form VOD and 3x as often as long form VOD.

Although consumers show a much lower tolerance for buffering and slow starts with live content, they have a higher likelihood of experiencing slow starts and buffering when compared to VOD content.

The Myth of High Quality

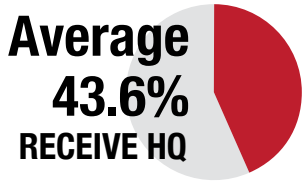
Viewers no longer accept anything less than a high quality experience. Providers such as HBO and Disney are investing heavily in content, production value and high quality formats to deliver a premium experience. Their viewers demand access via connected devices including Xbox and iPad. Providers must deliver high quality to reinforce the value their subscribers[II] invest in PayTV. In many markets, providers rely on the Internet as the primary delivery vehicle and therefore cannot risk delivering anything less than legendary quality.[III]

High Quality (HQ):

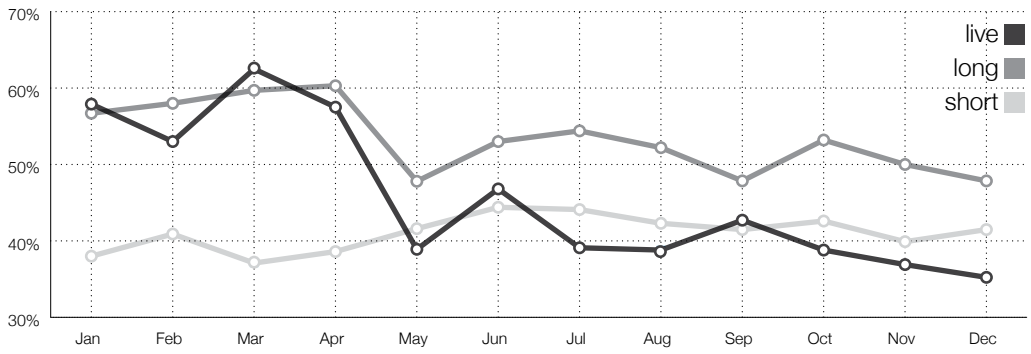
- *Standard derived from sensitivity analysis involving viewer engagement*
- *Low rate of interruptions*
  - » *Less than 2% buffering*
- *Higher visual fidelity*
  - » *Average bitrate > 1Mbps*

In 2012, less than half of online audiences were able to watch HQ video

Live viewing suffers the most from poor quality delivery. On average, less than 40% of live video streams are HQ. Even worse, quality declined during the year from a high of 60% in March to a low of 35% in December. Long form VOD fared better, averaging at 50% of streams delivered, yet also declined by year-end.



High quality views by month

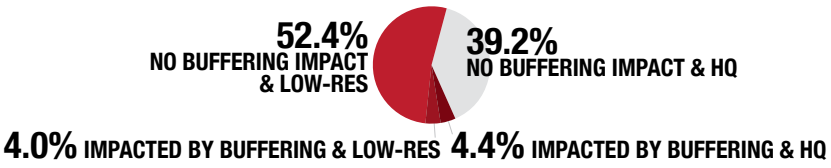


An optimal experience

So far the focus has been the myriad of problems with streaming over the Internet. Now let's examine the converse, streams delivered without buffering impact and with high quality picture (HQ).

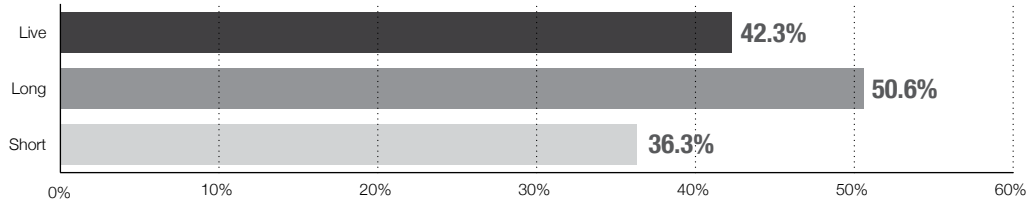
Of the 22.6 billion streams Conviva saw delivered in 2012, only 39% of streams were an optimal experience (HQ). The rest, the vast majority of streams, were less than optimal.

Average optimal views



Long form VOD fared the best, with more than 50% delivered being optimal. Live suffered with only 42% optimal views. Short form VOD quality had the worst performance, with a paltry 36% delivered optimally.

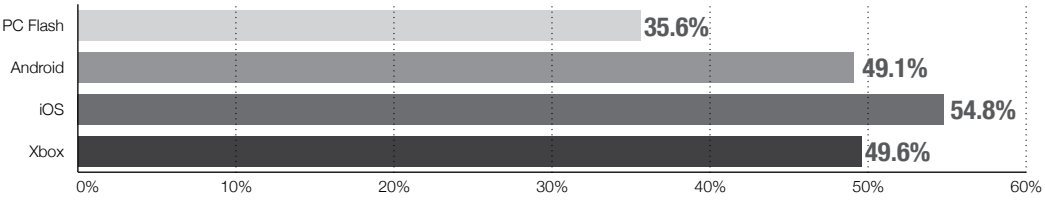
% of optimal views by content type



Experience varies by device and platform

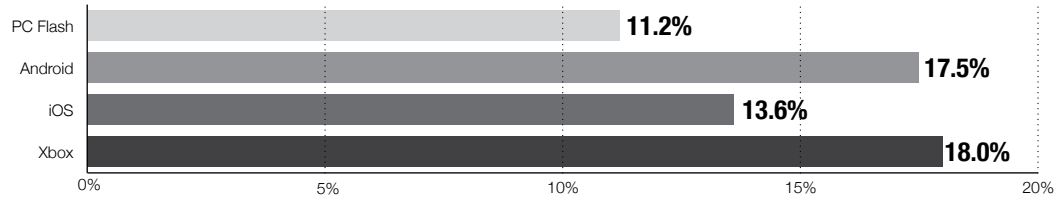
Today, the most growth in video usage is in mobile. Tablets, the latest addition to mobile, are leading the way. Penetration is growing faster than any device in recent memory jumping from 45 million US adults in January 2012 to 59 million in August.[IV] With smartphone penetration exceeding 50% in the US late 2012, streaming to mobile devices is exploding.[V]

% of views with buffering

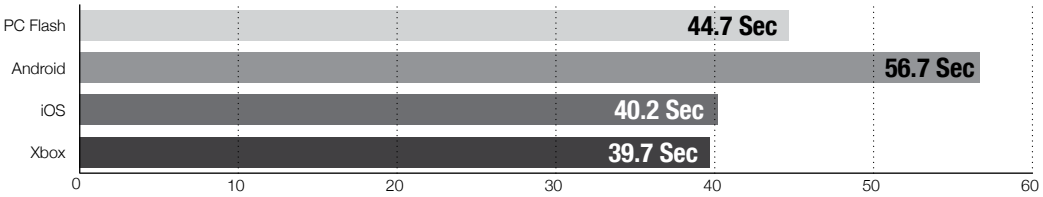


The most popular game console for streaming is the Xbox 360.[VI] Microsoft has invested heavily to reposition the platform as a media center. This laser focus is paying off with the company reporting that Xbox Live customers now spend more time watching video on the platform than playing games.

% of views that never successfully started



Avg time spent buffering per 10 minutes of content viewed

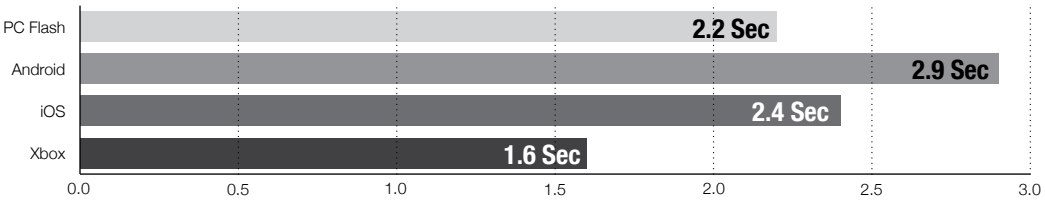


No clear winner has emerged in the platform war when measured against the three important parameters detailed thus far. Still, the data reveals marked differences worthy of discussion.

iOS devices beat Android devices in every category. The average time spent buffering per 10 minutes of content for iOS is 40.2 seconds while Android is 56.7 seconds. Average stream startup time for Android is slower than iOS (2.9 seconds versus 2.4 seconds). The percentage of Andriod streams that failed to start was higher than iOS (17.5% versus 13.6%).

The PC was the best of the four platforms considered in terms of buffering performance and Flash stream starts. The Xbox beat the other platforms in terms of video startup time.

Avg video start-up time



Quality Impacts Engagement

Regardless of business model (advertising, sponsorship, PPV, or subscription), a highly engaged audience is the most valuable. All operators and rights holders strive to increase minutes per view and streams per unique. However, few people discuss the loss of viewing due to poor quality and its effect on the economics of the business.

I. Buffering, stalling and stuttering. The percentage of time spent in buffering (buffering ratio) has the largest impact on engagement across all types of content.

II. Poor visual quality. Since lower bitrate streams correspond to poorer quality viewing experiences, the higher the average bitrate the better. Quality has a higher impact on live content compared to VOD.

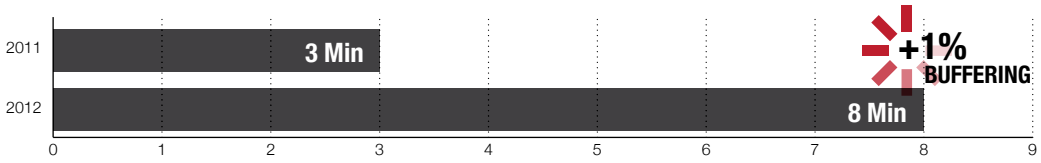
To maximize engagement an optimal viewing experience must be delivered.

Engagement – *measured by the amount of time a viewer watches video. Buffering, video start time and video resolution affect engagement. Delivering an optimal experience will increase engagement.*

Viewer impatience

There is a direct link between buffering events and time spent watching video. Conviva compared the impact of a 1% increase in the amount of time spent buffering on time spent viewing between 2011 and 2012. The result was shocking. In 2011, a 1% increase in the amount of time spent buffering resulted in 3 minutes less of viewing time. In 2012, the identical 1% increase led to 8 minutes lost in viewing time. Consumers are becoming far less tolerant of buffering. If quality doesn't meet expectations, viewers moved on to an alternative source.

Amount of time lost on average with an increase of 1% buffering

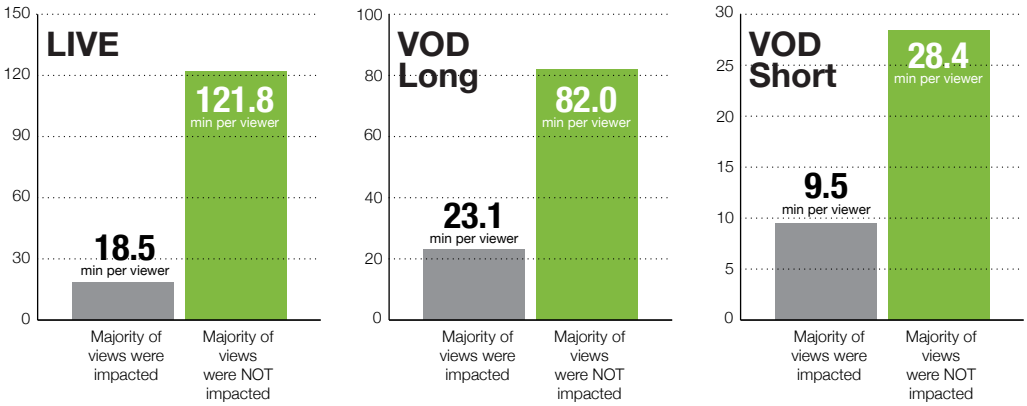


Keep them watching

When a viewer has a good experience, with fewer interruptions and higher resolution, they watch more. Fixing quality issues results in an increase in engagement for content companies. Better engagement delivers benefits that drive straight to the bottom line.

Conviva tracked individual viewers across all content types in 2012 and recorded the average viewing time for those impacted by buffering for more than 50% of monthly views compared with those who had a majority of optimal experiences. The impact is obvious—viewers with optimal experiences watch considerably longer across all content types.

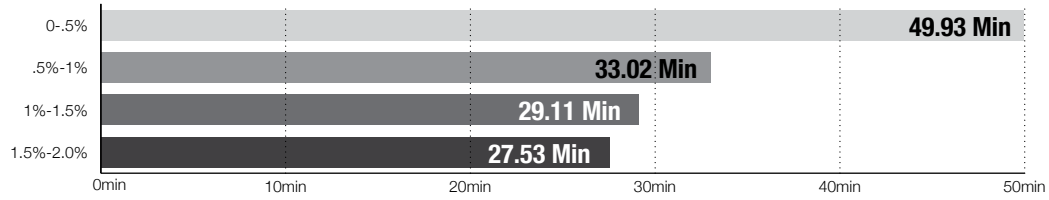
The impact of buffering on viewing



Viewing times for live streams were 10 times greater for those not impacted by buffering over those that were. Similarly, long form VOD viewers not impact by buffering watched nearly 4 times as much as those that were impacted.

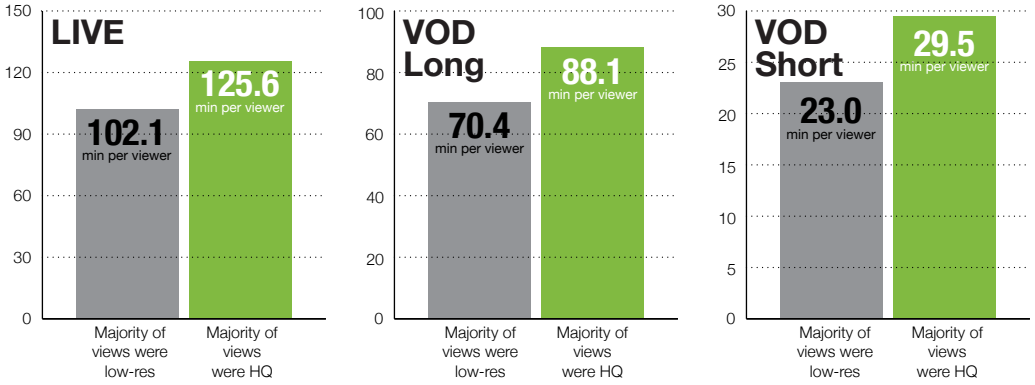
As the table above reveals, viewer tolerance for buffering is very low. If the buffering events increase to between 0.5% and 1.0%, average play time plummets nearly 17 minutes. Increases above that have a smaller, yet quite significant, affect.

Average play time per buffering percent



Conviva then analyzed the impact of video quality on viewing time. A comparison was made between viewing time for viewers who received a 1 Mbps or higher video stream (higher video stream bitrates normally equate to a better quality picture) for more than 50% of their views with those that did not.

The impact of resolution on viewing



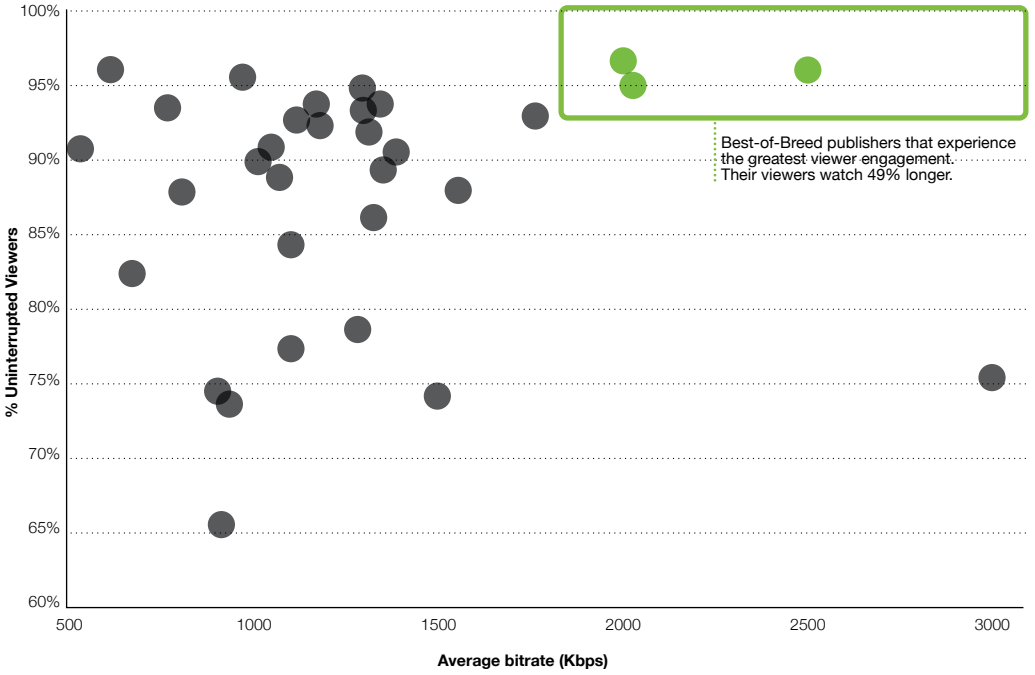
Although not as extreme as the impact of buffering, visual quality is a critical factor in engagement. Live streams were viewed 23% longer by those receiving higher quality video and long form VOD streams 25% longer. By far the largest impact was felt with short-form VOD streams. Viewers watched 28% more time at the higher quality.

The trade-off

There is a clear trade-off between improving picture quality to HQ and minimizing stream interruptions. Companies often work to improve one and end up adversely impacting the other.

Conviva data shows that the companies with the highest viewer engagement proactively adjust their delivery to accomplish both. The chart shows how companies today measure up. The optimal experience zone shows the area of the graph that Conviva data indicates will generate the highest viewer engagement for a video provider.

Among the 31 premium video sites displayed in the graph below, only three achieve an optimal experience by delivering bitrates greater than 2 Mbps, with 95% of viewers uninterrupted by quality issues. Of the 200 premium video sites tracked by Conviva, only 5% are classified as Best-of-Breed achieving optimal viewer experience.



The Race to Revenue

Poor viewing experiences have a profound effect on revenue. By improving the experience through decreased buffering and enhanced video quality, most companies would generate significant increases in revenue, especially those that rely on advertising for profitability.

Content Type	Revenue uplift from decreased buffering	Revenue uplift from HD viewing	Total potential increase in revenue per month
Live	8.5%	8.9%	17.4%
Long	4.4%	8.3%	12.7%
Short	5.7%	10.9%	16.6%

The stakes couldn't be higher

The online video market was estimated to be $11.1 billion in 2012 and is projected to grow to $28.7 billion by 2017. Companies that fix buffering issues will, on average, improve revenue by 6.2% and those that provide high quality video streams will improve revenue by 13.2%. If online video providers fail to address quality issues, they stand to lose $2.6 billion in aggregated revenue in 2013 and for the period 2013 through 2017—could lose a staggering $20 billion.

Potential revenue savings vary by content type. For example, by reducing buffering a live content provider could improve revenue (from more viewed advertising) by as much as 8.5%. The revenue uplift from improving video quality is even greater; upward of 11.4%. Combined, the potential total uplift reaches 20%.

In the case of a typical, dot-com TV offering that relies on pre and mid-roll advertising for profitability, improving buffering performance and video quality will result in a million dollar yearly revenue increase and improved retention from enhanced video delivery.

Views per month	10 million	
Minutes watched per month	718 million minutes	Industry average is 71.8 minutes per unique.
Monthy ad revenue	$10.7 million	1 ad every 3 minutes with a 45 CPM
Potential monthly revenue from reducing buffering	$473,000	Industry average is a 4.4% increase in revenue
Potential monthly revenue from optimizing bitrates	$894,000	Industry average is an 8.3% in additional revenue

Potential monthly revenue increase = $1,367,000

A View from the Top

Conviva examined data over 2012 and discovered the best performing companies in each of the three content categories. Cross tabulating this data against video quality, buffering ratio and failed video starts revealed that the top performing companies significantly outperform their peers:

Type	Bitrate	Industry Average	% Better than Industry	% HD	Industry Average	% Better than Industry
Best Live Video Publisher	1669	1349	23%	70.8%	50.6%	39.9%
Best VoD Long Form Publisher	2516	1306	92%	87.2%	54.2%	60.9%
Best VoD Short Form Publisher	1930	659	192%	74.4%	40.6%	83.3%

Type	Buffering Ratio	Industry Average	% Better than Industry	% Buffering Impacted Views	Industry Average	% Better than Industry
Best Live Video Publisher	0.6%	1.6%	63%	5.90%	12.3%	52%
Best VoD Long Form Publisher	0.5%	1.1%	54%	6.18%	7.6%	18%
Best VoD Short Form Publisher	0.5%	2.9%	82%	4.47%	8.3%	46%

Type	VSF%	Industry Average	% Better than Industry	Average View Time	Industry Average	% Better than Industry
Best Live Video Publisher	0.68%	4.1%	75%	33.38 min	23.14 min	44.3%
Best VoD Long Form Publisher	0.02%	1.3%	75%	31.47 min	19.51 min	61.3%
Best VoD Short Form Publisher	0.66%	2.1%	68%	6.92 min	4.89 min	41.5%

The best site in each content type had:

LIVE: Less than 32.4 sec of buffering for 90 min of content.

VOD LONG: Less than 27 sec of buffering for 90 min of content.

VOD SHORT: Only 1 out of 100 views failed because of technical start-time failures.

Conclusion

There are three best practices to deliver an optimal viewing experience.

I. **Continuous, real time viewer-centric monitoring**, across platforms. If you can't measure it, you can't optimize it and if the visibility isn't real time it becomes obsolete. The best content companies know every single viewer's experience, as it happens.

II. **Unified multi-bitrate and multi-CDN optimization** based on real time quality measurement. It is not sufficient to rely only on adaptive bitrate algorithms to optimize the quality of video. Achieving the best experience requires optimization across both bitrate and CDN. Using this approach allows a video provider to take the right action at the right time based on real time detection of network failures and performance degradation. This is the only way to improve video quality while simultaneously decreasing buffering and interruptions.

III. **Preemptive optimization of quality experience** driven by real time, local and global performance data. Taking action before issues arise allows publishers to protect their audience. Preemptive decisions are most effective when made using a real time global view. Leveraging real time data that identifies network congestion and CDN startup failures allows a provider to remedy problems before they affect viewers. Such a system allows for a highly personalized viewing experience at optimal quality.

The Viewer Experience Report reveals that the winner in the battle for viewership will provide great content, accompanied by a great viewer experience. Content providers that deliver buffer-free, fast starting experiences with a high resolution will see substantial lift in engagement and profitability.

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Data Sources

I. $20 billion forecast is total for five-year period. Projection based on average revenue increase of 6.20% from fixing buffering impact and a 13.23% increase from higher-sustained bitrates. Online video market was valued at $US 11.1 billion in 2012 and projected to grow to $US 28.7 billion in 2017. Vincent Flood, OTT and Online Video Market set for 'Sustained Global Boom', videoadnews.com, October 31, 2012, http://www.videoadnews.com/2012/10/31/ott-and-video-market-set-for-a-sustained-boom-say-digital-tv-research/ (accessed on 1/25/13)

II. Nielsen, State of the Media: The Cross-Platform Report Quarter 2 2012, The Nielsen Company, Q2 2012

III. Colin Dixon, Netflix in Scandinavia: An Odd Choice, TDG Research, August 17, 2012, http://tdgresearch.com/netflix-scandinavia-an-odd-choice/ (accessed on 1/23/2013)

IV. Marcello Ballve, Chart of the Day: Adults Acquiring Tablets at a Dizzying Rate, Business Insider, December 24, 2012, http://www.businessinsider.com/chart-of-the-day-tablet-penetration-2012-12 (accessed on 1/23/12)

V. Matt Lewis, US Smartphone penetration passes 50%, Rethink Wireless, November 5, 2012, http://www.rethink-wireless.com/2012/11/05/us-smartphone-penetration-passes-50.htm (accessed on 1/23/13)

VI. Tricia Duryee, Xbox Users Clocking More Hours Gobbling Media Than Gaming Online, AllThingsD, March 27, 2012, http://allthingsd.com/20120327/xbox-users-clocking-more-hours-gobbling-media-than-gaming-online/ (accessed on 1/23/13)