The Edge: Delivering the Quality of Experience of Digital Content

2016 EDITION

By Conviva for EdgeConneX

> As video consumption evolves from single screen to multi-screen, the burden on the Internet and its infrastructure will grow exponentially. The underlying infrastructure – never truly designed for digital video delivery – requires new thinking to ensure excellence in viewer experience. Furthermore, a viewer's Quality of Experience (QoE) with video is directly impacted by the interruptions in video delivery.

QoE in streaming video directly impacts viewer engagement (time spent) and retention. For OTT broadcasters and digital publishers, this has a direct impact on revenues. For service providers, the stakes are even higher since many publishers rely on network services to optimize video content delivery.

Edge co-location services intelligently minimize the distance between viewers and the video content. Such solutions circumvent the distance, capacity constraints, multiple network hops, and centralized processing load that exist in the traditional Internet architecture. EdgeConneX and Conviva have been consistently measuring the impact of these co-location solutions on the quality of experience delivered to viewers. Our research and data in 2016 have proven once again that localization of content brings success and directly impacts the bottom line for both SVOD and AVOD publishers.

In the 2015 study, Conviva found a 12-20% improvement in video rebuffering time when a content provider was "localized" in an EdgeConneX facility and directly linked to the ISP. This results in a significant increase in QoE, which in turn results in improved viewer satisfaction and engagement, and greater revenues from advertisements and subscription fees.

In the 2016 study, we find an average performance improvement of 25% as a result of localizing content at the metro edge across eight metro areas in the United States. The study measured aggregated QoE metrics — in particular re-buffering ratio — for the top three publishers with VOD traffic in Detroit, Pittsburgh, Minneapolis, Denver, Atlanta, Sacramento, Portland and Seattle metro areas before and after the deployment of the EdgeConneX solution. In addition, we calculated

the difference in performance for EdgeConneX versus other competing architectures. In this 2016 edition of the whitepaper, we continue to identify the challenges of using existing Internet infrastructure, quantify the impact of adding a local co-location element to the ISP service, and make recommendations for OTT broadcasters and digital video publishers seeking to deliver superior viewer experience.

The Internet Wasn't Built For Large Scale Video Streaming

The Internet was initially conceived as an offshoot of ARPANET, a closed network intended to connect academics and the military. At its heart was the idea of creating a global, connected network through which data could be shared – at the time, data that was largely assumed to be textual.

When Tim Berners-Lee invented the World Wide Web in 1989, the Internet opened up to the public, and swiftly expanded from text to all manner of multimedia. While the speed at which a picture loaded was largely immaterial to user satisfaction, consistency became vital once the Internet needed to support the delivery of video content. A video stream that stops every few seconds to load more data is inherently unsatisfying.

One could argue that video was largely a parlor trick online until 2005, when three ex-PayPal employees founded a company called YouTube. Although primarily used to share user-generated content, YouTube educated a video-hungry public to expect to be able to view video content through their computer. Not long after, premium video stepped into the frame. Netflix streaming was born in 2007, live sporting events became available through MLB at Bat in 2009, and the rest is history.

Consumers fell in love with video delivery over the Internet because they could watch what they wanted, when they wanted, and on whatever device they preferred. Meanwhile, the Internet strained to deliver high-definition video files to more capable devices at increasingly higher resolutions. Consumers, delighted with the idea of streaming through phones and Roku boxes, were often left disappointed. Video streams would come in at low quality, with frequent interruptions, and not be the TV-replacement they expected.

To address this growing challenge, two core solutions have evolved:

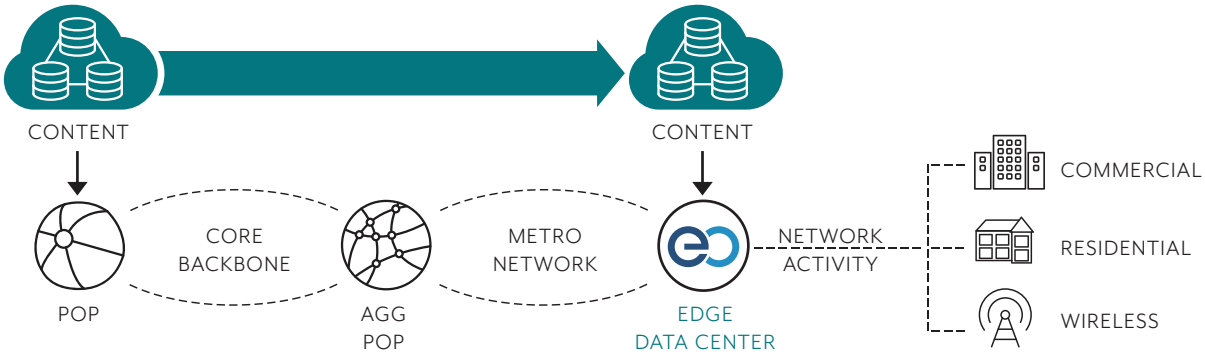
Using a Content Delivery Network (CDN) – A third-party service provider sets up its own distributed network, with which the video provider shares its content. When a viewer requests a file, rather than having it travel from a central location to the viewer, the stream is served from a nearby CDN, reducing the transit time.

Building a bespoke CDN – Netflix in particular has essentially built out its own 'sub-network', in which it places its own equipment directly connected with ISP networks. This allows the company to fully manage its delivery process, while providing the ability to distribute content for efficient delivery, albeit at a high cost.

CDNs are the most popular solution, and there are a number of providers offering these services. Each, of course, is liable to its own set of challenges, and many TV providers now balance their delivery across multiple CDNs. By contrast, most content providers have not opted to build out their own CDN across the Internet, for a combination of financial and competitive reasons.

EdgeConneX: A New Solution

EdgeConneX was born to solve a critical, logistical problem of the Internet: how to deliver large quantities of data for a real-time experience.



WITH EDGECONNEX, CONTENT MOVED TO THE EDGE

The EdgeConneX solution enables the "localization" of content in close proximity to the networks, connects directly with networks serving the viewer, and therefore improves the user experience by bringing the content closer to video viewing screens.

In order to illustrate the benefits of this solution to TV providers, EdgeConneX partnered with Conviva to track, monitor, analyze and summarize the outcome of real-world implementation.

In this 2016 edition of the study, EdgeConneX and Conviva closely analyzed different geographies, different ISPs and various OTT providers to further understand the challenges of using existing Internet infrastructure to deliver multi-screen video content at scale. Year after year, the findings suggests that "localization" is key to delivering superior viewer experiences.

The methodology was similar to the 2015 study: the most popular streams in each metro area were tested before and after localization to understand the difference in the rebuffering rate.

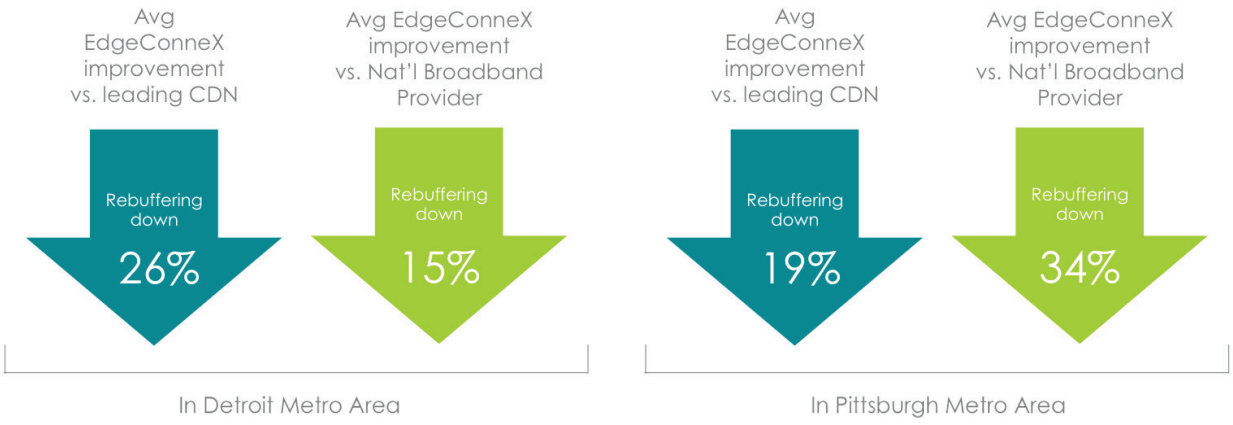
Two metro areas are provided below as examples. In each one, the most popular videos were tested before and after localization. After we found a consistent rebuffering improvement, we then compared it to a "control group" of competing architectures to see if the rise in quality was a result of local caching.

SCENARIO 1: Improvement vs. a competing CDN

- ISP A and CDN A (the local combination) VS. ISP A and CDN B (the CDN isn't local)

SCENARIO 2: Improvement vs. a competing ISP

- ISP A and CDN A (the local combination) VS. ISP B and CDN A (a competing ISP uses the same CDN, but does not directly connect in the metro area)

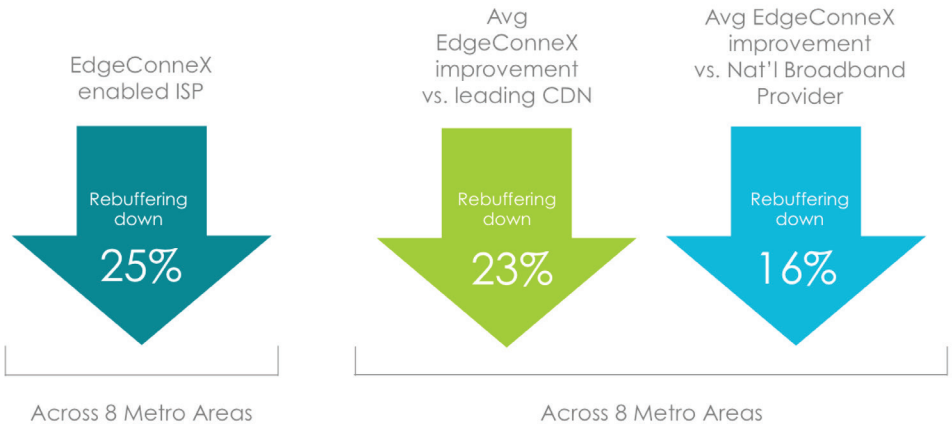


Similar results were found in all eight markets where localization took place in the second half of 2016.

The overall average performance increase that took place before and after localization was 25% across all markets.

Again, against the competition, the improvements still stand up. When compared with the non-local CDNs operating on the same network (scenario 1), the rebuffering improved 23% more.

In scenario 2, the local solution improved rebuffering by 16% more than the competing ISP using the same CDN.



2016 EdgeConneX & Conviva Study Findings

Per Conviva's 2015 Viewer Experience Report, a 1% increase in interruptions resulted in a 14-minute reduction in engagement per viewing session.

The EdgeConneX-enabled ISP shifted the gap between itself and other ISPs, resulting in a lead of 25% improvement; therefore, it should on aggregate be able to deliver an average of three and a half minutes higher engagement per viewing session.

Data tells us that viewers who perceive sub-par experiences will abandon in less than four minutes. According to a June 2016 study conducted by Verizon Digital Media Services, 86% of viewers are at a churn risk after even a single low-quality experience. The study revealed that the EdgeConneX-enabled ISP's improvements around reduction in interruptions across eight metro areas against the next leading CDN was 23% and against national broadband providers was 16%. And, in Detroit metro area EdgeConneX-enabled ISP has shown 26% improvements against the next leading CDN and 15% improvement against the National Broadband Provider.

In summary, by leveraging co-location services from EdgeConneX, the EdgeConneX-enabled ISP delivered superior viewing experiences and better yield due to reduced viewer and subscriber churn and increased advertising revenues due to lower abandonment rates.

Takeaways

Because the Internet is a sprawling network, with many ecosystem participants managing their components independently, understanding relative quality requires a view that crosses multiple publishers, ISPs, and regions. Understanding the value of co-location solutions is only possible when statistics are used to compare between those that have leveraged the opportunity against those that have not. That is why EdgeConneX and Conviva conducted this study in 2016 and discovered once again that delivering a superior viewing experience brings business success. Different publishers, geographies, and ISPs must be studied, as their own underlying systems and processes make their results variable, accounting for the different ranges across the publishers.

The reduction in a key quality metric, or in other words, interruptions in video delivery clearly demonstrates the value of the co-location solution. Through simple extrapolation, re-captured viewing time can be calculated, placing a clear and measurable return on the investment.

EdgeConneX® is the only global Edge Data Center® provider. Creating purpose-built, edge-of network infrastructure solutions that extend the internet's reach, EdgeConneX enables the fastest and most secure delivery of content, cloud services and applications. Edge Data Centers host bandwidth intensive and latency sensitive data closer to end-users, establishing a more secure, reliable and cost effective distribution model for the internet. For more information, please visit the EdgeConneX Internet of Everywhere® at edgeconnex.com.

Conviva powers every internet-connected screen with the most engaging viewing experiences imaginable by elevating the way OTT businesses use data-driven intelligence. For years, HBO, Sky, ESPN and the like have been using the Conviva Platform to enlighten, reveal and inform with important insights around consumer in-screen viewing experience allowing them to connect those metrics to important business outcomes. This allows customers to not only maximize subscriber retention and growth but also understand content and viewing trends so that they can deliver more personalized viewing experiences. We make engagement a data driven outcome based on actionable quality of experience (QoE) analytics. Conviva is privately held and headquartered in Silicon Valley, California, with offices in New York and London. For more information, please visit us at www.conviva.com.