



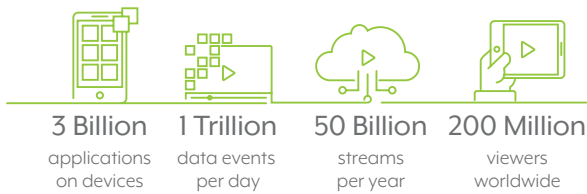
2018 ANNUAL

Conviva's State of the
Streaming TV Industry

conviva®

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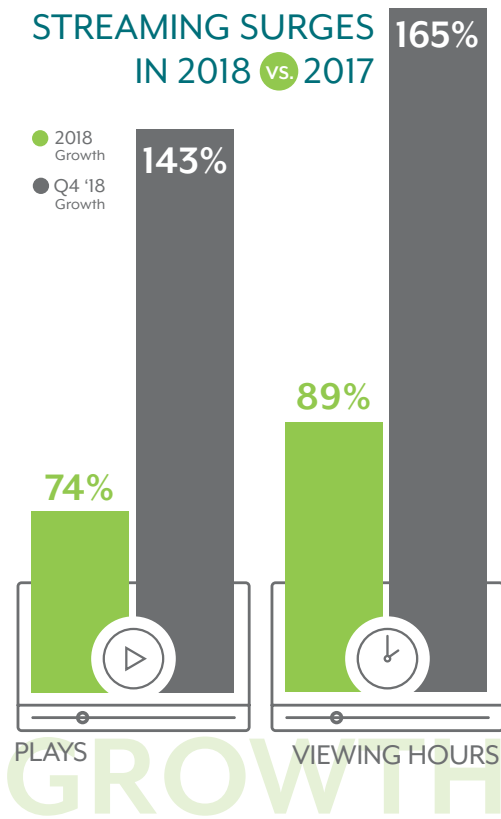
Conviva is the only real-time measurement and intelligence platform for streaming TV that looks at every second, every stream, and every screen. Conviva analyzes **50 billion annual streams**, across **200 million users**, to provide unparalleled precision and actionable insights to more than **200 global streaming brands** in **180 countries** on **five continents**. Streaming TV providers rely on Conviva's intelligence to optimize the viewer experience, drive engagement, and increase revenue.

Conviva's data for this report is collected using proprietary sensor technology, which is embedded directly within **3 billion video applications streaming on devices** globally and currently measures **1 trillion data events per day** across Conviva's customer base. In this report, the year-over-year data was normalized for a consistent set of Conviva customers in both 2017 and 2018.

Conviva's year-end 2018 report reveals new insights into market drivers and viewer behavior, as well as confirming trends highlighted in [Conviva's Q3 State of the Streaming TV Industry Report](#). Changing viewer expectations and the number of options available make it more important than ever for streaming TV providers to be vigilant and have visibility into every aspect of the viewer experience. Conviva's findings show that while measurable improvements are being achieved, factors such as skyrocketing traffic, growing consumer impatience, device diversity, and spikes in live viewership continue to make streaming TV delivery progressively more challenging overall. In 2018, Conviva measured:

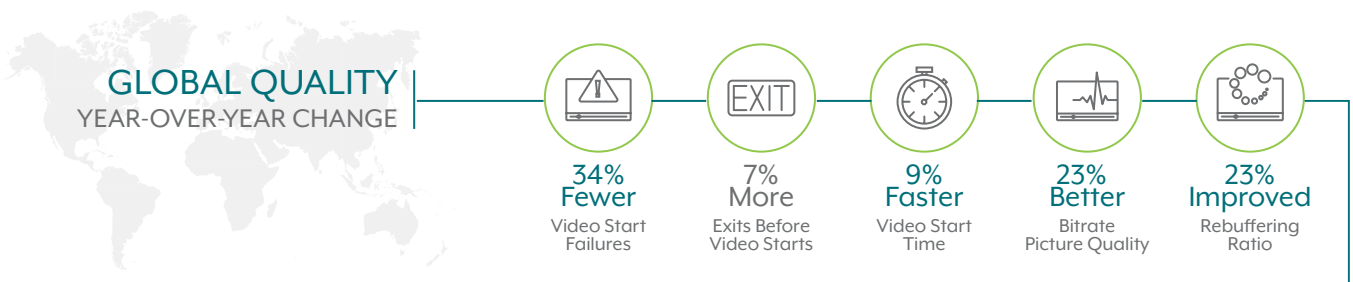
- Global adoption of streaming TV accelerated with **viewing hours up 89% year-over-year**, and **up 165% in Q4** as compared to Q4 2017.
- Viewers **lost patience** when faced with streaming TV delays as evidenced by the global **7% year-over-year increase in the rate of abandonment**, which translated to 14.6% of viewers who left before their video started.
 - In situations where expectations of experiences on par with traditional TV viewing were not met, **abandonment increased significantly faster** in 2018. Rates were 16.7% for live content up from 11.2% in 2017, 8.5% for U.S. vMVPDs up from 5.4%, and 6.6% for connected TVs up from 4.7%.
- vMVPDs (aggregators of content such as Hulu, Sling, PlayStation Vue, and DirecTV Now) continued to flourish, **growing 74% faster** in viewing hours in Q4 than publisher applications in the United States.
- Connected TVs came out on top among streaming devices with a **121% surge in viewing hours**, capturing **56%** of all viewing hours in 2018, up from 47% in 2017.
 - Competition heated up among connected TV devices for share of viewing hours commanded, as **Amazon Fire TV vaulted into 2nd place behind category leader Roku**, jumping up 5 spots from their 7th place position last year.
- **Live events** were not only responsible for the **biggest spikes** in viewing, but the scale of viewership raised overall streaming numbers nationally and globally in 2018.
 - The United States saw a **217% spike** in live news viewership with the **midterm election** and the **World Cup** lifted overall global traffic up to **29%**.

Scale and Expectations Soar



Across Conviva's customer base, in parallel with the **rapidly growing industry**, 2018 saw the convergence of **heightened viewer expectations** and waning patience. Streaming TV continued its meteoric rise with **89% growth in global viewing hours** and **74% growth in plays** as compared to 2017. This trend accelerated in Q4 2018 with **165% growth in viewing hours** and **143% growth in plays** year-over-year. This growth reflects a **multi-year trend of cord-cutting** as viewers shift their eyeballs and dollars from traditional cable or satellite options to streaming TV. This explosion is framed by a backdrop where streaming has gone from novelty to necessity and consumers have more choice than ever.

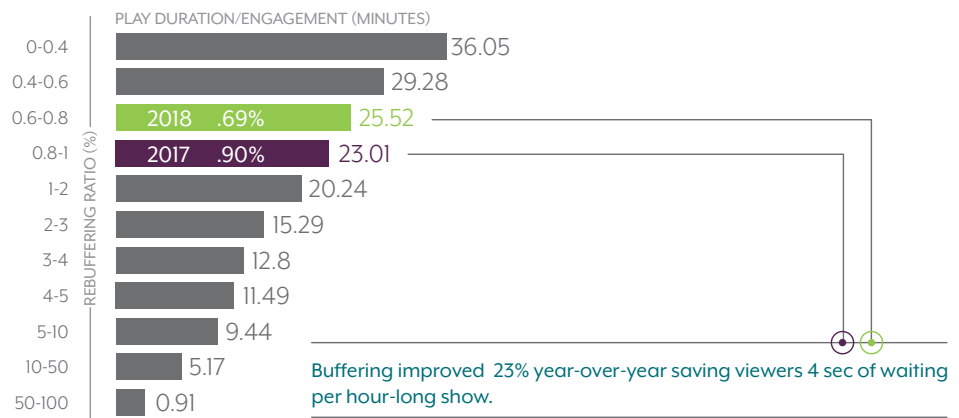
In 2018, viewers were in a position to be more demanding and less patient. Conviva data reflected this with a **7% increase in abandonment** across all content worldwide, at **14.6% in 2018** as compared to the **13.7% in 2017**. The rise in viewer-initiated exits indicates **increased impatience** with streaming delays. This effect was amplified when viewers faced delays in situations where they **expected the experience of traditional TV viewing**, such as on connected TVs, watching live content, and via vMVPDs. In addition, as options proliferate, the choice available to viewers demands streaming services not only focus on acquisition of customers, but on **retention** with an extraordinary experience.



Overall, streaming TV providers delivered a dramatic improvement in the quality of streams in 2018. Streaming TV providers and their viewers saw **34% fewer video start failures**, **23% better picture quality** (higher resolution in terms of bitrate), and **9% faster video start times**. A major source of ire to viewers, **buffering** (when the video pauses during playback so it can reload) **improved 23%** in 2018 to .69%. This still translates to **25 seconds of waiting** in an hour-long show. A 2018 **PwC study** on 5G found consumers would **pay a premium** if 5G provided "better quality video" on mobile devices (29% vs. 25% of home internet users) and "decreased buffering while streaming video" (25% vs. 19%). Further proof viewers are willing to open their wallets for better quality.

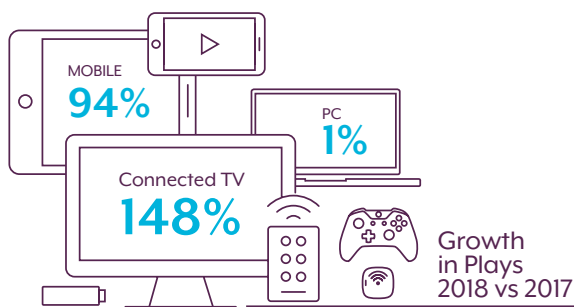
Less Time Lost Waiting for Buffering in 2018

As the viewer experience improves, engagement and therefore revenue increases.



Historically, viewer engagement has been correlated with quality as viewers watch longer on devices and services which offer a better experience. As streaming TV providers made great strides in quality in 2018, **minutes per play increased 8.4% to 19.6 minutes** from 18.1 minutes in 2017.

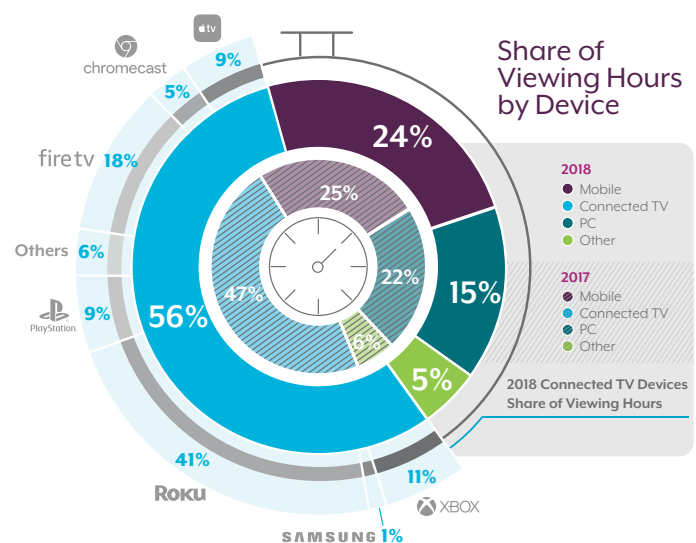
Big Brands Battle Among Connected TV Devices

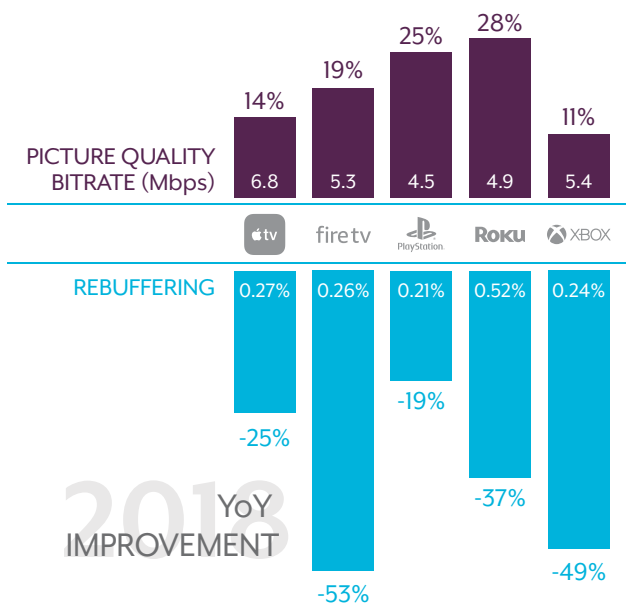


Connected TVs maintained their steep upward trajectory in 2018 with **148% growth in plays**. This outpaced mobile which saw a more modest but still impressive **94% growth** in plays, and PCs which remained relatively flat with just a **1% increase** in plays. Conviva identified connected TVs as the device of choice for streaming with **56% share** in viewing hours, up from 47% the year prior. **Connected TVs led in viewing quality** over mobile and PCs with the **least buffering, fewest start failures, and best picture quality**. Despite the popularity and major quality improvements for connected TVs, **increased viewer abandonment** due to streaming delays was also evident here at **6.6% exits before the video started, up 39%** from 4.7% in 2017.

Among connected TV devices, **Amazon Fire TV** secured 18% share of viewing hours Conviva measured in 2018, **an increase of 240% from 2017**. This catapulted them **from 7th into 2nd place in share among connected TV devices** and demonstrates the continued volatility of the rapid-growth streaming TV ecosystem.

Roku continued to dominate the #1 spot among connected TV devices Conviva measured, commanding **41% share** of viewing hours in 2018. Amid the expansion of the streaming TV industry, Roku still leads the pack by a significant margin, despite the fact that their **share declined from 46%** Conviva measured in 2017. Roku and all of the connected TV devices Conviva measured saw increases in total viewing hours in 2018.





Roku was particularly strong with live content in 2018, with **52% of all live connected TV** viewership Conviva measured. As a result of longer watch times for live content, Roku drove nearly **39 minutes per play** versus the average of **31 minutes** Conviva measured across all connected TV devices. Roku did have the **most buffering** among connected TV devices Conviva measured at **.52%**, possibly due to increased live viewership which sees more buffering overall than video on demand.

For the devices that delivered the best quality in 2018, connected TV or otherwise, **PlayStation** had the **least buffering** at a stellar **.21%**. **Apple TV** delivered the **highest picture quality** of any device at 6.8 Mbps, a particularly impressive feat considering the **time for the video to start was also the shortest** of any device at 2.29 seconds. Typically this is an inverse relationship, the higher the picture quality, the longer the start time required for the video to load.

LIVE

Anywhere, Anytime, Any Content

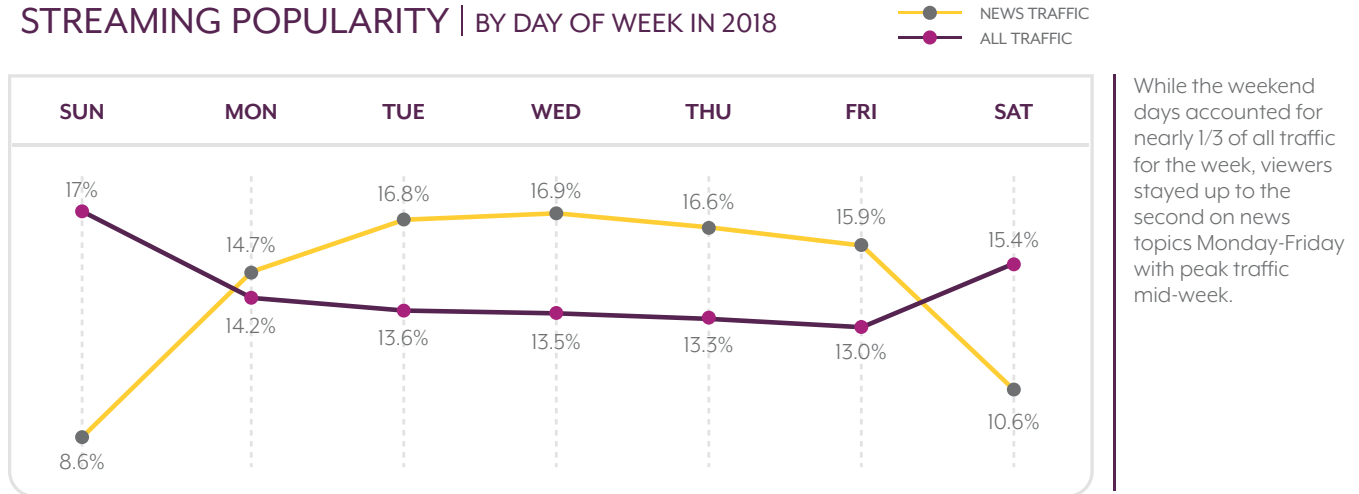
The fear of missing out on events of national or global relevance compelled viewers to stream at a scale that drove a significant impact on the total volume of streaming content worldwide. **Live content drove significant spikes in local, national, and global viewership** in 2018, primarily due to can't-miss news topics and major sporting events. While quality for live streams continued to improve year-over-year, **exits before the video started increased by a massive 49% to 16.7%** from 11.2% in 2017. As choice and expectations swell, viewers became increasingly impatient and abandoned live content at a rate higher than video on demand content for the first time in 2018.



Streaming coverage of the United States **midterm election** on November 6 ballooned live viewership of **news traffic 217% in the United States**, also resulting in a **14% increase in overall global viewership** that day. The rapid-fire news cycle toward the end of 2018 drove a number of spikes in United States live news traffic around political hot-button events, such as a **161% increase** for Supreme Court **nomination proceedings for Brett Kavanaugh**, and a **67% lift with coverage of the passing of former United States President George H. W. Bush**. These spikes illustrate the reliance on streaming to stay up to the second on the latest hot topics.

In 2018, weekdays were predominantly the time viewers in the United States kept to date on live news, while the weekends reigned supreme for all streaming globally. Live news **peaked mid-week** with **Wednesday accounting for 17% of viewing**. Conversely, there was a significant **drop in live news viewership on Saturday and Sunday**. Across all types of content, nearly **a third of global viewing hours happened on weekends** in 2018. This was dominated by Sunday which garnered **17%** of all viewing for the week, while **Fridays were the least popular** day of the week for overall streaming.

STREAMING POPULARITY | BY DAY OF WEEK IN 2018



Live viewership overall was **up 65%** in viewing hours year-over-year in 2018, with minutes viewed per play up nearly **9%** to **26.6** from 24.5 in 2017. This growth was especially notable on mobile where the timeliness of live and the ability to stream anywhere drove **82% growth** in live viewing hours, the biggest gain among all device categories year-over-year in 2018. In comparison, PCs and connected TVs saw year-over-year **growth of 41% and 69%** respectively. Viewing hours also grew rapidly for **video on demand content, up 111%** in 2018, reflective of consumer habits and a growing preference for time-shifted viewing. Content curation is increasingly important for on-demand viewing which accounted for **59%** of total viewing time in 2018, up from 53% in 2017.



26%

OLYMPICS
THU | FEB 15, 2018

Second only to the World Cup, the Olympics drew numerous bumps in viewership.

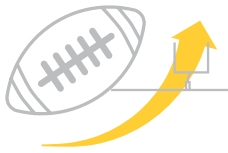


29%

WORLD CUP
MON | JUN 18, 2018

World Cup group stage saw the largest of many global spikes during the tournament

While news was increasingly a driver of live viewing in 2018, sports continued to have a massive impact, as noted previously in [Conviva's Q3 report](#). Coverage of the **World Cup drove the largest global spike with viewing hours up 29%** on a single day during the group stage of the tournament. World Cup streaming overall resulted in a **12% lift in global viewing hours** throughout the tournament. Earlier in the year, **Olympics** coverage also drove a daily increase in viewership of **26%** worldwide. As with the continuous news cycle, the time sensitivity of live sports drives the stakes **critically high** to deliver a perfect experience to viewers. Widely publicized issues, such as [Amazon Prime](#) had during the U.S. Open Tennis Tournament, erode viewer confidence in the medium and **highlight the importance of getting it right** when peak traffic makes it more difficult than ever to deliver a high-quality streaming experience.



15%

NFL

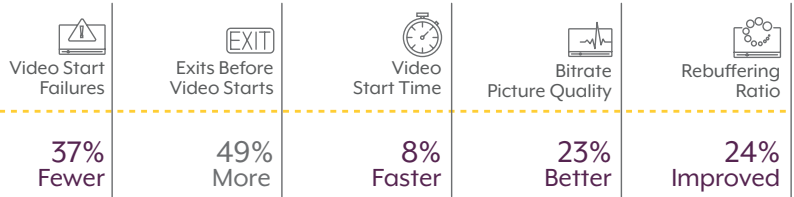
SUN | OCT 7, 2018

Despite being a U.S.-centric sport, NFL drove global spikes in traffic on game days.

NFL viewership drove large, global spikes of up to 15% on Sundays during the season. The global increases these football games influenced are especially impressive given that **Sundays were the busiest day for streaming in 2018, accounting for 17% of all viewing hours** for the week. Similarly, **March Madness** and the **Masters Golf Tournament** drove up to 10% and 12% increases respectively in viewership worldwide. For providers who look to recoup lost dollars as viewers move away from traditional broadcast TV, **streaming offers a bastion for sports**. Streaming has inherent flexibility, including distribution and access via multiple channels such as social media platforms like Facebook, sub-season package options down to a partial game, and niche content catering to specialty interests.

In terms of overall viewer experience, streaming TV providers delivered much better live quality than in 2017. This included **24% less buffering, 37% fewer video start failures, 23% better picture quality (bitrate), and 8% faster video start times** in 2018.

LIVE QUALITY



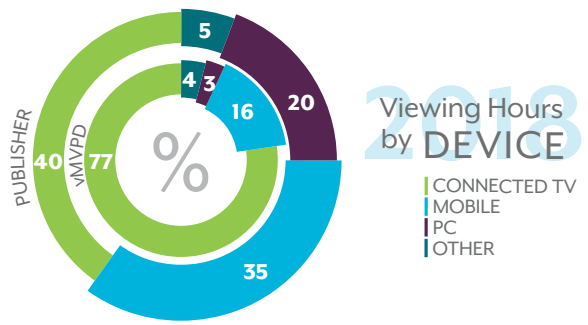
The Traditional TV Experience Goes Digital with vMVPDs

vMVPDs offer viewers a streaming TV experience that most closely resembles traditional cable or satellite TV. With healthy gains in 2018, vMVPDs in the United States continued to dominate **growing 74% faster than publisher applications** in the United States in Q4 as consumers increasingly opted for bundled choices. As was the trend across all content and especially live, **exits before the video started increased to 8.5% for vMVPDs in the United States, up 57% from 5.4%** the year prior, further indicative of dwindling viewer patience when forced to wait for content.



Fortune reports vMVPDs like Hulu, YouTube TV, Sony's PlayStation Vue, and Sling TV **grew a combined 2.1 million subscribers** over the first 9 months of 2018, which is starkly correlated with the **loss of 2.8 million subscribers for cable and satellite** during the same time period. vMVPDs have proven to be a popular option for cord-cutters striving for a cost-savings option that offers the convenience of streaming, with a breadth of content in a single platform. At 25 minutes per play, **engagement is 79% higher for vMVPDs** than the 14 minutes per play Conviva measured for publisher applications in the United States in 2018.

With their impressive growth, vMVPDs heavily contributed to the rise of connected TVs as **77% of all vMVPD viewing hours in the United States in 2018 were via connected TV**. This is nearly double the 40% of viewing hours Conviva measured on connected TVs for publisher applications in the United States. In contrast, PCs accounted for **only 3% share of viewing hours** from vMVPDs in the United States. The **30% decline in share of total viewing hours that PCs** experienced in 2018 is likely driven by the fact that they didn't benefit from this major growth sector.



Overall, the viewer experience continued to improve for vMVPD viewers in the United States as these services achieved **37% less buffering, 21% better picture quality, and 9% faster video start times** in 2018. vMVPDs offered an experience most like traditional TV in terms of content and also more reliable streaming quality, which seems to be a winning formula.

Streaming Quality	Video Start Failures	Exits Before Video Starts	Video Start Time	Bitrate Picture Quality	Rebuffering Ratio
U.S. vMVPDs	0.95%	8.46%	4.19 sec	4.9 Mbps	0.42%
All U.S. Streaming	1.33%	13.16%	4.65 sec	4.8 Mbps	0.50%

Closing Thoughts

Conviva's real-time measurement and intelligence platform for streaming TV highlighted significant shifts during 2018 that illustrate both the vast potential and the volatility of a rapidly maturing market. These shifts further cemented that amidst skyrocketing growth, exceeding expectations is a business imperative for providers looking to increase engagement, retention, and ultimately revenue.

About Conviva

Conviva is the real-time measurement and intelligence platform for streaming TV. Conviva's Video AI Platform provides insight into streaming TV consumption, engagement, and viewer experience across every second, every stream, and every screen. With a global footprint of 50 billion streams per year across 3 billion applications and 200 million users, Conviva serves more than 200 brands, including HBO, Hulu, Sky, Sling TV, Turner, Univision, and more. The company is privately held and headquartered in Silicon Valley, California, with offices around the globe (www.conviva.com).