



**CONVIVA**

**Q4**  
2021

**Conviva's  
State of  
Streaming**

During the pandemic, streaming adoption accelerated beyond expectation, skyrocketing to new heights with every passing quarter. However, as they say, all good things must come to an end. In the case of global streaming consumption, this means a stabilization as the pandemic-driven gains are maintained and a new bar is set for what normal looks like in entertainment. Global viewing time still rose 7% in Q4 2021 as compared to the previous Q4, and we expect in coming quarters it will continue to build slowly but steadily as the great streaming surge ebbs.

## Q4 2021 highlights:

- Big screens continue to dominate viewership globally, commanding over 50% of share in every region except Asia. Notably, Asia was a bright spot for big screens, as their share is growing rapidly in the region.
- Connected TVs' share of viewing time fell for the first time ever, and of connected TV-first device manufacturers, only Roku grew, while Apple TV and Amazon Fire TV dropped 1% and 7%, respectively.
- Globally video quality generally improved across all key measures with only one key exception - ad buffering ratio. This measure is correlated with viewer churn based on Conviva studies and needs to be addressed by the industry.
- YouTube Shorts seem to be gaining traction, as shorter-form content grew more than 2% from last year on the platform best known for long-form videos.
- U.S. sports leagues saw their high mark in engagement on social media in Q4, besting pre-pandemic numbers captured at the beginning of 2020.



Conviva's data is primarily collected using proprietary sensor technology with a global footprint of more than 500 million unique viewers watching 200 billion streams per year across nearly four billion applications streaming on devices. Embedded directly within streaming video applications, the sensor measures across content and ads to analyze nearly three trillion real-time transactions per day for its customers. In this report, the year-over-year data from Q4 2021 as compared to Q4 2020 was normalized based on Conviva's customer base.

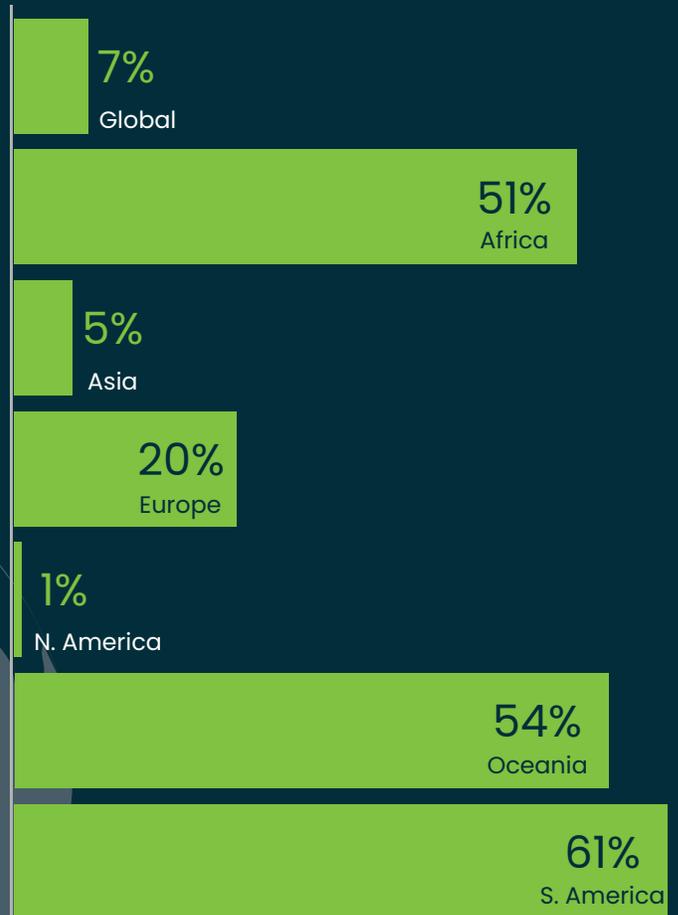
## Modest streaming gains

Global streaming viewing time for Q4 2021 was up 7%, driven mostly by double-digit growth in Africa, Oceania, and South America. In more established streaming markets, Europe was up 20%, Asia just 5%, and North America, one of the most mature streaming markets, saw just a 1% increase in viewing time.

While the massive streaming gains as a product of the pandemic were retained, the growth slowed, especially in more saturated markets like North America. North America commonly leads global streaming trends, so noting that growth was up only 2% last quarter and 1% this quarter, it's likely the rest of the world will also start to see significant deceleration.

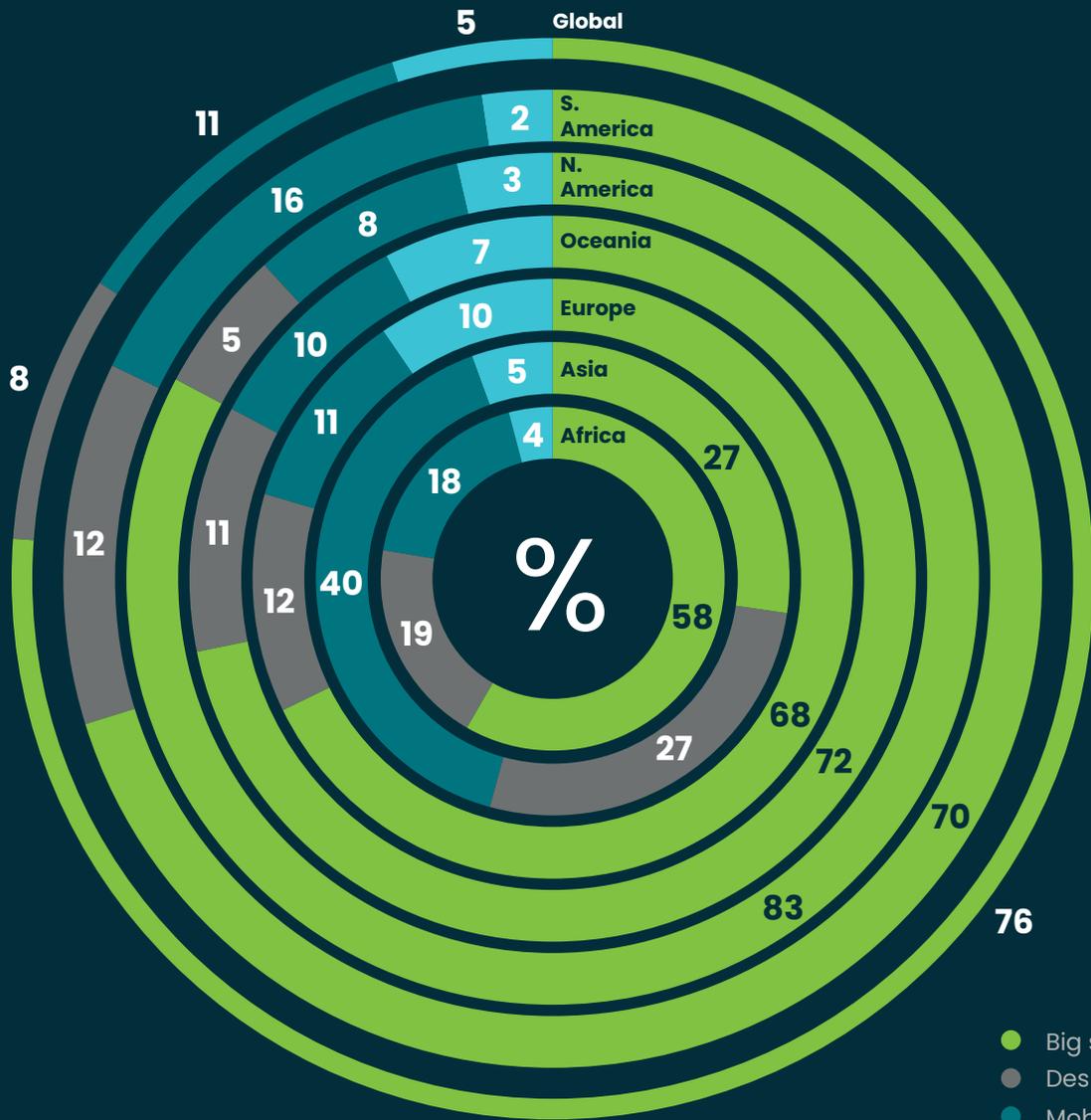
### Growth in viewing time by region

Q4 2021 vs. Q4 2020



# Share of viewing time by device

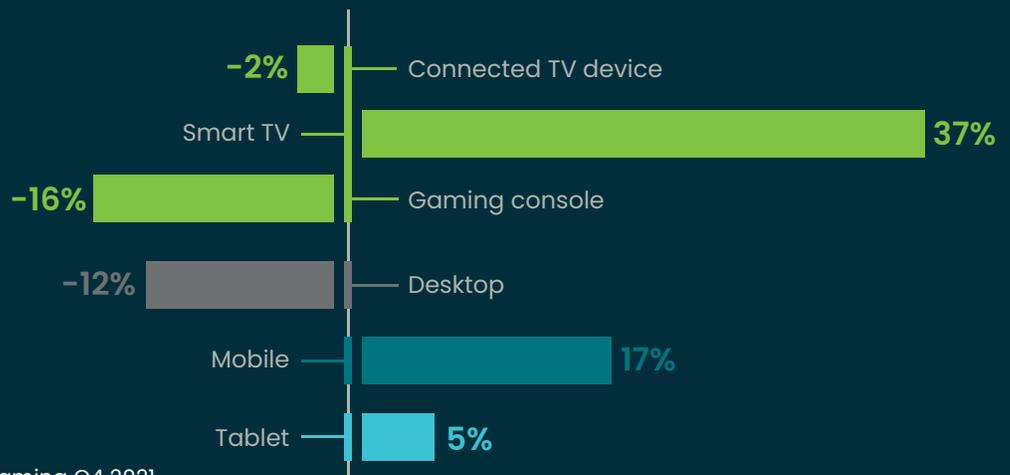
Q4 2021



- Big screen
- Desktop
- Mobile
- Tablet

# Growth in viewing time by device

Q4 2021 vs. Q4 2020



## Surprising turns in device viewing time

In a stunning turn, connected TVs' viewing time fell for the first time ever, down 2%; desktops were also down significantly by 12%; and gaming consoles continued the decline that was first reported in the middle of last year, down 16%. In an industry that has been used to up and to the right growth across all categories, we've reached a saturation point as device preferences shift.

In better news, tablets had a modest 5% growth in viewing time, and mobile phones enjoyed a 17% increase over this time last year. It was smart TVs that were the real winners, up 37% from Q4 2020, further cementing the global big screen growth trend even as viewers trade in their dongles for built-in capabilities.

## Big screens still reign supreme

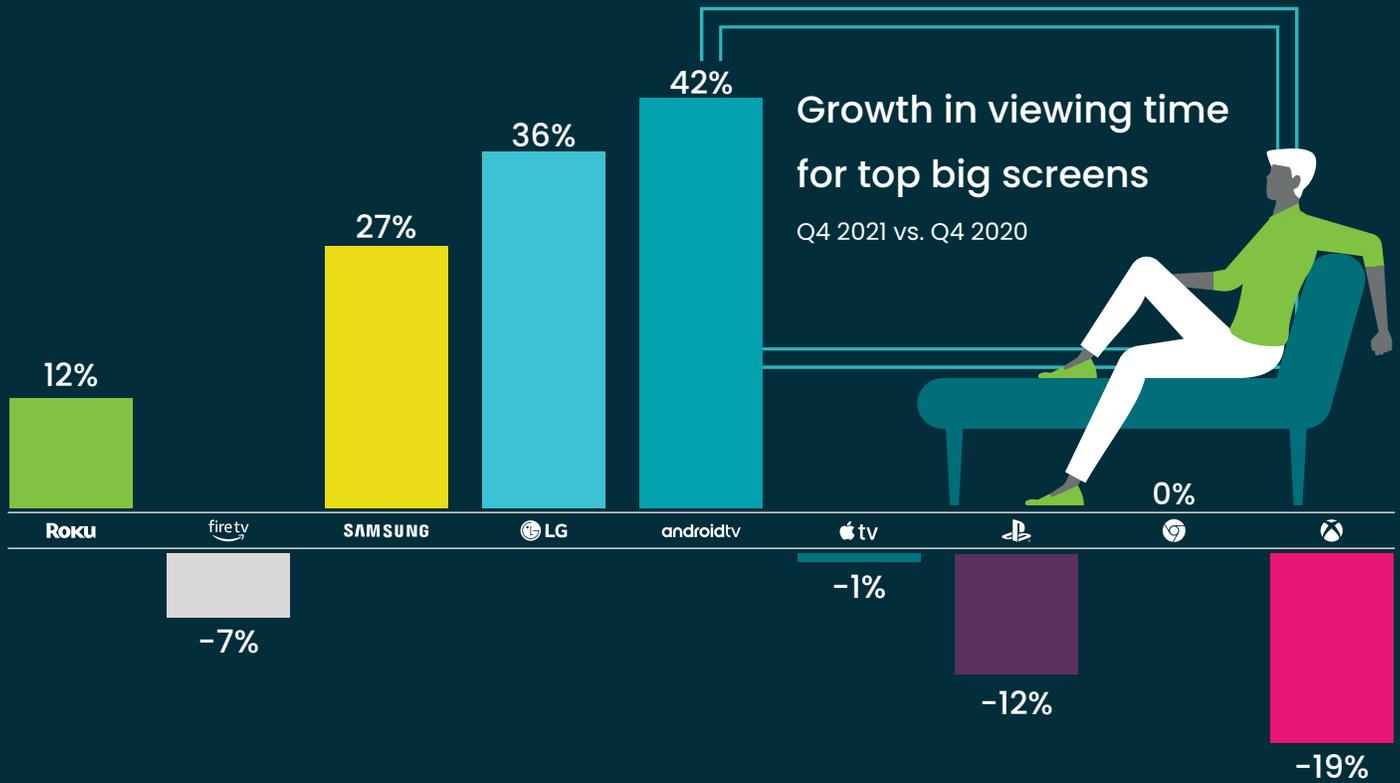
Big screens continued to dominate viewership globally, as they commanded over 50% of share in every region except Asia. Yet even Asia was a bright spot for big screens. Their share grew rapidly, up from 14% share in Q3 to 27% in Q4 2021—tying with regionally more consistent desktops. Mobile still accounted for the highest streaming consumption in Asia at 40%, and tablets made a small dent with 5%.

Africa had the next lowest big screen viewership at 58%, followed by desktop and mobile, which had similar share at 19% and 18%, respectively, while tablets took 4% of viewing time.

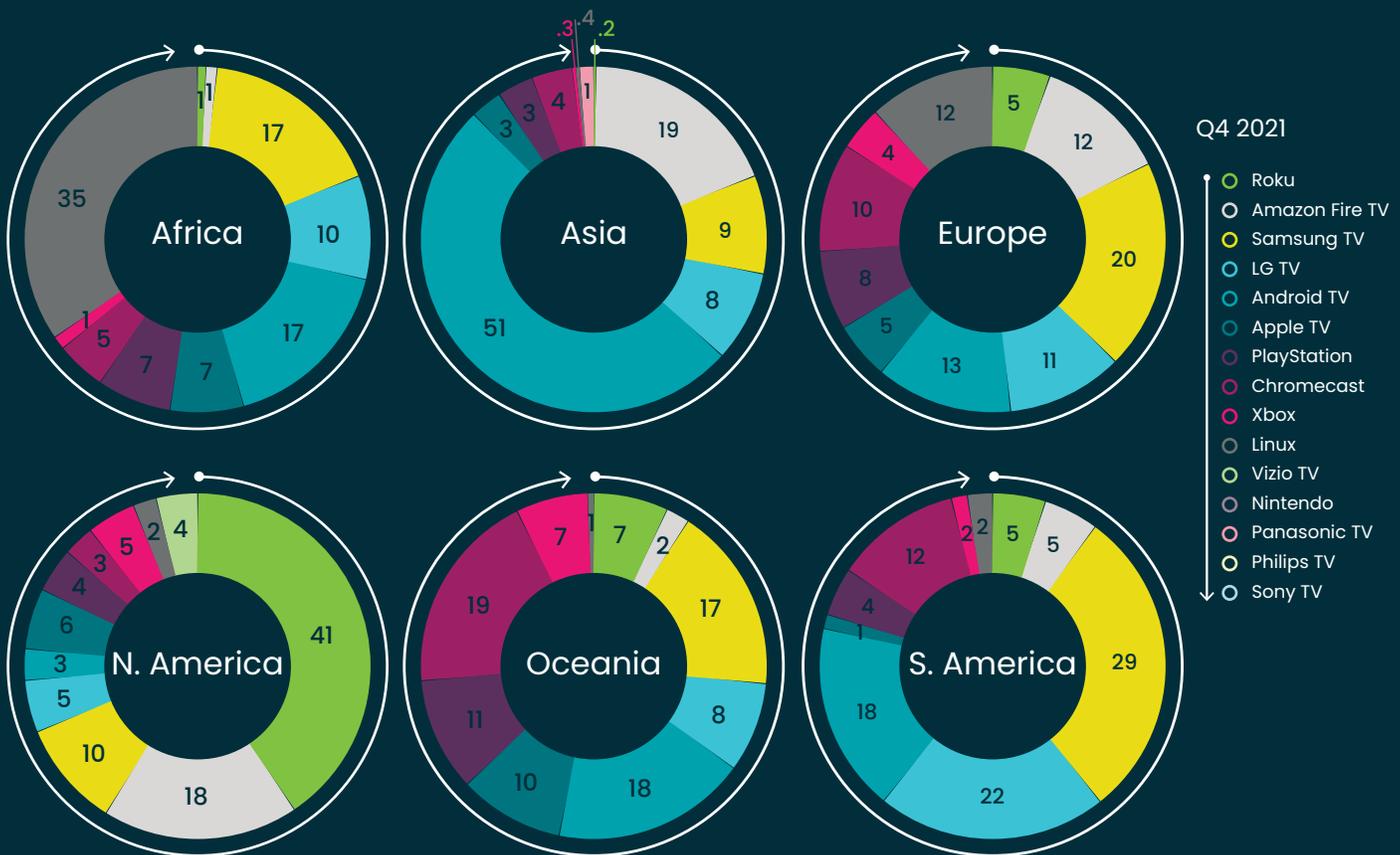
In Europe, big screens earned 68% of viewership, while desktops, mobile phones, and tablets were all only one percentage point apart with a little more than 10% each. Oceania and North America told similar stories to Europe. Oceania's big screens raked up 72% of viewing time, followed by a fairly even breakdown of the other devices: desktop at 11%, mobile at 10%, and tablets at 7%. North America had the largest share of big screen viewership at a huge 83%, while the other devices were split by just a few percentage points: mobile at 8%, desktop at 5%, and tablets at only 3%.

South America also preferred big screens to every other device, with 70% of the share. Mobile took 16%, followed by desktop at 12% and tablets with just 2%.

All told—globally mobile saw 11% share, desktops made up 8%, and tablets had only 5% share—the shift toward bigger screens is a continuing, strong trend as streaming providers focus on delivering content meant for the biggest screens possible.



### Regional viewing time by big screen (%)



## But connected devices start to stumble

For a while, we've been monitoring the explosive growth of not only streaming but also, more specifically, big screens across the globe. Year over year, we saw a number of declines, notably gaming consoles, with Xbox down 19% and PlayStation down 12%. But even more surprising were the declines for Apple TV and Amazon Fire TV, which dropped 1% and 7%, respectively. Conversely, Android TV led the way in growth, up 42%, followed closely by LG TV, up 36%, Samsung TV, up 27%, and Roku, up 12%. So, while many big screen devices are seeing stabilization, even more data points to smart TVs gaining ground.

## Big screen preferences across the globe

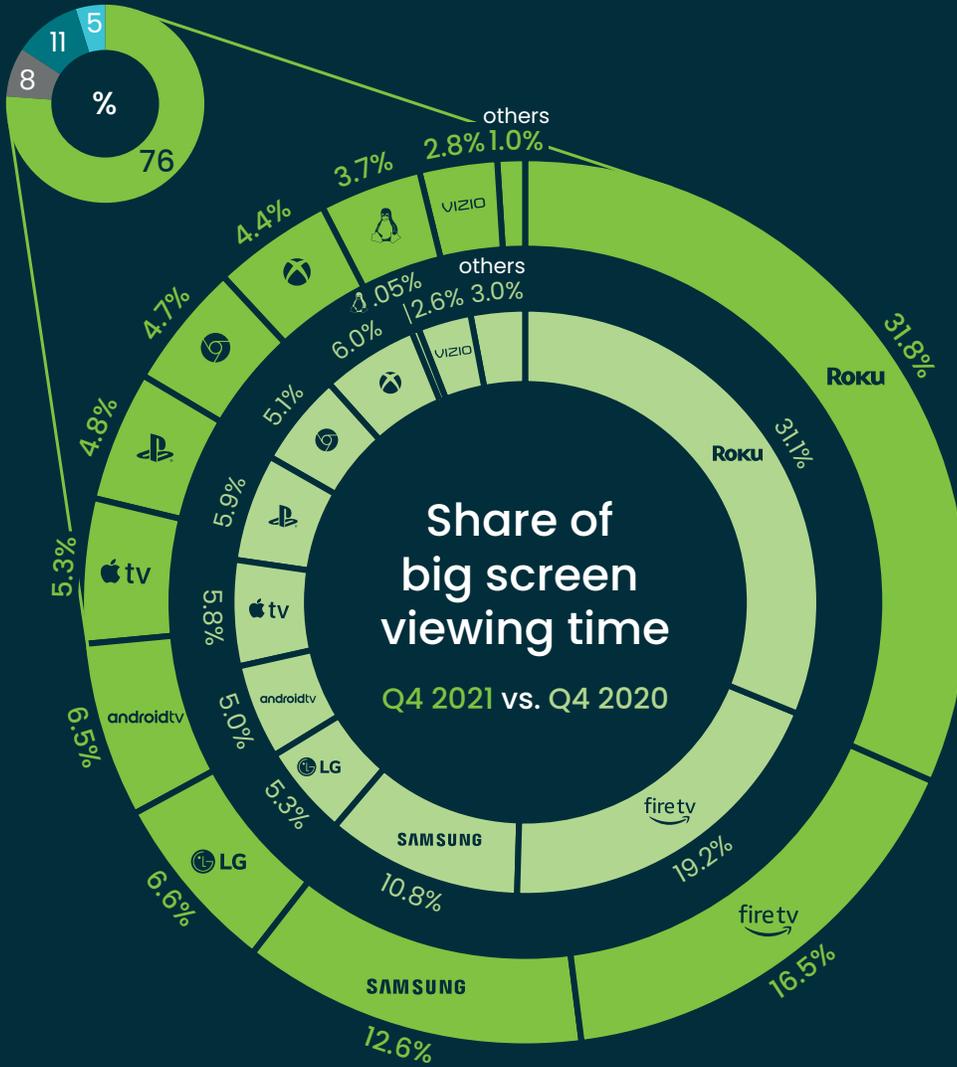
Globally, Roku, Amazon Fire TV, and Samsung TV took the top three spots when it came to share of big screen viewing time, while the middle of the pack was closely matched with just a few percentage points separating them.

Regionally, this picture changes. Everywhere but North America, Roku had single-digit share, lowest in Asia at just 0.2% and highest outside of North America in Oceania at 7%. Amazon Fire TV fared better globally, with double-digit share in Asia (18.6%), North America (18.4%), and Europe (12.3%). While third globally, it was Samsung TV that carried a higher share of viewing across multiple regions, with 9.2% in Asia, 10.1% in North America, 17.2% in Africa, 17.4% in Oceania, 19.5% in Europe, and 29.3% in South America.

Africa preferred Linux STB at 34.5%, followed at a far second by Samsung TV at 17.2% and Android TV at 16.8%. Android TV dominated in Asia with over 50% share. Amazon Fire TV was next popular in Asia at 18.6%, followed by Samsung TV at just 9.2%. Europe was more evenly divided; although Samsung TV was the clear winner at 19.5% share, Android TV and Amazon Fire TV were just 0.3% apart at 12.6% and 12.3%, respectively. North America relied heavily on Roku for streaming at 40.5%, with Amazon Fire TV coming in second at 18.4% and Samsung TV rounding out the top three at 10.1%. Oceania's top three were separated by a small margin: Chromecast at 18.8%, Android TV at 18.1%, and Samsung TV at 17.4%. Finally, South America favored Samsung TV, which had almost 30% of the viewing share. LG TV at 21.5% and Android TV at 17.6% completed the top three in South America.

## Share of viewing time by device

● Big screen ● Desktop ● Mobile ● Tablet



|                | 2021    | 2020    |
|----------------|---------|---------|
| Roku           | 31.8%   | 31.1%   |
| Amazon Fire TV | 16.5%   | 19.2%   |
| Samsung TV     | 12.6%   | 10.8%   |
| LG TV          | 6.6%    | 5.3%    |
| Android TV     | 6.5%    | 5.0%    |
| Apple TV       | 5.3%    | 5.8%    |
| PlayStation    | 4.8%    | 5.9%    |
| Chromecast     | 4.7%    | 5.1%    |
| Xbox           | 4.4%    | 6.0%    |
| Linux STB      | 3.7%    | 0.05%   |
| Vizio TV       | 2.8%    | 2.6%    |
| Others         | 1.0%    | 3.0%    |
| Nintendo       | 0.19%   | -       |
| Panasonic TV   | 0.08%   | 0.05%   |
| Philips TV     | 0.05%   | 0.05%   |
| Sony TV        | 0.03%   | 0.03%   |
| Hisense TV     | 0.02%   | 0.004%  |
| Whale OS TV    | 0.0008% | 0.0001% |
| TiVo           | 0.0001% | 0.04%   |

## Big screen quality

|                | Minutes / Play |      | Video Start Failures |      | Video Start Time |      | Buffering |      | Bitrate |     |
|----------------|----------------|------|----------------------|------|------------------|------|-----------|------|---------|-----|
| Roku           | 29.7           | -11% | 0.44%                | -1%  | 3.41             | -17% | 0.12%     | -29% | 7.33    | 2%  |
| Amazon Fire TV | 27.9           | 2%   | 0.77%                | -12% | 5.26             | 4%   | 0.23%     | -8%  | 7.84    | 8%  |
| Samsung TV     | 27.3           | 3%   | 0.64%                | 15%  | 5.45             | 16%  | 0.13%     | -30% | 9.36    | 7%  |
| LG TV          | 28.4           | 0%   | 0.61%                | -9%  | 7.16             | 32%  | 0.21%     | -6%  | 10.84   | 11% |
| Android TV     | 23.8           | 7%   | 1.94%                | -46% | 4.98             | 30%  | 0.24%     | -7%  | 9.33    | 15% |
| Apple TV       | 25.2           | -2%  | 0.99%                | 45%  | 2.75             | -5%  | 0.07%     | -51% | 9.08    | 7%  |
| PlayStation    | 26.9           | 2%   | 0.67%                | 48%  | 3.30             | -18% | 0.09%     | -55% | 8.11    | 22% |
| Chromecast     | 35.3           | -1%  | 0.73%                | 49%  | 7.13             | 25%  | 0.30%     | -36% | 6.60    | 15% |
| Xbox           | 26.9           | 0%   | 0.49%                | -75% | 4.64             | 10%  | 0.08%     | -31% | 7.64    | 4%  |
|                | Q4 2021        | YoY  | Q4 2021              | YoY  | Q4 2021          | YoY  | Q4 2021   | YoY  | Q4 2021 | YoY |

Improvements in green, declines in pink | Best per category in green, worst in pink

## Device divide on big screens

How did this change over the previous Q4 on a global scale? Roku continued to hold the top spot among big screen devices globally, even gaining a small bit over last year with 31.8% of viewing time. Amazon Fire TV decreased in share by almost 3% to 16.5% share of viewing time but still managed to maintain the second spot globally, after Roku. Samsung TV, LG TV, and Android TV rounded out the top five big screen, and each saw significant gains, as Samsung TV was up 1.8% from last year to 12.6% share, Android TV was up 1.5% to 6.5% share, and LG TV was up 1.3% to 6.6% share.

## Big screen quality improves, sort of

Like most quarters, Q4 had some improvements and declines when it came to quality. Buffering was down across all big screen devices. PlayStation improved the most, down 55%, but Apple TV was a bright spot as well, down 51%, and saw the lowest buffering rate at just 0.07%.

Picture quality also improved on every big screen, as PlayStation again progressed the most, up 22% from this time last year. LG TV had the best picture quality, though, with a bitrate of 10.84 Mbps, while Chromecast trailed at 6.60 Mbps.

The rest of the quality measurements were mixed. PlayStation, Roku, and Apple TV all claimed lower video start times year over year, with Apple TV boasting the lowest at just 2.75 seconds. But every other big screen reported higher start times, with LG TV owning both the highest percentage increase year over year, up 32%, and the longest start time of all big screens at 7.16 seconds.

Video start failures were up and down, too. Failures for Chromecast, PlayStation, and Apple TV soared, up almost 50% for each. Conversely, Xbox was the clear winner for most improved year over year, down a massive 75% to record the second-fewest failures among big screens, second best after Roku, which saw failures just 0.44% of the time. Though Android TV enjoyed a healthy 46% decline year over year in video start failures, it had the most failures this quarter, 1.94% of the time.

Roku and Android TV had the most fluctuation in minutes per play year over year; Roku was down 11% and Android TV was up 7%. The other big screens stayed static or increased or decreased nominally year over year. Minutes per play were pretty similar across big screens, although Chromecast came out on top with a hefty 35.3 minutes per play compared to Android TV's fewest minutes per play at 23.8.

## Waiting... for better quality all over the map

Globally, video quality improved year over year, with one big exception—video start time. Sometimes streaming providers will sacrifice longer start times for better buffering and bitrate, which could be the case this quarter, as every region recorded an increase in video start time but much improved buffering, picture quality, and video start failures. It's also likely that as more regions shift toward smart TVs, there will be longer wait times for a video to start but better quality overall.

For instance, in Asia, where smart TV adoption is growing rapidly, there was a 109% increase in video start time, but bitrate improved by 95%, video start failures decreased by 35%, and buffering decreased by 23% across all devices. While Asia had some of the biggest swings, the same trend can really be seen in every region.

Africa had a 6% increase in video start time but a 14% increase in picture quality, a 57% decrease in buffering, and a 36% decrease in video start failures year over year—even though the region had the most failures, at 3.2%.

Continuing the trend, Europe also saw declines in buffering and video start failures and an increase in bitrate. Despite recording the lowest video start time globally, Europe saw a 13% increase year over year.

Oceania boasted the best buffering rate of 0.21%, down a huge 51% year over year, as well as the best bitrate of 10.32 Mbps, up 26% year over year. Although video start time was up 13% to 5.46 seconds, video start failures were down 15%.

With a 14% increase in video start time, North America had the second-highest increase after Asia but also saw a decline of 13% in video start failures and the fewest failures at just 0.9%. In addition, the region enjoyed an 18% decrease in buffering and a 5% increase in picture quality.

The story persisted in South America, where video start time was up 12% to the second-highest globally of 7.05 seconds; however, video start failures fell a massive 54%, buffering was down by 29%, and bitrate improved 43% to again the second-highest globally at 8.73 Mbps.

The average minutes per play were about 20 globally, with Europe, though unchanged year over year, maintaining their lead at 23.3 minutes and Asia lagging at 9.9 minutes, down 5% year over year. Half the regions watched more minutes per play than the previous Q4, including Africa with a 46% increase to 13.1 minutes, Oceania with an 11% increase to 21.8 minutes, and South America with a 9% increase to 20.7 minutes. In addition to Asia experiencing a decrease in minutes per play, North America watched 2% fewer minutes per play, but the 21.7 minutes tallied was still quite high compared to other regions.

# Quality by region

Real Time Global Region Filters Metrics Q4 2021 vs. Q4 2020

|            | Minutes / Play |     | Video Start Failures |      | Video Start Time |      | Buffering |      | Bitrate |     |
|------------|----------------|-----|----------------------|------|------------------|------|-----------|------|---------|-----|
| Africa     | 13.1           | 46% | 3.2%                 | -36% | 7.56             | 6%   | 0.96%     | -57% | 6.99    | 14% |
| Asia       | 9.9            | -5% | 1.1%                 | -35% | 5.63             | 109% | 1.06%     | -23% | 4.10    | 95% |
| Europe     | 23.3           | 0%  | 1.5%                 | -14% | 4.24             | 13%  | 0.23%     | -36% | 7.89    | 21% |
| N. America | 21.7           | -2% | 0.9%                 | -13% | 5.06             | 14%  | 0.23%     | -18% | 7.11    | 5%  |
| Oceania    | 21.8           | 11% | 1.1%                 | -15% | 5.46             | 13%  | 0.21%     | -51% | 10.32   | 26% |
| S. America | 20.7           | 9%  | 1.7%                 | -54% | 7.05             | 12%  | 0.50%     | -29% | 8.73    | 43% |
| Global     | 20.5           | -1% | 1.1%                 | -22% | 5.10             | 20%  | 0.29%     | -22% | 7.29    | 12% |
|            | Q4 2021        | YoY | Q4 2021              | YoY  | Q4 2021          | YoY  | Q4 2021   | YoY  | Q4 2021 | YoY |



Improvements in green  
 Declines in pink  
 Best per category in green, worst in pink

## Quality by device continues to improve

By device, quality improvements were somewhat consistent, with buffering down and bitrate up across the board, while minutes per play increased, video start failures declined, and video start times rose for almost every device.

With the most minutes per play, connected TV devices saw a 2% increase year over year. Smart TVs also saw a 2% increase year over year to capture second with 27 minutes per play, while gaming consoles held steady and had the third-highest minutes per play at 26.5. Mobile phones increased moderately by 1% but, unsurprisingly, also had the fewest minutes per play at 8.7. Desktops were the sole devices to have fewer minutes per play, down 6% to 14.4 minutes.

Tablets not only had the most video start failures but also were the only device to have more failures year over year. All other devices improved on start failures, with gaming consoles coming out on top for both lowest percentage of video start failures at 0.6% as well as the most improved year over year, down 51%.

### Quality by device

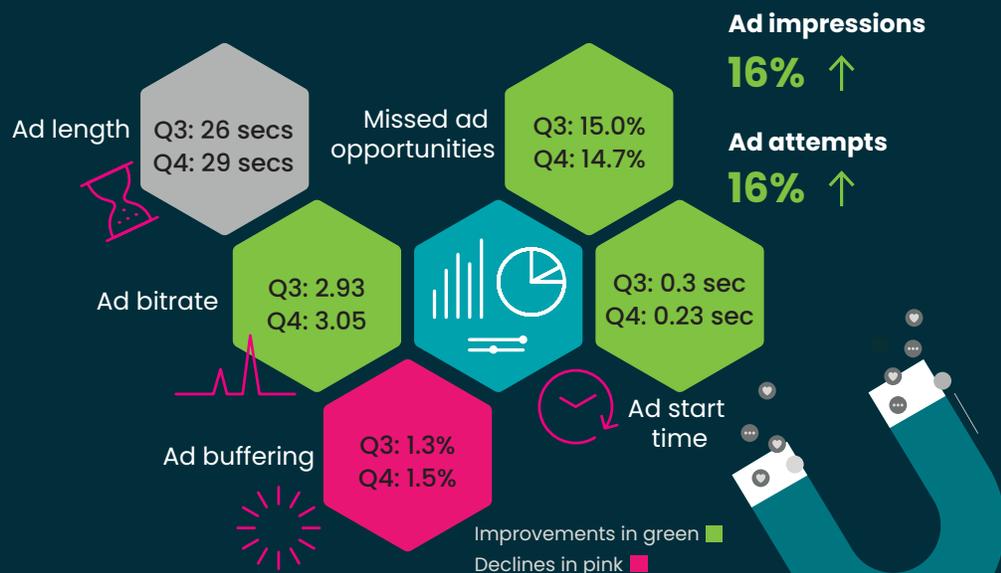
|  | Min / Play |     | Video Start Failures |      | Video Start Time |     | Buffering |      | Bitrate |     |
|--|------------|-----|----------------------|------|------------------|-----|-----------|------|---------|-----|
|  <b>Connected TV device</b> | 28.1       | 2%  | 0.9%                 | -17% | 4.92             | 8%  | 0.20%     | -21% | 7.86    | 10% |
|  <b>Smart TV</b>            | 27.0       | 2%  | 0.9%                 | -10% | 5.71             | 19% | 0.18%     | -17% | 9.60    | 11% |
|  <b>Gaming console</b>      | 26.5       | 0%  | 0.6%                 | -51% | 3.89             | -8% | 0.08%     | -47% | 7.86    | 14% |
|  <b>Desktop</b>             | 14.4       | -6% | 1.1%                 | -41% | 5.05             | 7%  | 0.33%     | -48% | 3.49    | 17% |
|  <b>Mobile phone</b>        | 8.7        | 1%  | 1.4%                 | -19% | 4.66             | 29% | 0.80%     | -30% | 4.08    | 16% |
|  <b>Tablet</b>              | 16.1       | 2%  | 1.7%                 | 8%   | 3.85             | 0%  | 0.36%     | -28% | 6.36    | 17% |
|  | Q4 2021    | YoY | Q4 2021              | YoY  | Q4 2021          | YoY | Q4 2021   | YoY  | Q4 2021 | YoY |

Improvements in green, declines in pink | Best per category in green, worst in pink

Gaming consoles won on the failures front, and they were the only devices to have shorter video start times year over year, down 8%. Tablets had the lowest video start time at 3.85 seconds but had no improvements year over year, while smart TVs had the longest video start time after keeping viewers waiting 19% longer as compared to the previous Q4. Mobile phones had the unfortunate honor of recording the highest video start time increase year over year, up 29% to 4.66 seconds.

When it comes to buffering, gaming consoles did very well again at just 0.08% rebuffering rate and decreased the second most year over year just after desktops, which improved their buffering by 48%. Despite decreasing buffering by 30% year over year, mobile phones experienced the highest buffering rate at 0.80%.

Finally, the top spots for most improved picture quality were very close, with desktops and tablets both up 17% and mobile phones up 16% year over year. Still, the rest of the devices upped their bitrate year over year and big screens enjoyed higher bitrates than smaller devices, with smart TVs prevailing at 9.60 Mbps.



## Ad quality improved, except for ad buffering

Let's start with the good news for streaming advertising. Ad impressions were up a decent 16%, as were ad attempts. Missed ad opportunities were down 2%, and bitrate improved 4% over last quarter. Ad start time also dropped from .3 to .23 seconds. All and all, Q4 had respectable growth and quality improvements.

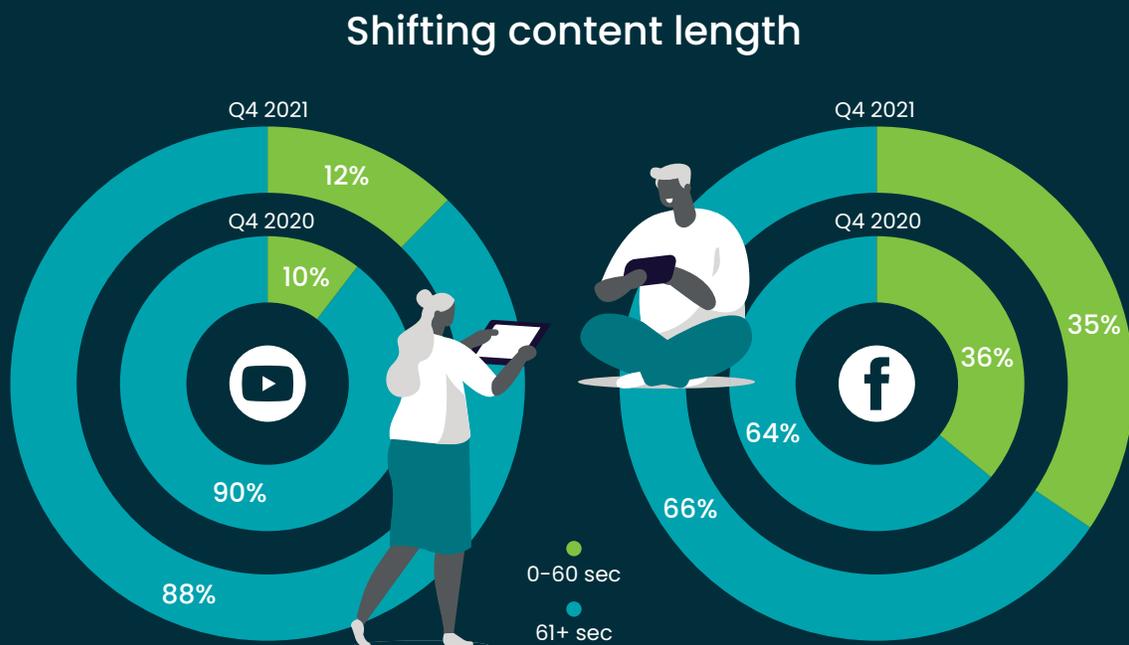
But there was some bad news on a key ad quality metric. Ad buffering was up from 1.3% in Q3 to 1.5% in Q4. Conviva studied buffering's effect on engagement and found for viewers who didn't even make it through 5% of the content, pre-roll ads tallied an average buffering ratio of 1.59%, illustrating how poor quality causes viewers to tune out. The continued swings in ad quality point to technology issues that advertisers and publishers alike need to investigate and invest in solving, because ad issues cause content abandonment and lost revenue.

## Shifting social video content length

YouTube has long been associated with longer-form social videos, but with the rollout of Shorts, a TikTok-esque, vertical short-form video experience, the percentage of shorter content got bigger.

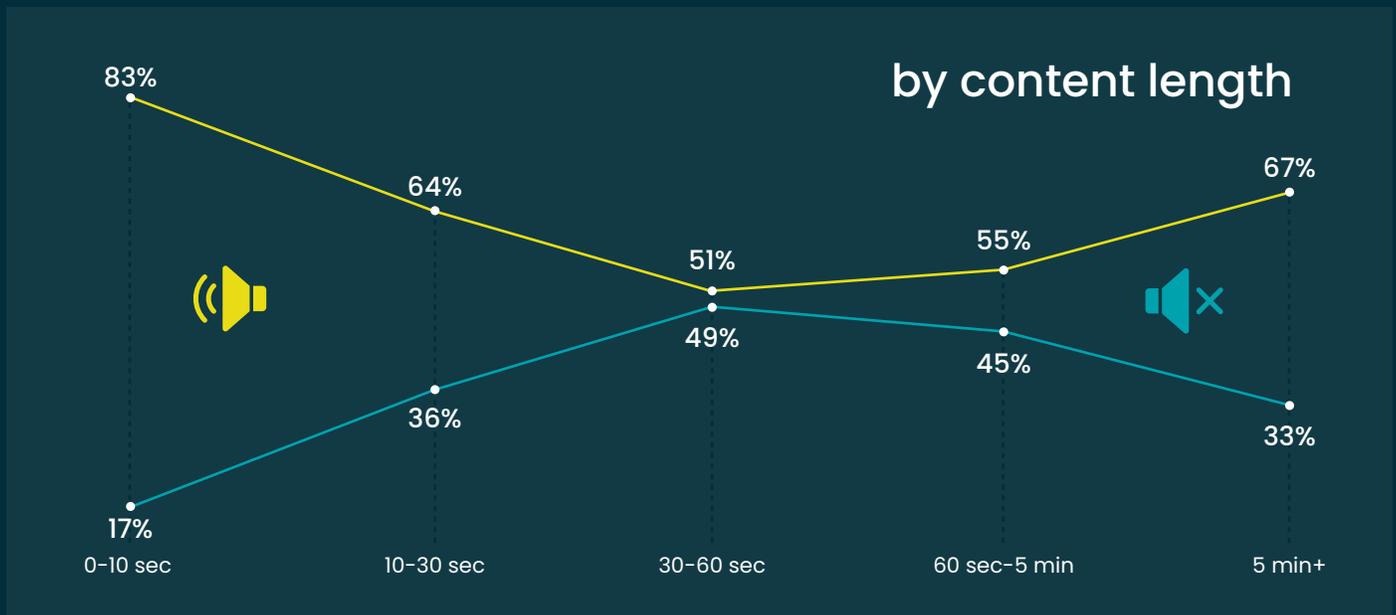
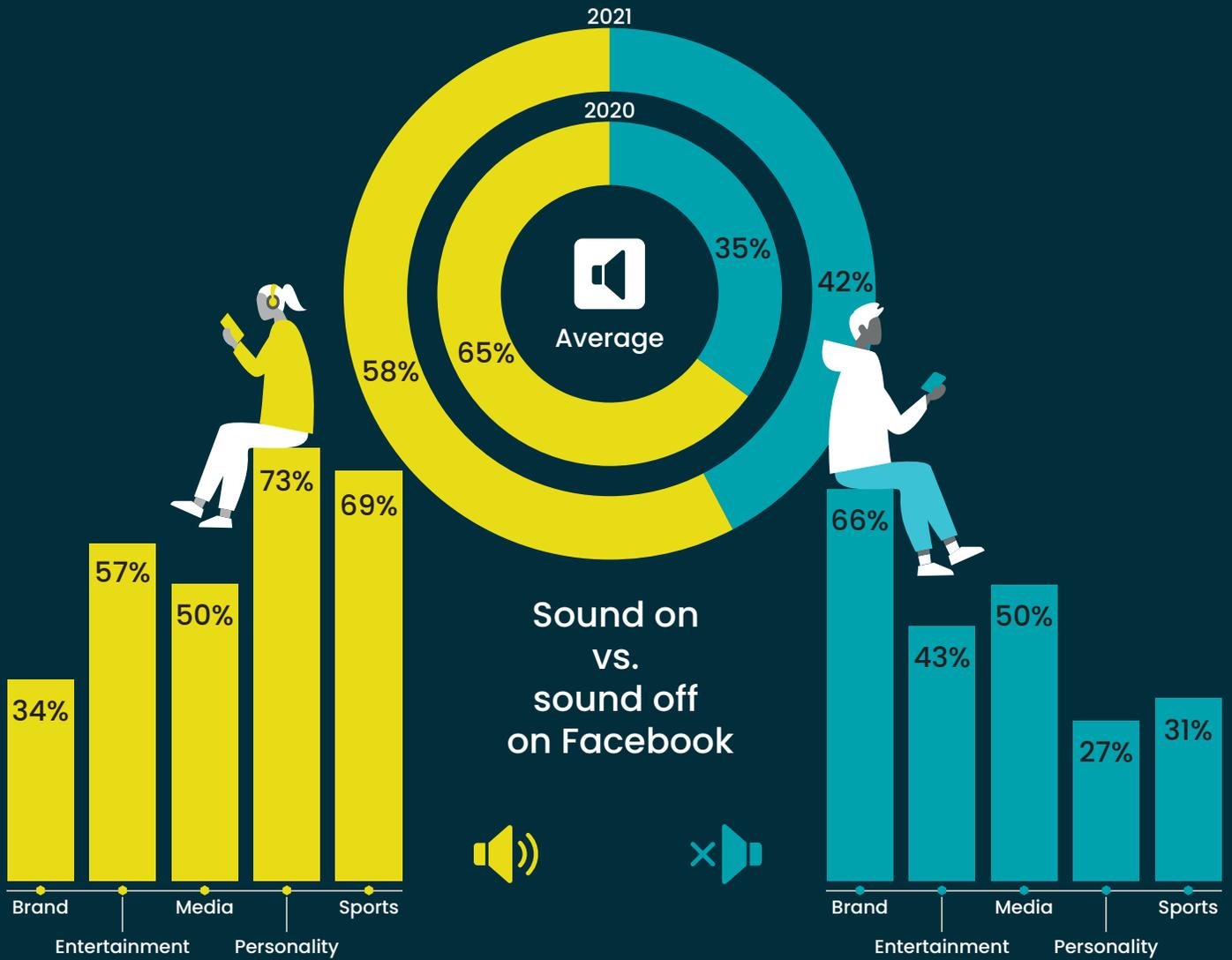
In Q4 2020, 90.3% of YouTube videos were over a minute, but in Q4 2021, this dropped to 87.9%, while videos less than a minute grew from 9.7% to 12.1% in a year. The content production landscape is changing, and you'll likely see more and more short-form content akin to TikTok on YouTube.

So where are the longer-form videos going? Facebook saw an increase of about two percentage points in content longer than a minute in Q4 2021 versus the previous Q4, showing that there's always room for longer-form content, but knowing where to post it is essential.



## The importance of captions on social media

As video becomes more and more important on social media, businesses need to understand more than ever how people are watching. One interesting trend is that more people are listening with the sound off on Facebook than a year ago. This is important—especially for brand videos, which had the lowest sound-on percentage, followed by media at 50% and entertainment at 57%—because many people might not be getting the full value of social videos unless captions are enabled.



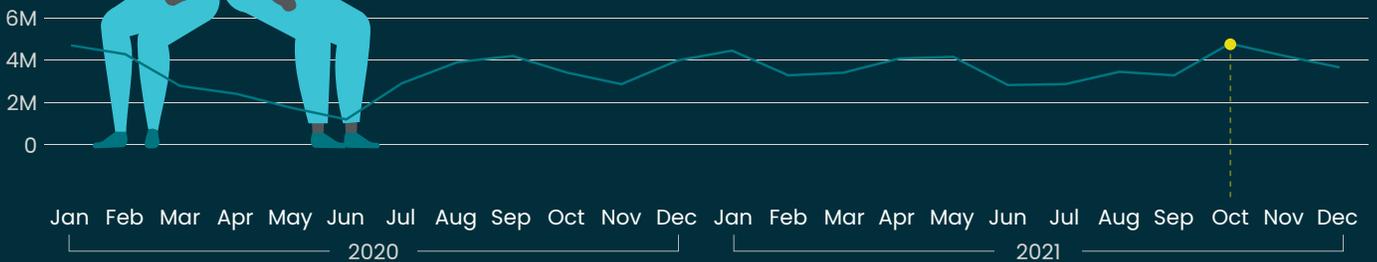
## U.S. sports see pre-pandemic numbers for the first time

Q4 2021 was a massive quarter for U.S. sports, likely much to the delight of social media managers at top sports organizations. Total engagements have been down for almost two years, but that shifted in Q4 in what is most definitely a cause for celebration. October was the first month U.S. sports, which included MLB, MLS, NBA, NFL, and NHL, exceeded pre-pandemic engagement levels since January 2020.

Total posts for U.S. sports also increased, up 42% in Q4 of 2021 over that same period in 2020. Total videos posted had a massive 56% increase led mostly by the NHL and NBA, and total engagements were boosted by 23%. While the NFL and NBA had the largest overall share of engagements overall, NHL and MLB led in absolute percentage growth.



### U.S. total engagements by month



## U.S. social sports

■ MLB ■ MLS ■ NBA ■ NFL ■ NHL



total posts



total videos



total engagements

Despite little change from Q4 2020, European sports have rebounded nicely since the beginning of the pandemic. They were the first to see growth after the sudden collapse of sports seasons at the beginning of 2020, so even a small increase is valuable. Although total posts were up 1% and videos increased 4%, engagements were down 2% overall.

Asian sports leagues, on the other hand, had a rough go of it in Q4 2021 versus Q4 2020. For the IPL, NPB, and KBO, total posts were down 31%, total videos were down 37%, and total engagements were down 23% year over year. The decline was led mostly by the IPL. A possible culprit is that the major IPL tournament was delayed in 2020, so much of it took place in Q4 2020, while in 2021, it ended in October.

## Europe social sports

■ Bundesliga ■ LaLiga ■ Premier League ■ Serie A



## Asia social sports

■ IPL ■ NPB ■ KBO



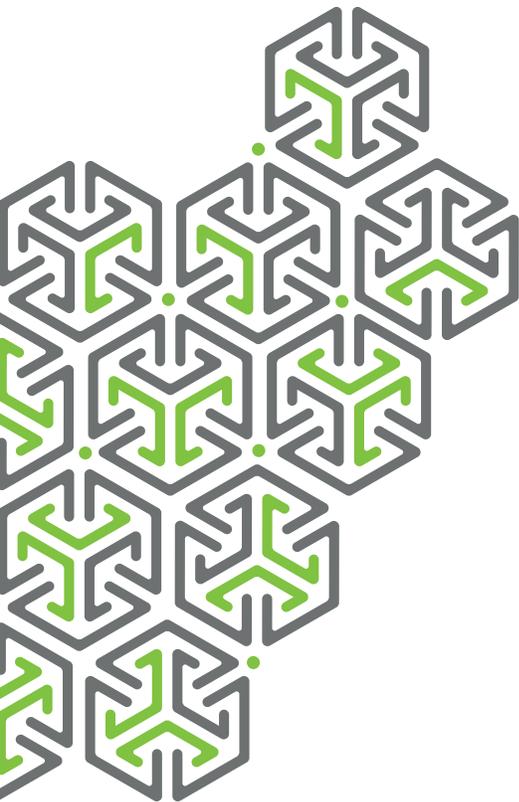
## Conclusion

Streaming was one of many industries that saw a boon during the pandemic, with people spending more time at home but nevertheless expecting premium content to play flawlessly, especially on their big screens. While the boon has come to an end, the industry will enjoy the gains that have been maintained.

## Methodology

Data for Conviva's State of Streaming report was primarily collected from Conviva's proprietary Stream Sensor technology currently embedded in nearly four billion streaming video applications, measuring in excess of 500 million unique viewers watching 200 billion streams per year with nearly three trillion real-time transactions per day across more than 180 countries. Year-over-year comparisons were normalized at the customer level for accurate representations of industry growth.

The social media data consists of data from over 2,863 accounts, over 1.8 million posts, and over 10 billion engagements across Facebook, Instagram, Twitter, and YouTube in Q4 2021. Social data for professional sports leagues was collected from individual leaderboard lists for each sports league that totaled 262 individual team accounts and tallied over 5.01 billion cross-platform engagements in Q4 2021.



**Q4 2021**

**Conviva's  
State of  
Streaming**



**About Conviva**

Conviva is the census, continuous measurement and engagement platform for streaming media. Powered by our patented Stream Sensor™ and Stream ID™, our real-time platform enables marketers, advertisers, tech ops, engineering, and customer care teams to acquire, engage, monetize, and retain their audiences. Conviva is dedicated to supporting brands like DAZN, Disney+, Hulu, Paramount+, Peacock, Sky, Sling TV, TED, and WarnerMedia as they unlock the incredible opportunity in streaming media. Today our platform processes nearly three trillion streaming data events daily, supporting more than 500 million unique viewers watching 200 billion streams per year across four billion applications streaming on devices. Conviva ensures digital businesses of all sizes can stream better—every stream, every screen, every second.

**Any Questions?**

Visit [www.conviva.com](http://www.conviva.com)  
or contact Conviva at [pr@conviva.com](mailto:pr@conviva.com)