STATE OF STREAMING SPRING 2023

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KEY TAKEAWAYS

1. 71% of respondents both create and distribute content, a significant increase from the 46% in our initial Spring 2020 survey.

2. Monthly viewership and upper-end annual revenue numbers continue to erode, while lower-end viewership numbers are on the rise, including concurrent viewership of live events.

3. As a revenue type, subscriptions (without ads) remain constant, but both subscriptions with ads and ad-only revenue types have dropped for the first time in survey history.

4. Percentage of the overall market verticals streaming business has fallen back to pre-pandemic levels for houses of worship; news has also dropped below those levels, but education continues to see significant growth.

5. Simultaneous concerns about capital expenditures (capex) and operational expenses (opex) present a possible conundrum for an industry heavily reliant on public cloud solutions.

6. A move toward lower latency expectations is moving in seeming lockstep with intent to use smaller regional data centers to address latency and edge compute challenges.

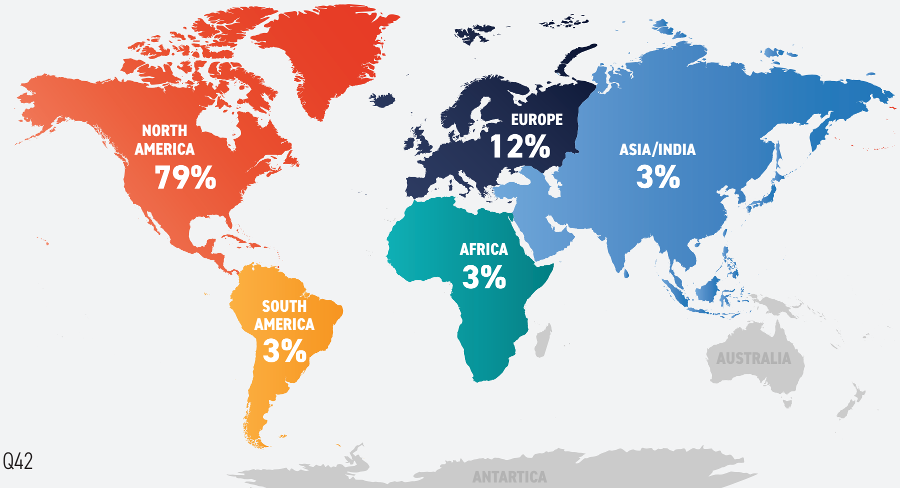
7. FAST growth and planning appear to be slowing.

WHERE IN THE WORLD?

This seventh edition of *Streaming Media* magazine's semi-annual State of Streaming survey report builds on previous versions that span from early 2020 to early 2023. This report highlights both the survey results as well as snippets of a live presentation of the data that occurred at the mid-May Streaming Media East 2023 event in Boston.

Sponsored by Tulix and crafted by the team at Help Me Stream Research Foundation, the Spring 2023 edition shows further acceleration in the transition of streaming into emerging markets. While responses to the 46-question survey typically come from North America and Europe, this current survey has increased global participation, with respondents hailing from every continent except Australia and Antartica. Africa, Asia (primarily India), and South America all account for 3% each of overall responses, with Europe accounting for 12% of responses—a slight rise from 10% in Autumn 2022— with North American responses accounting for the rest.

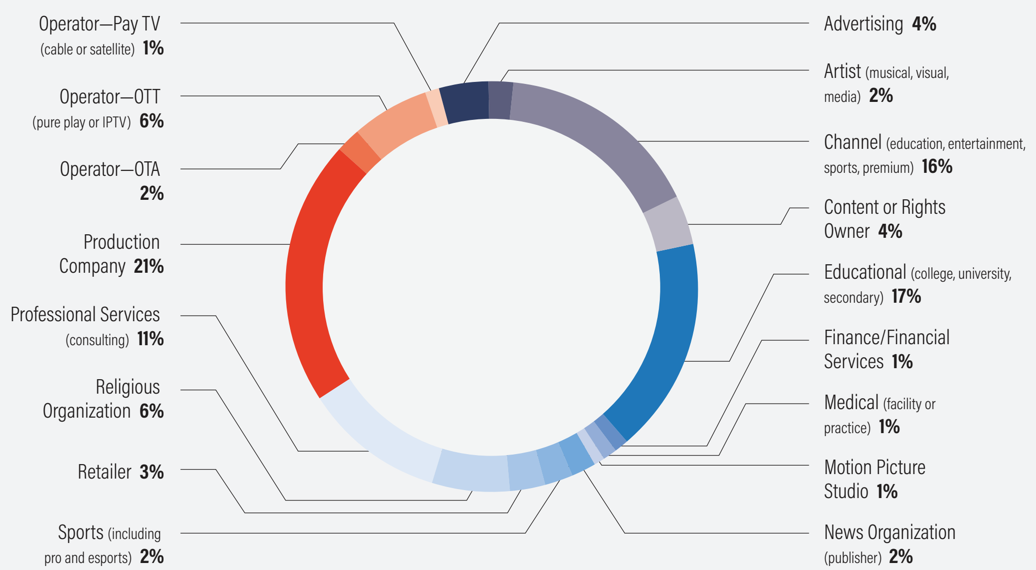
IN WHICH REGION OF THE WORLD ARE YOU BASED?



Q42

The chart below shows the breadth of industries represented in our most recent survey. Of particular note is the rise in respondents who work in the education market vertical, as well as those who report working at education, entertainment, premium or sports channels.

WHICH OF THE INDUSTRIES BELOW MOST CLOSELY MATCHES YOUR ORGANIZATION?



Q3

SUBSCRIBER/VIEWERSHIP TRENDS

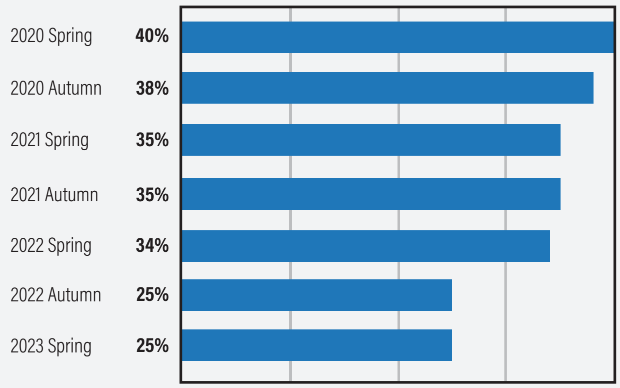
As noted in the last edition of the State of Streaming report (Autumn 2022), typical audience size continues to shrink, with higher-end monthly viewership rates (which the survey designates as monthly subscriber or viewership rates of greater than 10,000 viewers) dropping away, while lower-end viewership rates rise. For the current survey, we find this trend has continued.

Between Spring 2020—when we launched our initial State of Streaming survey report, with data gathered in late 2019, providing a pre-pandemic baseline of streaming growth trajectories before the pandemic upended all trend analysis—and last year's Autumn 2022 survey, the decline in upper-end audience sizes fell from 40% to 25% on a fairly consistent slope.

This year, respondents stating their typical viewer or subscriber size per month exceeded 10,000 viewers has remained constant at 25% over the past two surveys.

INCLUDING BOTH TRADITIONAL AND STREAMING MEDIA, WHAT IS YOUR ORGANIZATION'S TYPICAL VIEWER OR SUBSCRIBER SIZE PER MONTH?

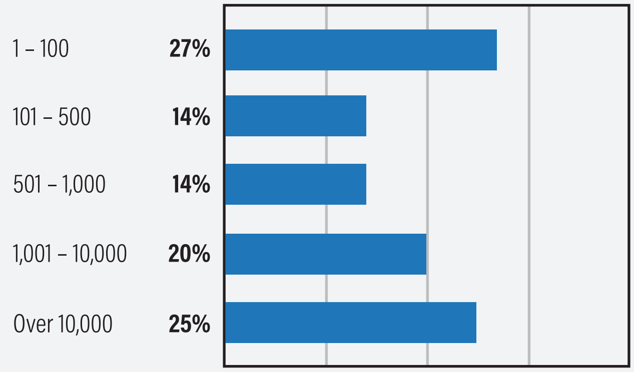
COMPARATIVE 2020-2023 FOR OVER 10,000 MONTHLY



Q14 (2020-2023 Comparative Over 10,000 Monthly)

At first glance, this holding pattern at 25% might look like stabilization of upper-end monthly viewership or subscriber size. As the subsequent chart attests, however, there's robust growth at the much lower end of the viewership scale, despite stagnation of upper-end viewership. In fact, the lowest-end viewership or subscriber rates (1-100 viewers) have risen from 9% in Spring 2020 to now account for 27% of all respondents' monthly viewership or subscriber rates, surpassing the upper-end viewership rates for the first time.

INCLUDING BOTH TRADITIONAL AND STREAMING MEDIA, WHAT IS YOUR ORGANIZATION'S TYPICAL VIEWER OR SUBSCRIBER SIZE PER MONTH?



Q14

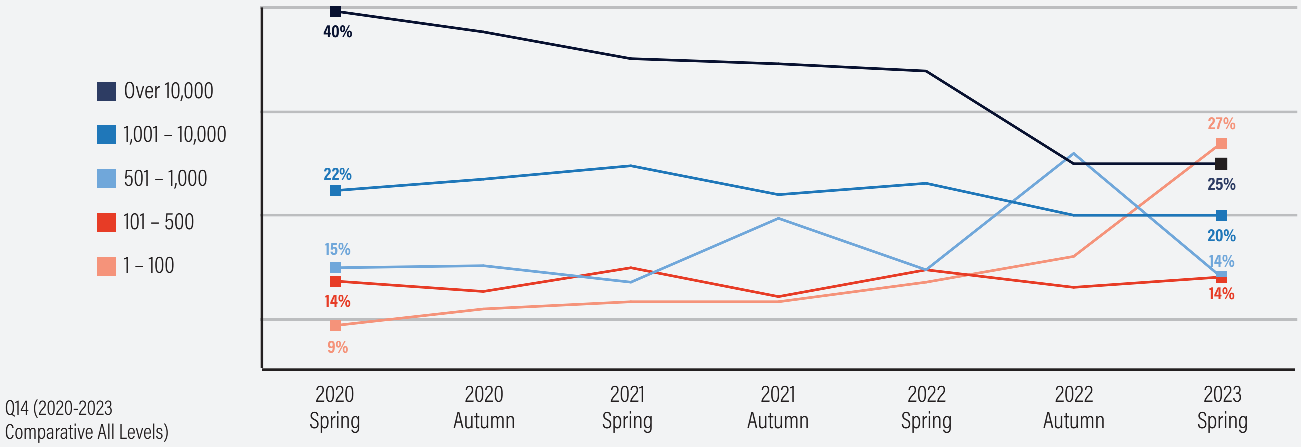
The Autumn 2022 edition noted a similar crossover between higher-end and mid-level viewership (501-1,000 monthly viewers or subscribers), but the mid-level numbers fell back from 26% to a more modest 14% rate in the current survey.

Given that fluctuation, we're not yet ready to declare the 1-100 or 500-1,000 viewership ranges as stabilizing, but we'll note one of several interesting datapoints that counter one objection raised around trend assessment: Different people taking each version of the survey might skew the data. The 101-500 viewership range has remained steady at 14%-15% across all seven surveys.

With a consistently tightening range of percentages between the various groups of monthly subscriber or viewership rates—down from an initial 31-point spread (9%-40% range) in early 2020 to a 13-point spread (14%-27%) in early 2023—we're comfortable suggesting that this contraction will continue forward for at least the next 18 months.

INCLUDING BOTH TRADITIONAL AND STREAMING MEDIA, WHAT IS YOUR ORGANIZATION'S TYPICAL VIEWER OR SUBSCRIBER SIZE PER MONTH?

COMPARATIVE 2020-2023 FOR ALL LEVELS



What that means in practical terms for streaming media professionals is that the diversification of content, along with the costs associated with creating and distributing that content, will require a harder look at return-on-investment (ROI). We'll expand on that briefly later in this report, but consider this perspective from George Bokuchava, CEO of Tulix:

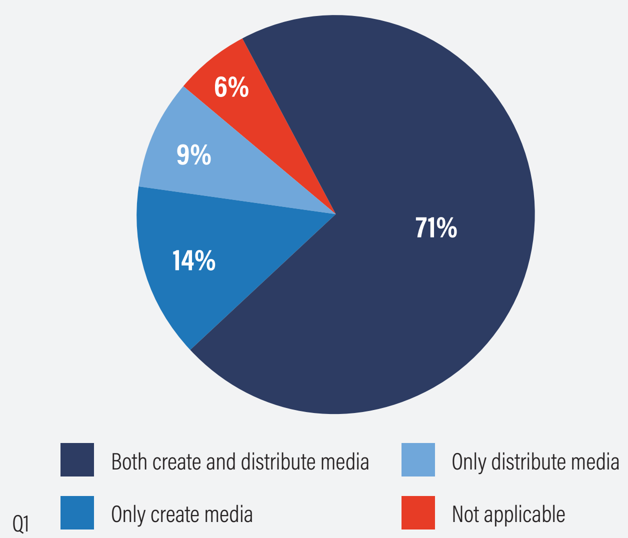
"We often have customers who are planning to have more than 10,000 viewers, but it's very difficult to actually reach this number," said Bokuchava. "We see more and more difficulties for multiple reasons: more content on the market, more competition, and eyeballs getting split between multiple installations."

CREATION AND DISTRIBUTION OF CONTENT

Speaking of content creation, one question we've asked from the initial survey onward centers on whether participants create or distribute content. As the chart shows, 71% of respondents state that their organization both creates and distributes content, with 14% stating they only create media and another 9% responding that they only distribute media.

By comparison, our initial survey in Spring 2020 only showed 46% of respondents choosing the "both create and distribute media" option, which is a 54% increase over the 3-year period. This trend toward both creating and distributing media continues to force streamers to think holistically. It's not only about creating compelling content, but also about making sure the content finds the best distribution channel. As we'll see later in the report, content creation and distribution costs pose key challenges in the industry.

DOES YOUR ORGANIZATION CREATE AND/OR DISTRIBUTE MEDIA CONTENT?



BREAKING DOWN MARKET VERTICALS

Another area that's remained constant across all seven surveys is the tight range of percentages when it comes to market verticals serviced by the streaming industry. This chart shows that the majority of market verticals shift only in a 1%-2% range across every survey, with the occasional rise in key market verticals (education and houses of worship during the pandemic, for instance) at key macroeconomic inflection points.

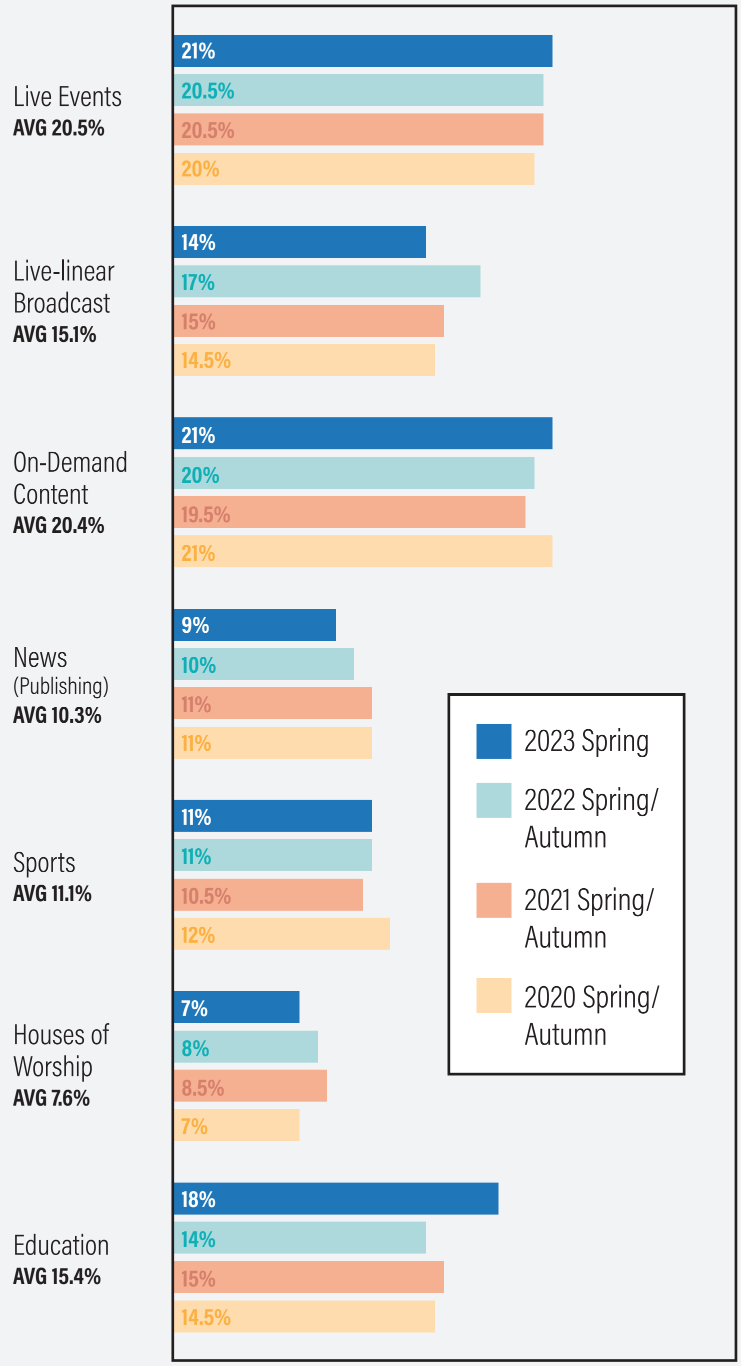
Given the consistency of percentages for these overall market verticals, it's worth noting that news has dropped off from its highs in 2020 and 2021, settling in at 9% in this current survey. Respondent data also matches anecdotal evidence, with recent headline announcements around downsizing in online news media, with live streaming of news events dropping off at a consistent pace. Peeling back this correlation, one might reasonably attribute this dip to the fact that the United States news cycle is currently in the chasm between election cycles, with town halls and debates expected to begin to gain traction in mid-2023 as we head into 2024 election landscape.

In addition, houses of worship as a percentage of overall streaming business have dropped back to pre-pandemic levels.

One outlier in this chart is the rise in education, which has jumped from an average of 14.5% up to 18% overall. This may have resulted, in part, from the preponderance of education-focused respondents to the Spring 2023 survey, so we'll put a pin in this datapoint until the Autumn 2023 survey results come in.

PLEASE INDICATE THE PERCENTAGE RANGE OF EACH MARKET VERTICAL FOR YOUR OVERALL STREAMING BUSINESS.

COMPARATIVE 2020-2023



Q5 (Comparative 2020–2023)

LIVE EVENT FREQUENCY AND VIEWERSHIP

Another cross-section of market verticals measurement is the frequency and audience size of live events.

One constant across several surveys is respondent's organizations delivering live events more than five times per week. The percentage rate for this option has stayed at a constant 16%-17% over multiple surveys, as has the monthly live-event creation/delivery percentage, which has fluctuated in a narrow 16–19% range over all surveys since Autumn 2021.

In the most recent survey, however, there's a drop-off of respondents who say their organization only creates/delivers one live event per week (15% in Spring 2023 versus 22%-24% in prior surveys) and a subsequent rise in those respondents who say their organization creates/delivers live events on a quarterly basis (19% in Spring 2023 versus 7%-11% range in prior surveys).

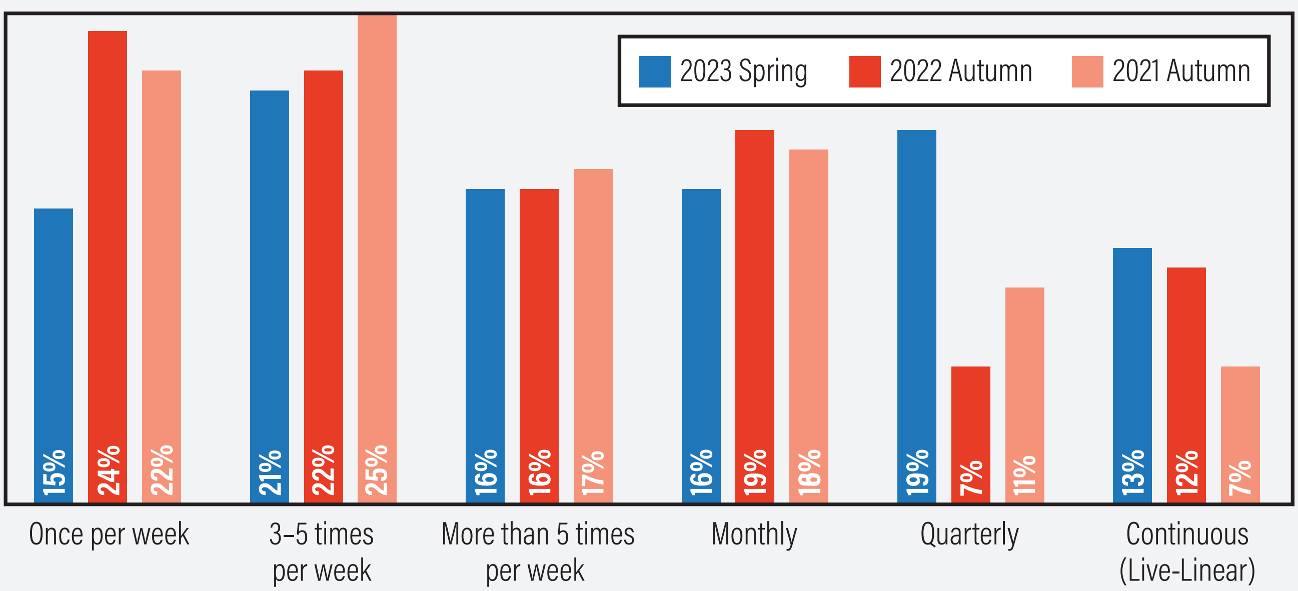
Continuous (live-linear) creation/distribution has also continued to rise, currently settling in at 13% of overall respondents, up from 7% in Autumn 2021.

Viewership of live events is best measured in concurrent viewers. In keeping with overall viewership rising at the lower-end range, but falling in the mid-tier ranges, the lowest concurrent viewership option (fewer than 500 concurrent viewers) has risen to account for 60% of overall responses, from 45% in Spring 2022.

The chart on the next page shows concurrent viewership rates across 2022 and into Spring 2023. Note that the 500–5,000 range fell from an average of 28.5% down to 17% of overall responses, while the 5,001–10,000 range had a significant decrease from an average of 13.5% to a stunningly low 3.5% in the most recent survey.

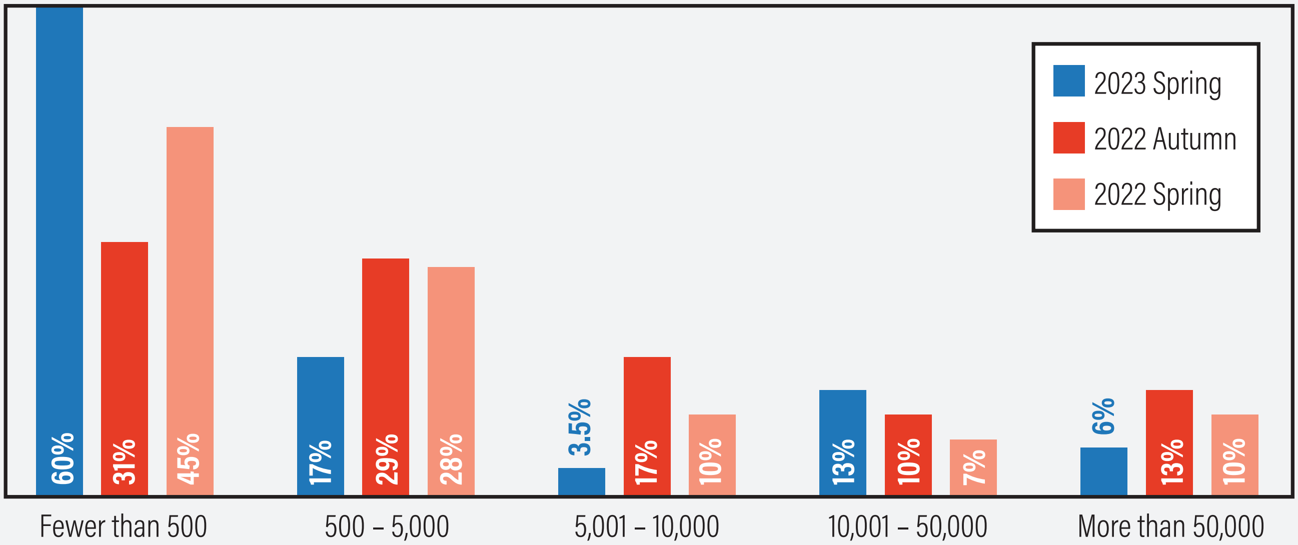
In a bit of a reverse on the upper-end viewership trend, mentioned in the previous section of this report, where it remained constant between Autumn 2022 and Spring 2023, the upper end of concurrent viewers (more than 50,000) dropped to 6% from an average of 11.5% in prior surveys.

FREQUENCY OF LIVE EVENTS



Q7

AVERAGE CONCURRENT VIEWERS



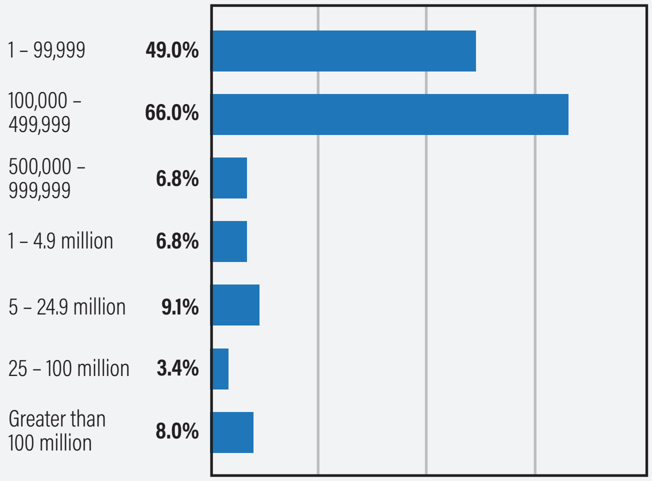
Q12/Q13

REVENUE TRENDS

In addition to concurrent viewerships staying mostly in line with the overall monthly subscriber-viewership datapoints, a similar trend has emerged in reported revenues. Where the lowest-end choice in viewerships (1-100 monthly viewers) rose, we see a similar jump in revenues at the low end. Respondents reporting annual video-based revenues in the $1 to $99,999 range jumps to 49% from 27% in Autumn 2022.

The same is true, however, at the upper-end of annual video-based revenues (greater than $100 million), which rose to 8% of overall responses compared to 6% of overall in Autumn 2022. Higher monthly subscription rates, some of which have climbed almost 10% over the past six months, might account for the upper-end revenue rise.

INCLUDING BOTH TRADITIONAL AND STREAMING MEDIA, PLEASE PROVIDE YOUR ORGANIZATION'S OVERALL VIDEO-BASED ANNUAL REVENUE IN U.S DOLLARS.



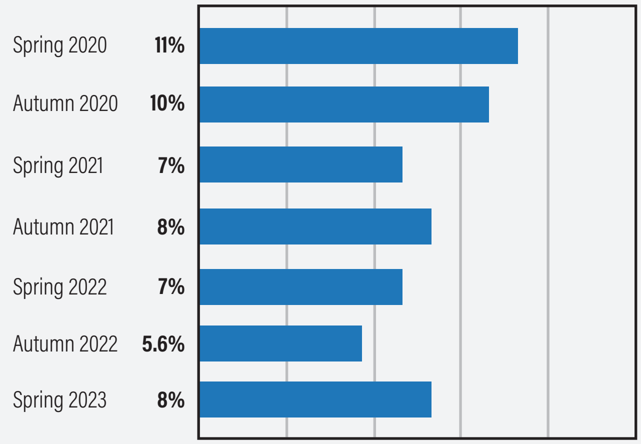
Q18

In the middle, though, the video-based revenue story is a bit bleaker. From $500,000 to just below $100 million, percentage rates have dropped off, in some cases by high single digits. For instance, the $500,000–$999,999 annual revenue option dropped from 14% in Autumn 2022 to just below 7% in Spring 2023, while the $25-100 million option dropped from 7% to 3.4% of overall responses between the two surveys.

Thinking back to the prior mention of viewership numbers falling, this collapse in the middle tiers of revenue options begs a question: With the exception of premium content, will spending on big-ticket productions be less likely to generate a guaranteed mega-hit status to draw in subscribers or viewers without implementation of multiple revenue streams?

INCLUDING BOTH TRADITIONAL AND STREAMING MEDIA, PLEASE PROVIDE YOUR ORGANIZATION'S OVERALL VIDEO-BASED ANNUAL REVENUE IN U.S DOLLARS.

COMPARATIVE 2020-2023 AVERAGE ANNUAL REVENUES OVER $100M USD



Q18 (2020-2023 Comparative over $100M)

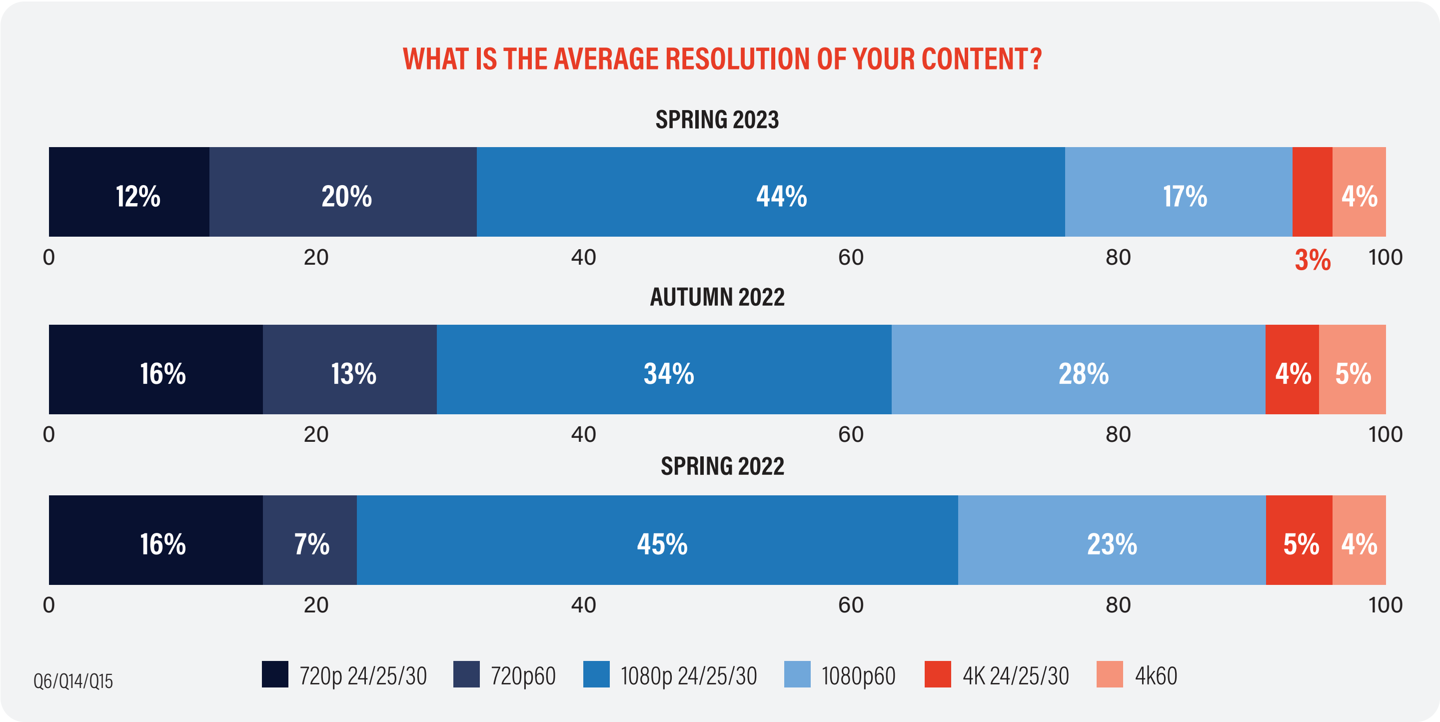
RESOLUTIONS AND DATA RATES

Before we jump into the data concering multiple revenue streams and the continued conundrums around both overall advertising revenues and free-ad-supported (FAST) models, let's season the distribution pie with two more ingredients: video resolution/frame rates and subsequent data rates.

During the presentation of the Autumn 2022 State of Streaming data, we noted that 720p resolutions appeared to be experiencing a bit of a renaissance, especially higher-frame rate 720p (50 or 60 frames per second) used for sports and other fast-action content. As the chart on the next page shows, that Spring 2022-Autumn 2022 renaissance is morphing into a trend in the Spring 2023 data.

720p60 resolution/frame rate combo has risen from 7% in Spring 2022 to 20% in Spring 2023, with the majority of the shift occurring against 1080p60 (which rose from 23% to 28% across 2022 but fell back to 17% for Spring 2023). The current survey's data around 720p60 confirms a projection we made in the Autumn 2022 report: "Especially with sporting events, it appears that the sweet spot for growth might just be 720p60. …"

This tale of two resolutions and their corresponding high frame rates demonstrates that sports continues to play a role in streaming. Many consumer studies cite live-sports streaming as a roadblock to transitioning away from cable subscriptions, but the rise of 720p60 shows content distributors are trying to balance data



rates against bandwidth delivery costs as a way to deliver live-sports streaming to a larger mobile-device audience.

On the 4K front, we're also seeing a slight dip in usage, but only by 2 percentage points, so we'll keep an eye on 4K resolutions over the next few State of Streaming surveys.

On the data rate side of things, there's movement at the lower-end and upper-end data rates, in keeping with revenue trends mentioned earlier.

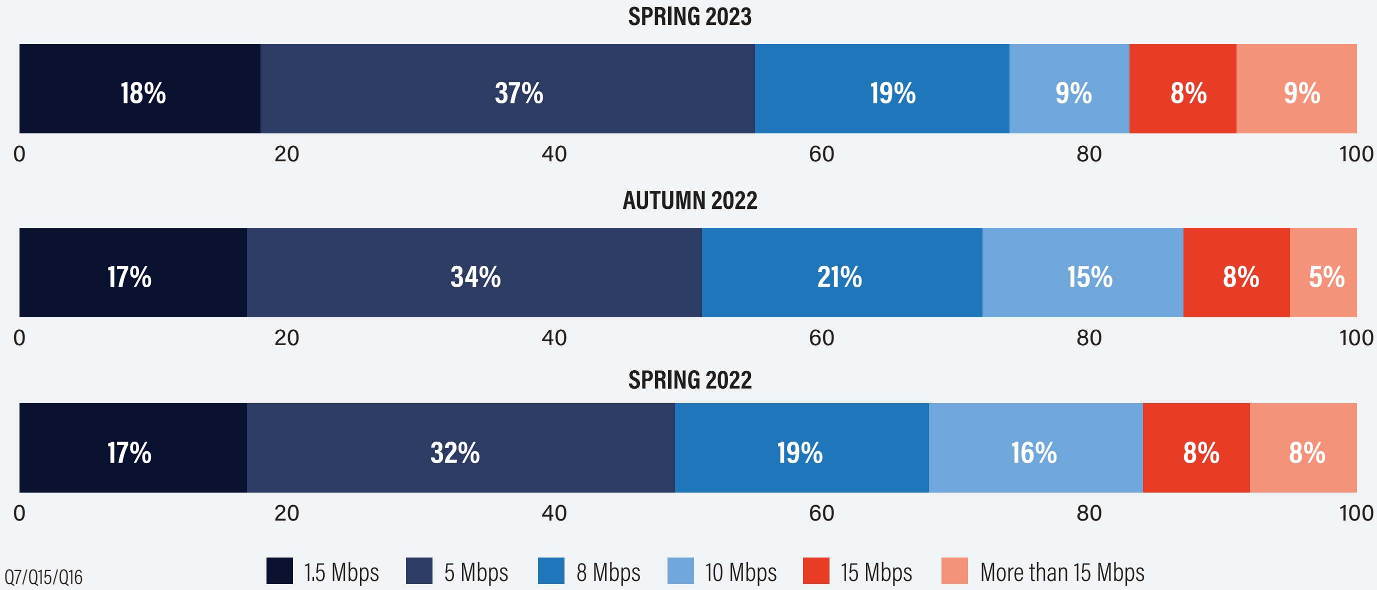
As shown on the chart at the top of the next page, the lower end, the 1.5 Mbps rose to 18.1% from 17% and 5 Mbps rose to 37% from 34% in Autumn 2022.

The 8 Mbps option dropped slightly, but the 10 Mbps range dropped by almost half, from 15% in Autumn 2022 to 9.5% in the current survey, a decline we noted in the Spring 2022 report.

In addition, the rise in 720p60 resolutions, and subsequent drop in 1080p60 usage, could possibly account for the data rate rise at 5 Mbps and subsequent drop at 10 Mbps overall.

Also in keeping with the growth in upper-end revenue numbers, we saw a rise in data rates above 15 Mbps, which had varied between 5%-8% of overall responses. The rise to 9% overall is still not a breakout rate, so we'll also keep this datapoint in mind when analyzing future State of Streaming surveys.

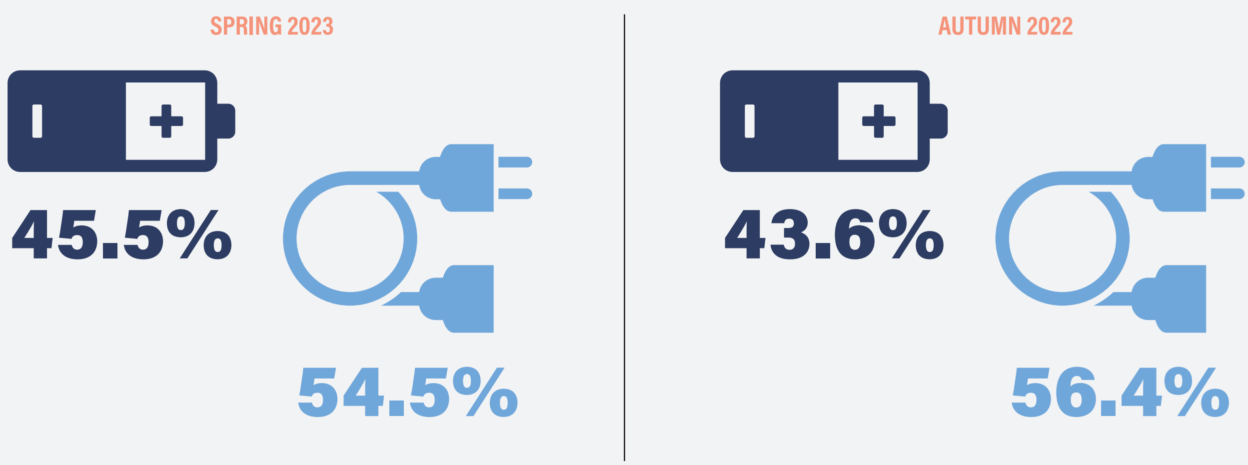
WHICH OF THE FOLLOWING IS CLOSEST TO THE AVERAGE BITRATE AT WHICH YOUR CONTENT IS SERVED?



Q7/Q15/Q16

A final datapoint for this section, centered on content delivery to electrical-powered devices (e.g., connected TVs, set-top boxes) as compared to battery-powered devices (e.g., smartphones, tablets). While Autumn 2022 data showed that respondents were delivering 43.6% of their content to battery-powered devices, the newest data shows that percentage rising to 45.5% for the current survey. Datapoints from only two surveys don't comprise a trend, but if this shifts even further in the Autumn 2023 survey, we'll out call the increase as part of an emerging pattern.

APPROXIMATELY WHAT PERCENTAGE OF YOUR CONTENT IS DELIVERED TO BATTERY-OPERATED DEVICES (SMARTPHONES, TABLETS, ETC.) VERSUS POWERED DEVICES (CONNECTED TV, SET-TOP BOX, ETC.)?



Q16/Q17

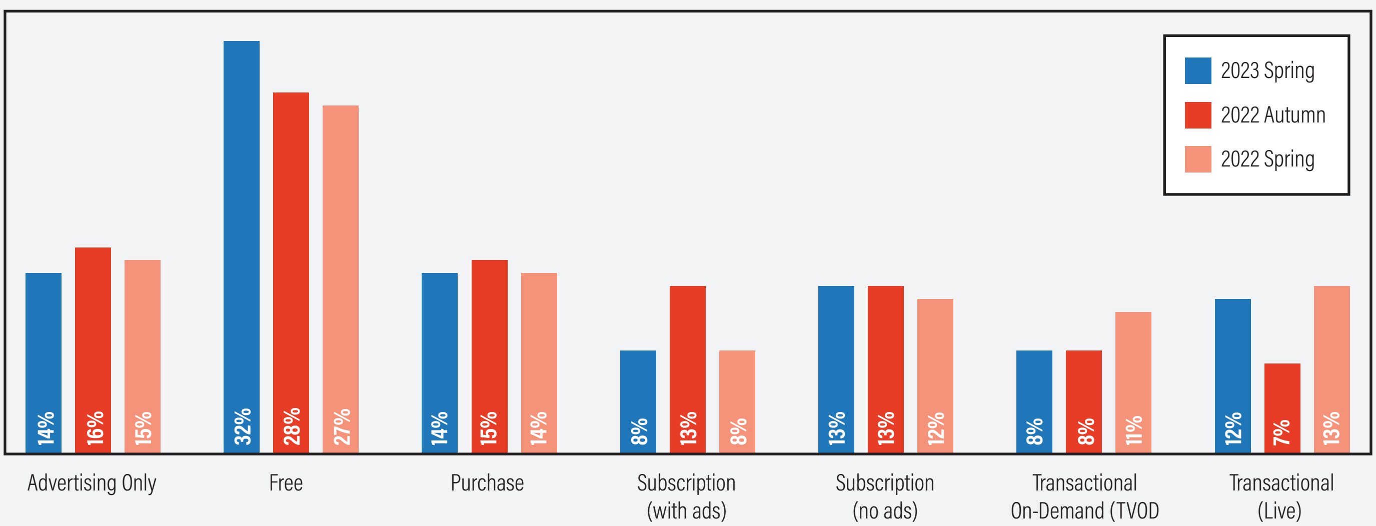
MOVING TOWARD ADVERTISING?

A number of companies in the premium OTT space have recently announced reduced-price tiers for video-on-demand (VOD) content that combine advertising and lower subscriptions. Looking at the past 2 years, however, we see a slightly different story when we examine this year's data around revenue types that organizations use to support their consumer-facing streaming business.

Free offerings have jumped from an average of 28% to 32% while advertising-only has fallen from an average of 16% to 14% between 2020 and 2023. After a bit of uncertainty, the *subscriptions (with ads)* category is back to 8% after having popped up to 13% in the Autumn 2022 survey report.

Interestingly, the *subscriptions (no ads)* category has remained at ~13% overall for each of the last three surveys, continuing to go against the common wisdom that pure subscription services are phasing out in favor of ad-driven revenue.

HOW MANY OF THE FOLLOWING REVENUE TYPES DOES YOUR ORGANIZATION USE TO SUPPORT YOUR CONSUMER-FACING STREAMING BUSINESS?



Q13/Q21 (2022-2023 Comparative)

A FAST SLOWDOWN?

On the FAST front, we're also seeing a bit of a shift here. In Spring 2021, about 1/3 of respondents expressed interest in offering a FAST service. By Spring 2022, that number had increased to more than half.

Given the trend of the past 2 years, it would seem logical that FAST plans would continue to grow across the industry. If you'll pardon the pun, though, we'd like to say "not so FAST" here in early 2023.

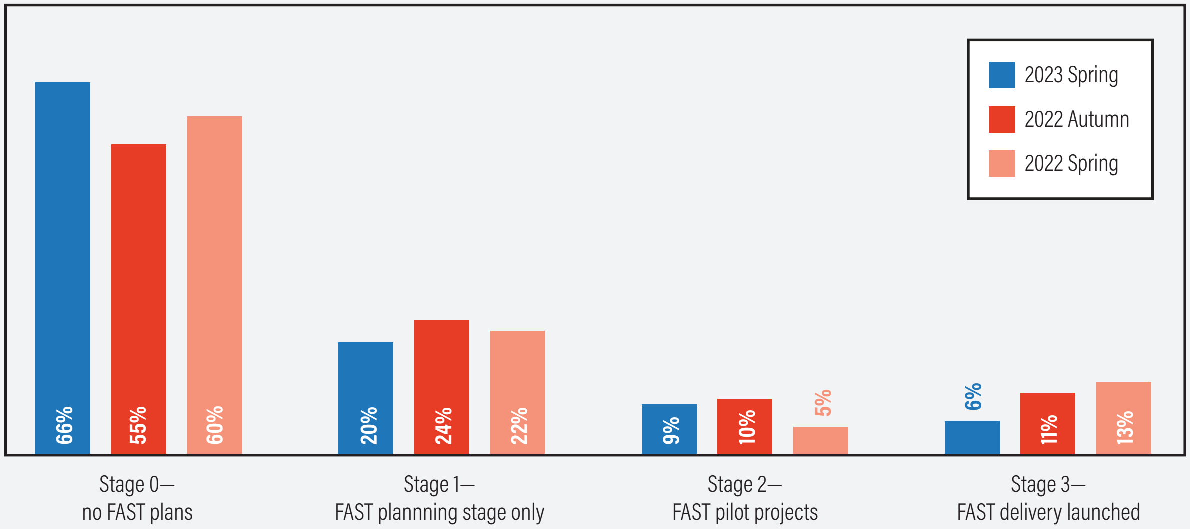
The chart below illustrates this point: Those respondents reporting they have no FAST plans have grown to 66% overall, up from 55% in 2022. For those with FAST pilot projects or launched initiatives, this combination only comprises 15% of all responses in 2023, compared to 21% of responses in 2022.

Why is FAST lagging behind in early 2023, on the heels of 2 years of seemingly strong interest in FAST rollouts? We see four potential reasons, each briefly covered below.

First, consider this quote from Gustavo Neiva de Medeiros, managing director of WISPTV and CEO of TeleUP. As the president of the FAST Alliance, a nonprofit organization comprised of independent FAST channels, de Medeiros joined us on the Streaming Media East 2023 panel revealing the Spring 2023 State of Streaming survey's results.

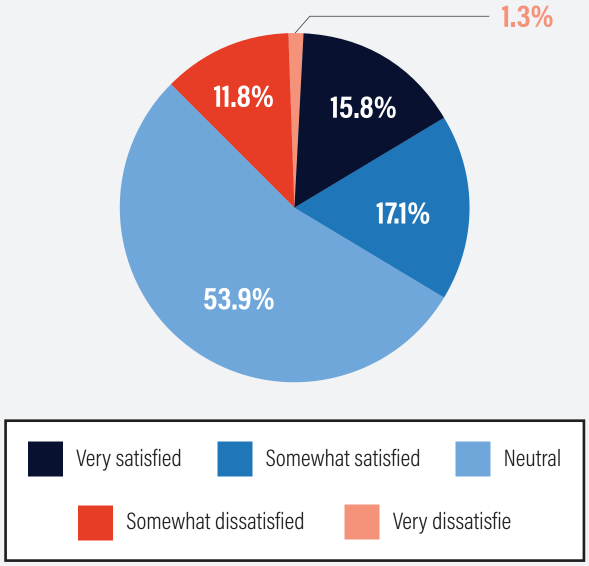
"In the realm of streaming media, a growing imbalance is perceptible," said de Medeiros. "The percentage of revenue FAST channel providers generate from advertising is increasingly at odds with the share retained by delivery platforms like Roku or various smart TV and set-top box manufacturers."

AT WHAT STAGE ARE YOUR ORGANIZATION'S PLANS TO INCORPORATE FAST INTO YOUR STREAMING OFFERINGS?

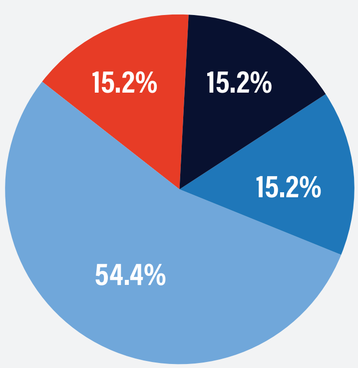


Q15/Q34 (2022-2023 Comparative)

HOW SATISFIED ARE YOU YOUR CHOICE OF AD REVENUE OPTIONS (E.G., AD-REVENUE PLATFORMS OR AD MARKETS)?



HOW SATISFIED ARE YOU THE COST OF YOUR CURRENT AD MARKETS?

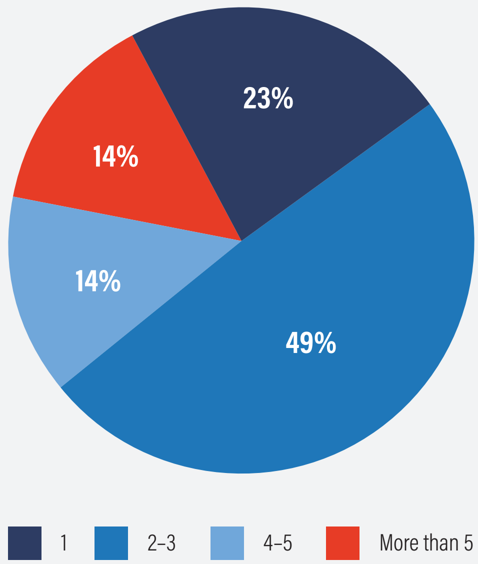


Q25/Q26

Second, building de Medeiros' comment, the chart above shows a growing number of respondents are either neutral or dissatisfied with both the choice of ad-revenue options and the cost of current ad markets. Just over one-third of respondents that use ad platforms or ad markets are very satisfied or somewhat satisfied with the choice of ad-revenue options, and barely 30% express satisfaction with the cost of their current ad markets.

Third, approximately one-quarter of respondents using ad markets report using just a single ad market. Almost half use two to three ad markets, and the remainder use four or more ad markets. This drive to use multiple ad markets could mean that FAST channels are trying to stuff their services with ads, and it sometimes feels that way, but we'd offer a counterargument as well: FAST channels need to balance the cost of ad markets against the cost of content acquisition and delivery, and, therefore, they'll likely use four or more ad markets in an attempt to break even.

HOW MANY AD PLATFORMS DO YOU TYPICALLY USE?



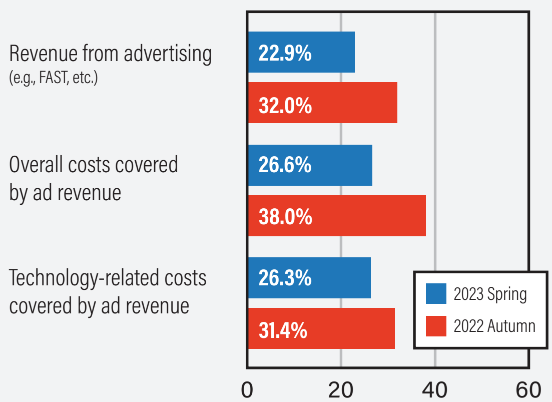
Q27

Our fourth and final take on the decline in FAST channel launches—and a question on whether existing FAST channels can continue as viable businesses—has to do with the break-even concept mentioned above and expanded on during the Autumn 2022 State of Streaming survey report presentation. The next section will further highlight break-even concerns.

BREAKING DOWN OR JUST BREAKING EVEN?

During the Streaming Media West 2022 event in November 2022, we laid out the first findings around the balance of advertising revenues and the overall or technology-related costs covered by advertising.

ADVERTISING REVENUES AND COVERED COSTS



Q22/Q23/Q24

The initial responses to these questions in Autumn 2022 set off a three-alarm concern for the FAST-related portion of the industry, and that concern is growing here in 2023.

Respondents in Autumn 2022 told us that, on average, their advertising revenues account for about 32% of overall revenues. In the Spring 2023 survey data, advertising revenue now represents a bit less than 23% of overall revenues.

Second, respondents in Autumn 2022 told us that advertising revenues cover approximately 38% of their overall costs. In the most current survey, respondents told us less than 27% of their overall costs were covered by advertising revenue.

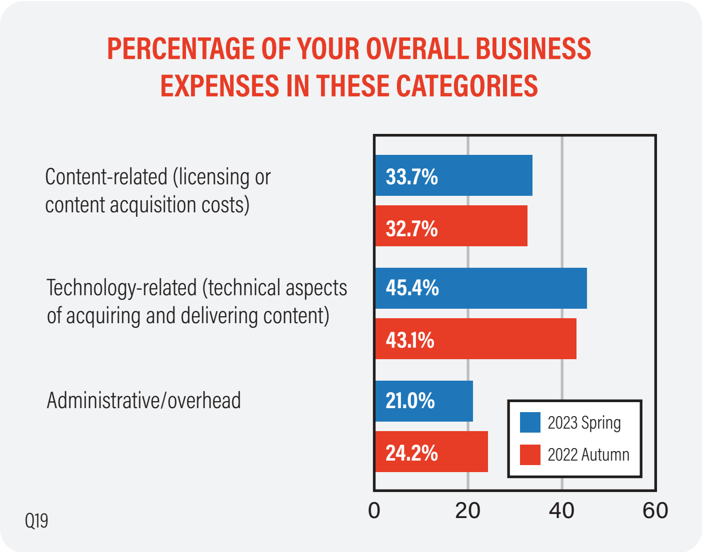
Third, respondents in Autumn 2022 indicated that less than 32% of their technology costs are covered by advertising revenue. Today, that number is just over 26% at a time when technology costs are rising.

After the Autumn 2022 survey results were announced, Tim Siglin, founding executive director of Help Me Stream Research Foundation and co-author of all the State of Streaming survey reports, voice this concern.

"This makes me wonder how many companies in the industry are cashflow-negative at this point?" Siglin asked as part of the Autumn 2022 research keynote. "It's certainly is a sobering question that we want to continue to ask in future surveys because if your ad revenue isn't covering your costs, … there are some serious questions from the viability standpoint."

IS ADVERTISING ENOUGH TO SUSTAIN STREAMING DELIVERY COSTS?

So, have those potential cashflow-negative issues abated? Unfortunately, no, as the following chart demonstrates.



While respondents indicate that they've been able to lower the overall administrative-overhead expenses in their businesses (from 24.2% in Autumn 2022 to 21% in the current survey), they've not been able to reduce content-related costs, from licensing to content acquisition.

In addition, their technology-related costs, covering the technical aspects of acquiring and delivering content, have risen from 43.1% in Autumn 2022 to 45.4% in Spring 2023.

A portion of this is likely due to the overall rise in technology costs—as with almost everything from groceries to power bills that have risen over the past six months—but another portion is likely due to the cost of implementing FAST channels and other new technologies.

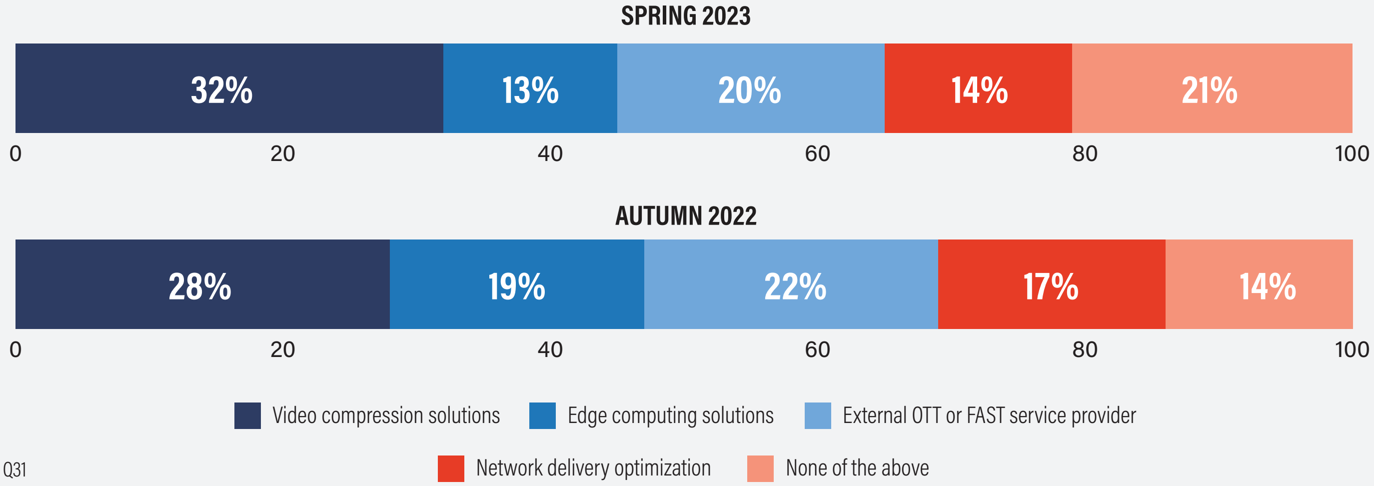
OVERCOMING BUSINESS AND TECHNICAL CHALLENGES

Given the various revenue types, along with the fact that streaming providers are sinking more of their overall revenue into technology-related expenses, an obvious question is how to reduce costs across the board while still maintaining video streaming quality and end-user quality of experience.

Over the past seven surveys, we've asked respondents how they handle technical challenges around network bandwidth and storage. As the chart on the next page shows, video compression solutions continue to dominate the options we provide to respondents. All other options have decreased between Autumn 2022 and Spring 2023, including edge computing and reliance on external OTT or FAST service providers to fix the problem.

Speaking of edge compute, we've asked a correlative question around data centers in the past three surveys. The working hypothesis on data centers—especially when it comes to edge compute, bidirectional streaming, and other microservices that require low latency—is that smaller (regional) data centers heighten the chance of lowering overall latency by placing data centers in somewhat niche locations that are closer to the end customer.

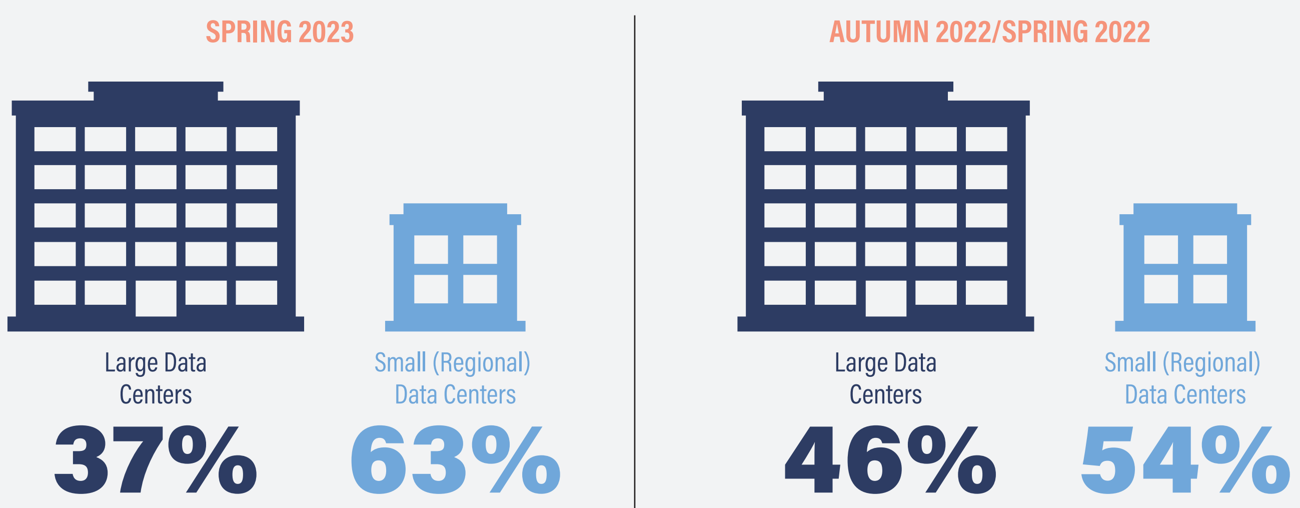
IF NETWORK BANDWIDTH AND STORAGE REQUIREMENTS ARE CHALLENGES FOR YOUR ORGANIZATION'S VIDEO DELIVERY SERVICE, HOW DO YOU PLAN TO ADDRESS THEM?



Q31

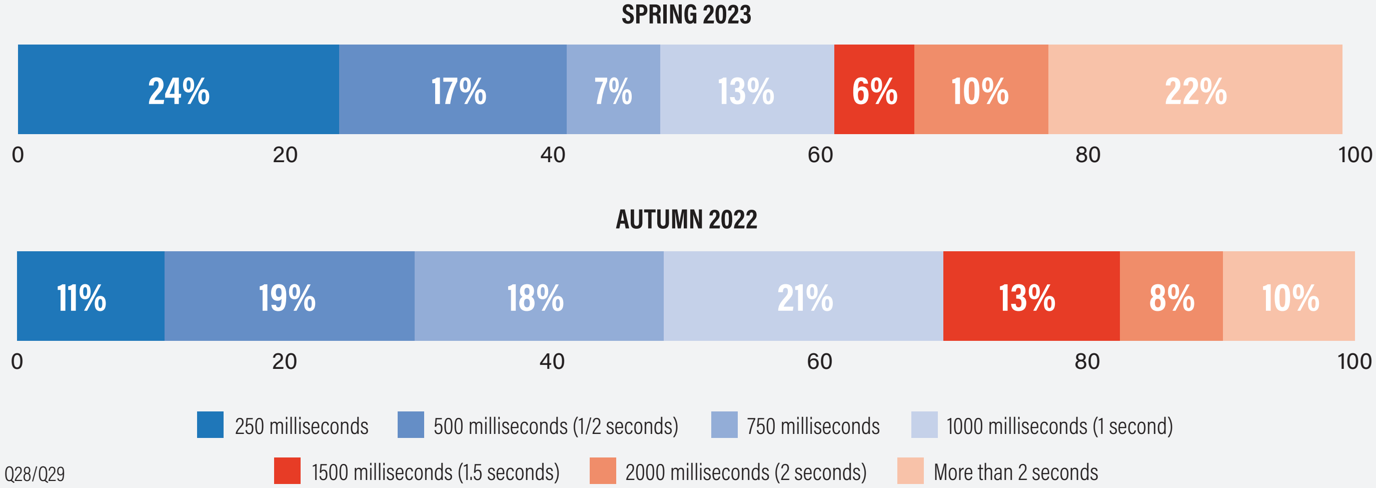
In both 2022 surveys, the percentage of respondents—among those whose organizations have edge compute strategies—indicating that they plan to use these smaller, geographic-specific data centers has held steady at 54% overall. The chart below, though, indicates a rising interest in the use of these smaller data centers (63% in the current survey) versus those who plan to center edge compute strategies in large, centralized data centers.

IF YOUR ORGANIZATION HAS AN EDGE COMPUTE STRATEGY, DOES IT (OR WILL IT) USE LARGE CENTRALIZED DATA CENTERS OR SMALLER, GEOGRAPHIC-SPECIFIC (REGIONAL) DATA CENTERS?



Q33/Q22 (Spring 2022)/Q32 (Autumn 2022)

WHAT IS YOUR GLASS-TO-GLASS LATENCY EXPECTATION FOR REAL-TIME OR ULTRA-LOW-LATENCY (ULL) STREAMING?



Q28/Q29

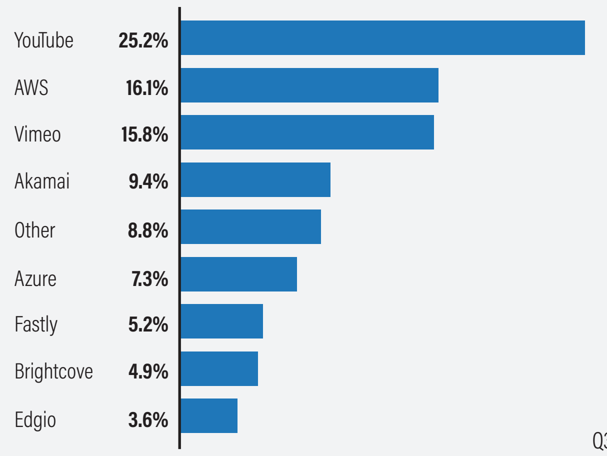
The shift in the question on data center sizes is matched somewhat by a shift in perceptions about glass-to-glass latency expectations. While only 30% of respondents in Autumn 2022 expected latencies of 500 milliseconds (ms) or less for real-time or ultra-low-latency (ULL) streaming, that expectation has risen to 41% in Spring 2023.

Taken together, the combination of data centers and ULL expectations naturally leads into conversation around cost constraints and the use of either cloud services, content delivery networks (CDNs), or a hybrid of both. For the Spring 2023 survey, we also included a CDN option on the network bandwidth and storage requirement challenges question referenced earlier, and 22.2% of respondents indicated they would rely on their CDN to address these challenges.

We then asked respondents to indicate which CDN services they might use, providing a list that contained everything from free video-centric services to traditional CDNs to cloud providers. The chart at right covers responses to all the choices, with a number of respondents also providing us with examples of other services (8.8%) in comments.

In addition, we asked respondents to tell us the percentage of their cloud services, based on usage of private clouds, public cloud services, or no cloud usage. As the chart on the next page indicates, public-cloud usage outstrips private-cloud usage, but not by as much as we'd anticipated.

IF NETWORK BANDWIDTH AND STORAGE REQUIREMENTS ARE CHALLENGES FOR YOUR ORGANIZATION'S VIDEO DELIVERY SERVICE, HOW DO YOU PLAN TO ADDRESS THEM? (CONT.)



Q32

Of significant interest were the justifications of using each, which often argued the same benefit for either private- or public-cloud usage. For instance, on the security front, some respondents commented that they used private clouds to maintain access control to content, while others stated that they felt their security options were better if they used public clouds, since their assumption was public cloud providers had more experience in securing content and limiting overall access to that content.

Another area for which both private and public cloud usage generated positive commentary was costs. For small organizations, the use of a solution like YouTube was noted as a way of saving on costs, with respondents commenting that they looked for free solutions at the outset and bought into paid solutions with the same provider as they grew. Conversely, for those established brands, the cost of public clouds was too great—a datapoint we spent considerable time discussing during the Autumn 2022 State of Streaming presentation—and so the choice was to use private clouds as a cost-savings measure.

PUBLIC VERSUS PRIVATE CLOUD USAGE

PUBLIC CLOUD
49%

Cost **(38%)**
Scalability **(24%)**
Performance/services **(19%)**
Security **(5%)**

PRIVATE CLOUD
36%

Security **(54%)**
Controlled access (content/function) **(23%)**
Cost **(8%)**

NEITHER
15%

Q4/Q39

COST VERSUS INNOVATION?

On the topic of costs, as a way to wrap back around to the business and technical challenges faced by streaming professionals and their organizations, one area we noted in Autumn 2022 was capital expenditure (CapEx) challenges.

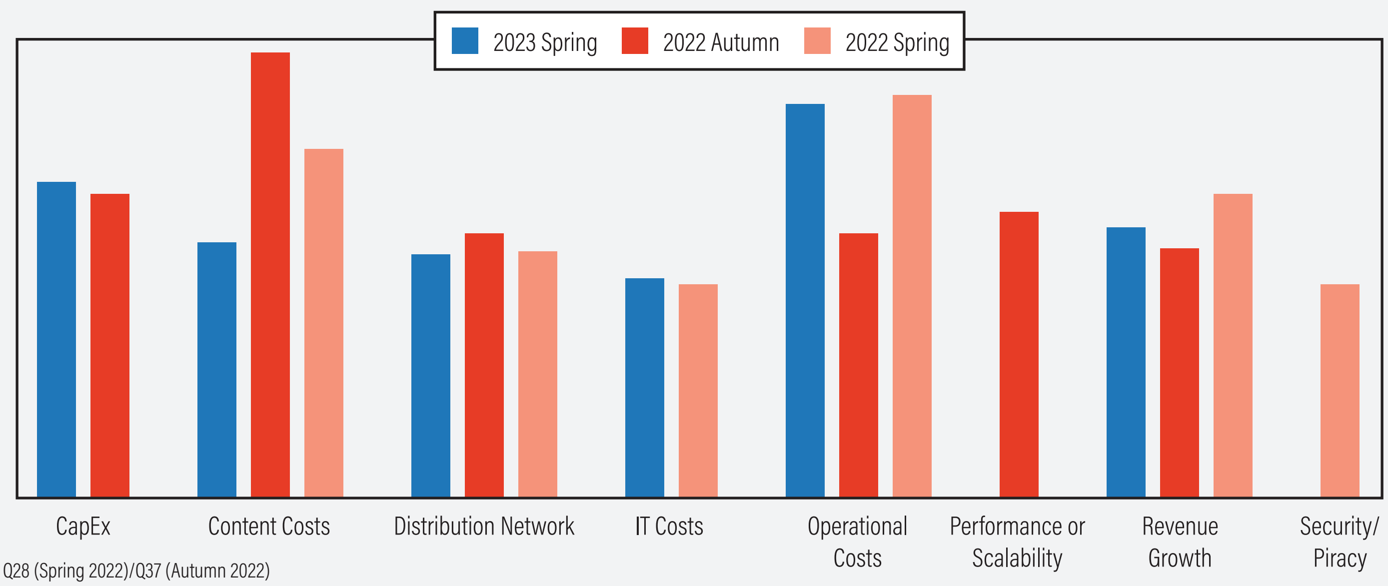
Prior to that survey, operational costs (OpEx) had been an ongoing concern, but CapEx hadn't made it into the top six challenges. We posited that the rise in CapEx might be tied to the creation of private clouds in response to the rising cost of public-cloud delivery solutions.

In the Spring 2023 survey, not only has CapEx continued to rise as an ongoing concern, but OpEx has also risen back to the top-ranked business or technical challenge.

In addition, the challenge of content costs, which had risen to the top-ranked challenge in Autumn 2022, has fallen back to the fourth position, just slightly behind revenue growth concerns.

Taken as a whole, we're going to expand on our comments from the Autumn 2022 State of Streaming survey presentation: One explanation for the rise in OpEx, while CapEx remains a significant concern, may be due in part to the fact that larger streaming service providers are finding their private cloud implementations aren't moving along as quickly as projected, resulting in a potential need to maintain OpEx at traditional levels while also putting CapEx to work in hopes that overall delivery costs will decline once private cloud operations are fully functional.

PLEASE INDENTIFY YOUR ORGANIZATION'S BUSINESS AND TECHNICAL CONCERNS, OVER THE NEXT 24 MONTHS.



Q28 (Spring 2022)/Q37 (Autumn 2022)

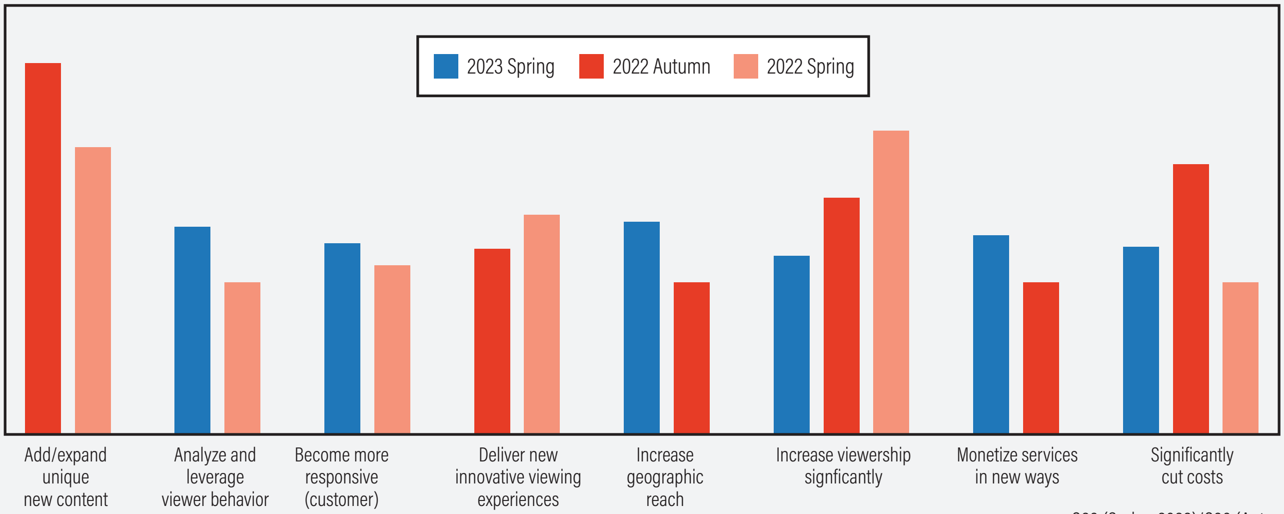
On the one hand, there could be a factor here that we are unaware of, and we plan to investigate further.

Our final chart, based on a question where we'd asked respondents to tell us about their organizational goals, shows an industry in flux. While adding or expanding unique new content was a top-rated organizational goal throughout 2022 (and even prior to that in our 2020 and 2021 surveys), it doesn't even make the top seven rankings for Spring 2023.

On the other hand, the goal of significantly cutting costs has remained a highly ranked goal for 2023, albeit a slightly lower one than it was in Autumn 2022. The top-ranked goals for 2023, in an almost dead tie, are to "analyze and leverage viewer behavior" and "increase geographic reach" into emerging markets.

Fortunately, the industry also understands the need to reduce churn, as the next highest-ranked goal is to "become more responsive to customers" as it attempts to monetize services in new ways.

PLEASE RANK THE FOLLOWING ORGANIZATIONAL GOALS FROM TOP (GREATEST) TO BOTTOM (LOWEST), OVER THE NEXT 24 MONTHS.



Q29 (Spring 2022)/Q38 (Autumn 2022)

CONCLUSION

2023 appears to be the year we've "crossed the chasm" between the distinctions of streaming media industry content creators and content distributors. While there are still about one-quarter of respondents who exclusively create or distribute content, the group of respondents who do both now sits at 71% overall, a significant increase from the 46% in our initial Spring 2020 survey.

At the same time, monthly viewership numbers, as well as upper-end annual revenues, continue to erode. It's not that fewer people are watching streams—the lower-end viewership numbers are on the rise, including concurrent viewership of live events—but it's a challenge for those companies who have sunk a significant investment in exclusive premium content.

FAST appears to be stalling out, seemingly due to the slowdown in advertising, but as mentioned earlier in this report, there's a bit of a disconnect between advertising and delivery platform revenues that may be further exacerbating a lack of interest in FAST.

Education continues to rise in importance as an overall percentage of streaming market verticals, but more effort is needed to provide connectivity in rural and remote areas for primary education. To that end, the growth in interest in using small data centers in geographic-specific locales could be a way to address edge and latency concerns as well as to close the digital divide for all students.

Finally, the baseline data presented in this report around the balance of public and private cloud usage will be explored further in the Autumn 2023 edition of the State of Streaming survey to gauge whether the balance shifts as streaming organizations address simultaneous CapEx-OpEx concerns.

Tulix is a streaming technology incubator that supports innovators, investors, and enterprises by providing guidance and resources on strategy, infrastructure, technology, and business models across the whole streaming ecosystem.

Tulix's dedicated R&D team strives to always provide the latest streaming technologies and has a number of internet firsts under its belt.

Tulix uses its own as well as hybrid infrastructure to provide fully managed streaming solutions that are flexible, cost-effective, and customized for its customers.

Working with broadcasters, content owners, startups, and just about anybody who needs streaming, Tulix offers various custom streaming services, including fully managed end-to-end OTT, channel origination, live 24/7 worldwide streaming over its own streaming-optimized MultiCDN, security, and monetization.

STATE OF STREAMING SPRING 2023 was produced by *Streaming Media* magazine, sponsored by Tulix, and crafted by Michelle Fore-Siglin and Timothy Siglin of Help Me Stream Research Foundation. To review abstracts of our past reports, visit www.streamingmedia.com/Research.

APPENDIX

STATE OF STREAMING SPRING 2023 SURVEY & ANALYSIS

FINAL QUESTIONS

Q1 Does your organization create and/or distribute media content?

Q2 Please identify your organization's mix of traditional (e.g., broadcast) and streaming (e.g., OTT) business.

Q3 Which of the industries below most closely matches your organization?

Q4 Please indicate the mix of public- versus private-cloud usage in your streaming business.

Q5 Please select the market vertical(s) in which your organization participates.

Q6 Please rank, from highest (1) to lowest (7), your organization's business for each of the following sub-categories in the Live Events market vertical.

Q7 Please identify the frequency of events that your organization creates and/or delivers in the Live Events market vertical.

Q8 Please rank, from highest (1) to lowest (5), your organization's business for each of the following sub-categories in the Video On-Demand (VOD) market vertical.

Q9 Please rank, from highest (1) to lowest (6), your organization's business for each of the following sub-categories in the News (publishing) market vertical.

Q10 Please rank, from highest (1) to lowest (8), your organization's business for each of the following sub-categories in the Sports market vertical.

Q11 Please indicate the percentage range of each market vertical for your overall streaming business.

Q12 Please indicate the mix of live and on-demand in your streaming business.

Q13 How many concurrent viewers typically view your live streams?

Q14 Including both traditional and streaming media, what is your organization's typical viewer or subscriber size per month?

Q15 What is the average resolution of your content?

Q16 Which of the following is closest to the average bitrate at which your content is served?

Q17 Approximately what percentage of your content is delivered to battery-operated devices (smartphones, tablets, etc.) versus powered devices (connected TV, set-top box, etc.)?

Q18 Including both traditional and streaming media, please provide your organization's overall video-based annual revenue in US dollars.

Q19 What percentage of your overall business expenses are content related (licensing or content acquisition costs) versus technology related (technical aspects of acquiring and delivering content) versus administrative / overhead?

Q20 In US dollars, what is your average monthly per-user delivery cost?

Q21 How many of the following revenue types does your organization use to support your consumer-facing streaming business?

Q22 What percentage of your revenue come from advertising (e.g., FAST, etc.)?

Q23 What percentage of your overall costs are covered by advertising revenue?

Q24 What percentage of your technology-related costs are covered by advertising revenue?

Q25 How satisfied are you your choice of ad revenue options (e.g., ad-revenue platforms or ad markets)?

Q26 How satisfied are you the cost of your current ad markets?

Q27 How many ad markets do you typically use?

Q28 Do you use any of the following low-latency solutions to acquire or contribute live content?

Q29 What is your glass-to-glass latency expectation for real-time or ultra-low-latency (ULL) streaming?

Q30 Please rank, from highest to lowest, the following challenges you experience in video service delivery.

Q31 If network bandwidth and storage requirements are challenges for your organization's video delivery service, how do you plan to address them?

Q32 Have your used any of the following video delivery solutions?

Q33 If your organization has an edge compute strategy, does it (or will it) use large centralized data centers or smaller, geographic-specific (regional) data centers?

Q34 At what stage are your organization's plans to incorporate FAST into your streaming offerings?

Q35 For your organization's FAST channels, please indicate the mix of truly live content versus pre-recorded (playlist) content.

Q36 Relative to the cost of delivering your organization's FAST channel(s), how satisfied is your organization with the revenue generated from each FAST channel?

Q37 Please identify your organization's business and technical concerns, over the next 24 months, from the following list.

Q38 Please rank, from highest to lowest, the following organizational goals over the next 24 months.

Q39 Please detail any reasons for your organization's choice of private cloud, public cloud or hybrid video infrastructures.

Q40 In how many regions do you deliver your content or applications to today?

Q41 For your organization's overall streaming business, please rank, from highest to lowest, the geographies in which you do business.

Q42 In which region of the world are you based?

Q43 What is your job title?

Q44 What is your primary job responsibility?

Q45 How many years have you been in the streaming industry?

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