



REAL-WORLD HEVC INSIGHTS

ADOPTION, IMPLICATIONS, AND WORKFLOWS

By Tim Siglin,
Contributing Editor, *Streaming Media* magazine, and
Founding Executive Director, Help Me Stream Corp.

Produced by *Streaming Media* and Unisphere Research,
a Division of Information Today, Inc.

June 2018

Sponsored by



BEAMR



**streaming
media**

THE BUSINESS &
TECHNOLOGY OF
ONLINE VIDEO

TABLE OF CONTENTS

<i>OVERVIEW</i>	3
<i>SUMMARY.....</i>	4
<i>WHO RESPONDED?</i>	5
<i>SETTING THE STAGE(S).....</i>	5
<i>WHAT SERVICES DO YOU PERSONALLY USE?</i>	8
<i>CONTENT ENCODING: SERVICE, DEVICE TYPES, RESOLUTIONS, AND APPROACHES</i>	10
<i>WHEN 4K HYPE MEETS REALITY.....</i>	10
<i>CURRENT STATE, LOOKING AHEAD.....</i>	12
<i>WHY MOVE TO HEVC?</i>	13
<i>CONCLUSION.....</i>	16

The word “codec” is a small word, an intentional shortening of two words—compression and decompression—but the implications around codec choice are large. As a result, codecs are often considered a third-rail topic in the industry.

Whether it is a legacy codec such as the VPx series or H.264 (Advanced Video Coding, or AVC), or a newer codec such as the Alliance for Open Media’s AV1 or the MPEG standard H.265 High Efficiency Video Coding (HEVC), codec choice not only heavily shapes the addressable market but also impacts infrastructure costs, existing workflow architectures, and the potential overall success or failure of a video service.

To better understand the dynamics around codec selection, Unisphere Research—in partnership with Beamr, Help Me Stream Corporation, and StreamingMedia.com—conducted a survey of streaming media experts on the topic in early 2018, shortly after Apple announced that it was joining the Alliance for Open Media but before HEVC Advance signaled a significant shift in its royalty structure by eliminating HEVC licensing fees for all non-physical digital content delivery mediums.

OVERVIEW

The survey, titled the *Real-World HEVC Insights: Adoption, Implications, and Workflows*, covers topics around workflows and production pipelines and was designed to move past the question of whether High Efficiency Video Coding (HEVC) will be adopted, addressing the implications this may have on other codecs and how to best modify existing workflows to take full advantage of the additional encoding capabilities inherent in HEVC.

Even though the survey had HEVC in the name, the questions posed to industry experts didn’t ignore potential proponents of other next-generation codecs, such as the emerging AV1 codec, or even legacy codecs such as the VPx (VP8, VP9) series or H.264 (AVC) codecs.

The survey garnered 406 quality responses, with 66% of respondents hailing from North America, another 20% from Europe, 6% from Asia-Pacific, and 4% from South America.

Almost one-third of survey respondents are in functional roles with an engineering focus, 25% in executive management, 16% in operations, and 12% in business development. Another 9% are in product management roles, and the remaining 7% are scattered across educational and religious organizations.

To say that interest in this topic is high might just be the understatement of the year. All but 33 of the 406 respondents provided complete responses—a 92% completion rate that is far above the typical completion rate that we’ve seen for Unisphere-StreamingMedia.com surveys in the past two years.

What region of the world are you based in?

North America	66%
South America	4%
Europe	20%
Middle East	1%
Asia-Pacific	6%
Australia/New Zealand	2%
Africa	1%
Other	1%

What is your functional role?

Business Development	12%
Executive Management	25%
Engineering	31%
Operations	16%
Product Management	9%
Other	7%

SUMMARY

Here is the short version of what we learned as a result of this survey. From the wide matrix of analysis opportunities available from the survey, we've chosen five key takeaways for those seeking the most relevant insights on business or technical impact, and especially for those struggling to make sense of the codec smorgasbord.

1. Fewer than 14% of respondents encode in a codec other than H.264 (AVC) or HEVC. In use today by just 8% of all survey takers, HEVC growth over the next 24 months will reach 37% of all encoding, according to these same survey respondents. This ramp-up in HEVC encoding is in line with Apple's estimated 1 billion-plus HEVC-equipped hardware-enabled devices available in today's market. Combined, these data points appear to indicate HEVC availability and viability for mass consumer access isn't a future trend but a current reality.
2. HEVC adoption is not just for 4K (UltraHD/UHD) content. Respondents told us they believe HEVC's benefits apply to HD as well as 4K. It's true that 4K video requires an advanced codec beyond H.264 (AVC) but even high-frame rate (HFR) or High Dynamic Range (HDR) content at 1080p can benefit from HEVC's advancements. Respondents who have moved into HEVC production workflows are even finding benefit in encoding 720p content with HEVC.
3. Of all the proposed next-generation codecs, HEVC is currently the only viable solution with sufficient market penetration in players. Our survey data reveals that video services looking to simultaneously reduce bandwidth and improve quality are using HEVC for not just HD but also some SD resolutions, opening up a major competitive opportunity to extend encoding operations to lower resolutions of the ABR stack.
4. Video distributors are benefiting from integration of the HEVC codec into existing H.264 production workflows. This mixed use of codecs in an existing encoding pipeline shows that HEVC adoption is being driven as much by technical ease of integration as by any specific business strategy. An added benefit is the fact that ABR stacks being created with HEVC-equipped transcoders could potentially allow mixed H.264 (AVC) and HEVC deliverables—using the de facto Apple HLS segmented HTTP delivery method—months before AV1 attempts to accomplish this feat.
5. Bandwidth savings is not the only driver for HEVC. Several survey respondents pointed out that HEVC enables, in some cases, even better quality with a reduction in bandwidth.

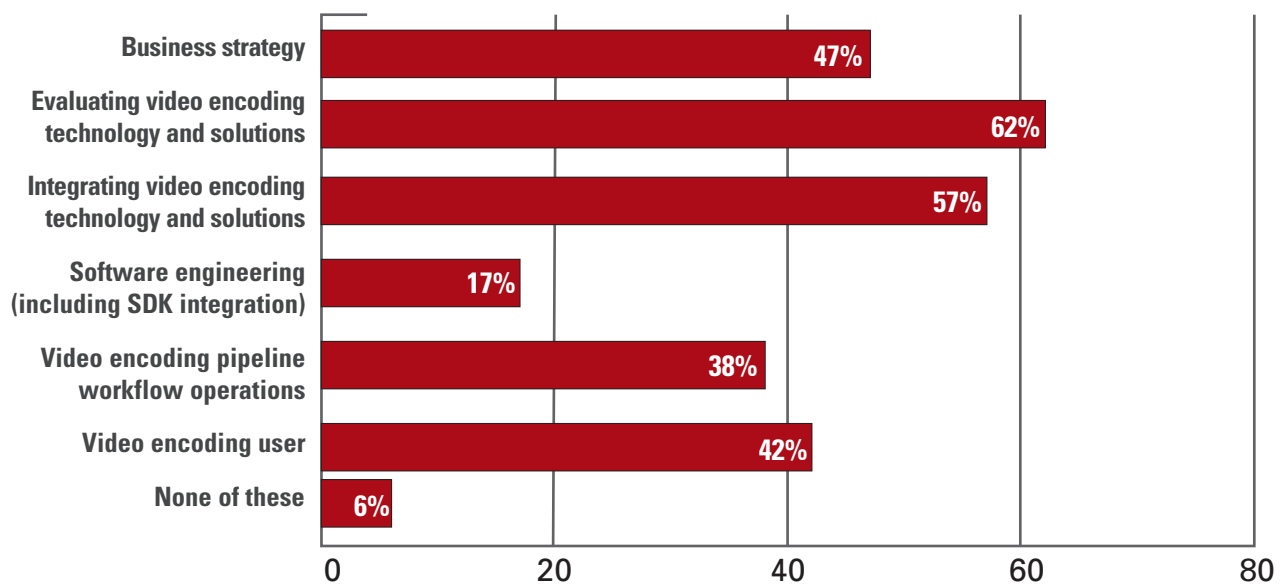
WHO RESPONDED?

A note about charting in this report: Not all charts will equal 100% of responses. Some questions allowed more than one response and, where applicable, the survey report author chose to remove non-applicable responses for brevity's sake.

Of the 406 survey responses received, well over 90% of survey respondents are actively engaged in evaluating, engineering, integrating, and/or using video encoding production pipelines and workflows.

Almost two-thirds (62%) of respondents reported a primary job responsibility involving “evaluating video encoding technology and solutions,” and 58% said their primary job responsibility involved “integrating video encoding technology and solutions.” Business strategy (47%) and video encoding user (42%) responsibilities outpaced video encoding pipeline workflow operations positions (38%) followed by 17% whose primary job responsibility centered on software engineering, including SDK integration.

Does your primary job responsibility include any of the following:



SETTING THE STAGE(S)

As with other recent Unisphere-StreamingMedia.com surveys, the *Real-World HEVC Insights* survey sets a baseline by first asking respondents to gauge the stage at which their current HEVC implementations might best fit across the five lifecycle stages displayed in the topmost chart on the next page.

The first stage, which we called Stage 0, where a survey respondent's organization had no plans to adopt HEVC, accounted for just over one-third of survey responses (34%) in the chart at the top of the next page. Given the fact that HEVC is often only seen as a codec to solve 4K (UHD) resolution issues, a 34% adoption rate initially makes sense.

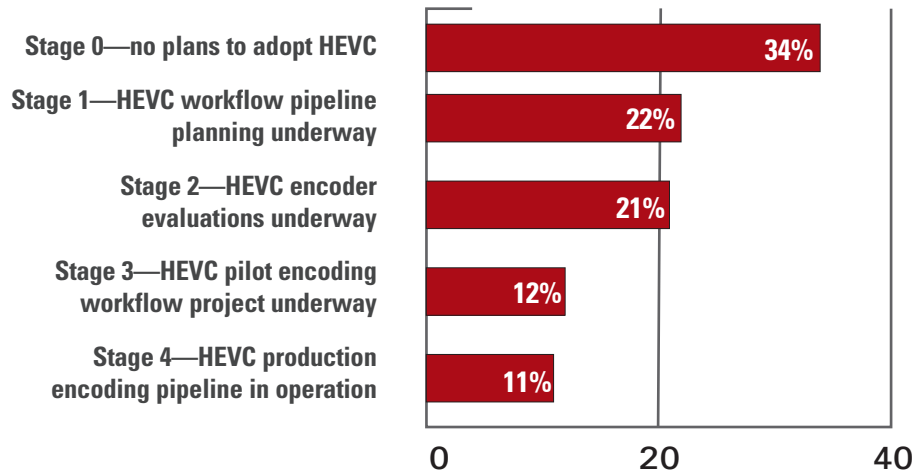
For the remaining two-thirds of respondents, the next two stages (Stages 1 and 2) account for about half of all responses, almost evenly split between those who are in the HEVC

workflow pipeline planning stages (22%) and those who have moved on to HEVC encoder evaluations (21%).

The remaining roughly one-quarter of respondents are already deep into pilot projects (12%) or already have an HEVC production pipeline in operation today (11%).

Taken together, encoder evaluations and pilot encoding projects (Stages 2 and 3, respectively) account for 33% of all responses, meaning that tire-kicking was well underway by the beginning of 2018. Note that pilot projects and deployments were being launched prior to the HEVC Advance announcement regarding the elimination of streaming content royalties. This means, despite licensing concerns being expressed by some in the ecosystem, a significant number of video encoding operators and their customers felt comfortable moving forward with HEVC.

Identify the current status of your organization's migration to, or potential adoption of, HEVC (H.265) compression solutions over the next two years:



When we drilled down a bit further into Stage 4—the 11% of respondents that already had an HEVC production pipeline in place—the answers were quite interesting: 56% of Stage 4 respondents said they were using HEVC integrated into an existing AVC encoding pipeline, while 33% said their HEVC implementation is separate from existing AVC encoding pipeline setups.

Approximately 7% of all respondents currently in Stage 4 use an HEVC-only production pipeline, meaning pure-play HEVC encoding environments are slowly gaining traction.

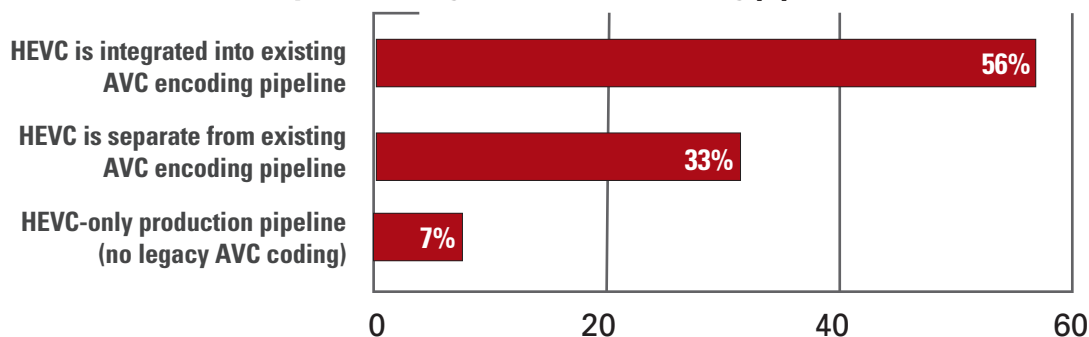
In addition, for those in Stages 2 or 3, planning HEVC workflows or implementing encoder pilot projects, 4.7% say they plan to use HEVC-only production pipelines.

In practical terms, then, is it accurate to say that one of the

benefits of moving from AVC to HEVC is the reusability of an established AVC production workflow pipeline? Yes. And that may be a tall order for AV1 proponents to move beyond.

It is also worth noting one key fact, lest anyone attempt to argue that these AVC-integrated or HEVC-only pipeline implementations are driven by business-strategy job types rather than engineering types. For those in Stage 4—relative to overall primary job responsibilities, noted on page 5—the percentage of primary job responsibilities for engineers actually increased, the number of video encoding user primary jobs decreased, and the number of business strategy job types stayed constant. In other words, this HEVC-only trend may be driven as much by ease of integration as any specific business strategy.

If your organization is currently using an HEVC production pipeline (Stage 4 in prior question), what is its relation to your existing AVC (H.264) encoding pipeline?



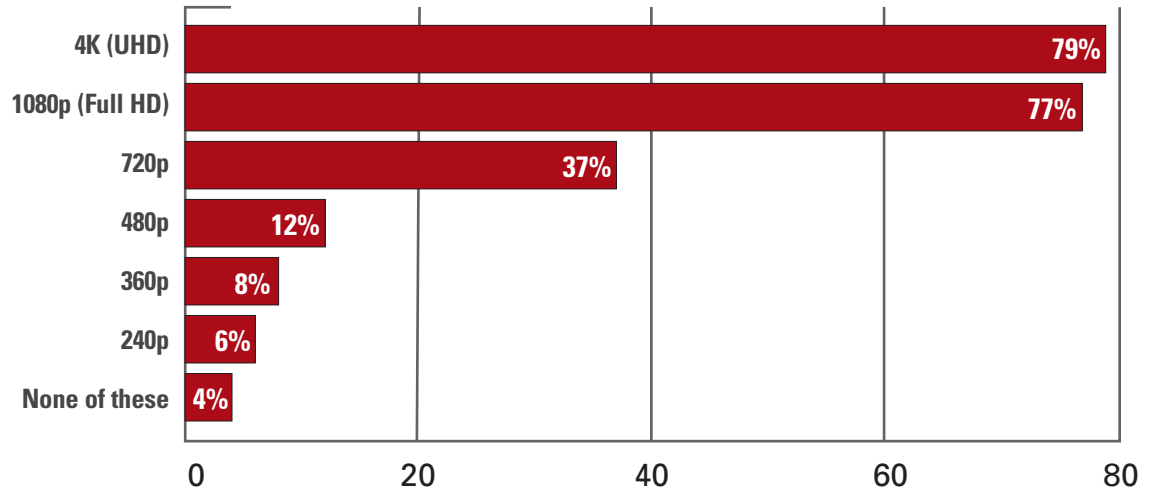
Shifting gears just a bit, it's also worth noting just how the industry-wide concept of "HEVC only as a UHD solution" is debunked in the responses.

Overall, there was a clear parallel between 4K (UHD) and 1080p (Full HD) when respondents were asked the following question:

"In your opinion, is HEVC (H.265) encoding a viable alternative to AVC (H.264) encoding for one or any of the following resolutions?"

The multi-choice responses break down this way:

In your opinion, is HEVC (H.265) encoding a viable alternative to AVC (H.264) encoding for one or any of the following resolutions?



Stage 0 respondents who don't plan to implement HEVC (almost 34% of total responses) were 14% less likely to see HEVC as a viable alternative to AVC for 4K UHD or 1080p versus those in Stages 1 to 3. Stage 0 respondents were also 10% less likely to see choose HEVC as an alternative to AVC for 720p, 480p, 360p, or 240p resolutions, with many Stage 0 respondents flatly stating that HEVC is not an AVC alternative for any of the listed resolutions.

Remember the mention at the outset of codecs as a third-rail topic? This is one possible reason for negating HEVC as a feasible alternative: Those who have tested HEVC at varying data rates and resolutions are more likely see it as a realistic AVC replacement versus those with no HEVC implementation plan. It's not our job to judge codec agnosticism or preference, but this data point bears scrutiny in future surveys around HEVC's ability to meet real-world compression needs.

Almost 54% of respondents, however, do see benefits to HEVC "beyond reducing cost for OTT service providers" with several respondents commenting on the efficiency of post-production workflows but cautioning that the need for new hardware to decode HEVC may negate some of the benefits.

Still others point out the royalty issue, which is only partially solved since HEVC Advance is one of two HEVC

patent royalty groups. And, at least one respondent, thinking from an enterprise standpoint, pointed out the potential benefit of HEVC in rural areas, allowing "corporate video delivery in bandwidth-challenged locations." This assumes, of course, that consumer hardware is available for decoding, but there's good news on that front: The vast majority of TV sets with a 40-inch or greater diagonal screen sold today are UHD-capable and feature an HEVC decoder.

Keeping with the same pattern noted above, those in Stages 2-4 are more likely to visualize the benefits of HEVC, beyond just reducing cost for over-the-top (OTT) service providers. A whopping 73% of respondents affirmed that HEVC has greater value than just bandwidth reduction.

In your opinion, does HEVC enable benefits beyond reducing cost for OTT service providers?



Several comments along these lines focused on the first mile (content acquisition) rather than the last-mile considerations that so often dominate conversations around next-generation codecs. One respondent summed up this sentiment, stating that HEVC would provide “better quality for live contribution from low bandwidth locations.”

Others are more definitive in their answers, even if the accuracy in the real world is slightly off. For instance, one respondent said about HEVC: “For 4K+ resolutions, it is mandatory; AVC would not be viable,” and another talked about the HDR capabilities in HEVC, although those are also readily available in AVC.

Another respondent said, “HEVC encoding dependence on cloud solutions is an added cost,” ignoring the fact that there are a number of desktop and on-premise workgroup HEVC encoding options.

The overall sentiment could be summed up with one respondent’s additional comment to the question: “HEVC

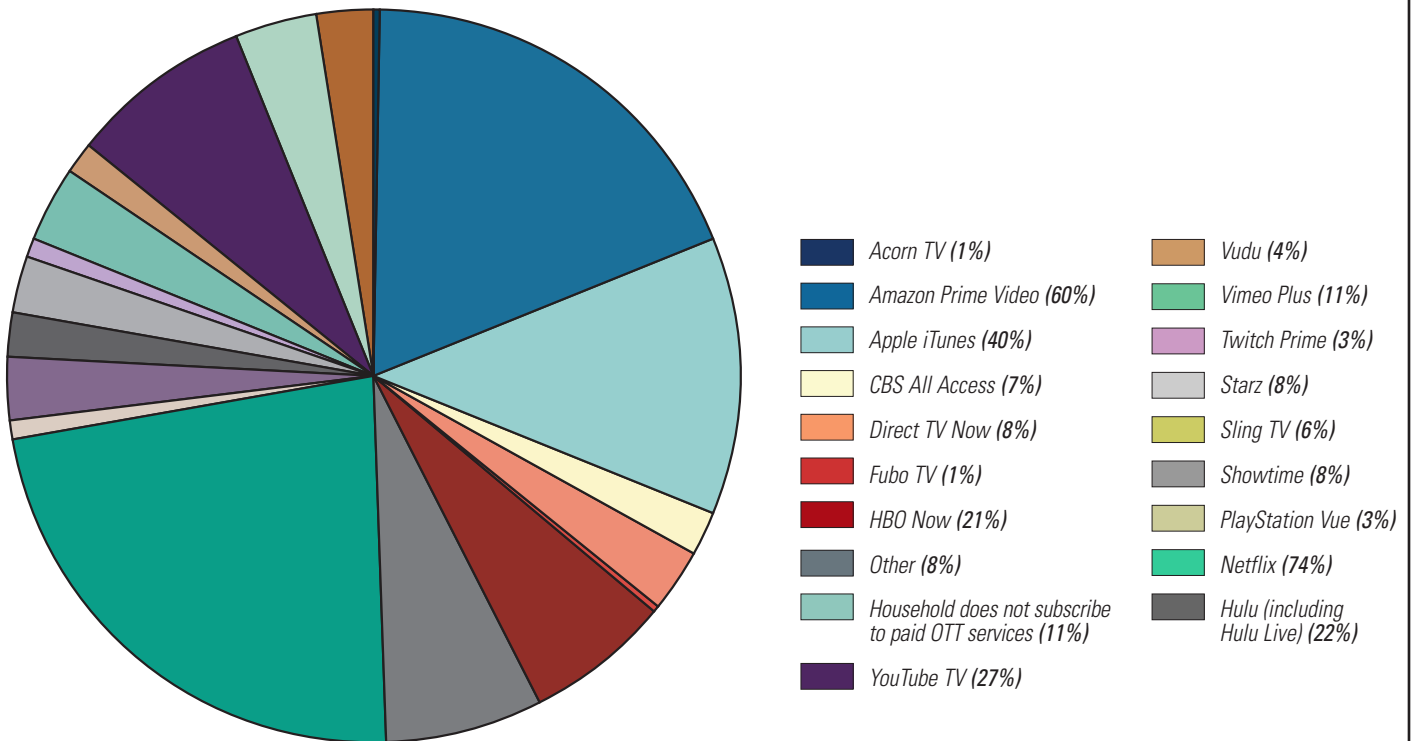
reduces bandwidth requirements, which allows emerging markets to have greater access to 4K content through HEVC transcoding than does AVC.”

WHAT SERVICES DO YOU PERSONALLY USE?

Turning to the question of personal media consumption, a series of questions asked respondents to tell us which household subscriptions they use or have used for paid OTT services, as well as which media consumption devices they own or use most in their day-to-day life. Each of these questions allowed multiple answers.

Regarding paid OTT services, the top five services were dominated by Netflix (74%) and Amazon Prime (60%) with only Apple iTunes (40%) rising above the rest of the pack—itsself almost twice as popular as the next closest three: YouTube TV (27%), Hulu (22%), and HBO Now (21%).

Please identify all your household subscriptions from the following paid OTT services:

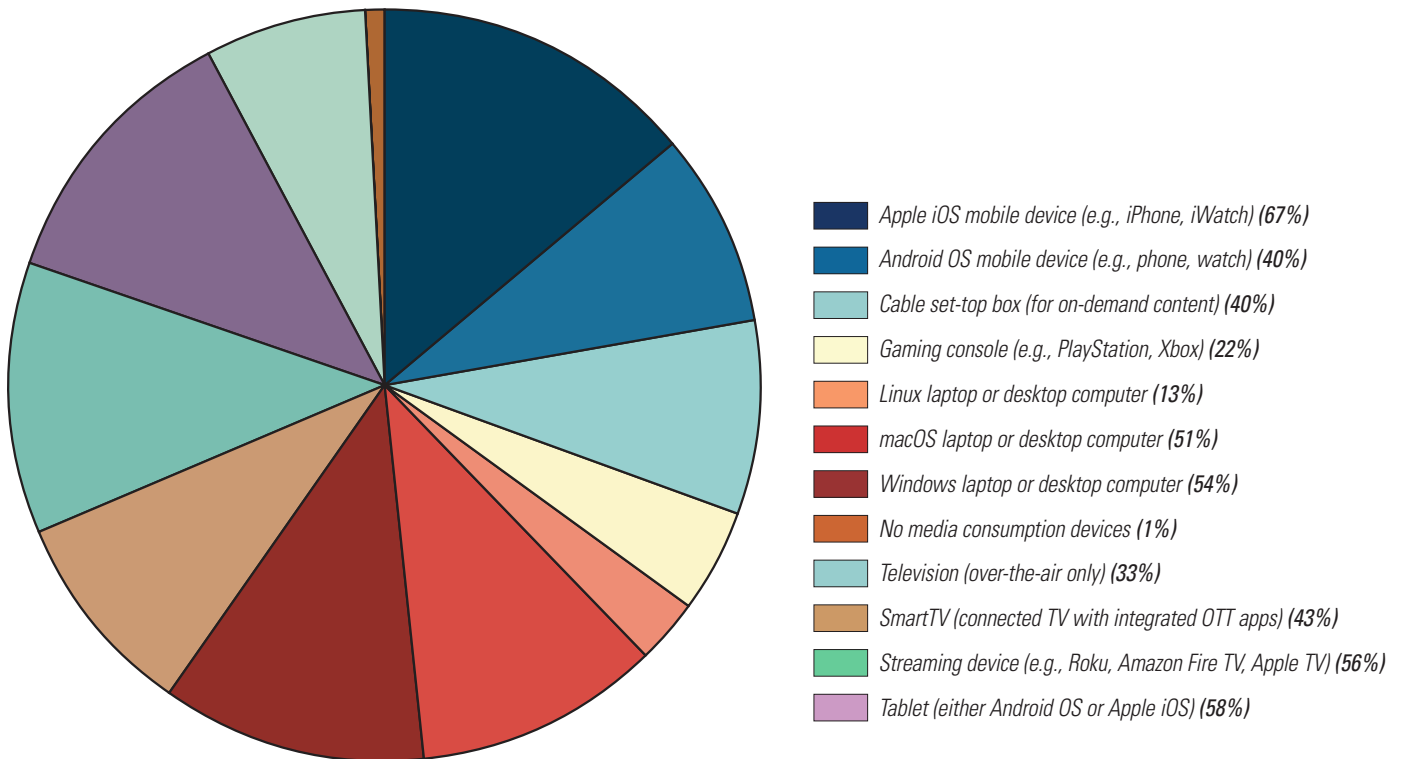


Regarding devices, the results were a bit surprising: About two-thirds of respondents chose a smaller Apple iOS mobile device (e.g., iPhone, iWatch) while 58% of respondents chose a tablet (either Android OS or Apple iOS operating system). These were followed by two options at approximately 55% each: streaming devices (e.g., Roku, Amazon Fire TV, Apple TV) and Windows-based laptop or desktop computers.

Rounding out the top five is the venerable smart TV category, connected televisions with integrated OTT apps as a choice of 43% of all respondents.

What's most interesting is that Android devices were tied with cable TV set-top boxes at 40% and not much higher than over-the-air (OTA) live linear television (33%).

Please identify all your household subscriptions from the following paid OTT services:



We then asked respondents to compare the availability of 4K-capable devices at their disposal versus their personal consumption patterns for 4K content.

Over half of respondents (56%) said they had a media consumption device that allows 4K (UHD) viewing, but

owning a device and consuming 4K content on it appears to be an altogether different matter.

When asked “What percentage of content do you personally consume in 4K?” only about 9% of respondents indicated they consume 4K content on their 4K-capable devices.

Do you own or use a media consumption device that allows 4K (UHD) viewing?

Yes	56%
No	44%

What percentage of content do you personally consume in 4K?

Highest	100%
Lowest	0%
Average	9%

CONTENT ENCODING: SERVICE, DEVICE TYPES, RESOLUTIONS, AND APPROACHES

The *Real-World HEVC Insights* survey then shifted gears, focusing on respondents' organizations and their use of encoding services for various types of content.

Regarding the use of external encoding services, 42% of respondents said they use third-party external encoding services. Some respondents added comments about build-it-yourself, on-premise, and cloud-based solutions.

We then asked respondents to tell us about the device types that their organization's customers use to access the organization's service. The highest average was browser-based playback (27%) for Firefox or Chrome on macOS or Windows. This was followed closely by mobile device access (26%) on Android phone, iPhone, or iWatch. The next highest was tablet viewing (11%) on either Android OS or Apple iOS devices.

Does your organization currently leverage third-party external encoding services?

Yes	42%
No	58%

WHEN 4K HYPE MEETS REALITY

When survey respondents were asked which resolutions their organization is delivering online, far and away, the top two resolutions were 1080p Full HD (77%) and 720p (72%) in sharp contrast to 4K delivery coverage (25%).

In fact, standard definition resolutions came in as third and fourth with 480p (44%) followed by 360p (32%) resolutions. And, most surprisingly, 240p (22%) resolutions were almost as popular as 4K resolutions.

In survey analysis, we often look for gaps between personal behavior and organizational behavior. One such gap appears to be at play here as the organizational 4K encoding and delivery responses seem to vary widely from the individual consumption patterns for those working in the industry.

As noted on the previous page, 4K consumption averaged around 9% for individual survey respondents, yet these same survey-takers work for organizations that are three times as likely (25%) to create 4K encodes.

This inconsistency between industry hype around 4K and real-world consumption patterns should be explored further, and it is tellingly borne out in two subsequent questions.

Please provide typical percentages, for the following device types, which your customers use to access your service:

	Average	Highest	Lowest	Median
Mobile devices (e.g., Android phone, iPhone, iWatch)	26	100	0	20
Tablets (either Android OS or Apple iOS)	11	70	0	10
Browsers (Firefox, Chrome on macOS, or Windows)	28	100	0	20
Smart TV (connected TV with integrated OTT apps)	6	100	0	0
Streaming device (e.g., Roku, Amazon Fire TV, Apple TV)	7	100	0	0
Gaming console (e.g., PlayStation, Xbox)	2	90	0	0
Uncertain	15	100	0	20
No media consumption devices	5	100	0	0

What resolutions does your organization currently encode or deliver across all devices?

4K (UHD)	25%
1080p (Full HD)	77%
720p	72%
480p	44%
360p	32%
240p	22%
None of these	5%
Other	3%

Today, what percentage of your online video is delivered in 4K (UHD)?

None	54%
1–10%	28%
11–20%	6%
21–40%	3%
More than 40%	3%

Asked about the percentage of their organization's online video delivered in 4K (UHD), over half (54%) of respondents chose none and an additional 28% chose the option of 1%–10% of their organization's online video being delivered in 4K. That leaves only 12% of all survey respondents delivering more than 10% of their total video in a 4K resolution.

Responses to a question about the importance of 4K (UHD) content encoding and delivery to a respondent's organization were also revealing. Only 21% said that 4K was very important to their organization, with a total of 41% rating it as either not important, uncertain, or a non-issue (no 4K plans). A little over one-third (37%) rated 4K as somewhat important, so it is clear that 4K content encoding and delivery has basic mindshare. While not yet top of mind for the whole industry, the relative lack of importance for 4K encoding and delivery may merely be a function of mezzanine or master content availability: The percentage of SD and HD content available to most services is quite high as compared to 4K content.

How important is 4K (UHD) content encoding and delivery to your organization?

Very important	21%
Somewhat important	37%
Not important	18%
Uncertain	12%
No 4K event plans	11%
Additional comments	3%

As noted on page 7, survey respondents see HEVC as an AVC alternative for 1080p (77%) and 720p (37%) resolutions. The need for next-generation codecs such as HEVC will grow as respondents move from planning to actually implementing pilot projects. And, as 10- and 12-bit high-dynamic range (HDR) and high-frame-rate 1080p and 720p playback device options proliferate, this will drive additional next-generation codec needs.

Encoding for on-demand (VOD) assets continues to remain popular, with 63% of respondents stating VOD asset encoding occurs in their organization and 70% of respondents currently encoding live events. What's intriguing is the marked rise of live-linear streaming, a trend that's continued over the past two years of Unisphere survey cycles, with 35% of respondents saying that their organization currently encodes live-linear content.

For which types of services does your organization currently encode content?

VOD (on-demand)	63%
Live (event)	70%
Live-linear	35%
Do not encode video	12%

When it comes to VOD encoding, respondents were asked to choose the most important factor in their organization's business model:

- Reducing bitrates and overall file sizes: 38%
- Higher-quality video delivery versus competing services: 35%
- Shortening encoding time: 14%

Which is most important to your organization's on-demand (VOD) business model?

Reducing bitrates and overall file sizes	38%
Shortening encoding time	14%
Higher quality video delivery versus competing services	35%
Do not encode VOD assets	13%

As we drilled down into encoding approaches, it's clear that on-premise solutions (e.g., server farm or desktop encoding) continue to dominate (61%) followed by hybrid solutions (29%) that leverage either a public or private cloud alongside an on-premise solution. Public cloud services account for 27% of all respondents' choices, followed by 21% who only use private cloud solutions, without an on-premise component.

Which encoding approaches does your organization use to encode its media assets?

On premise (e.g., server farm or desktop encoding)	61%
Hybrid (public or private cloud plus on-premise solution)	29%
Public cloud (e.g., AWS, GCP, Azure, etc.)	27%
Private cloud	21%
Do not encode content	9%
Other	2%

CURRENT STATE, LOOKING AHEAD

At the outset of 2018, what were the averages between assets encoded in AVC (H.264) versus HEVC (H.265)?

According to the 379 respondents, 78% of all assets are encoded in AVC and only 8% in HEVC. On average, less than 14% of assets are encoded in another codec.

Since HEVC is currently only 8% of all encoding responses, but anticipated to grow to an average of 37% over the next

Today, what percentage of your video assets are encoded in HEVC (H.265)?

Highest	100%
Lowest	0%
Average	8%

two years, it's worth watching closely to see the impact of AV1. Will it take the wind out of the sails of the AVC armada or instead becomes a drag on the momentum of HEVC?

Within the next two years, what percentage of your video assets will be encoded in HEVC (H.265)?

Highest	100%
Lowest	0%
Average	37%

When respondents were asked about their organization's "plans to invest in any of the following video compression options over the next 12 months," almost 58% of 375 survey respondents said they plan to invest in HEVC video compression in the next year—impressive since the survey finished before HEVC Advance announced elimination of online delivery royalties for HEVC content.

Despite royalty uncertainties, HEVC appears to be gaining traction. Yet more than half of responses indicated plans for AVC video compression investments over the next 12 months, with AV1 interest at 21% and VP9 interest at less than 15% of total responses.

Today, what percentage of your video assets are encoded in AVC (H.264)?

Highest	100%
Lowest	0%
Average	78%
Median	99%

Does your organization have plans to invest in any of the following video compression options over the next 12 months?

HEVC (H.265)	58%
AVC (H.264)	52%
AV1	21%
VP9	14%



WHY MOVE TO HEVC?

Given current and near-term interest in HEVC, let's explore the motivations for moving to HEVC. Are visual quality, business decisions, or technical decisions most important?

According to 375 survey respondents, visual decisions (18%) slightly outweigh technical decisions (16%) but neither is fully dominant. Adding business decisions (11%) to these considerations yields almost half of all responses.

Is your organization's primary motivation for considering HEVC encoding driven by visual, business, or technical decisions?

Visual (e.g., higher-quality, including 4K [UHD] and HDR or high-dynamic range)	18%
Business (e.g., cost of delivery, storage)	11%
Technical (e.g., better streaming performance on mobile networks)	16%
A combination of business and technical	15%
A mix of all three	28%
Do not offer HEVC-encoded content	12%

What are the remaining compelling decisions to move to HEVC? Approximately 15% of respondents said their HEVC motivations are based on a combination of business and technical decisions. An additional 28% said it's a mix of all three: visual, business, and technical decisions.

When we drilled down into business issues surrounding the move to HEVC, respondents told us that budget constraints (45%) were the greatest business challenge their organization faced in adopting HEVC production pipelines, followed closely by low HEVC device support (41%) and low consumer adoption of HEVC (36%). Those three challenges made the business decision to move to HEVC less strategic at the moment, especially since only 10% of responses highlighted competitive pressure from other services as a key business concern.

Royalty rates and licensing issues were both concerns for about one-third of respondents, but may now be of lesser concern as the royalty and licensing landscape begins to level out.

What are the most significant business challenges your organization faces in adopting HEVC for your production pipeline?

Budget constraints	45%
Royalty rates	30%
Licensing concerns	33%
Competitive pressure from other services	10%
Low HEVC device support	41%
Low consumer adoption of HEVC	36%
Status quo ("AVC is good enough")	24%
Do not offer HEVC-encoded content	16%
Other	3%

Technical challenges mirrored business challenges, with almost half of responses claiming insufficient player adoption or device compatibility as the key technical hurdle. Technical challenges surrounding computational issues and limited integration engineering resources were of concern to about a quarter of respondents.

What are the most significant technical challenges your organization faces in adopting HEVC for your production pipeline?

Computing resources requirements	23%
Limited integration engineering resources	21%
Insufficient player adoption or device compatibility	46%
Uncertain	23%

On the computational front, we asked questions about respondents' technical setups. Software-based (57%) outpaced hardware-based solutions (35%) with the remainder of respondents saying they did not offer encoding services. If those responses are stripped out, software solutions represent a full two-thirds of encoding workflows of survey respondents.

Is your encoding workflow primarily hardware- or software-based?

Dedicated hardware (e.g., encoding appliances)	35%
Software (e.g., FFmpeg on generic hardware)	57%
Do not encode video	8%

When it comes to software solutions, almost three-quarters of respondents that encode video use a third-party software encoder or transcoder (71%) while the remaining 29% integrate a software SDK with their own software.

If your encoding pipeline workflow is software-based, do you...

Integrate a software SDK with your own software	29%
Use a third-party software encoder or transcoder	71%

As for the software used within the production encoding workflow, more than two-thirds use x264 (67%), while FFmpeg is present in 36% of all production encoding workflows. What about x265 in production workflows? It's present in just 25% of our respondents' production encoding workflows.

Which of the following does your production encoding workflow utilize?

x264	67%
x265	25%
FFmpeg	36%
Commercial workflow management system	22%

In terms of hardware used for software-based encoding workflows, respondents were allowed to choose several out of a smorgasbord of processor options. Intel's integrated CPU-GPU processors dominated survey responses, with 44% of respondents saying their solutions contain these combination processors.

If your production pipeline primarily uses software-based encoding, which processors do you typically use in your encoding workflow?

AMD CPU	7%
AMD GPU	6%
Intel CPU	34%
Intel CPU + GPU	44%
Nvidia GPU	34%
Specialized (e.g., DSP, FPGA)	7%
ARM-based (e.g., Raspberry Pi, tablet)	4%
Uncertain	16%
Do not encode video	10%
Other	2%

There was a statistical tie for second place between Intel CPUs and Nvidia GPUs with each at 34%. AMD CPUs and specialized processors (e.g., DSP, FPGA) both were noted in 7% of installations, with AMD GPUs and ARM-based solutions (e.g., Raspberry Pi or tablet devices) both at approximately 5% each.

For all the discussion of HEVC and other next-generation codecs, the business of online video delivery often comes down to a cost-quality conundrum. To put this in perspective, we asked survey respondents to tell us which they are more likely to compromise in their organization's encoding workflow: file size or picture quality. By more than a 2:1 margin, respondents said they would allow larger file sizes to preserve quality.

In your organization's encoding workflow, which are you more likely to compromise?

File size	48%
Picture quality	22%
Uncertain	23%
Do not encode video	7%

In a subsequent question, respondents were asked to identify the performance-based metrics used to drive encoding decisions.

- Image quality: 75%
- Bandwidth reduction: 61%
- Processing time: 51%
- Device support: 49%

In other words, image quality is the most important metric, followed by bandwidth reduction. This is the one-two punch, the promise of next-generation codecs.

What performance-based metrics drive your encoding decisions?

Processing time	51%
Device support	49%
Bandwidth reduction	61%
Image quality	75%
Uncertain	3%
No performance metrics	6%

A decorative graphic consisting of several overlapping, wavy, orange-colored lines that flow across the upper half of the page, creating a sense of motion and depth.

CONCLUSION

HEVC adoption, while slow in some market verticals, has maintained a steady pace across the board. Despite licensing uncertainties—many of which were addressed in early 2018 when HEVC Advance eliminated HEVC licensing fees for all non-physical digital content delivery mediums—a large number of our survey respondents had already chosen to begin pilot projects well ahead of the HEVC Advance announcement.

Going forward, optimization of HEVC codec and workflow implementations should strengthen the case for H.265 as a natural successor to H.264.

That's not to say that H.264 will disappear anytime soon, as visual and perceptual quality optimizations continue to bring advances to AVC, but the same advances will also benefit HEVC encoder optimizations, helping to grow available libraries of HEVC-encoded content to meet consumer demand as part of a burgeoning HEVC viewership base.

AV1 is not yet locked out of the market, but it is clear HEVC continues to gain traction. With the added benefit of HEVC easily fitting into some existing AVC workflows, the pace of HEVC adoption should steadily continue throughout 2018.