Video Developer Report 2018

BITMOVIN

Welcome to the 2018 Video Developer Report!

First and foremost, I'd like to thank everyone for making the 2018 Video Developer Report possible! In its second year the report is wider both in scope and reach.

With 456 survey submissions from over 67 countries, the report aims to provide a snapshot into the state of video technology in 2018, as well as a vision into what will be important in the next 12 months.

This report would not be possible without the great support and participation of the video developer community. Thank you for your dedication to figuring it out. To making streaming video work despite the challenges of limited bandwidth and a fragmented consumer device landscape.

We hope this report provides you with insights into what your peers are working on and the pain points that we are all experiencing. We have already learned a lot and are looking forward to the 2019 Video Developer Survey a year from now!

Best Regards,

Stefan Lederer

Stefan Lederer
CEO, Bitmovin

Key findings

- In 2018 **H.264/AVC dominates** video codec usage globally, used by 92% of developers in the survey. However, H.265/ HEVC has expanded rapidly, up from less than a third (28%) in 2017.

- **AV1** is poised to accelerate, with **double the planned usage rate since 2017**, to 29% globally.

- **Apple HLS and MPEG-DASH remain the dominant streaming formats in 2018** with over half of developers surveyed embracing MPEG-DASH and over 3/4 embracing HLS.

- **Software** is the most popular and fastest growing choice for **video encoders**, but hardware encoders continue to hold steady, declining just 3 points in the last year.

- **HTML5** is by far the most widely used format for video and audio delivery, with 87% of providers using it today.

- 62% and 60% of developers are leveraging **native playback** on Apple iOS and Android platforms respectively.

- **Chromecast** is the current leader in TV-connected **OTT streaming devices**, used by 42% of survey respondents compared to 36% for Apple TV, 34% for Android TV and 23% for Roku.

- 50% of respondents report that achieving **playback on all devices** is one of the biggest problem in video technology, almost exactly the same percentage (49%) as in last year's survey.

- **DRM use is increasing dramatically**, only 36% of developers in 2018 report not using any content protection, compared to 65% in 2017.

- Client side ad insertion is still the most popular choice of **advertising architecture** but the gap with server side ad insertion is closing - currently at 52% vs 44% respectively.

- **Broadcast delay (latency) is the biggest problem for video developers in 2018**, identified by over half of respondents (55%) globally, and almost three quarters of responents in LATAM (74%).

(%) shown mark changes from 2017 video developer report.

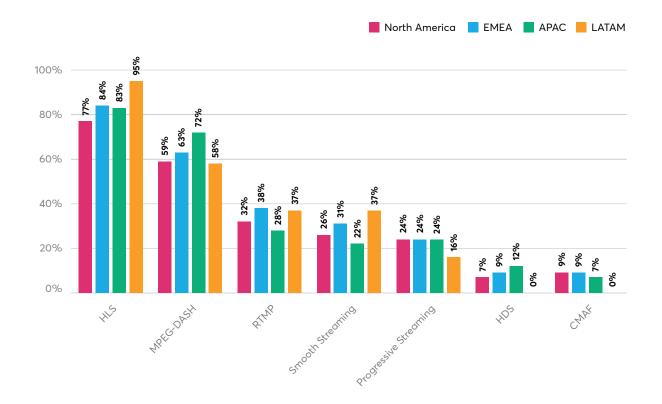| Format	Value
HLS	**82%** (+4%)
MPEG-DASH	**61%** (+5%)
Smooth Streaming	**27%** (+1%)
HDS	**9%** (-3%)
CMAF	**10%** (+4%)
Progressive Streaming	**23%** (-2%)
RTMP	**33%** (-4%)

Which streaming formats are you using currently?

In 2018 Apple's HTTP Live Streaming (HLS) continues to be the industry work horse. This is a consistent pattern from 2017, whereas MPEG-DASH and CMAF have also gained developer support, perhaps indicating wider adoption in the near future. Surprisingly Smooth Streaming and Adobe HDS, both considered out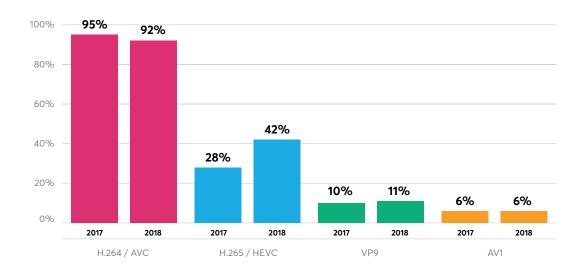dated formats, are still holding steady compared to 2017, showing that the older formats in OTT Video aren't exiting as quickly as expected, and a "simpler" video technology landscape is still beyond the horizon. Progressive Streaming (non adaptive video files) is still used by almost a quarter of the participants, probably as a fallback for older browsers!

Regional variations in streaming formats

Compared to 2017, we see a significant increase in MPEG-DASH and MPEG-CMAF adoption in North America. While in APAC, HLS and MPEG-DASH have gained at the expense of all other formats. In LATAM,

HLS is gaining in a big way and surprisingly, so is Smooth Streaming. Overall, the streaming format distribution looks relatively similar between the regions, perhaps with the exception of LATAM.

Legend: ■ North America ■ EMEA ■ APAC ■ LATAM

Format	North America	EMEA	APAC	LATAM
HLS	77%	84%	83%	95%
MPEG-DASH	59%	63%	72%	58%
RTMP	32%	38%	28%	37%
Smooth Streaming	26%	31%	22%	37%
Progressive Streaming	24%	24%	24%	16%
HDS	7%	9%	12%	0%
CMAF	9%	9%	7%	0%

Which video codecs are you using currently?

In 2018, the use of H.265/HEVC increased significantly, while H.264/AVC is still holding strong, indicating developers are working with both codecs simultaneously. VP9 - the high-efficiency codec to reach browsers like Chrome, Firefox, Microsoft Edge, and Android devices - maintains a similar level of usage. Like HEVC, it has more efficient compression than H.264, it can deliver better quality videos for the same amount of data, or use less data while maintaining the same visual quality.
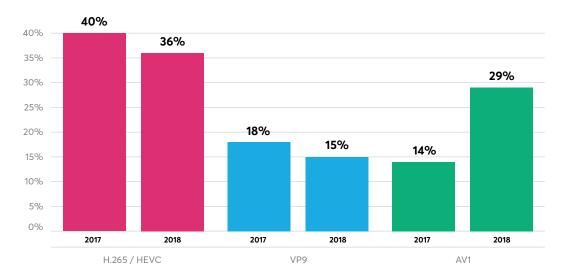
Comparing the 2018 "12 months from now" predictions against the 12 month predictions in the 2017 report, both HEVC and VP9 are dipping slightly, which doesn't make a lot of sense, until you see the huge spike in planned AV1 adoption, more than doubling since 2017.
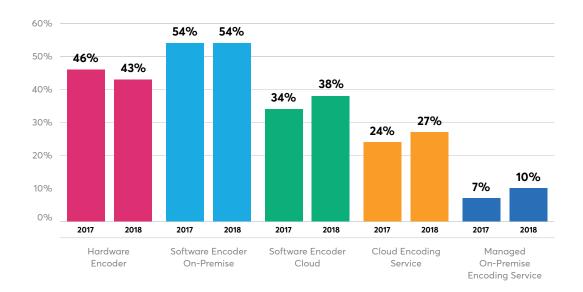
AV1 was launched in March of 2018, as the royalty-free codec from the Alliance for Open Media, which some predict will take over as the codec of choice. Endorsed by all major device manufacturers, browser vendors, and content distributors, the compression efficiency and potential device reach will likely make it an appealing choice in the coming years.

Driven by engineering teams at browser makers and content distributors like Google, Mozilla, Microsoft, Facebook and others, AV1 is clearly gaining momentum. Already Firefox, Chrome and Edge Web browsers support AV1 in their early release versions, which suggests commercial applications are just around the corner. This explains the importance of AV1 for a lot of developers.

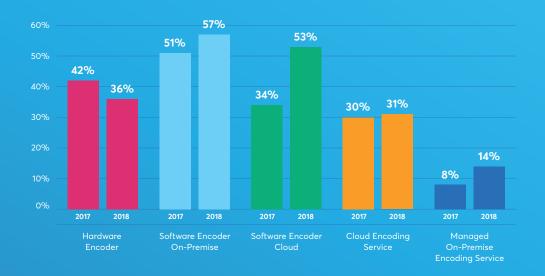**Which video codecs are you planning to use in 12 months?**

	H.265 / HEVC		VP9		AV1	
Year	2017	2018	2017	2018	2017	2018
Value	40%	36%	18%	15%	14%	29%

Bar chart showing encoding deployment by category, comparing 2017 and 2018:

Category	2017	2018
Hardware Encoder	46%	43%
Software Encoder On-Premise	54%	54%
Software Encoder Cloud	34%	38%
Cloud Encoding Service	24%	27%
Managed On-Premise Encoding Service	7%	10%

Where do you encode video?

The majority of the video developers in our survey, report using software encoders on local on-premise machines. Hardware encoders, while slightly down from 2018, still remain very popular, especially for live streaming use cases. However we expect this number to keep going down slowly and steadily in the coming years, as software encoders continue to gain popularity thanks to their scalability, flexibility, and rapid deployment benefits.
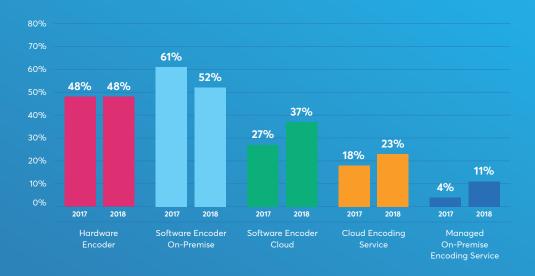
Overall the encoding infrastructure deployments appear fairly steady in overall compared to last year. We see a slow trend to move away from hardware encoders towards cloud software and managed services, both cloud and on-premise. However, the regional data on the following pages paints a very different picture!

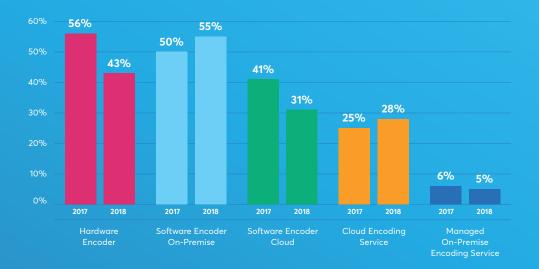# Regional variations in encoding deployments

North America

	Hardware Encoder	Software Encoder On-Premise	Software Encoder Cloud	Cloud Encoding Service	Managed On-Premise Encoding Service
2017	42%	51%	34%	30%	8%
2018	36%	57%	53%	31%	14%

EMEA

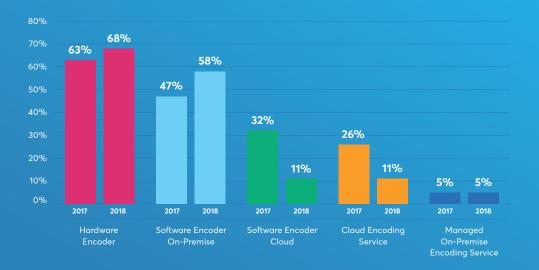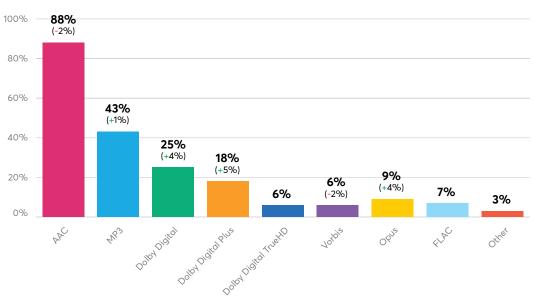|	Hardware Encoder	Software Encoder On-Premise	Software Encoder Cloud	Cloud Encoding Service	Managed On-Premise Encoding Service
2017	48%	61%	27%	18%	4%
2018	48%	52%	37%	23%	11%

In 2018 we see a big pickup in cloud deployments of encoding software in North America and EMEA. Interesting that in North America the increase is at the expense of hardware, while in EMEA it's the on-premise software that's taking a dip, both indicating greater traction of video workflow movement towards the cloud.

APAC

	Hardware Encoder		Software Encoder On-Premise		Software Encoder Cloud		Cloud Encoding Service		Managed On-Premise Encoding Service	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
	56%	43%	50%	55%	41%	31%	25%	28%	6%	5%

LATAM

	Hardware Encoder		Software Encoder On-Premise		Software Encoder Cloud		Cloud Encoding Service		Managed On-Premise Encoding Service	
	2017	2018	2017	2018	2017	2018	2017	2018	2017	2018
	63%	68%	47%	58%	32%	11%	26%	11%	5%	5%

(%) shown mark changes from 2017 video developer report.

Which audio codecs do you use?

In terms of audio formats, AAC continues to dominate with 90% of respondents reporting using the codec. Not surprisingly, there is very little change in audio codec adoption, although, we have included more granular options in the 2018 survey, to help us better understand the usage of the various premi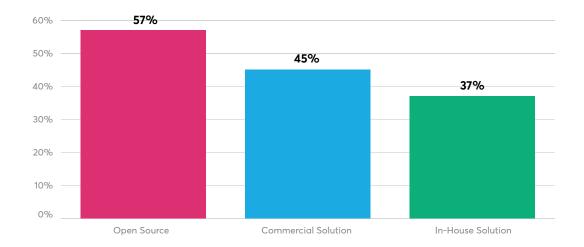um codecs. Dolby Digital, Dolby Digital Plus and True HD are primarily used in premium use cases on set-top boxes and TVs, where the user has the necessary audio hardware to appreciate the premium sound quality. The open source codecs - Vorbis, Opus and FLAC - are not widely used by the survey participants.
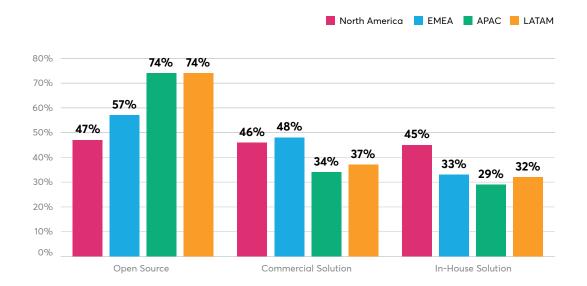
What player codebase are you using?

A new question for the 2018 survey, player codebase adoption, shows that open source frameworks are more popular worldwide. The second most popular solution are the commercial players, offering the benefits of the "outsourced maintenance" (SaaS model) and typically, a more robust feature set. Many commercial player solutions also offer native SDKs for mobile and set-top boxes, which significantly simplify development and generally perform better than HTML5. Still, over 30% of respondents report having in-house built solutions, which offer the greatest flexibility for the teams that have the resources to develop and maintain the codebase.
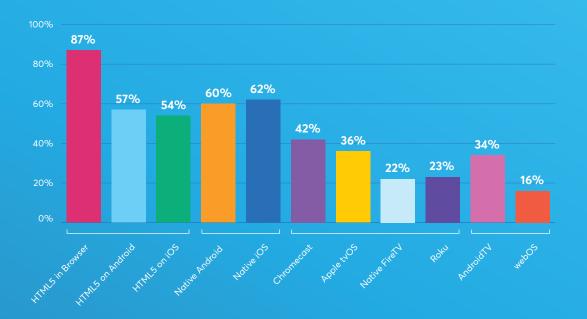
It is also interesting to note that the results show a total of well over 100%, which hows that many developers are working with two or more players from different codebases. This may be because many companies are using different players in different platforms, or it could indicate that many are testing an alternative player in parallel with their production player.

Legend: North America · EMEA · APAC · LATAM

	North America	EMEA	APAC	LATAM
Open Source	47%	57%	74%	74%
Commercial Solution	46%	48%	34%	37%
In-House Solution	45%	33%	29%	32%

Regional variations in player deployments

The regional data breakdown reveals a surprising nuance - while the distribution of open-source, commercial and in-house solutions look quite similar across EMEA, APAC and LATAM, North America has decidedly fewer open-source deployments, in favor of in-house solutions.

Chart data:
- HTML5 in Browser: 87%
- HTML5 on Android: 57%
- HTML5 on iOS: 54%
- Native Android: 60%
- Native iOS: 62%
- Chromecast: 42%
- Apple tvOS: 36%
- Native FireTV: 22%
- Roku: 23%
- AndroidTV: 34%
- webOS: 16%

Which of the following platforms and devices do you use to stream video or audio content?

HTML5 is clearly the technology of choice for desktop delivery and also has a significant footprint on mobile devices. This year we have expanded the the set of categories to develop a deeper insight into target platforms and devices. The breakdown of HTML5 vs Native player technologies on mobile devices shows very similar results across Android and iOS platforms. The clear takeaway is that mobile video delivery is a key focus for developers in 2018 and it is refreshing to see that in well over half of the use c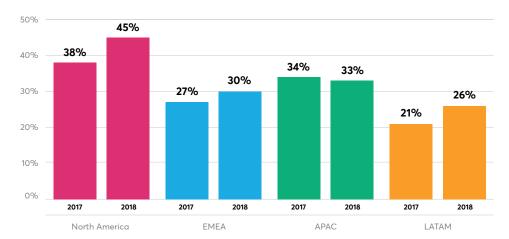ases, developers are leveraging native capabilities of the devices, presumably due to the better performance of the native players.

As for OTT delivery, Chromecast dominates with 42% of the developers in the survey targeting the streaming device, followed by Apple tvOS at 36%, and Roku and FireTV with less than a quarter of respondents reporting using these OTT platforms. Smart TV's are in the report for the first time, with AndroidTV at double the adoption of LG's webOS.
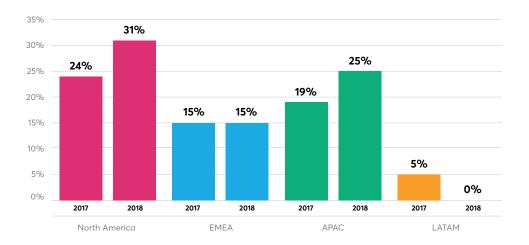
Google Chromecast

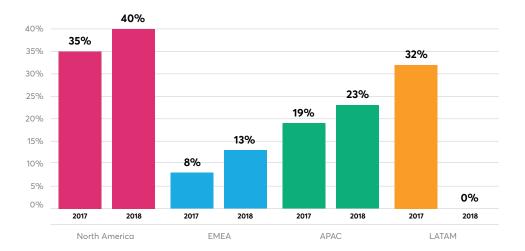**Apple tvOS**

Regional variations in OTT adoption

The survey data shows significant regional differences among the most popular OTT devices, including Google Chromecast, Amazon Fire, Apple TV and Roku. Chromecast enjoyed single-digit gains with the developers in North America, EMEA and LATAM, but no progress in APAC.

A similar pattern can be seen with AppleTV. However, Amazon FireTV and Roku have picked up in APAC and North America regions. Reflecting Roku's recent market momentum, it is now the second most targeted OTT device after Apple TV in North America and experienced growth in APAC and EMEA as well.
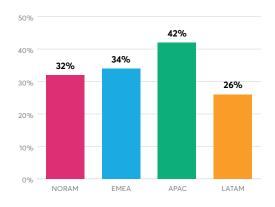
Amazon FireTV

	North America		EMEA		APAC		LATAM	
	2017	2018	2017	2018	2017	2018	2017	2018
	24%	31%	15%	15%	19%	25%	5%	0%

Roku

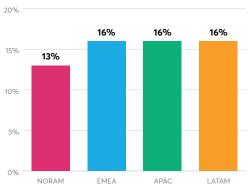|	North America		EMEA		APAC		LATAM	
	2017	2018	2017	2018	2017	2018	2017	2018
	35%	40%	8%	13%	19%	23%	32%	0%

The 2018 survey also asked which native mobile and Smart TV platforms are being targeted by developers. Not surprisingly, iOS and Android were equally strong across all regions, each showing that approximately 60% of developers are using them. This is an interesting insight into the strength of Apples hold on the market, despite losing out significantly in terms of the number of devices.

Between the two SmartTV platforms, Android TV is strongest in APAC with 42% and weakest in LATAM with 26%, while WebOS (mostly LG products) was fairly evenly targeted across all regions at around 16%, slightly lower in North America.
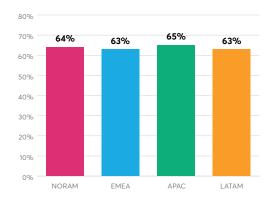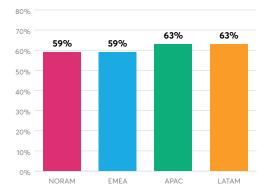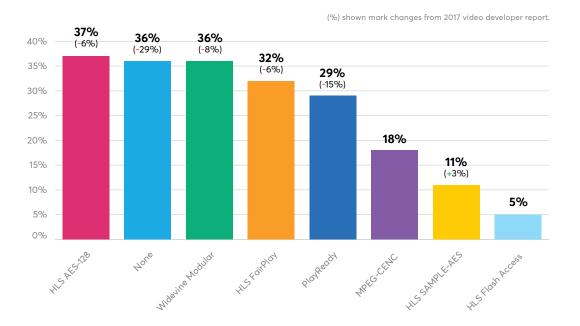
AndroidTV

	NORAM	EMEA	APAC	LATAM
	32%	34%	42%	26%

webOS

	NORAM	EMEA	APAC	LATAM
	13%	16%	16%	16%

Native iOS

	NORAM	EMEA	APAC	LATAM
	64%	63%	65%	63%

Native Android

	NORAM	EMEA	APAC	LATAM
	59%	59%	63%	63%

(%) shown mark changes from 2017 video developer report.

Technology	Value
HLS AES-128	37% (-6%)
None	36% (-29%)
Widevine Modular	36% (-8%)
HLS FairPlay	32% (-6%)
PlayReady	29% (-15%)
MPEG-CENC	18%
HLS SAMPLE-AES	11% (+3%)
HLS Flash Access	5%

What DRM/content protection systems do you use?

In 2018 we see the number of video developers NOT applying some form of content protection to their streams decrease dramatically since last year. Down from 65 percentage points to only 36, this change strongly suggests a trend towards premium, high value content in OTT distribution. This could be driven by consumer demand for premium content "every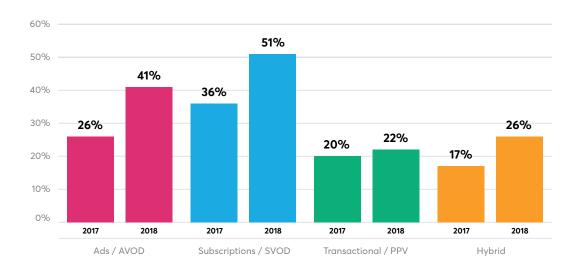where". Despite this trend, when we look at each technology individually, we see a slight decrease across the board, apart from MPEG-CENC, which is a new option in the survey. Although we cannot refer to a hard number, last year's "other" result was 10%, only 2% more than this year, so it follows logically that there is a growing number of developers working with CENC.
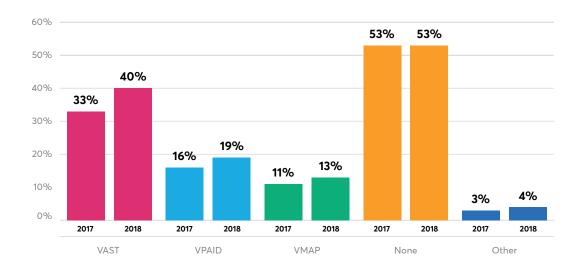
What monetization model do you follow?

Across the board, the percentages for monetization models are up from 2017, suggesting that many companies are diversifying their revenue models to incorporate new income streams. This theory is further supported by the increase in "hybrid" ad models. The online video deployments using subscription based models are up 15 points. These generate the most predictable recurring revenue stream and are a popular choice for OTT streaming services. Ad-supported models have seen a similar increase among the developers in the survey. The advertising model is very common for online video distribution, especially among broadcasters, digital publishers and social media companies that want to get their content in front of a wide audience.

One surprise is the aparently slow growth observed in Transactional/PPV monetization - especially considering this model's popularity with multichannel video programming distibutors (MVPDs). This may be explained by the fact that only 10% of the survey respondents are from Telco/Cable industry.

Chart: Monetization model percentages by year (2017 vs 2018)
- Ads / AVOD: 2017 = 26%, 2018 = 41%
- Subscriptions / SVOD: 2017 = 36%, 2018 = 51%
- Transactional / PPV: 2017 = 20%, 2018 = 22%
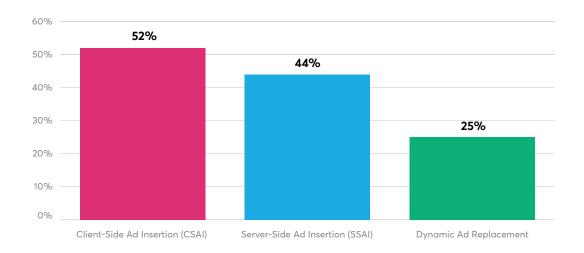- Hybrid: 2017 = 17%, 2018 = 26%

What type of ad standard & technology are you using today?

Nearly half of the video developers surveyed are using standardized advertising technologies in their deployments, which is similar to 2017. However, great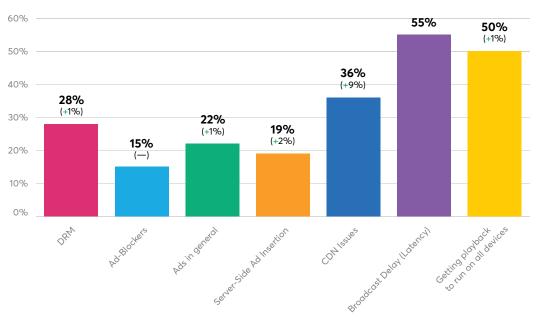er numbers are implementing the IAB standards. VAST is the most common way of serving ads in video, due to its simplicity and support by most ad-providers and video players.

Which ad architecture do you use?

It is noteworthy that in 2018, just over 40% of the developers with ad requirements have a Server-Side Ad Insertion (SSAI) solution in place and a full quarter have adopted Dynamic Ad Replacement solutions, which generally requires more complex workflows and systems. SSAI is a useful tool for overcoming ad blockers as well as ensuring a consistent user experience between the ads and the content. Dynamic Ad Replacement is less common among the survey respondents today, but it's a useful personalization tool that helps publishers make the most of their content on every platform, and we anticipate its wider adoption in the near future.

(%) shown mark changes from 2017 video developer report.

What are the biggest problems that you are experiencing with video technology today?

The most common problem was broadcast delay (also referred to as latency), closely followed by "Getting playback running to all devices". Broadcast delay affects all streamers alike, and can be a sign of a wide range of issues - from CDN and network performance, to encoding optimizations and player adaptation - these can all masquerade as Latency.

Interestingly, it's the trend towards using the 10-year old HTML5 video tag that could be to blame for many

of the challenges associated with achieving playback on all devices; while in most cases HTML5 significantly simplifies online video, using the MSE/EME is definitely more challenging than the legacy ecosystems, like Flash or Silverlight. On top of this, video is consumed on more and more different platforms, which all come with their own special problems.
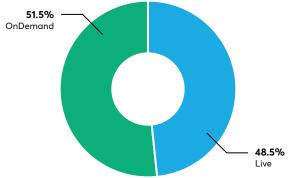
Survey Participants

A survey is an aggregate of opinions expressed by its participants. The Bitmovin Developer Survey has voices from a wide variety of professionals working in the the online video industry, from broadcasters and publishers, to OTT streaming services and online video platforms (OVPs).

Interestingly, there is an almost equal distribution between participants operating live and on-demand content, and many, obviously, work with both. Nearly 70% of respondents work with professional premium content, representing industries from OTT Services and Broadcasters to Online Video Platforms and Integrators.
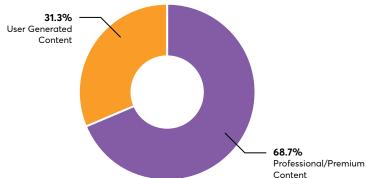
79% of the participants come from technical roles, like developers & product managers, 18.5% are in business roles and 2.5% in research.

Finally, the responses came in from 67 countries, across six continents - a truly global perspective on a global industry with a universal product. Video.
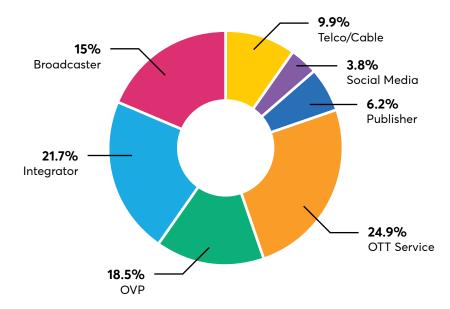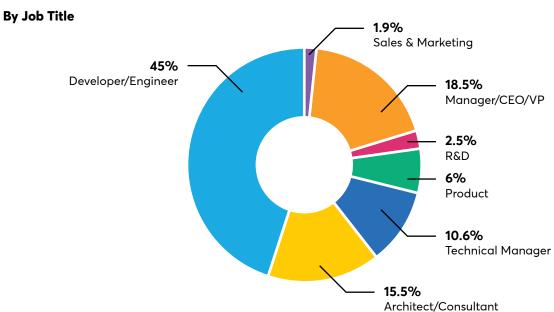
Types of streams - Live or VOD

51.5%
OnDemand

48.5%
Live

Types of streams - Premium Content vs UGC

31.3%
User Generated Content

68.7%
Professional/Premium Content

By Industry

- **9.9%** Telco/Cable
- **3.8%** Social Media
- **6.2%** Publisher
- **24.9%** OTT Service
- **18.5%** OVP
- **21.7%** Integrator
- **15%** Broadcaster

By Job Title

- **1.9%** Sales & Marketing
- **18.5%** Manager/CEO/VP
- **2.5%** R&D
- **6%** Product
- **10.6%** Technical Manager
- **15.5%** Architect/Consultant
- **45%** Developer/Engineer

About Bitmovin

Bitmovin is a leading provider of video infrastructure for technology-forward media companies around the world. As a developer-focussed company, Bitmovin has been at the forefront of technology developments in online video - from building the world's first commercial adaptive streaming Player for DASH/HLS/fMP4, to implementing next generation AV1 codec and deploying software-defined encoding products that run simultaneously on any cloud provider or in a data-centre. We work with companies in over 100 countries to build innovative video products. Bitmovin solutions are completely in-house developed, highly customisable to fit with existing workflows and easy to integrate.

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