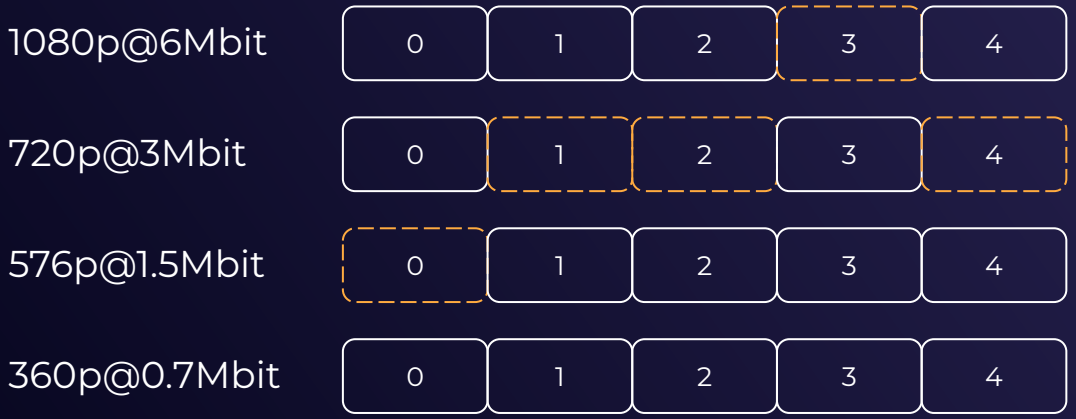
BITMOVIN

Video Coding in the Cloud Challenges and Solutions

March 20th, 2022

Adaptive Streaming



Cloud encoding

C7g C6g C6gn C6i C6a Hpc6a C5 C5a C5n C4

C4 instances are optimized for compute-intensive workloads and deliver very cost-effective high performance at a low price per compute ratio.

Features:

- Up to 2.9 GHz Intel Xeon Scalable Processor (Haswell E5-2666 v3)
- High frequency Intel Xeon E5-2666 v3 (Haswell) processors optimized specifically for EC2
- Default EBS-optimized for increased storage performance at no additional cost
- Higher networking performance with Enhanced Networking supporting Intel 82599 VF
- Requires Amazon VPC, Amazon EBS and 64-bit HVM AMIs

Instance	vCPU*	Mem (GiB)	Storage	Dedicated EBS Bandwidth (Mbps)	Network Performance
c4.large	2	3.75	EBS-Only	500	Moderate
c4.xlarge	4	7.5	EBS-Only	750	High
c4.2xlarge	8	15	EBS-Only	1,000	High
c4.4xlarge	16	30	EBS-Only	2,000	High
c4.8xlarge	36	60	EBS-Only	4,000	10 Gigabit

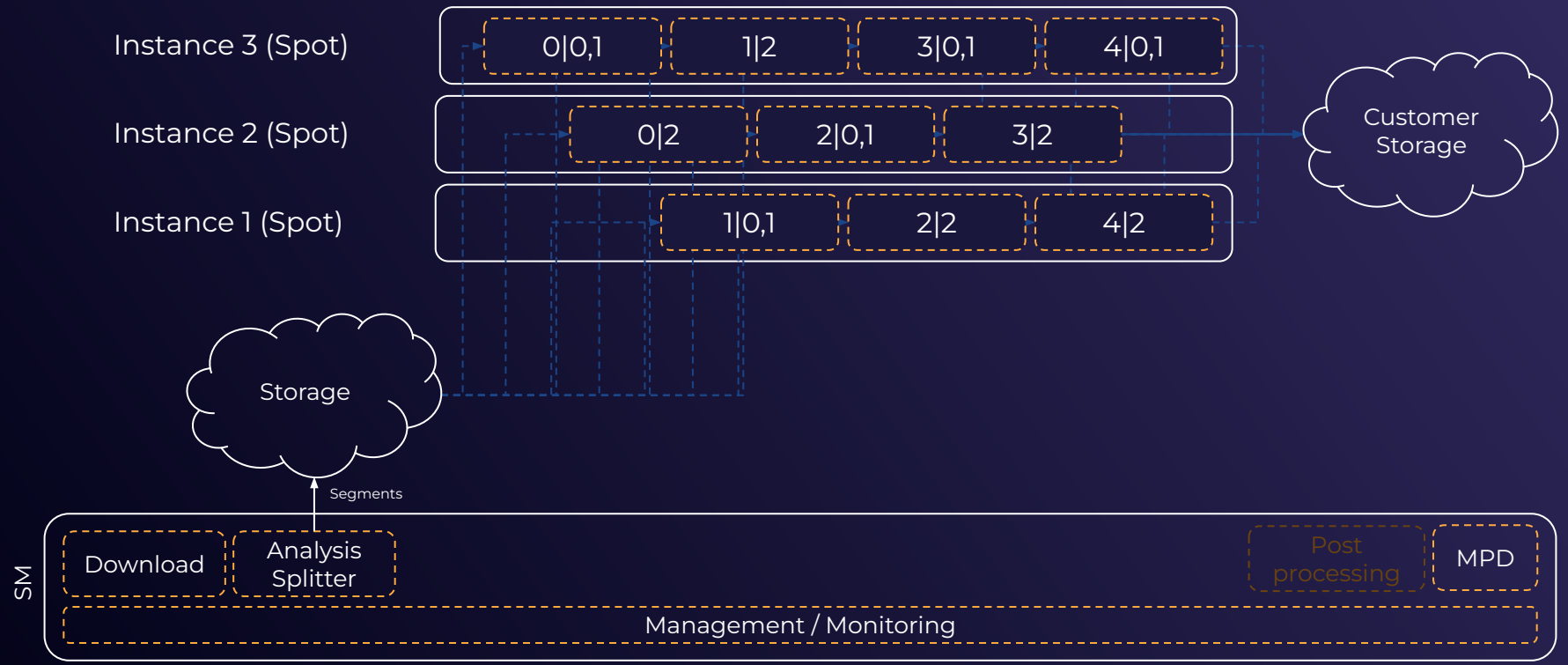
All instances have the following specs:

- Up to 2.9 GHz Intel Xeon Scalable Processor
- Intel AVX†, Intel AVX2†, Intel Turbo
- EBS Optimized
- Enhanced Networking†

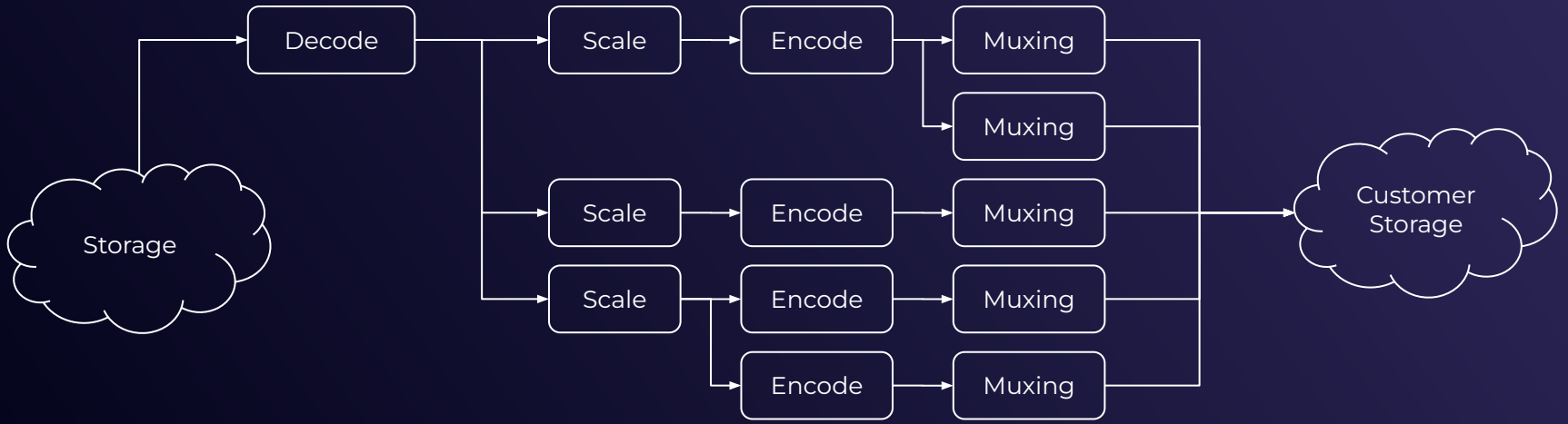
Machine types	vCPUs*	Memory (GB)	Max number of persistent disks (PDs)†	Max total PD size (TB)	Local SSD
c2-standard-4	4	16	128	257	Yes
c2-standard-8	8	32	128	257	Yes
c2-standard-16	16	64	128	257	Yes
c2-standard-30	30	120	128	257	Yes
c2-standard-60	60	240	128	257	Yes

Instance	Core(s)	RAM	Temporary storage
B1ls	1	0.5 GiB	4 GiB
B1s	1	1 GiB	4 GiB
B1ms	1	2 GiB	4 GiB
B2s	2	4 GiB	8 GiB
B2ms	2	8 GiB	16 GiB
B4ms	4	16 GiB	32 GiB
B8ms	8	32 GiB	64 GiB
B12ms	12	48 GiB	96 GiB
B16ms	16	64 GiB	128 GiB
B20ms	20	80 GiB	160 GiB

Bitmovin cloud encoding



Bitmovin cloud encoding



Core encoding

	Performance / Cost	Flexibility	Availability
CPU x86			
CPU Arm			
GPU Compute			
GPU Hardware			
FPGA			
ASIC			

Cost per encoding

- Vod
  - Duration 1:40, 4k, 10Bit HDR, 10 Renditions HEVC
    - Runtime 6h, 33k Billing minutes, 580$
  - Duration 0:22, 1080p, 11 Renditions AVC
    - Runtime 13:45 min, 960 Billing minutes, 16$
  - Duration 0:02, 1080p, 1 Rendition AVC
    - Runtime 1:30 min, 4 Billing minutes, 0.07$

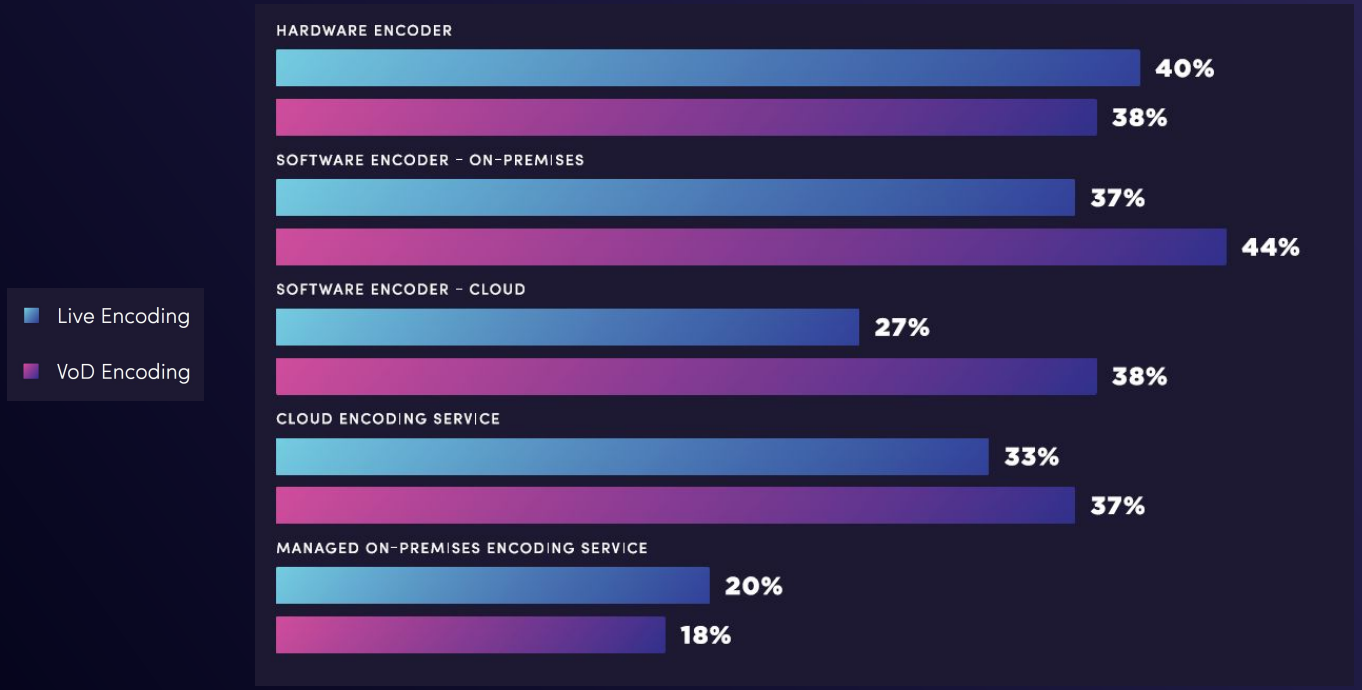
Real world problems that our customers face

“Who'd have thought a nuclear reactor would be so complicated?"

Use cases

	E2E Delay	
VOD	-	Netflix, Youtube
Live	5-60s	TV, Twitch
Real time	<1s	Video conference, Cloud Gaming, Remote driving

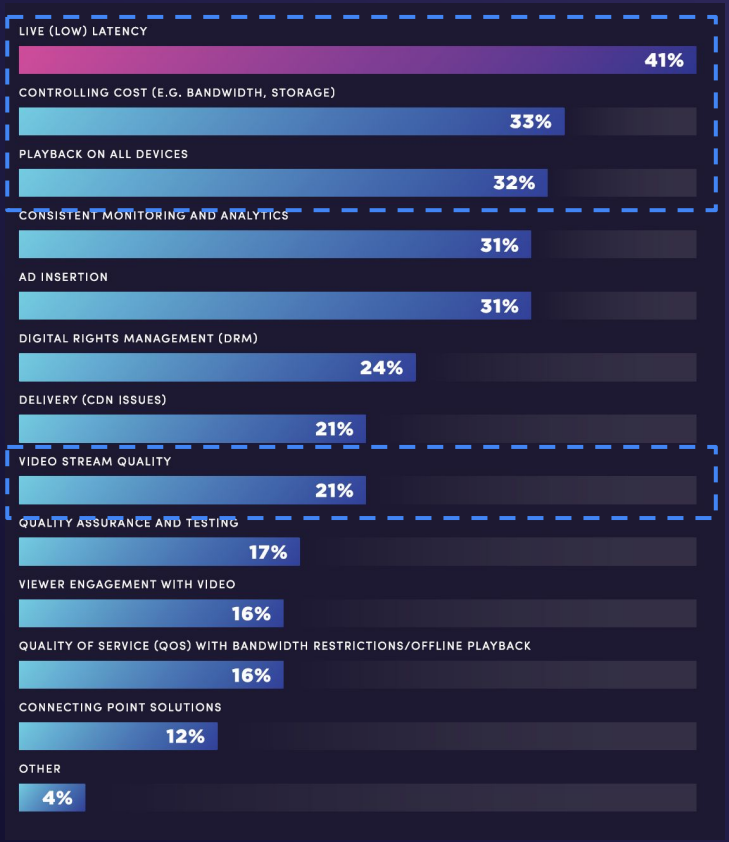
Where to encode?



Bitmovin Video Developer Report - https://go.bitmovin.com/video-developer-report

Biggest problems

What are the biggest challenges you are experiencing with video technology today?



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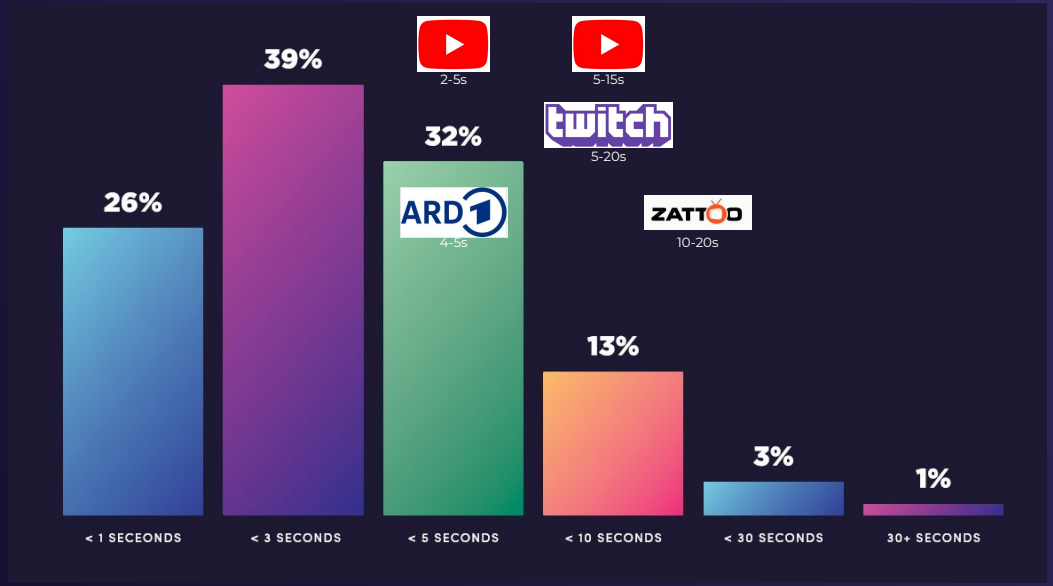
Live latency

What is your low latency expectation for Live streams?



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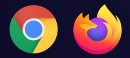
Controlling cost (and quality)

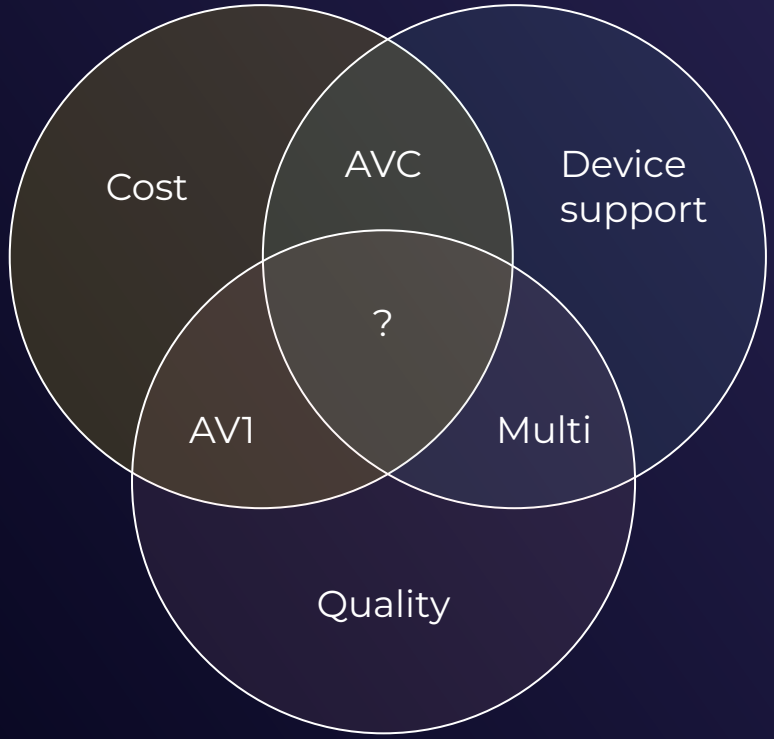
1. *Cost = cost(encoding) + cost(CDN) * nrViews*
2. *cost(encoding) ~ cost(CDN) ~ QOE*

Device support

	AVC	HEVC	VP9	AV1	VVC
	✅	❌	✅	✅	(❌)
	✅	✅	✅	(✅)	(✅)
	✅	✅	❌/✅[1]	❌	(✅)
	✅	✅	✅	(✅)	(✅)

[1] Enabled for some vendors

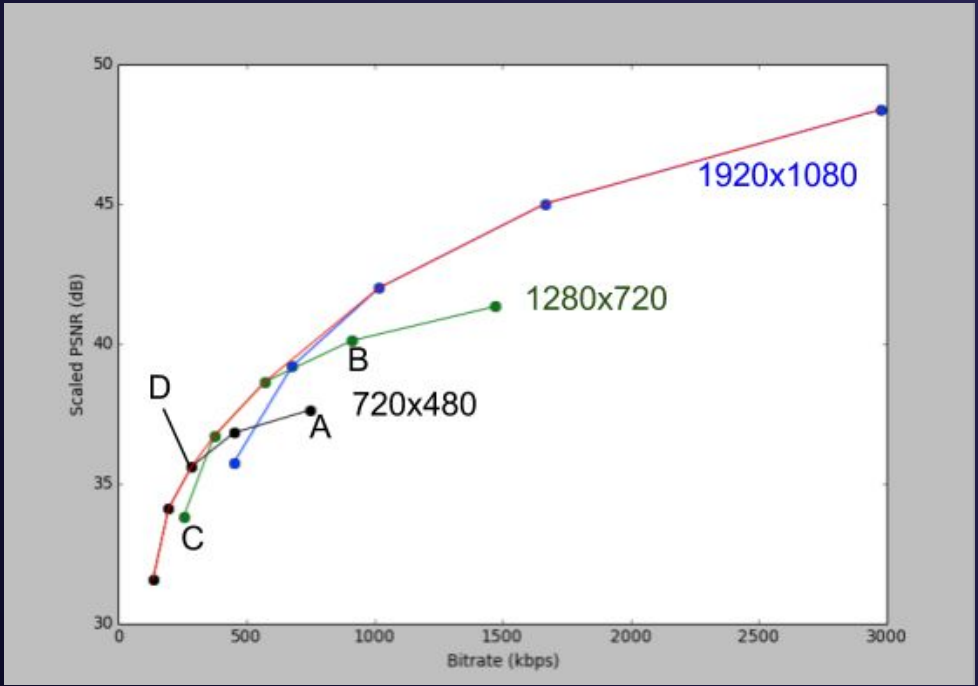
What codec to choose



Biggest asks

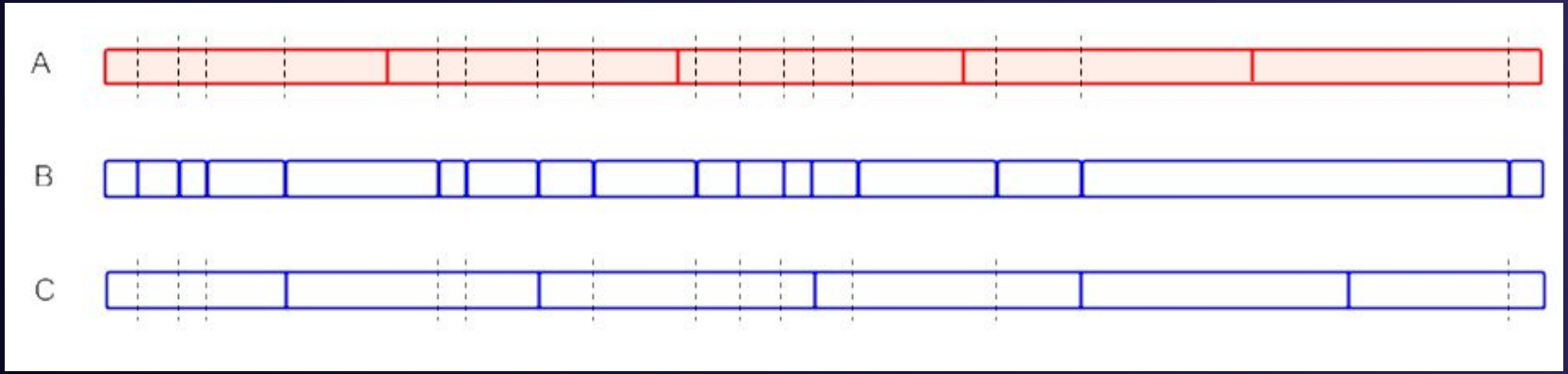
“Improve existing workflows without changing the codecs or affecting playback on devices”

Per Title Encoding



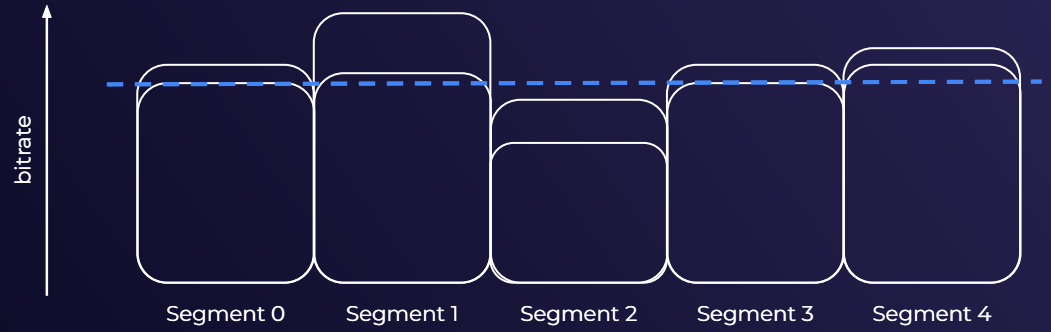
Netflix Techblog -
https://netflixtechblog.com/per-title-encode-optimization-7e99442b62a2

Per Scene Optimization



Netflix Techblog -
https://netflixtechblog.com/optimized-shot-based-encodes-now-streaming-4b9464204830

3-Pass Encoding




Thank you.