Deploying VP9 at YouTube: a postmortem

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YouTube

-7,490,427,558,466,059,808 bytes

why i

why is the sky blue
why is youtube so slow
why is the ocean salty
why is the pope resigning

why i

why is the sky blue

why is youtube so slow

why is the ocean salty

why is the pope resigning

This is not great.

VP9

~600:1

50% smaller with
same or better quality

Viewers watch more when VP9 is used

“What *is* VP9?”

Let’s build a video codec (sorta)

[demos]

https://github.com/stevenrobertson/reaktor-dev-day-talk

- Frequency quantization
- Temporal prediction
- Motion compensation

H.261

H.261 (1988): 26:1

H.261 (1988): 26:1

VP9 (2013): ~600:1

Lots of tricks.

Intra prediction

Altref frames (VPx)
B-frames (H.26x)

“What is next-gen?”

64-pixel superblocks

Asymmetric transforms

How to ship a next-gen codec in eight easy steps

1. Demonstrate the finished product.

NAB™
NATIONAL ASSOCIATION OF BROADCASTERS

Hacked proxy serving hacked media to a hacked player on hacked Chrome

Sincerity level:
0.2

2. Create test media.

Viper

Hydra

Split mezzanine into chunks, encode in parallel

Distributed headaches

“Query of Death”

5 seconds of video
0.01x realtime

timeout=500

timeout=5000

(it’s 20000% better now)

3. Demonstrate the finished product.

VP9 summit

Everything about this was awkward.

https://www.youtube.com/user/WebMVP9/playlists

Kept flipping to Flash

HD upgrades took
40 seconds

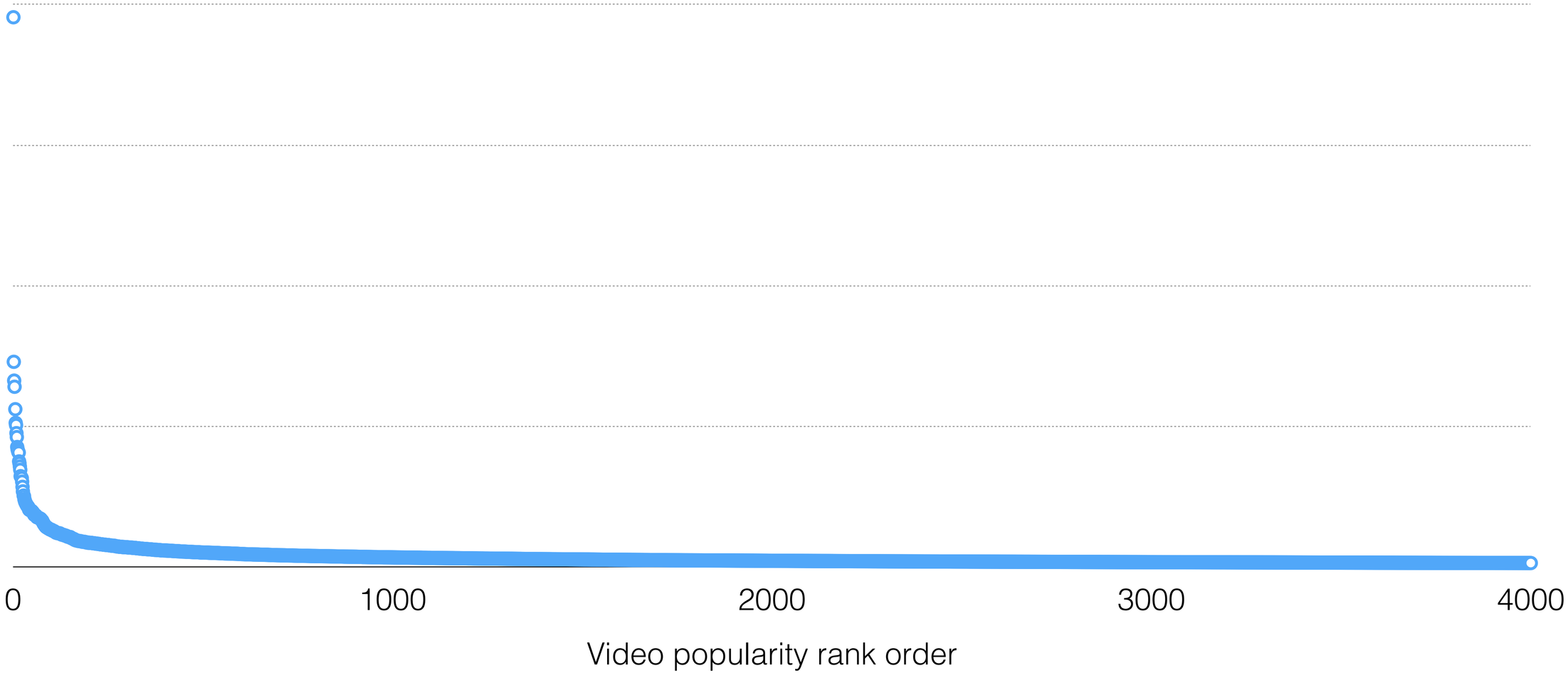
Hadn’t even frozen the bitstream

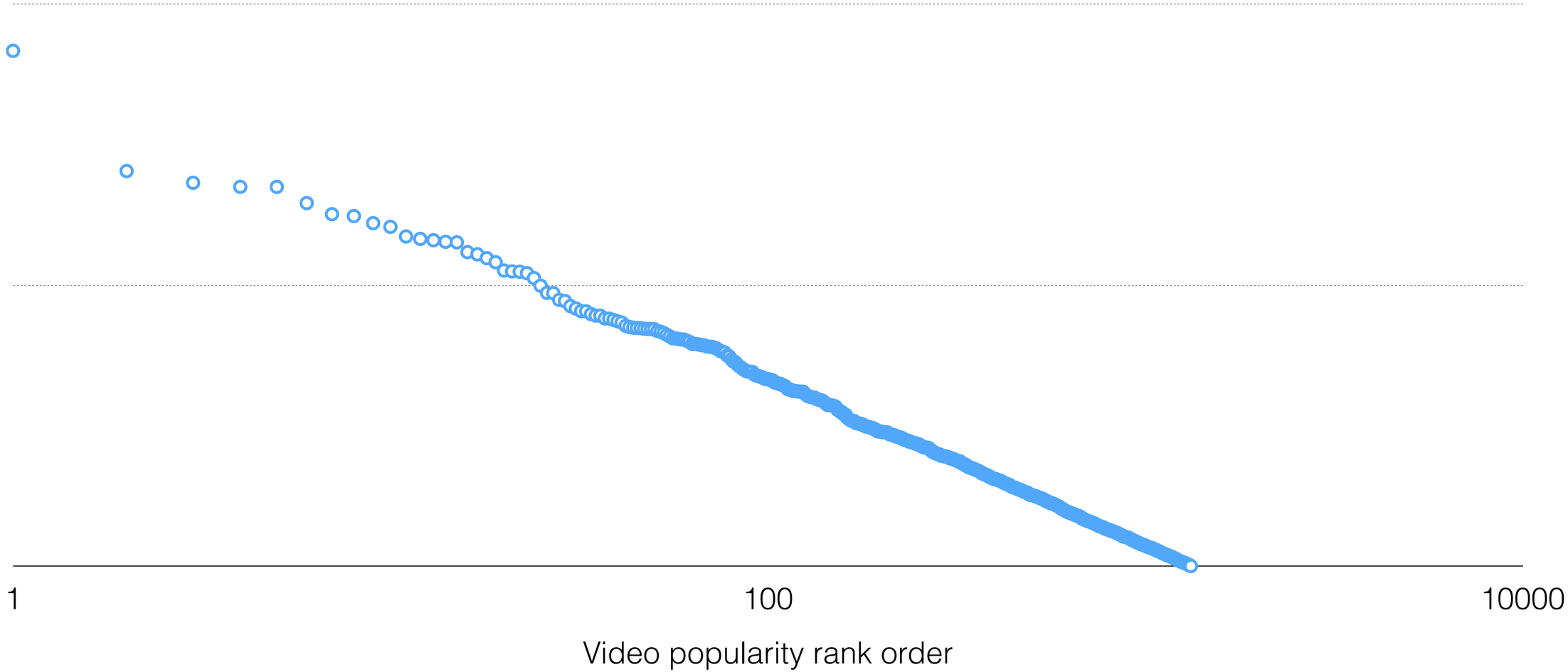
Prod player, prod site,
prod Chrome.

Sincerity level:
0.9

4. Ship it.

Popularity reruns


0
1000
2000
3000
4000
Video popularity rank order


1
100
10000
Video popularity rank order

Launching HTML5 in Chrome

Let’s just toss in VP9 and see what happens.

Kicked off popularity rerunner

Compared HTML5
H.264 vs VP9

Everything was better!

Spot the error?

5. Measure it properly.

Oh crap.

6. Unship it.

Decoder performance.

7. Demonstrate the finished product. At 4K.

International
CES®

Sincerity level:
0.4

8. Launch for real.

No perf data
via web APIs.

Banned WinXP.

Decoder improvements in M33.

Over 1,000,000,000 served.

We learned
some things.

Hustle.

Seeing is believing.

Take advantage of
the power law.

Always, always
have a proper counterfactual.

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