

Why AV1 and AOMedia

Vibhoothi,
September 2021

Slides: <https://people.videolan.org/~mindfreeze/av1fossunited2021.pdf>

Who am I?

Vibhoothi

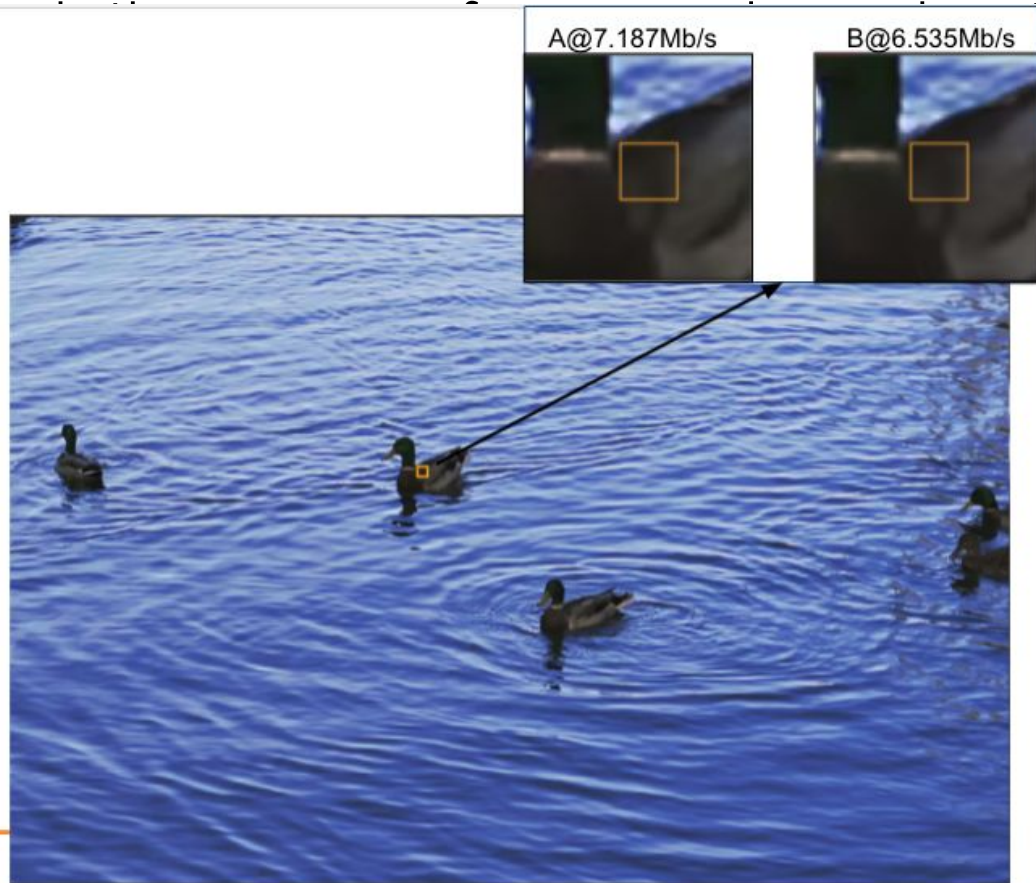
- Active member and collaborator in various open-source multimedia projects
 - [VideoLAN](#), [Xiph Org.](#) [Rust-av](#) etc
- Research Assistant and Graduate Student, at [Trinity College, Dublin.](#)
- 2020 Graduate from [Amrita](#), was part of the [amFOSS](#) Club Initiatives.
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 - [@vibhoothi](#) on Twitter.

- We will talk about Video compression.
- We will talk a lot about AV1.
- We will talk a little about AOMedia.
- We will talk a little about how you can help the efforts.

- Video Encoding is the process of compressing an input video sample into a specific format whilst making sure that the quality of the compressed video matches best to the original version.
 - Involves lot of Maths, Signal Processing, science and research
 - Video is VERY Very very Hard!
 - Even in 2021, many of the modern Video codecs are kind of derived and implemented starting late 1980s papers and research.

Video Compression

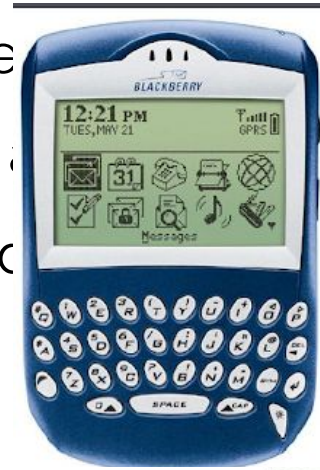
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- More than 80% of Internet traffic is “Video”, predicted by [Cisco](#).
- H.264: Most commonly used format(~91%) for all video-usecases like recording, compression, and distribution of video content as of September 2020[1].
 - Standardized in 2003.
 - Other things that were new in 2003
 - Blackberry phones
 - Thinkpad laptops

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 - Example: HEVC/H.265 commercial license are
 - 20c per unit for over 100k units, max of \$25M/year since in 2013.
 - Conservative Apple sold 35M devices in 1 Quarter , so Apple maxed out.

[1]: <https://www.mpegla.com/wp-content/uploads/HEVCweb.pdf>

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 - Offers best compression out of all available formats
 - Designed to be used in a broad set of use cases
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What is AV1?



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 - Offers best compression out of all available formats
 - Designed to be used in a broad set of use cases
 - **Royalty-free** and **Open-source**
 - Support from many largest technology companies
 - Offers more than 50% compression than H.264, and ~30% than HEVC/H.265/VP9.
 - It is already fairly ubiquitous, at least if we think about **decoding**.



AV1 Hardware Adopters



MEDIATEK



and lot more...

Why AV1 and AOMedia @FOSSUnited

 BROADCOM® MEDIATEK ROKU® oppo AMD REALTEK DUNE HD @mlogic realme NVIDIA

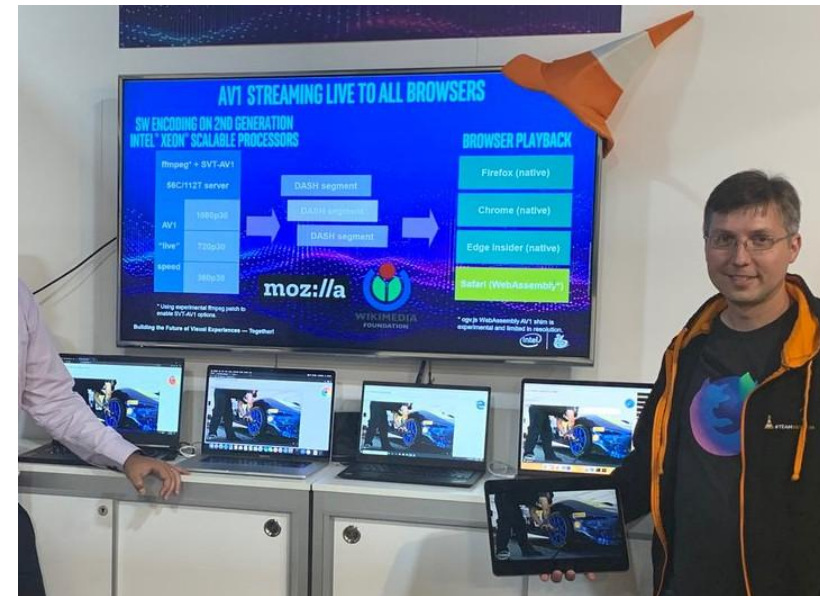
HUAWEI

 ZTE LG
Life's Good SAMSUNG vivo Rockchip NETINT TCL motorola
A Lenovo Company

and lot more...

AV1 decoding capability is nearly ubiquitous already

- AV1 decoding capability is built-in Android Q, [Netflix](#), [Google Duo](#).
- AV1 Decoding support in various [CPUs](#) and [GPUs](#).
- Microsoft has a [media extension](#) for it.
- VLC supports AV1 Linux & macOS (using [dav1d](#)).
- [Amazon Firestick](#) and many Android TVs.
- Fast AV1 decoding in most browsers



Average Relative bitrate performance of AV1 wrt other codecs

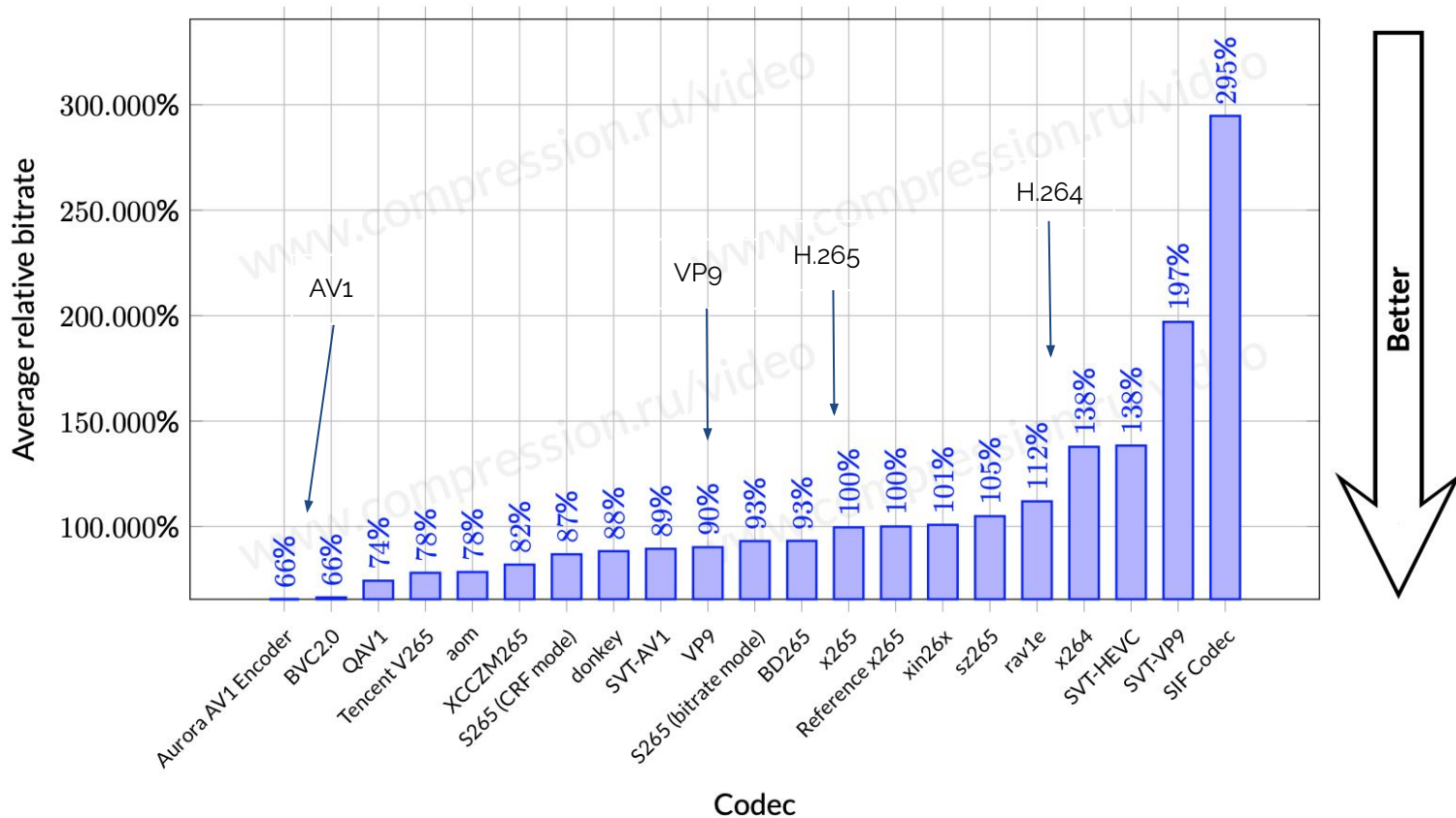


Figure 18: Average bitrate ratio for a fixed quality—use case “Offline (1 fps),” all sequences, YUV-SSIM metric.

Encoding is always harder

- **x264** took about 7 years to become great
- **x265** needed nearly the same time to become a good competitor
 - It managed to leverage a good deal of experience
 - But making effective use of the HEVC features took more effort.
- **AV1** standardised in 2018,
 - Getting decent complexity vs speed trade-off is hard.

- Adoption of a standard is a "chicken-and-egg" problem,
 - Where device manufacturer's are waiting for availability of content before adding support for AV1 and content producers are waiting for universal AV1 support before committing to using the format.

HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



How you can help the efforts

- If you are
 - **Building projects** which has video element ,
 - Try using Royalty-Free solutions for both Audio and Video.
 - Company/Organisation which has **video storage, distribution**.
 - Try to have your videos in AV1 [Can even save ~80% if doing optimised transcoding.]
 - Thinking to do **research**
 - Starting to do in Video compression, open-standards might be great :). [Be prepared to invest some years into video]
 - **Security** Enthusiast
 - Reverse Engineering and exploiting Open-standards will be amazing.
 - **Documentation** Geek
 - Writing guides, user flows etc of transcoding will be grand ^^
- and many more.....

- AV1 **Adoption** is happening in full-swing
- **Faster** AV1 decoding and encoding in ARM Platforms.
- Public availability of AV1 **hardware Encoders** in 2021
- Wider adoption of AV1 Hardware decoding including **ARM** Platforms
- Adoption of AV1 into **Real-time WebRTC** and Video calling softwares.
- **Academia** bodies started caring about AV1.

Thank You

Considering that video and images make up about 80% of all internet traffic, the impact of how things get encoded is pretty big. Even a modest 1% BDR gain tool translates into about 20 EB of traffic yearly currently, or 20,000,000,000 GB.

Steinar Midtskogen (Cisco)