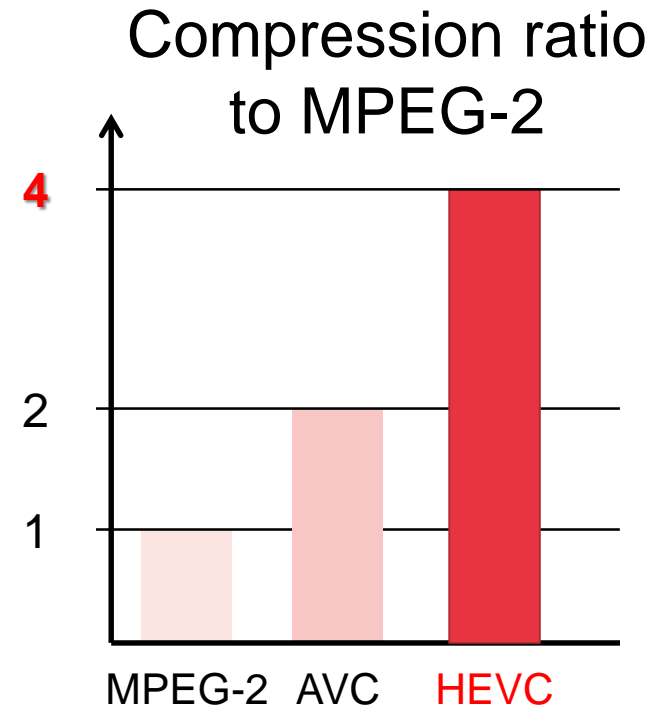


Overview of HEVC/H.265 Transfer Syntax Supplement 195

DICOM WG4/13 HEVC ad-hoc group

June 1st , 2016

- MPEG-2 (1994): Standardized in DICOM in 2004
 - Supplement #40
- MPEG-4/AVC (2003): Standardized in DICOM in 2010
 - Supplement #149 and #180
- HEVC (2013): Proposed for standardization into DICOM **today**



- Encode single or multi-frame video content
- Can be used instead of AVC or MPEG-2
- Should be used to compress the size of DICOM video data
- For compression of video of up to 4k resolution and frame rate of 60fps
- Main 10 profile usable for HDR and WGC content

- Smartphones compatibility
 - HEVC content is already created
 - As of now, need transcoding to be used in DICOM
- Higher compression efficiency
 - For optimized usage of server space and network bandwidth

Differences between AVC and HEVC

- More efficient
 - Doubled compression rate
- More complex
 - Supported by off the shelf hardware and software
- Compression artifacts less obvious
 - Less “blockiness”

- HEVC has one profile per type of video
- Supplement 195 proposes support for 2 profiles:
 - HEVC Main profile with level 5.1
 - 4:2:0 content
 - Up to 8 bit depth
 - HEVC Main 10 profile with level 5.1
 - 4:2:0 content
 - Up to 10 bit depth
 - Both for videos with up to 4k resolution at 60fps

- No new SOP Classes or IODs
- Addenda to 6 parts of DICOM
- 2 new transfer syntaxes
 - HEVC Main profile
 - HEVC Main 10 profile
- Essentially similar to AVC transfer syntaxes
 - Support for audio stream to be encompassed

- Market is already set up for HEVC 4:2:0 chips
- New smartphones already support HEVC

- Fujitsu has no patent pertaining to the inclusion of HEVC inside DICOM
- HEVC is associated to 2 patent pools known to the Editor of this supplement. No claims to the comprehensiveness of the following list. This is not intended as legal advice:
- 1) MPEG-LA patent pool:
 - <http://www.mpeg-la.com/main/programs/HEVC/Documents/HEVCweb.pdf>
 - Licensing fee only for hardware/software
 - Not per stream

- 2) HEVC Advance
 - <http://www.hevcadvance.com/pdf/RoyaltyRatesSummary.pdf>
 - New patent pool // Controversial and criticized
 - Payment per stream IF stream is sold or rented to a customer

- Should we loosen the constraint concerning fragmenting?
 - Do we enforce the need for a key frame at the beginning of a fragment?
- This group recommends to loosen the constraint
- Keep one DICOM object per stream
 - Limits to $2^{31}-1$ maximum frames (19884 hours at 30fps)

Next Steps

- Checking the proposed supplement sanity
- Publishing the supplement for public comment