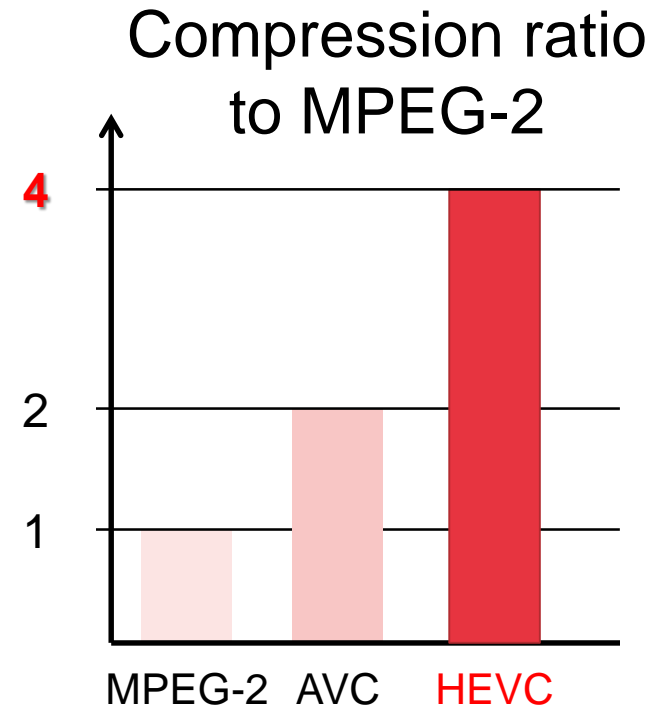


# ***Overview of HEVC/H.265 Transfer Syntax Supplement 195***

DICOM WG4/13 HEVC ad-hoc group

June 1<sup>st</sup> , 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.mpegla.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