# Review of video in 1722

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# 1722 video support today

- IIDC (IEC 61883/IIDC)
- SDI Video Format
- Raw Video Format
- Compressed Video Format:
  - MJPEG
  - H.264
  - JPEG 2000

# 1722 video support today

- IIDC (IEC 61883/IIDC)
  - Uncompressed
  - Based on ieee 1394 video camera standards and ieee 1394 transport streams
  - Max resolution 1600x1200 (UXGA)
- SDI Video Format
  - Widely used in broadcast
  - Transports SDI stream over 1722
- Raw Video Format
  - 1722's 'native' uncompressed video format
  - Flexible: supports many resolutions, bit-depths, frame-rates, chroma formats, colour-spaces
  - A great option for transporting uncompressed video over TSN

# 1722 video support today (continued)

- Compressed Video Format:
  - Based on IETF RTP Payload Formats published as RFCs:
    - MJPEG RFC 2435
    - H.264 RFC 6184
    - JPEG 2000 RFC 5371
  - Each compressed encoding has its advantages and disadvantages in terms of compression ratio, encoder/decoder efficiency, supported resolutions/colour-spaces etc, and adoption.

# What’s missing?

Currently supported compressed formats (MJPEG, H.264, JPEG 2000) are not widely used for:

- 4K and 8K content
- 10 and 12 bit video
- Stereo (3D) video

Why?

- Compression ratio leads to large files/bitrates
- Lack of support in the codecs

# Possible solutions

1722 needs to be able to transport a compressed video standard that offers:

- 4K, 8K, and beyond
- Colour depths to 16bit
- High chance of adoption

Two possible video compression standards:

- H.265/HEVC
- AV1

# Brief comparison of H.265 and AV1

| | H.265 | AV1 |
|---|---|---|
| Maturity | V1 approved 2013<br>V4 approved 2016 | Released 28 March 2018<br>V1 validated 25 June 2018<br>Errata 1 released 8 January 2019 |
| Developers | Joint Collaborative Team on Video Coding (JCT-VC), a collaboration between the ISO/IEC MPEG and ITU-T VCEG. | Alliance for Open Media (AOMedia) |
| Adoption/ Deployments | Hardware decoding supported in several SoCs. | Good browser support. Support in all browsers promised. |
| Containers | ISO base media file format, MPEG-TS (Transport Stream), MPEG-MT (Media Transport), Matroska,<br>**RTP (IETF RFC 7798)** | ISO base media file format,<br>Draft RTP from AOMedia |
| Other | Licence cost considerations | ‘Open’ |

# Getting H.265 into 1722

Options proposed by Ashley two years ago:

- Modify the H.264 section (8.5) to additionally support H.265, referencing RFC 7798
- Add a new CVF format subtype for H.265 with a new sub-clause pointing to the RTP RFC (RFC 7798)
- create a native sub-clause that doesn’t point to the RFC?

# Getting H.265 into 1722

Options proposed by Ashley two years ago:

- ~~Modify the H.264 section (8.5) to additionally support H.265, referencing RFC 7798~~ (Network Abstraction Layer (NAL) unit is larger and RFC7798 uses different terminology for aggregation units, so Figures 41..46 are not relevant for RFC7798)
- Add a new CVF format subtype for H.265 with a new sub-clause pointing to the RTP RFC (RFC 7798)
  - Rapid incorporation
- create a native sub-clause that doesn't point to the RFC?
  - Create new entry in Table 19 and don't use RTP
  - Could provide a more optimal solution (no duplication/ambiguity of timestamps between AVTP header and RTP header)
  - A lot more work!

# Getting AV1 into 1722

- Add a new CVF format subtype for AV1 with a new sub-clause pointing to the AOMedia RTP draft
  - When will this draft be approved?
  - Will the IEFT adopt this?
- Wait for IEFT to publish RFC for AV1 RTP and reference that
  - Are they working on this?
  - When?
- create a new 1722 CVF payload format in Table 19, add a native sub-clause for AV1
  - No dependency on other groups
  - Can optimise the solution for TSN/1722
  - A lot of work!

# Which way forward?

- Do we adopt H.265, AV1, or both?
- How do we decide?
- Feedback, comments welcome from video and standards experts!