

**INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC1/SC29/WG11
CODING OF MOVING PICTURES AND AUDIO**

**ISO/IEC JTC1/SC29/WG11 MPEG2015/M37251
October 2015, Geneva, Switzerland**

Source **Telecom ParisTech, Canon Research Centre France**
Status **For consideration at the 113th MPEG Meeting**
Title **Editorial comments on LHEVC File Format**
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1 Introduction

In this contribution we provide editorial and technical inputs on the DIS text.

2 Temporal Sub Layers

HEVC stores all temporal sublayers in the same track as the base layer. Reading the L-HEVC, there seems to be no indication that temporal sublayers may be stored in different tracks than the layer itself. Section 9.3 indicates:

“L-HEVC streams are stored in accordance with 8.2” (aka HEVC track Structure).

However the LayerInfoGroupEntry seems to indicate that not all sublayers can be in a track (usage of min and max sublayers). This should be clarified, either by:

Adding to 9.3:

“Temporal sublayers of an L-HEVC layer shall be stored in the same track as the L-HEVC layer”.

and removing the references to min/max sublayers

Or updating in 9.3 sentence :

“L-HEVC streams are stored in accordance with 8.2” (aka HEVC track Structure), with the exception that temporal sublayers of an L-HEVC layer may be stored in a different track as the L-HEVC layer”.

3 L-HEVC samples and VCL

The specification states in section 9.6.2:

“After resolution of extractors, an L-HEVC sample shall contain at least one VCL NAL unit.”

This may not be the case for tile tracks in L-HEVC, or for L-HEVC if we allow splitting a NALUs of a given layer_id among tracks (not forbidden ...); in some cases, we could end up with a sample of a track containing only parameter sets or SEI messages. We suggest clarifying as follows:

“If explicit reconstruction is used, after resolution of extractors, an L-HEVC sample shall contain at least one VCL NAL unit. If implicit reconstruction is used, an L-HEVC sample may contain only non VCL NAL units.”

4 Data copy of NAL Units in tracks

As said in m36650, the current text allows for pure data copy of a NAL, as said in 9.7.2:

“Different tracks may logically share data. This sharing can take one of the following two forms:

- a) The sample data is duplicated in different tracks.

”

There is an editorial comment on this sentence (currently in DIS text: w15479):

“M36560 suggested to remove the ability to hard copy data between tracks in order to avoid collecting several time the same AU when using implicit reconstruction, but the minutes are not clear about that. Should we only allow extractors for data sharing (I really prefer this)?”

The problem is that when the AU reconstruction is implicit (without extractors), a file reader reconstructing an AU from two tracks carrying duplicate NALUs from the same layer will have no way to identify the duplication, resulting in a non-compliant reconstructed bitstream.

With SVC, this was not an issue since a single track (potentially with extractor to other tracks) was used. MVC does not seem to allow data copy, since implicit reconstruction is used (this is not very clear in the spec, but the section “data sharing and extraction” is not present for MVC).

We suggest removing the data copy possibility and replace:

“Different tracks may logically share data. This sharing can take one of the following two forms:

- a) The sample data is duplicated in different tracks.
- b) There may be instructions on how to perform this copy at the time that the file is read.

For this case, Extractors (defined in A.3) are used.”

With

“Different tracks may logically share data. There may be instructions on how to perform this copy at the time that the file is read. For this case, Extractors (defined in A.3) are used. Otherwise, implicit data sharing as described in this section can be used.”

5 Order of NAL Units in tracks

Currently there are no restrictions on how multiple layers are stored in a track when no extractors are used. Especially, it is possible to store NAL units out of decoding order. When extractors are used this is not the case (Section 9.6.2. says: “*The order of all NAL units included in an Aggregator or referenced by an Extractor is exactly the decoding order as if these NAL units were present in a sample not containing Aggregators/Extractors*”).

We believe the absence of a restriction on layer per track organization complicates a lot the implicit AU reconstruction process in terms of memory processing. We suggest including the following restriction in section 9.7.2:

“NAL units in an LHEVC track shall always be stored in increasing order of `nuh_layer_id`, and for a same value of `nuh_layer_id`, in increasing order of `temporal_id`.”

6 Implicit reconstruction and extractors

In section 9.7.2 the specification states:

“Otherwise, an access unit is reconstructed from the respective samples in the required tracks, as indicated by the Operating Points Information and Layer Information sample groups. **Extractors in the respective samples are ignored**, and other NAL units are arranged...”

Ignored is not strong enough as it may lead to file readers not removing the extractors present in the sample. We suggest being more specific: “**Extractors in the respective samples shall be ignored** and removed from the bitstream, and other NAL units shall be arranged...”

7 L-HEVC visual width and height

Section 9.7.4 indicates “otherwise they shall be the maximum visual width and height”

However the spec says in 4.6: “If the width or height of the sequence changes, then a new sample entry is needed.”

The ISO/BMFF spec also says generally that the maximum is used.

Which one should be picked? We believe the statement in 4.6 shall apply.

8 Sync sample

In 9.7.5, the specification says: “An L-HEVC sample is considered as a sync sample if the base layer picture in the access unit is an IRAP picture as defined in ISO/IEC 23008-2.”

Given the Defect Report on part 15, shouldn't the base layer be a “sync sample” rather than a “IRAP picture” ?

9 Reference error

In section 10.6.1 the specification indicates Annex B for the extractor, it should be annex A:

“Both the HEVC/LHEVC tile track and the track containing the associated layer, as indicated by the ‘tbas’ track reference, may use extractors, **as defined in Annex A**”

10 Conclusion

We suggest MPEG to issue a study text for ISO/IEC 14496-15 with the above issues addressed.