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# Introduction

This document captures the technologies under consideration for future amendments of the Common Media Application Format (CMAF), ISO/IEC 23000-19 specification.

The current technologies under consideration include:

* Removal of restrictions for scalable resolutions

# Objectives

The goal for this effort is to describe the technologies under consideration for inclusion in a future CMAF PDAM. Note that the technologies under consideration should stay in the scope of CMAF, defined by the requirement document [1].

# Remove restrictions of scalable resolutions

SA4 Rel-18 includes a study on various HEVC coding tools under the study item "FS\_HEVC\_Profiles" [2]. This study includes the investigation of scalable HEVC to support adaptive streaming applications. In this context, it is important to note that the current CMAF specification (ISO/IEC 23000-19 3rd edition [2]) in Annex H.4.2.2 (General constraints) restricts the spatial resolution of the enhancement layer to 1.5, 2, or 3 times the base layer, both horizontally and vertically. This raises a few issues:

1. The current text omits the important spatial resolution ratio of 1.0 for the enhancement layer, that can be used for many purposes beyond spatial resolution scalability, e.g., to provide bit-depth scalability.
2. The 3 ratios explicitly specified here almost arbitrarily omit several other possible ratios, e.g., it is not clear why the ratio may go up to 3 and not up to 4 or why some typical ratios, e.g., 1.25 would not be allowed.

In the context of above, it is proposed to remove this restriction in CMAF specification (ISO/IEC 23000-19 3rd edition) with the following text update for Annex H.4.2.2 General constraints:

**H.4.2.2 General constraints**

— The bitstream shall contain at most two layers, a base layer and possibly an enhancement layer.

— The base layer shall conform to HEVC Main 10 profile and main tier.

— The enhancement layer, when present, shall conform to HEVC scalable Main 10 profile and main tier.

~~— The spatial resolution of the enhancement layer shall be equal to X times that of the base layer both horizontally and vertically. The value of X shall be 1.5, 2 or 3.~~

— Each layer shall contain at most two sub-layers, with TemporalId equal to 0 and 1 when there are two sub-layers, and the value of sps\_max\_sub\_layers\_minus1 of each SPS shall be set equal to 0 or 1. If there is only one sub-layer, the TemporalId shall be 0.

— The value of sub\_layer\_level\_present\_flag[ 0 ] shall be equal to 1. This constraint requires the signalling of the level of the sub-layer representation with TemporalId equal to 0.

# References

1. Requirements for the Common Media Application Format, [w16144](https://dms.mpeg.expert/doc_end_user/current_document.php?id=54984&id_meeting=0)
2. Draft text of ISO/IEC FDIS 23000-19 3rd edition Common Media Application Format, [w20887](https://dms.mpeg.expert/doc_end_user/current_document.php?id=80983&id_meeting=0)