

Title: **Profiles for Extended Precision**

Status: Input Document to JCT-VC

Purpose: Proposal

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Abstract

Extended Precision Profiles for 12-bit 4:2:0 and 12-bit 4:4:4 that enable sequence parameter set (SPS) extended_precision_processing_flag = 1 (and perhaps increased transform and motion coefficient filter precision being investigated in Vienna AHG18) are requested for application in studio production where Qp is expected to be frequently set to 6 and below in coding units. Early tests on high dynamic range (HDR) and wide color gamut video 12-bit BitDepth precision show that transfer functions exceeding SMPTE | ITU Rec. 2020 range may exhibit contouring more easily than video graded for traditional transfer functions and gamuts at the same BitDepth. In Vienna it was anticipated that extended_precision_processing_flag = 1 be permitted only for 14 and 16-bit RExt profiles.

1 Introduction

JCTVC-N0188 [1] outlined the case for increased product internal data path to 23-bits (signalled by extended_precision_processing_flag) prior to DPB sample clipping to InternalBitDepth. Annex A [1] also requested study of transform matrix precision, but no flag was yet accommodated in the draft RExt specification for such constant coefficients as was done for the entropy coded coefficients via extended_precision_processing_flag. The temporary conclusion of the Vienna meeting would be to enable extended_precision_processing_flag = 1 only for 14 and 16-bit profiles. Analysis of histograms confirms that HDR makes greater use of the available code levels, and therefore natural HDR video is more likely to encounter precision issues that Rec.709 content would encounter only at 2+ higher bit depths. So far, only color bar tests show the need for extended constant coefficient precision [3], but it is anticipated that natural and most likely CGI video will exhibit similar needs at 12-bit BitDepth.

2 Proposal

For Extended Precision Main 12-bit profile: copy the restrictions for Main 12 (section A.3.5 of the RExt draft spec[2]), except allow `extended_precision_processing_flag` equal to 0 or 1.

- `extended_precision_processing_flag`, when present, shall be equal to 0 or 1.

As such decoders in the applications cited in the abstract above are likely to be software-only executed on large parallel processing machines, no restriction on compression factor and bitrate, other than the coded bitstream shall not exceed the raw video rate, is suggested.

3 References

- [1] K. Sharman, N. Saunders, J. Gamei, “AHG 5 and 18: Internal Precision for High Bit Depths”, JCTVC-N0188, July 2013.
- [2] D. Flynn, J. Sole, T. Suzuki, “HEVC Range Extensions text specification: Draft 4”, JCTVC-N1005, August 2013.
- [3] K. Sharman, N. Saunders, “AHG5 and AHG18: Transform Matrix Precision for High Bit Depths” , [JCTVC-O0068](#), October 2013.

4 Patent rights declaration(s)

Harmonic, Movielabs, and Universal do not have any current or pending patent rights relating to the technology described in this contribution.