

*Title:* Proposed Editorial Improvements to High efficiency video coding (HEVC) Range Extensions Text Specification Draft 4  
*Status:* Input Document to JCT-VC  
*Purpose:* Information  
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## Abstract

This contribution details a number of issues with the Range Extensions text specification Draft 4 (JCTVC-N1005 [1]) that have been reported. Editorial changes and further action are recommended.

## 1 Issues – editorial with proposed fixes

- Ticket № 1173: Contains multiple editorial fixes regarding typos and missing indices on some variables.  
Resolution: adopt
- Ticket № 1184:
  - 1. avoid use of undefined `inter_rdpem_flag`  
Resolution: adopt by defining inference of zero values
  - 2. missing index for `inter_rdpem_flag`, `inter_rdpem_dir_flag`  
Resolution: adopt
  - 3. missing check `inter_rdpem_flag` in residual processing of luma in inter blocks  
Resolution: add check
  - 4. missing check `inter_rdpem_flag` in residual processing of chroma in inter blocks  
Resolution: add check
- Ticket № 1183: Incorrect scaling list reference calculation.  
Resolution: adopt
- Ticket № 1176: Typo in chroma MV variable in interpolation process.  
Resolution: adopt
- Ticket № 11:37 Normalisation of transform skip coefficients for block sizes  $4 \times 4$ . The introduction of large transform skip blocks requires a different shift value to compensate for the norm of the transform in coefficient scaling. The text used for integration omitted this, however, a similar proposal that was effectively also adopted made the change.  
Resolution: adopt (fix typo in ticket:  $2 \rightarrow 5$ ).
- Ticket № 1135: Inconsistent use of transform skip max size syntax element name.  
Resolution: Use `log2_max_transform_skip_block_size_minus2`.
- Ticket № 1134: Typo in level definition of minimum compression ratio.  
Resolution: adopt
- Ticket № 1133: Incorrect use of Max/Min in `tsShift` calculation with `extended_precision_processing_flag`.  
Resolution: adopt

- Ticket № 1180: Incorrect context derivation for new context indices.  
Resolution: fix indices
- Ticket № 1178: Spurious tsShift operation in scaling process by tsShift.  
Resolution: adopt
- Ticket № 1142: Multiple issues: - Inter RDPCM not being performed for lossless path - Missing index on `inter_rdpdm_*_*` in TU - Inter RDPCM should be processed during inverse transform.  
Resolution: adopt the first two points. The last point has been addressed during the meeting.

## 2 Issues – Editorial to do

- Ticket № 1136: Motion constrained tile sets SEI message needs updating. This previously adopted SEI message change was not integrated into the text.  
Resolution: adopt

## 3 Other – No action required

- Ticket № 1182: Multiple issues relating to IntraBC, which have been addressed during the meeting.
- Ticket № 1175: IntraBC is lacking constraints.  
Resolved by adoption at this meeting
- Ticket № 1178: Modification of Intra angular filtering breaks v1 compatibility.  
Resolved by adoption at this meeting

## 4 Other – action may be required

- Ticket № 1140: Possible constraint required on the value of `VUI matrix_coeffs` when `chroma_format_idc = 0` (monochrome)
- Ticket № 1139: Refine definition of decoded picture hash SEI message for separate colour planes
- Ticket № 1138: Usage of `BitDepthC` when `ChromaArrayType` is equal to 0
- Ticket № 1185: High-precision support

The previous meeting notes record the following decision:

Decision (BF): At this point, for up to 12b depth, no change. For MC, 12b has 4b downshift. Set downshift to 4b for > 12b. *For transform, we have a coeff level range limit and a clip after coeff reconstruction, and a clip after the 1st stage inverse transform. These are 16b (signed). Set to bit depth + 7 (signed) for profiles supporting bit depths beyond 12 bits.* Have a SPS extension flag to control which rule applies (extended range/precision or not). One flag controls both at once. We have a downshift after the first stage inverse transform of 7 bit, which we won't change now.

The Trac ticket reports:

In N1005\_v3, only the cropping changes are implemented, which is pointless since the increased accuracy is immediately discarded prior to the transform, reverting back to 16-bit (signed) rather than the adopted  $\max(16, \text{bitDepth}+7)$ .

- `intra_bc_flag` context initialization and use mismatch against HM
- `sig_coeff_flag` context initialization and use mismatch against HM

## References

- [1] D. Flynn, J. Sole, and T. Suzuki, "Range extensions draft 4," JCTVC-N1005, JCT-VC, Jul. 2013.