

Best-effort decoding of 10-bit sequences using an 8-bit decoder

(This annex forms an integral part of this Recommendation | International Standard)

F.1 General

This annex specifies the recommended behaviour for decoders conformant with the Main profile that also provide a best-effort decoding capability for bit streams conformant to High profile that would otherwise not be decodable.

NOTE: The use of this recommended behaviour does not guarantee perfect reconstruction of the video sequence and an element of drift is likely.

F.2 Modified decoding process

A decoder implementing the modified decoding process as specified in this annex shall perform the ordinary decoding process as specified in this Recommendation | International Standard unless otherwise modified below.

The variables $\text{RestrictedBitDepth}_Y$ and $\text{RestrictedBitDepth}_C$ are each set to the value 8.

The following mathematical functions are defined:

$$\text{RClip1}_Y(x) = \text{RClip1Idx}(x, 0) \quad (\text{F-1})$$

$$\text{RClip1}_C(x) = \text{RClip1Idx}(x, 1) \quad (\text{F-2})$$

$$\text{RClip1Idx}(x, \text{cIdx}) = \text{Clip3}(0, (1 \ll \text{RestrictedBitDepthOf}(\text{cIdx})) - 1, x) \quad (\text{F-3})$$

$$\text{BitDepthOf}(\text{cIdx}) = \begin{cases} \text{BitDepth}_Y & ; \text{cIdx} = 0 \\ \text{BitDepth}_C & ; \text{cIdx} = 1, 2 \end{cases} \quad (\text{F-4})$$

$$\text{RestrictedBitDepthOf}(\text{cIdx}) = \begin{cases} \text{RestrictedBitDepth}_Y & ; \text{cIdx} = 0 \\ \text{RestrictedBitDepth}_C & ; \text{cIdx} = 1, 2 \end{cases} \quad (\text{F-5})$$

$$\text{RoundToEven}(x, \text{cIdx}) = \text{RoundToEvenShift}(x, \text{BitDepthOf}(\text{cIdx}) - \text{RestrictedBitDepthOf}(\text{cIdx})) \quad (\text{F-6})$$

$$\text{RoundToEvenShift}(x, \text{shift}) = x + (1 \ll (\text{shift} - 1)) - 1 + ((x \gg \text{shift}) \& 1) \gg \text{shift} \quad (\text{F-7})$$

The sample adaptive offset semantics as specified in subclause 7.4.9.3 are modified as follows. Subsequent to the ordinary derivation of SaoOffsetVal , each value is modified as follows:

$$\begin{aligned} \text{SaoOffsetVal}[\text{cIdx}][\text{rx}][\text{ry}][i] = \\ \text{SaoOffsetVal}[\text{cIdx}][\text{rx}][\text{ry}][i] \gg (\text{BitDepthOf}(\text{cIdx}) - \text{RestrictedBitDepthOf}(\text{cIdx})) \end{aligned} \quad (\text{F-8})$$

The generation of unavailable pictures as specified in subclause 8.3.3.2 shall be performed using $\text{RestrictedBitDepth}_Y$ in place of the variable BitDepth_Y and $\text{RestrictedBitDepth}_C$ in place of the variable BitDepth_C .

The general decoding process for coding units coded in intra prediction mode as specified in subclause 8.4.1 when $\text{pcm_flag}[\text{xCb}][\text{yCb}]$ is equal to 1, shall be performed using $\text{RestrictedBitDepth}_Y$ in place of the variable BitDepth_Y and $\text{RestrictedBitDepth}_C$ in place of the variable BitDepth_C .

The general intra sample prediction process as specified in subclause 8.4.4.2.1 is modified as follows. Subsequent to the ordinary derivation of $p[x][y]$ when the sample $p[x][y]$ is marked as "available for intra prediction", the value of $p[x][y]$ is modified as follows:

$$p[x][y] = p[x][y] \ll (\text{BitDepthOf}(\text{cIdx}) - \text{RestrictedBitDepthOf}(\text{cIdx})) \quad (\text{F-9})$$

The general decoding process for coding units coded in inter prediction mode as specified in subclause 8.5.1 is modified as follows. Subsequent to the invocation of the inter prediction process as specified in subclause 8.5.2, the three arrays predSamples_L , predSamples_{Cb} and predSamples_{Cr} are modified as follows:

$$\begin{aligned} \text{predSamples}_L[x][y] &= \text{predSamples}_L[x][y] \ll (\text{BitDepth}_Y - \text{RestrictedBitDepth}_Y) \\ &\text{with } x, y = 0..nC_bS_L \end{aligned} \quad (\text{F-10})$$

$$\begin{aligned} \text{predSamples}_{Cb}[x][y] &= \text{predSamples}_{Cb}[x][y] \ll (\text{BitDepth}_C - \text{RestrictedBitDepth}_C) \\ &\text{with } x, y = 0..nC_bS_C \end{aligned} \quad (\text{F-11})$$

$$\begin{aligned} \text{predSamples}_{Cr}[x][y] &= \text{predSamples}_{Cr}[x][y] \ll (\text{BitDepth}_C - \text{RestrictedBitDepth}_C) \\ &\text{with } x, y = 0..nC_bS_C \end{aligned} \quad (\text{F-12})$$

The luma sample interpolation process as specified in subclause 8.5.3.3.2 shall be performed using $\text{RestrictedBitDepth}_Y$ in place of the variable BitDepth_Y .

The chroma sample interpolation process as specified in subclause 8.5.3.3.3 shall be performed using $\text{RestrictedBitDepth}_C$ in place of the variable BitDepth_C .

The weighted sample prediction process as specified in subclause 8.5.3.3.4.1 shall be performed using $\text{RestrictedBitDepth}_Y$ in place of the variable BitDepth_Y and $\text{RestrictedBitDepth}_C$ in place of the variable BitDepth_C .

The picture construction process prior to the in-loop filter process as specified in subclause 8.6.5 is modified as follows. The derivation of $\text{recSamples}[][]$ using equation (8-280) is replaced by the following:

$$\begin{aligned} \text{recSamples}[x_{\text{Curr}} + i][y_{\text{Curr}} + j] &= \\ &\text{RClip1Idx}(\text{RoundToEven}(\text{predSamples}[i][j] + \text{resSamples}[i][j], cIdx), cIdx) \\ &\text{with } i = 0..n_{\text{CurrS}} - 1, j = 0..n_{\text{CurrS}} - 1 \end{aligned} \quad (\text{F-13})$$

The decision process for luma block edges as specified in subclause 8.7.2.5.3 shall be performed using $\text{RestrictedBitDepth}_Y$ in place of the variable BitDepth_Y .

The decision process for chroma block edges as specified in subclause 8.7.2.5.5 shall be performed using $\text{RestrictedBitDepth}_C$ in place of the variable BitDepth_C .

The filtering process for a luma sample as specified in subclause 8.7.2.5.7 shall be performed using RClip1_Y in place of the function Clip1_Y .

The filtering process for a chroma sample as specified in subclause 8.7.2.5.8 shall be performed using RClip1_C in place of the function Clip1_C .

The sample adaptive offset coding tree block modification process as specified in subclause 8.7.3.2 shall be performed using $\text{RestrictedBitDepth}_Y$ in place of BitDepth_Y and $\text{RestrictedBitDepth}_C$ in place of BitDepth_C .

F.3 Interpretation of SEI message semantics

TBD

F.4 Interpretation of VUI semantics

TBD