



JCTVC-AM0024

Illustration of the shutter interval info SEI message in HEVC Draft

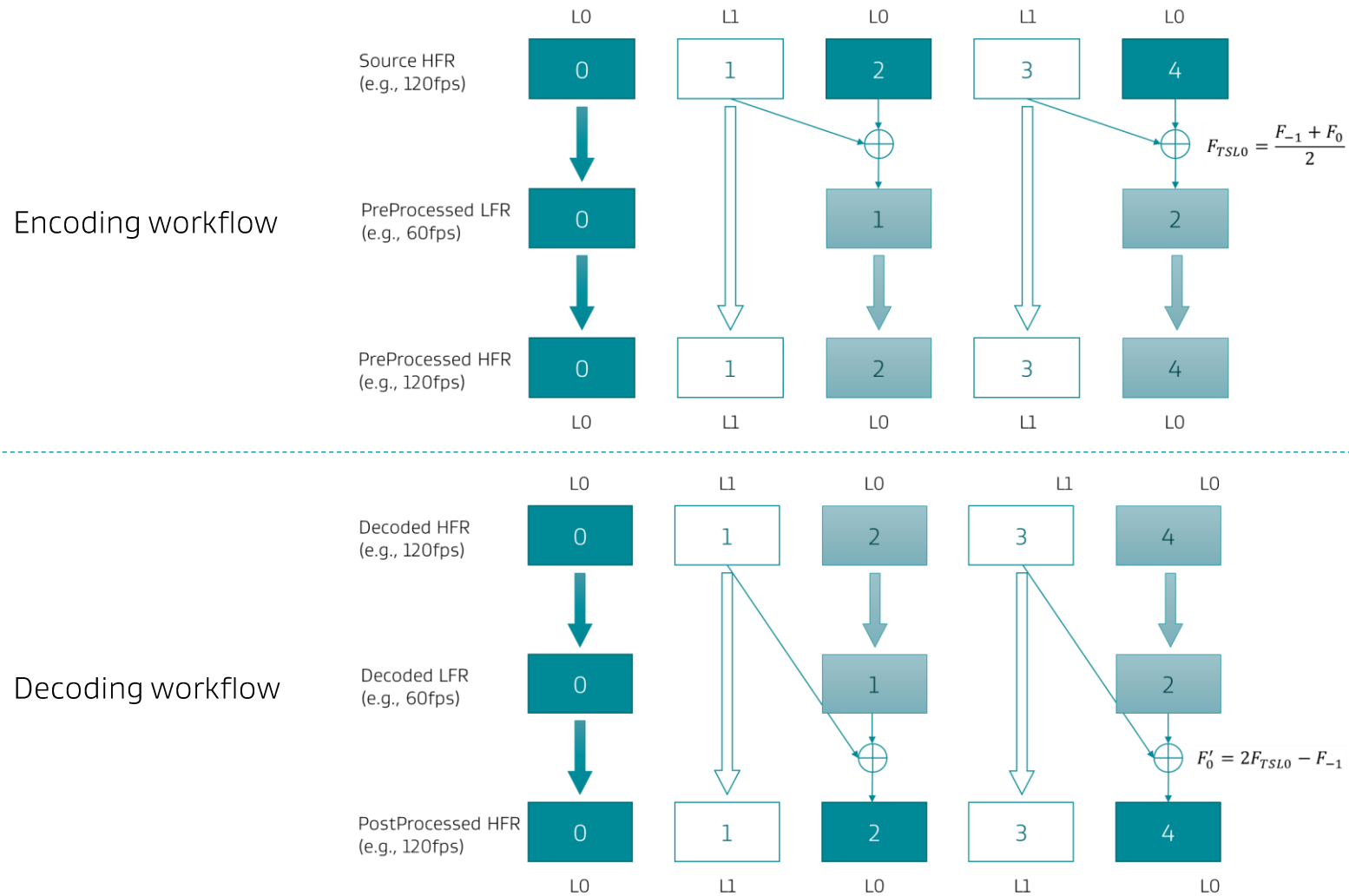
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Summary of contribution

- Description of a software implementation that illustrates the use of the shutter interval information (SII) SEI message in HEVC
- The software illustrates use of SII SEI using the example of encoding and decoding content in a manner consistent with ATSC 3.0
- The software may be used to experiment with other applications for which shutter interval information may be useful.

Illustration of SII SEI message based on ATSC 3.0 Annex D



SII syntax, software package, and example settings

Table 1 Shutter interval information SEI message syntax

shutter_interval_info(payloadSize) {	Descriptor
sii_time_scale	u(32)
fixed_shutter_interval_within_clvs_flag	u(1)
if(fixed_shutter_interval_within_clvs_flag)	
sii_num_units_in_shutter_interval	u(32)
else {	
sii_max_sub_layers_minus1	u(3)
for(i = 0; i <= sii_max_sub_layers_minus1; i++)	
sub_layer_num_units_in_shutter_interval[i]	u(32)
}	
}	

The SII-Process software package is enabled by Macro: **SHUTTER_INTERVAL_SEI_PROCESSING = 1**.

Two encoder configurations are provided:

- shutter_interval_info_fix.cfg // common setting with single shutter interval
- shutter_interval_info_mul.cfg // shutter interval SEI processing with multiple shutter intervals

(note: each of the two example cfg assumes that HFR is 120fps; but in the software the correct value is computed based on sequence picture rate)

The encoding command line is: TAppEncoderStatic -c seq.cfg -c encoder_randomaccess_main10.cfg -c shutter_interval_info_mul.cfg -sii preprocessed_seq.yuv

The decoding commandline is: TAppDecoderStatic -b seq.bit -o dec.yuv -sii postprocessd_seq.yuv

Optionally, to decode corresponding LFR, use: TAppDecoderStatic -b seq.bit -o dec.yuv -t 3

(In this example, set -t 3 for HEVC CTC RA test case with GOP size = 16.)

Example syntax settings

- sii_time_scale = 24000000
- fixed_shutter_interval_within_clvs_flag = 0
- sii_max_sub_layers_minus1 = 4 (In HEVC CTC, for RA, the GOP size is set to 16).
- sub_layer_num_units_in_shutter_interval[i] = LFR value in Table 2 for i = 0, 1, 2, 3
- sub_layer_num_units_in_shutter_interval[4] = HFR value in Table 2

Table 2 sii_num_units_in_shutter_interval value for Source (HFR) and LFR

picture rate (sec ⁻¹)		sii_num_units_in_shutter_interval (sii_time_scale = 24000000) (source shutter interval = 1 / picture rate)	
Source (HFR)	LFR	Source (HFR)	LFR
24	12	1000000	2000000
30	15	800000	1600000
48	24	500000	1000000
50	25	480000	960000
60	30	400000	800000
96	48	250000	500000
100	50	240000	480000
120	60	200000	400000
240	120	100000	200000

Simulations and crosscheck

- We ran simulations using HM CTC Class B (HD) test sequences.
- It was observed that the software implementation (SII-Process) and SII SEI message function as expected.

Original



Preprocessed and encoded QP22

not blended



blended



Decoded (mix of blended and not blended, QP 22)

not blended



blended



Postprocessed decoded: Reconstructed HFR

not blended



reconstructed



Postprocessed decoded: Extracted LFR

extracted



Thank you

- We thank Chad Fogg from MovieLabs for help to crosscheck the software

