
**Information technology — High
efficiency coding and media delivery
in heterogeneous environments —**

**Part 2:
High efficiency video coding**

**AMENDMENT 1: Shutter interval
information SEI message**

*Technologies de l'information — Codage à haute efficacité et livraison
des médias dans des environnements hétérogènes —*
Partie 2: Codage vidéo à haute efficacité

*AMENDEMENT 1: Message SEI d'information sur l'intervalle
d'obturation*



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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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This document was prepared by joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*, in collaboration with ITU-T (as Rec. ITU-T H.265).

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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 2: High efficiency video coding

AMENDMENT 1: Shutter interval information SEI message

Clause 4

Add an abbreviated term as follows:

ATSC Advanced Television Systems Committee

D.2.1

Replace the contents of D.2.1 with the following.

D.2.1 General SEI message syntax

sei_payload(payloadType, payloadSize)	Descriptor
if(nal_unit_type == PREFIX_SEI_NUT)	
if(payloadType == 0)	
buffering_period(payloadSize)	
else if(payloadType == 1)	
pic_timing(payloadSize)	
else if(payloadType == 2)	
pan_scan_rect(payloadSize)	
else if(payloadType == 3)	
filler_payload(payloadSize)	
else if(payloadType == 4)	
user_data_registered_itu_t_t35(payloadSize)	
else if(payloadType == 5)	
user_data_unregistered(payloadSize)	
else if(payloadType == 6)	
recovery_point(payloadSize)	
else if(payloadType == 9)	
scene_info(payloadSize)	
else if(payloadType == 15)	
picture_snapshot(payloadSize)	
else if(payloadType == 16)	
progressive_refinement_segment_start(payloadSize)	

else if(payloadType == 17)	
progressive_refinement_segment_end(payloadSize)	
else if(payloadType == 19)	
film_grain_characteristics(payloadSize)	
else if(payloadType == 22)	
post_filter_hint(payloadSize)	
else if(payloadType == 23)	
tone_mapping_info(payloadSize)	
else if(payloadType == 45)	
frame_packing_arrangement(payloadSize)	
else if(payloadType == 47)	
display_orientation(payloadSize)	
else if(payloadType == 56)	
green_metadata(payloadSize) /* specified in ISO/IEC 23001-11 */	
else if(payloadType == 128)	
structure_of_pictures_info(payloadSize)	
else if(payloadType == 129)	
active_parameter_sets(payloadSize)	
else if(payloadType == 130)	
decoding_unit_info(payloadSize)	
else if(payloadType == 131)	
temporal_sub_layer_zero_idx(payloadSize)	
else if(payloadType == 133)	
scalable_nesting(payloadSize)	
else if(payloadType == 134)	
region_refresh_info(payloadSize)	
else if(payloadType == 135)	
no_display(payloadSize)	
else if(payloadType == 136)	
time_code(payloadSize)	
else if(payloadType == 137)	
mastering_display_colour_volume(payloadSize)	
else if(payloadType == 138)	
segmented_rect_frame_packing_arrangement(payloadSize)	
else if(payloadType == 139)	
temporal_motion_constrained_tile_sets(payloadSize)	
else if(payloadType == 140)	
chroma_resampling_filter_hint(payloadSize)	
else if(payloadType == 141)	
knee_function_info(payloadSize)	
else if(payloadType == 142)	
colour_remapping_info(payloadSize)	
else if(payloadType == 143)	
deinterlaced_field_identification(payloadSize)	

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else if(payloadType == 144)	
content_light_level_info(payloadSize)	
else if(payloadType == 145)	
dependent_rap_indication(payloadSize)	
else if(payloadType == 146)	
coded_region_completion(payloadSize)	
else if(payloadType == 147)	
alternative_transfer_characteristics(payloadSize)	
else if(payloadType == 148)	
ambient_viewing_environment(payloadSize)	
else if(payloadType == 149)	
content_colour_volume(payloadSize)	
else if(payloadType == 150)	
equirectangular_projection(payloadSize)	
else if(payloadType == 151)	
cubemap_projection(payloadSize)	
else if(payloadType == 152)	
fisheye_video_info(payloadSize)	
else if(payloadType == 154)	
sphere_rotation(payloadSize)	
else if(payloadType == 155)	
regionwise_packing(payloadSize)	
else if(payloadType == 156)	
omni_viewport(payloadSize)	
else if(payloadType == 157)	
regional_nesting(payloadSize)	
else if(payloadType == 158)	
mcts_extraction_info_sets(payloadSize)	
else if(payloadType == 159)	
mcts_extraction_info_nesting(payloadSize)	
else if(payloadType == 160)	
layers_not_present(payloadSize) /* specified in Annex F */	
else if(payloadType == 161)	
inter_layer_constrained_tile_sets(payloadSize) /* specified in Annex F */	
else if(payloadType == 162)	
bsp_nesting(payloadSize) /* specified in Annex F */	
else if(payloadType == 163)	
bsp_initial_arrival_time(payloadSize) /* specified in Annex F */	
else if(payloadType == 164)	
sub_bitstream_property(payloadSize) /* specified in Annex F */	
else if(payloadType == 165)	
alpha_channel_info(payloadSize) /* specified in Annex F */	
else if(payloadType == 166)	
overlay_info(payloadSize) /* specified in Annex F */	

else if(payloadType == 167)	
temporal_mv_prediction_constraints(payloadSize) /* specified in Annex F */	
else if(payloadType == 168)	
frame_field_info(payloadSize) /* specified in Annex F */	
else if(payloadType == 176)	
three_dimensional_reference_displays_info(payloadSize) /* specified in Annex G */	
else if(payloadType == 177)	
depth_representation_info(payloadSize) /* specified in Annex G */	
else if(payloadType == 178)	
multiview_scene_info(payloadSize) /* specified in Annex G */	
else if(payloadType == 179)	
multiview_acquisition_info(payloadSize) /* specified in Annex G */	
else if(payloadType == 180)	
multiview_view_position(payloadSize) /* specified in Annex G */	
else if(payloadType == 181)	
alternative_depth_info(payloadSize) /* specified in Annex I */	
else if(payloadType == 200)	
sei_manifest(payloadSize)	
else if(payloadType == 201)	
sei_prefix_indication(payloadSize)	
else if(payloadType == 202)	
annotated_regions(payloadSize)	
else if(payloadType == 205)	
shutter_interval_info(payloadSize)	
else	
reserved_sei_message(payloadSize)	
else /* nal_unit_type == SUFFIX_SEI_NUT */	
if(payloadType == 3)	
filler_payload(payloadSize)	
else if(payloadType == 4)	
user_data_registered_itu_t_t35(payloadSize)	
else if(payloadType == 5)	
user_data_unregistered(payloadSize)	
else if(payloadType == 17)	
progressive_refinement_segment_end(payloadSize)	
else if(payloadType == 22)	
post_filter_hint(payloadSize)	
else if(payloadType == 132)	
decoded_picture_hash(payloadSize)	
else if(payloadType == 146)	
coded_region_completion(payloadSize)	
else	
reserved_sei_message(payloadSize)	

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if(more_data_in_payload()) {	
if(payload_extension_present())	
reserved_payload_extension_data	u(v)
payload_bit_equal_to_one /* equal to 1 */	f(1)
while(!byte_aligned())	
payload_bit_equal_to_zero /* equal to 0 */	f(1)
}	
}	

D.2.48

Renumber subclause D.2.48 as D.2.49.

Add a new subclause D.2.48, as follows:

D.2.48 Shutter interval information SEI message syntax

	Descriptor
shutter_interval_info(payloadSize) {	
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)
}	
}	

D.3.1

Replace the three paragraphs following NOTE 2 with the following:

The list SingleLayerSeiList is set to consist of the payloadType values 2, 3, 6, 9, 15, 16, 17, 19, 22, 23, 45, 47, 56, 128, 129, 131, 132, 134 to 152, inclusive, 154 to 159, inclusive, 200 to 202, inclusive, and 205.

The list VclAssociatedSeiList is set to consist of the payloadType values 2, 3, 6, 9, 15, 16, 17, 19, 22, 23, 45, 47, 56, 128, 131, 132, 134 to 152, inclusive, 154 to 159, inclusive, 200 to 202, inclusive, and 205.

The list PicUnitRepConSeiList is set to consist of the payloadType values 0, 1, 2, 6, 9, 15, 16, 17, 19, 22, 23, 45, 47, 56, 128, 129, 131, 132, 133, 135 to 152, inclusive, 154 to 159, inclusive, 200 to 202, inclusive, and 205.

In Table D.1, insert the following row at the end of the table:

Shutter interval information	The CLVS containing the SEI message
------------------------------	-------------------------------------

D.3.48

Renumber subclause D.3.48 as D.3.49.

Add a new subclause D.3.48, as follows:

D.3.48 Shutter interval information SEI message semantics

The shutter interval information SEI message indicates the shutter interval for the associated video source pictures prior to encoding and display, e.g., for camera-captured content, the shutter interval is amount of time that an image sensor is exposed to produce each source picture.

When a shutter interval information SEI message is present for any picture of a CLVS of a particular layer, a shutter interval information SEI message shall be present for the first picture of the CLVS. The shutter interval information SEI message persists for the current layer in decoding order from the current picture until the end of the CLVS. All shutter interval information SEI messages that apply to the same CLVS shall have the same content.

sii_time_scale specifies the number of time units that pass in one second. The value of **sii_time_scale** shall be greater than 0. For example, a time coordinate system that measures time using a 27 MHz clock has an **sii_time_scale** of 27 000 000.

fixed_shutter_interval_within_clvs_flag equal to 1 specifies that the indicated shutter interval is the same for all temporal sub-layers in the CLVS. **fixed_shutter_interval_within_clvs_flag** equal to 0 specifies that the indicated shutter interval may not be the same for all temporal sub-layers in the CLVS. When the value of **sps_max_sub_layers_minus1** is equal to 0, the value of **fixed_shutter_interval_within_clvs_flag** shall be equal to 1.

sii_num_units_in_shutter_interval, when **fixed_shutter_interval_within_clvs_flag** is equal to 1, specifies the number of time units of a clock operating at the frequency **sii_time_scale** Hz that corresponds to the indicated shutter interval of each picture in the CLVS. The value 0 may be used to indicate that the associated video content contains screen capture content, computer generated content, or other non-camera-captured content.

The indicated shutter interval, denoted by the variable **shutterInterval**, in units of seconds, is equal to the quotient of **sii_num_units_in_shutter_interval** divided by **sii_time_scale**. For example, to represent a shutter interval equal to 0.04 seconds, **sii_time_scale** may be equal to 27 000 000 and **sii_num_units_in_shutter_interval** may be equal to 1 080 000.

sii_max_sub_layers_minus1 plus 1 specifies the maximum number of temporal sub-layers that may be present in each CLVS referring to the SPS. The value of **sii_max_sub_layers_minus1** shall be equal to the value of **sps_max_sub_layers_minus1** in the SPS.

NOTE For example, the information conveyed in this SEI message is intended to be adequate for purposes corresponding to the use of ATSC A/341:2019 Annex D when **sii_max_sub_layers_minus1** is equal to 1 and **fixed_shutter_interval_within_clvs_flag** is equal to 0.

sub_layer_num_units_in_shutter_interval[i], when present, specifies the number of time units of a clock operating at the frequency **sii_time_scale** Hz that corresponds to the shutter interval of each picture in the sub-layer representation with **TemporalId** equal to **i** in the CLVS. The sub-layer shutter interval for the sub-layer representation with **TemporalId** equal to **i**, denoted by the variable **subLayerShutterInterval[i]**, in units of seconds, is equal to the quotient of **sub_layer_num_units_in_shutter_interval[i]** divided by **sii_time_scale**.

The variable **subLayerShutterInterval[i]**, corresponding to the indicated shutter interval of each picture in the sub-layer representation with **TemporalId** equal to **i** in the CLVS, is thus derived as follows:

$$\begin{aligned} &\text{if(fixed_shutter_interval_within_clvs_flag)} \\ &\quad \text{subLayerShutterInterval[i]} = \text{sii_num_units_in_shutter_interval} \div \text{sii_time_scale} \quad (\text{D-63}) \\ &\text{else} \\ &\quad \text{subLayerShutterInterval[i]} = \text{sub_layer_num_units_in_shutter_interval[i]} \div \text{sii_time_scale} \end{aligned}$$