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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT Amendment

ISO/IEC 23001-11:2023/ DAM 2

Information technology — MPEG systems technologies —

Part 11: Energy-efficient media consumption (green metadata)

AMENDMENT 2: Energy-efficient media consumption for new display power reduction metadata

ICS: 35.040.40

ISO/IEC JTC 1/SC 29

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Information technology — MPEG systems technologies — Part 11: Energy-efficient media consumption (green metadata) — Amendment 2: Energy-efficient media consumption for new display power reduction metadata

Foreword

Replace the following

The main changes are as follows:

- The clause 6.2 related to complexity metrics for decoder-power reduction is amended by the specification of a new VVC SEI message carrying complexity metrics for decoder-power reduction.
- The clause 9 related to metrics for quality recovery after low-power encoding is amended by the specification of additional metrics for quality recovery after low-power encoding in the newly added VVC SEI message.

with

The main changes are as follows:

- The clause 6.2 related to complexity metrics for decoder-power reduction is amended by the specification of a new VVC SEI message carrying complexity metrics for decoder-power reduction.
- The clause 9 related to metrics for quality recovery after low-power encoding is amended by the specification of additional metrics for quality recovery after low-power encoding in the newly added VVC SEI message.
- The clause 6.3 related to interactive signalling for remote decoder-power reduction is amended by adding new syntax elements allowing requests of cancellation of previous decoding operation reduction requests from the decoder and allowing a response from the encoder to acknowledge decoder power reduction requests
- The clause 7 related to display power reduction using display adaptation is amended by extending Green SEI metadata. These metadata rely on the use of Attenuation Maps transmitted thanks to auxiliary pictures conveyed along with the base video pictures. In addition, the clause 7 is amended by adding new syntax elements allowing interactive signalling for remote display-power reduction.

Introduction

Replace the following

The metadata for energy-efficient decoding specifies two sets of information: complexity metrics (CM) metadata and decoding operation reduction request (DOR-Req) metadata. A decoder uses CM metadata to vary operating frequency and thus reduce decoder power consumption. In a point-to-point video conferencing application, the remote encoder uses the DOR-Req metadata to modify the decoding complexity of the bitstream and thus reduce local decoder power consumption.

The metadata for energy-efficient encoding specifies quality metrics that are used by a decoder to reduce the quality loss from low-power encoding.

The metadata for energy-efficient presentation specifies RGB-component statistics and quality levels. A presentation subsystem uses this metadata to reduce power by adjusting display parameters, based on the statistics, to provide a desired quality level from those provided in the metadata.

with

The metadata for energy-efficient decoding specifies two sets of information: complexity metrics (CM) metadata and decoding operation reduction request (DOR-Req) and response (DOR-Resp) metadata. A decoder uses CM metadata to vary operating frequency and thus reduce decoder power consumption. In a point-to-point video conferencing application, the remote encoder uses the DOR-Req metadata to modify the decoding complexity of the bitstream and thus reduce local decoder power consumption. The remote encoder uses the DOR-Resp metadata to acknowledge for the request and indicate how it has decided to answer.

The metadata for energy-efficient encoding specifies quality metrics that are used by a decoder to reduce the quality loss from low-power encoding.

The metadata for energy-efficient presentation specifies Attenuation Map Information (AMI) metadata, RGB-component statistics and quality levels. A presentation subsystem uses this metadata to reduce power by modifying the content based on Attenuation Map and/or adjusting display parameters, based on the statistics, to provide a desired quality level from those provided in the metadata.

In a point-to-point video conferencing application, a decoder can use the Display Attenuation Map Power Reduction Request (DAMPR-Req) message to reduce the energy consumption of the display. The remote encoder uses the Display Attenuation Map Power Reduction Response (DAMPR-Resp) message to adapt the amount of light emitted by the display, and thus reduce the display energy consumption.

3.2

Add the following in alphabetical order in subclause 3.2 (“Symbols and abbreviated terms”)

AMI	attenuation map information
DA	display adaptation
DAMPR-Req	display attenuation map power reduction request
DAMPR-Resp	display attenuation map power reduction response
picAMI	Attenuation Map sample values coded in auxiliary pictures of type AUX_ALPHA

6.3.2

Replace the Table 11 in subclause 6.3.2 (“Syntax”)

Table 11 – syntax for interactive signalling for remote decoder-power reduction

	Descriptor
dec_pow_reduction_type	u (2)
if (dec_pow_reduction_type == 0) {	
dec_ops_reduction_req	s (6)
else if (dec_pow_reduction_type == 1) {	

<code>disable_loop_filters</code>	<code>u(1)</code>
<code>disable_bi_prediction</code>	<code>u(1)</code>
<code>disable_intra_in_B</code>	<code>u(1)</code>
<code>disable_fracpel_filtering</code>	<code>u(1)</code>
<code>user_defined_req</code>	<code>u(2)</code>
<code>}</code>	
<code>else if (dec_pow_reduction_type == 2) {</code>	
<code> pic_width_in_luma_samples</code>	<code>u(14)</code>
<code> pic_height_in_luma_samples</code>	<code>u(14)</code>
<code> frames_per_second</code>	<code>u(10)</code>
<code>}</code>	

with

Table 11 – syntax for interactive signalling for remote decoder-power reduction

	Descriptor
<code>dec_pow_reduction_type</code>	<code>u(2)</code>
<code>if (dec_pow_reduction_type == 0) {</code>	
<code> dec_ops_reduction_req</code>	<code>s(6)</code>
<code>else if (dec_pow_reduction_type == 1) {</code>	
<code> disable_loop_filters</code>	<code>u(1)</code>
<code> disable_bi_prediction</code>	<code>u(1)</code>
<code> disable_intra_in_B</code>	<code>u(1)</code>
<code> disable_fracpel_filtering</code>	<code>u(1)</code>
<code> user_defined_req</code>	<code>u(2)</code>
<code>}</code>	
<code>else if (dec_pow_reduction_type == 2) {</code>	
<code> pic_width_in_luma_samples</code>	<code>u(14)</code>
<code> pic_height_in_luma_samples</code>	<code>u(14)</code>
<code> frames_per_second</code>	<code>u(10)</code>
<code>}</code>	
<code>else if (dec_pow_reduction_type == 3) {</code>	
<code> dec_pow_reduction_extension_type</code>	<code>u(2)</code>
<code> if (dec_pow_reduction_extension_type == 0) {</code>	
<code> nb_dec_pow_reduction_type_req</code>	<code>u(2)</code>
<code> for (i = 0 ; i < nb_dec_pow_reduction_type_req; i++){</code>	
<code> dec_pow_reduction_type_req_id[i]</code>	<code>u(2)</code>
<code> }</code>	
<code> }</code>	
<code>}</code>	

Add the following at the end of subclause 6.3.2 (“Syntax”)

The transmitter then uses the message format described in Table X.1 to acknowledge the request of the decoding operation reduction from the receiver:

Table X.1 – syntax for interactive signalling from the transmitter to acknowledge remote decoder-power reduction

	Descriptor
dec_pow_reduction_type_resp	u(2)
if (dec_pow_reduction_type_resp == 0) {	
dec_ops_reduction_resp	s(6)
else if (dec_pow_reduction_type_resp == 1) {	
disabled_loop_filters_resp	u(1)
disabled_bi_prediction_resp	u(1)
disabled_intra_in_B_resp	u(1)
disabled_fracpel_filtering_resp	u(1)
user_defined_resp	u(2)
}	
else if (dec_pow_reduction_type_resp == 2) {	
pic_width_in_luma_samples_resp	u(14)
pic_height_in_luma_samples_resp	u(14)
frames_per_second_resp	u(10)
}	
else if (dec_pow_reduction_type_resp == 3) {	
dec_pow_reduction_extension_type_resp	u(2)
if (dec_pow_reduction_extension_type_resp == 0) {	
nb_dec_pow_reduction_type_resp	u(2)
if (nb_dec_pow_reduction_type_resp == 0) {	
pic_width_in_luma_samples_resp	
pic_height_in_luma_samples_resp	
frames_per_second_resp	
}	
else {	
for (i = 0 ; i < nb_dec_pow_reduction_type_resp; i++){	
dec_pow_reduction_type_resp_id[i]	u(2)
}	
}	
}	
}	

6.3.3

Replace in subclause 6.3.3 (“Signalling”)

The transmitter in each device sends a decoding operation reduction request (DOR-Req) message to the attention of the remote encoder. In a first mode (dec_pow_reduction_type equal to 0), this message

requests the remote encoder to adjust its encoding parameters so that ideally, when the local decoder decodes the bitstream, the power saving of the local decoder matches the power saving implied by the DOR-Req message. In a second mode (dec_pow_reduction_type equal to 1), this message requests the remote encoder to disable coding tools so that, when the local decoder decodes the bitstream, the power consumption of the local decoder is decreased. In a third mode (dec_pow_reduction_type equal to 2), this message requests the remote encoder to adjust the picture resolution and video frame rate so that, when the local decoder decodes the bitstream, the power consumption of the local decoder is decreased.

with

The transmitter in each device sends a decoding operation reduction request (DOR-Req) message to the attention of the remote encoder. In a first mode (dec_pow_reduction_type equal to 0), this message requests the remote encoder to adjust its encoding parameters so that ideally, when the local decoder decodes the bitstream, the power saving of the local decoder matches the power saving implied by the DOR-Req message. In a second mode (dec_pow_reduction_type equal to 1), this message requests the remote encoder to disable coding tools so that, when the local decoder decodes the bitstream, the power consumption of the local decoder is decreased. In a third mode (dec_pow_reduction_type equal to 2), this message requests the remote encoder to adjust the picture resolution and video frame rate so that, when the local decoder decodes the bitstream, the power consumption of the local decoder is decreased. In a fourth mode (dec_pow_reduction_type equal to 3), this message indicates that some other extended decoding operation reduction types are requested by the remote encoder.

Add the following at the end of subclause 6.3.3 ("Signalling")

In a first extension of the decoding operation reduction types, the message requests a global or partial cancellation of the last decoding operation reduction requests of specific types at the transmitter side. In this case, the encoder stops the corresponding changes previously enabled in its coding process. In case a global cancellation is requested, the transmitter goes back to the nominal mode, where no change in local decoding operations compared to the start of the video session is applied.

In response to a decoding operation reduction request (DOR-Req), the remote encoder sends a decoding operation reduction response (DOR-Resp) message to the remote decoder. In a first mode (dec_pow_reduction_type_resp equal to 0), it acknowledges that it has proceeded to an adjustment of its encoding parameters to save power while decoding. In a second mode (dec_pow_reduction_type_resp equal to 1), this message acknowledges that the encoder has disabled some coding tools. The list of coding tools it has accepted to disable is then sent in the message. In a third mode (dec_pow_reduction_type_resp equal to 2), it acknowledges that it has adjusted the picture resolution and video frame rate. In a fourth mode (dec_pow_reduction_type_resp equal to 3), this message indicates that some other extended decoding operation reduction types were acknowledged.

In a first extension of the decoding operation reduction types, the remote encoder acknowledges the list of types of decoding operation reduction requests it has accepted to cancel.

6.3.4

Add a new subclause title right at the beginning of subclause 6.3.4 ("Semantics")

6.3.4.1 Decoding operation reduction request semantics

Replace the Table 13 in subclause 6.3.4 ("Semantics")

Table 13 - definition of dec_pow_reduction_type

dec_pow_reduction_type	Definition
0	Decoder operations reduction
1	Coding tool configuration
2	Spatial and temporal scaling

with

Table 13 – definition of dec_pow_reduction_type

dec_pow_reduction_type	Definition
0	Decoder operations reduction
1	Coding tool configuration
2	Spatial and temporal scaling
3	Extension of the request types

Add the following at the end of subclause 6.3.4 (“Semantics”)

dec_pow_reduction_extension_type indicates other types of requests for decoding operation reduction from the remote decoder.

When **dec_pow_reduction_extension_type** equals 0, it indicates that a global or partial cancellation of the last decoding operation reduction requests of specific types at the transmitter side is requested. In this case, the encoder is requested to stop the corresponding changes previously enabled in its coding process. In case a global cancellation is requested, the transmitter is requested to go back to the nominal mode, where no change in local decoding operations compared to the start of the video session is applied.

nb_dec_pow_reduction_type_req indicates the number of requested types of request the decoder requests to cancel. **nb_dec_pow_reduction_type_req** shall not be larger than 3.

dec_pow_reduction_type_req_id[i] indicates that the decoder requests to cancel the last request of corresponding type. **dec_pow_reduction_type_req_id[i]** shall not be equal to **dec_pow_reduction_type_req_id[j]**, for any **j** in **0..nb_dec_pow_reduction_type_req** not equal to **i**.

6.3.4.1 Decoding operation reduction response semantics

dec_pow_reduction_type_resp indicates the type of the decoder power reduction method the encoder acknowledges to have received and accepts to apply. The type is indicated by an unsigned integer. The types are explained in Table X.2.

Table X.2 - definition of dec_pow_reduction_type_resp

dec_pow_reduction_type_resp	Definition
0	Decoder operations reduction
1	Coding tool configuration

2	Spatial and temporal scaling
3	Extension of the response types

dec_ops_reduction_resp indicates the variation of local decoding operations relative to the local decoding operations since the last dec_ops_reduction_req was sent to the transmitter, or since the start of the video session, if no earlier dec_ops_reduction_req was sent, the encoder accepts to set in place. dec_ops_reduction_resp is an integer in the interval [-31, 32]. When not present, dec_ops_reduction_resp is set equal to 0.

$P_{\text{DecOpsReductionReq}}$ is derived by dec_ops_reduction_resp and indicates the requested percentage change of local decoding operations by

$$P_{\text{DecOpsReductionReq}} = 2 * d_{\text{resp}}$$

where d_{resp} is set equal to dec_ops_reduction_resp.

A negative percentage means a decrease of decoding operations. $P_{\text{DecOpsReductionReq}}$ is an integer in the interval [-62, 64] in steps of two.

disabled_loop_filters_resp equal to 1 indicates that loop filters were disabled, disabled_loop_filters_resp equal to 0 specifies that the encoder does not accept to disable loop filters. Loop filters include, upon availability, the deblocking filter, sample Adaptive offset, and the adaptive loop filter.

disabled_bi_prediction_resp equal to 1 indicates bi-prediction is disabled in B slices. disabled_bi_prediction_resp equal to 0 indicates that the encoder does not accept to disable bi-prediction in B slices.

disabled_intra_in_B_resp equal to 1 indicates intra prediction is disabled in B slices. disabled_intra_in_B_resp equal to 0 indicates that the encoder does not accept to disable intra prediction in B slices.

disabled_fracpel_filtering_resp equal to 1 indicates fractional pel filtering is disabled in P slices or B slices. disabled_fracpel_filtering_resp equal to 0 indicates that the encoder does not accept to disable fractional pel filtering in P slices or B slices.

user_defined_resp indicates whether or not the encoder accepts to enable or disable user-defined coding tools.

pic_width_in_luma_samples_resp indicates the picture width in the units of luma samples that the encoder accepts to encode.

pic_height_in_luma_samples_resp indicates the picture height in the units of luma samples that the encoder accepts to encode.

frames_per_second_resp indicates the frame rate samples that the encoder accepts to produce.

dec_pow_reduction_extension_type_resp indicates other types of requests for decoding operation reduction acknowledged by the remote encoder.

When dec_pow_reduction_extension_type_resp equals 0, it indicates that a global or partial cancellation of the last decoding operation reduction requests of specific types was accepted at the transmitter side. In this case, the encoder stops the corresponding changes previously enabled in its coding process. In case a global cancellation was accepted, the transmitter goes

back to the nominal mode, where no change in local decoding operations compared to the start of the video session is applied.

nb_dec_pow_reduction_type_resp indicates the number of requested types the encoder accepts to cancel. When **nb_dec_pow_reduction_type_resp** equal to 0, it indicates that a global cancellation of all previous decoding operation reductions was accepted by the encoder. **nb_dec_pow_reduction_type_resp** shall not be larger than 3.

dec_pow_reduction_type_resp_id[i] indicates that the encoder accepts to cancel the last request of corresponding type. **dec_pow_reduction_type_resp_id[i]** shall not be equal to **dec_pow_reduction_type_resp_id[j]**, for any **j** in **0..nb_dec_pow_reduction_type_resp** not equal to **i**.

7.1

Replace the following in subclause 7.1 ("General")

With respect to the functional architecture, display adaptation (DA) provides green metadata comprised of RGB-component statistics and quality indicators. The statistics are used to set display controls in the presentation subsystem so that desired quality levels and corresponding display power reductions are attained.

with

With respect to the functional architecture, display adaptation (DA) provides green metadata comprised of Attenuation Map Information (AMI), RGB-component statistics and quality indicators. The Attenuation Map Information (AMI) metadata indicate how to use Attenuation Maps carried as auxiliary pictures of type AUX_ALPHA for display adaptation. The Attenuation Maps and their related Attenuation Map Information as well as RGB-component statistics are used to set display controls in the presentation subsystem so that desired quality levels and corresponding display power reductions are attained.

In a point-to-point video conferencing application, the display adaptation can be performed with or without an SEI message.

7.2.1

Add a new subclause right at the beginning of subclause 7.2.1 ("Systems without a signalling mechanism from the receiver to the transmitter")

7.2.1.1 Systems using SEI messages to transmit DA green metadata

The syntax for the AMI metadata is described in Table. This syntax is the same for AVC, HEVC and VVC.

Table X.3– syntax for the AMI metadata

	Descriptor
ami_flags	u (8)
if (ami_flags && 0x01 != 0x01) {	
ami_display_model	u (4)
if (ami_flags && 0x04 == 0x04) {	
ami_map_approximation_model	u (4)

}	
ami_map_number	u (3)
for (i=0;i<ami_map_number;i++) {	
ami_layer_id[i]	u (8)
ami_ols_number[i]	u (4)
for (j=0;j<ami_ols_number[i];j++){	
ami_ols_id[i][j]	u (8)
}	
ami_energy_reduction_rate[i]	u (5)
ami_max_value[i]	u (8)
if (ami_flags && 0x02 != 0x02) or (i == 0) {	
ami_attenuation_use_idc[i]	u (4)
ami_attenuation_comp_idc[i]	u (4)
if (ami_flags && 0x08 == 0x08){	
ami_preprocessing_flag[i]	u (1)
if(ami_preprocessing_flag[i]){	
ami_preprocessing_type_idc[i]	u (2)
}	
ami_preprocessing_scale_idc [i]	u (8)
}	
if (ami_flags && 0x10 == 0x10){	
ami_backlight_scaling_idc[i]	u (4)
}	
}	
}	
}	

Add a new subclause title right after the insertion of the above subclause in subclause 7.2.1 (“Systems without a signalling mechanism from the receiver to the transmitter”)

7.2.1.2 Systems not using SEI message to transmit DA green metadata

7.2.2

Add a new subclause right at the beginning of subclause 7.2.2 (“Systems with a signalling mechanism from the receiver to the transmitter”)

7.2.2.1 Systems using SEI messages to transmit DA green metadata

The receiver first uses the message format to signal information related to Display Adaptation through the use of Attenuation Maps described in Table X.4:

Table X.4 - syntax from receiver for display adaptation through the use of Attenuation Maps (DAMPR-Req)

	Descriptor
--	------------

ami_cancel_flag_req	u (1)
if (! ami_cancel_flag_req) {	
ami_display_model_cap	u (4)
ami_attenuation_use_cap	u (8)
ami_attenuation_comp_cap	u (8)
ami_preprocessing_type_cap	u (8)
ami_map_approximation_model_cap	u (8)
}	
ami_map_number_req	u (3)
for (i = 1; i <= ami_map_number_req; i++) {	
ami_energy_reduction_rate_req [i]	u (5)
}	

The transmitter then uses the message format to signal metadata to the receiver described in Table X.5X.5:

Table X.5 - syntax from transmitter to receiver for display adaption through the use of Attenuation Maps (DAMPR-Resp)

	Descriptor
ami_map_number_resp	u (3)
for (i = 1; i <= ami_map_number_resp; i++) {	
ami_energy_reduction_rate_resp[i]	u (5)
}	

Add a new subclause title right after the insertion of the above subclause in subclause 7.2.2 (“Systems with a signalling mechanism from the receiver to the transmitter”)

7.2.2.2 Systems not using SEI message to transmit DA green metadata

7.3.1

Add a new subclause right at the beginning of subclause 7.3.1 (“Systems without a signalling mechanism from the receiver to the transmitter”)

7.3.1.1 Systems using SEI messages to transmit DA green metadata

SEI messages can be used to signal green metadata in an AVC, HEVC or VVC stream.

The green metadata SEI message payload type is specified in ISO/IEC 14496-10, ISO/IEC 23008-2, and ISO/IEC 23090-3.

Attenuation Map Information (AMI) metadata describing how to use Attenuation Maps are carried through SEI message from the transmitter to the receiver. The Attenuation Maps are carried as auxiliary pictures of type AUX_ALPHA for display adaptation, with the flag alpha_channel_use_idc equal to 3.

The complete syntax of the green metadata SEI message payload, including the Attenuation Map Information, is specified in Annex A.

The SEI message containing the AMI metadata is transmitted at the start of an upcoming period. The next message containing AMI metadata is transmitted at the start of the next upcoming period. Therefore, when the upcoming period is a picture or the interval up to the next I-slice, a message is transmitted for each picture or interval, respectively. However, when the upcoming period is a specified time interval or a specified number of pictures, the associated message is transmitted with the first picture in the time interval or with the first picture in the specified number of pictures.

Add a new subclause title right after the insertion of the above subclause in subclause 7.3.1 (“Systems without a signalling mechanism from the receiver to the transmitter”)

7.3.1.2 Systems not using SEI messages to transmit DA green metadata

Replace the following in subclause 7.3.1 (“Systems without a signalling mechanism from the receiver to the transmitter”)

Green metadata can be carried as specified in ISO/IEC 13818-1 or it can be carried in metadata tracks within the ISO base media file format (ISO/IEC 14496-12), as specified in ISO/IEC 23001-10. Using the format in 7.2.1.2, the transmitter sends a message to the receiver. The DA metadata is applicable to the presentation subsystem until the next message containing DA metadata arrives.

with

Green metadata can be carried as specified in ISO/IEC 13818-1 or it can be carried in metadata tracks within the ISO base media file format (ISO/IEC 14496-12), as specified in ISO/IEC 23001-10. Using the format in 7.2.1.2, the transmitter sends a message to the receiver. The DA metadata is applicable to the presentation subsystem until the next message containing DA metadata arrives.

7.3.2

Add a new subclause right at the beginning of subclause 7.3.2 (“Systems with a signalling mechanism from the receiver to the transmitter”)

7.3.2.1 Systems using SEI messages to transmit DA green metadata

The receiver in each device sends a Display Attenuation Map Power Reduction Request (DAMPR-Req) message to the attention of the transmitter. This message allows the receiver to request some Attenuation Maps with some specific energy reduction rates to the transmitter, and to specify the transmitter with specific information on its capacities to apply Attenuation Maps, e.g., its display type, supported processings to apply on the requested Attenuation Maps and supported types of Attenuation Maps.

In response to the DAMPR-Req from the receiver, the transmitter sends a Display Attenuation Map Power Reduction Response (DAMPR-Resp) message. In a first mode, this message indicates the number of Attenuation Maps it accepts to produce and the information of energy reduction rate expected when applying them on the original video. In a second mode, when this message is used to acknowledge a DAMPR-Req with a cancel flag:

- 1 it is empty or the parameter `ami_map_resp_number` is set to 0 for a global cancellation of the attenuation maps
- 2 it contains the list of the remaining attenuation maps with their related energy reduction rate.